PRODUCTION AND PROFITABILITY OF FISH FARMING: A CASE STUDY OF BEGNAS LAKE AREA, KASKI

A Thesis

Submitted to the Department of Economics,

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in Partial Fulfillment of the Requirements for the Degree of

MASTER OF ARTS

in

ECONOMICS

Submitted by

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LETTER OF RECOMMENDATION

This thesis entitled **"Production and Profitibalaity of Fish Farming: A Case Study of Begnas Lake Area, Kaski)" is prepared by Deviraman Tiwari u**nder my supervision. I hereby recommend this thedid for approval by the thesis committee.

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APPROVAL SHEET

We certify that thesis entitled **"Production and Profitibalaity of Fish Farming: A Case Study of Begnas Lake Area, Kaski)"**submitted by Devi Raman Tiwari to Department of Economics, Prithvi Narayan Campus Pokhara, Faculty of Humanities and Social Sciences, Tribhuvan University, in partial fulfillment of the requirements for the degree of MASTER OF ARTS in ECONOMICS has been found satisfactory in scope and quality. Therefore, we accept this thesis as a part of the said Degree.

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ABSTRACT

The study entitled, “Production and Profitability of Fish Farming in Pokhara Lekhnath Metropolitian, Kaski” has been carried out in partial fulfillment for the degree of Master of Arts in Economics. The study has targeted to analyze profitability of fish farming and use means and resources applied in the study area.

Pokhara Lekhnath Metropolitan, ward num. 31 of Kaski district has been taken as the study area to study the production and analyze the profitability. There are 90 farmers which are directly involved in fish production in the study area. These are divided into five different strata (very low, low, medium, high and very high) on the basis of their production and forty five households were selected as respondents randomly in the condition to represent the strata. This study was mainly based upon primary data which were collected through the direct personal interview taken by researcher himself. Collected raw data has been analyzed through scientific standard unit then process in Excel program.

This study has been organized into five chapters. The first chapter is an introduction to the study, which includes background, statement of the problem, objectives of the study, significance of the study, limitations of the study, justification of the study and organization of the study. The second chapter includes theoretical review, reviews of the related studies and research gap are presented. Third chapter is related to research methodology, fourth chapter is related to analysis and interpretation of data. Finally, conclusion and suggestions have been presented in chapter five.

The profit analysis of fish farming concludes that the fish farmers have been seen profitable in the study area. The farmers who produce fish in very low scale have only 2.1 percent average profit, low scale have average profit 6.1 percent, medium scale have 13.8 percent, high scale have 22.8 percent and the farmers that produce in very high scale have 55.2 percent average profit. The farmers who produce fish in large scale have been seen more profitable than in small scale.

This study suggests the farmers for motivating them to higher productivity of fish for their more profit. The study has found that the growers are involving in traditional multi-farming activities and they have not given the priority in commercial fish farming though it is profitable and easy economic activity. It is therefore suggested to all the concerned that fish farming is reliable geographically and climatically suitable to Nepal, it can uplift the economic standard of people fast, so farmers should be provided with training and knowledge.

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LIST OF ACRONYMS

ADB	Asian Development Bank
ADB/N	Agriculture Development Bank, Nepal
ADO	Agriculture Development Office
AEC	Agro Enterprise Center
CBS	Central Bureau of Statistics
DADO	District Agriculture Development Office
DFTQC	Department of Food Technology and Quality Control
DOA	Department of Agriculture
FNCCI	Federation on Nepalese Chamber of Commerce and Industry
ICAR	Indian Council of Agricultural Research
LCC	Lekhnath Chamber of Commerce
MOA	Ministry of Agriculture
MOF	Ministry of Finance
NARC	Nepal Agriculture Research Center
PACT	Project for Agriculture Commercialization and Trade
UNDP	United Nation of Development Program

CHAPTER I

INTRODUCTION

1.1 Background

Nepal is an agricultural country. Agriculture is the backbone of the Nepalese economy. To break its cycle of under development, it is the time that market oriented approach and commercialization processes are initiated in agriculture sector. Contribution of agriculture sector to the Nepalese economy has been noteworthy. The agriculture sector occupies almost one third of Gross Domestic Product (GDP) with about two third of country's population are dependent in this sector. Contribution of this sector to GDP was 33.87 percent in fiscal year (FY) 2012/13, which was expected to remain at 33.10 percent in fiscal year 2013/14. In fiscal year 2070/71, the annual growth rate of agriculture sector was expected to be 4.72 percent at constant prices of 2000/01. The structure of Nepalese economy has been changing gradually. Contribution of agriculture and industry sectors to GDP showed a declining trend while that of services sector showed the opposite. From the sectoral perspective, the contribution of primary, secondary and tertiary sector contribution to nominal GDP are estimated to remain at 33.7 percent, 14.1 percent and 52.3 percent respectively. While classifying GDP into agriculture and non-agriculture sectors, contribution of the agriculture sector showed declining trend while the non-agriculture sector showed the opposite. Contribution of the agriculture sector to GDP at current prices stood at 37.4 percent in FY 2001/02, while it has come down to 33.1 percent in current fiscal year 2013/14.(MOF, 2014)

Nepal, a landlocked country, has large numbers of rivers and fresh water lakes. Water supply to these fresh water bodies are melting snows of Himalayas. There are a lot of water resources in Nepal with about 6,000 rivers flowing north to south. These rivers are characterized by low water temperature, high

dissolved oxygen, high turbulent fast current in higher mountainous and hilly region. On the other hand, high water temperature, low dissolved oxygen, low turbulence is normal for the river in Terai (low land) region (Petr, 1999). There are many inland water resources like water reservoir, lakes, rivers, fish ponds, irrigated field and marginal swams suitable for aquaculture and fisheries development and it has been noted that improvement of fish farming and aquaculture was done by government of Nepal in recent times with the help of international agencies like ADB, UNDP, JICA, FAO etc. (Shrestha, 1999).

Due to high geographical variation, more than 182 fresh water indigenous and exotic fish species have been found in Nepal (Shrestha, 1999; Shrestha, 2001; Subba and Ghosh, 1996). Talking about history, it is difficult to find the exact history for introduction to systematic fisheries in Nepal. Aquaculture practices are quiet new trend but it starts with pond culture of Indian carps (FAO, 2012). Paddy field aquaculture practice was started in 1960s (FAO, 2012). There was initiation of aquaculture programme in 1972 by Nepal government in Phewa lake of Pokhara and implementation of participatory approach of fisheries management improved the production and economic income of poor people (Gurung et al., 2005). It has been mentioned that for salmonoid species there was unsuccessful attempts for Atlantic salmon, rainbow trout, brown trout and sockeye salmon before 1988. Afterwards breeding, rearing and production of rainbow trout have been successful with gradual improvement in technological and production practices (Gurung and Basnet, 2003). There are several new rainbow trout farms, which are emerging now so it necessitates the commercial and technological production of trout (Gurung, 2008) and other fish. It has been found and suggested by many previous studies (Rai et al., 2008) and practical implementation of participatory management (Gurung et al., 2005) improves the economic status and living standards of fisher man's family. So this makes fisheries important incomes sources and they need to be improve. This paper will give overview of history and present status of fresh water fisheries with

their major challenges in Nepal. In addition, some suggestions and comment has given in authors perspectives.

Economically most valuable indigenous species are *katle* (Neolissochelius hexagonolepis), *Chuchee asala* (Schizothoraichthys spp), *Snow trout* (Schizothorax spp) locally also known as *asala*, *mahseer* (Tor spp.). Schizothorax moleshowrthii and S. progastus are considered as delicious fish in Nepal. *Snow trout* are herbivorous but Tor spp. are omnivorous. High altitude lakes in Himalayas are characterized by *snow trout* fish also there are some undescribed species of *snow trout* are found in these lakes. There was successful artificial rearing for the species N. hexagonolepis, Tor tor, T. putitora, Schizothorax spp. by stripping the pituitary secretion (Shrestha, 1999). These and other different species might be commercially important for rearing and aquaculture development and production. There are other indigenous fish species possible for commercial production. Species like *Karange* (Puntius chilinoides), *Gurdi* (Labeo dero), *Jalkapur* (Clupisoma garuwa), *Fageta* (Barillius spp.) (Shrestha, 1999) etc. are tasty but consumed at local level without aquaculture knowledge and management.

Rainbow trout, grass carp, common carp, bighead carp, silver carp were introduced from different country in Nepal (Gurung and Basnet, 2003; Shrestha, 1999; Swar, 2008; FAO, 2012). Successful breeding in captivity of Chinese exotic fish silver carp (Hypophthalmichthys molitrix), bighead carp (Aristichthys nobilis) and grass carp (Ctenopharyngodon idellus) was the great achievement in Nepali aquaculture sector. Common carp (Cyprinus carpio) farming gets popular in private sector after successful breeding. Breeding of three commercial indigenous carp *rohu* (Labeo rohita), *mrigal* (Cirrhinus mrigala) and *catla* (Catla catla) was also successful with important commercial value (FAO, 2012). Now there are pond and cage culture practices for carps in private sector.

Aquaculture, through its integration into farming systems, has been promoted in the mid-hill region of Nepal with an ultimate objective of assisting rural households to improve and diversify their production, nutrition and income sources. Aquaculture in ponds has been practiced for a long time in the lowlands of the country but is poorly developed in the hilly region due to its topographical limitation and poor technological intervention. An assessment of the adoption, utilization and economic performance of small-scale pond aquaculture technology in the hilly region was made from a survey of 12 fish grow-out farms in Kaski and Tanahu districts in 2008 to determine its productivity and profitability and to identify major production constraints. Economics of pond aquaculture were analyzed, particularly technology, and cost and return. Almost 42% of the studied farms were no more than 0.14 ha with 2 ponds (small farms) and only two farms were above 0.50 ha with 6 ponds (medium farms). The pond efficiency per unit area in fish polyculture system was greater for the small farms, producing higher yield (3.5 ton/ha) compared to the medium farms (2.5 ton/ha). The small farms also expended higher cost than the medium farms but at the same time realized higher annual net profit , i.e., NRs 155,100 vs. 80,100/ha. With the present technology, farm size and stocking rate were proved to be two important determinants of output. Price efficiency analysis demonstrated that the stocking rate could be increased with advantage, as it was positively correlated with the profit. Intensification and expansion of small-scale pond aquaculture in the hilly region require removing/lessening the present constraints of quality fish seed and other inputs. The government should, therefore, provide support to the resource-poor fish farmers by establishing a decentralized fish seed nursing and distribution network. (Fisheries Research Centre, Pokhara, 2014)

Nepal is land of varieties of agriculturally potential land around 61% of total population is involved in agricultural in Nepal. From this major profession nearly 35% of the total GDP is contributed by agriculture. Similarly 2.65% of

the total agricultural production is occupied by fish farming and 0.86% of the total GDP is occupied by fish farming. In 2003 B.S. the then agriculrural council formed a seperate unit of fish agricultural with the main objective of environmental proection, bio-diversity protection, increase of job oppotunity and mainly to elliviate poverty from the country .

Although fish farming is a very alluring bussiness. Many farmers are still unaware of it's fruitful inome and about correct metholodgy of their production. Till now 218 species of fish are discovered in Nepal. (Hussen, 2014) Among them 5 species of fish are found only in Nepal. Moreovor *tor tor* and *tor putitora* fishes are in the verg of extinction. Among the different species fish found in Nepal the *Bagarius Yarrely* is regarded as the largest species of fish where as *Danio Rerio* is the smallest.

In the fiscal year 065/066 nearly 26,730 Tons from fish farming and 21,500 Tons from natural water resources. The total of 48,230 M.tons of fishes were produced. According to fiscal year 067/068 in the ponds of Nepal when a total area of 6900 hector of land is used for fish farming then a total of 24837 metric ton of fish are produced and when it is done in mere 100 hector then 45 metric tons. In a cage of 80000 cubic metre 480 metric ton, in an enclouser of 100 hector 140 metric tons and in raceway of 5000 cubic metre 100 metric tons of fish of are produced. In the fiscal year of 067/068 38,230 metric tons of fish are produced from private ponds. (Fisheries Research Centre, Pokhara, 2014)

1.2 Statement of the Problem

The development of different aspects of agriculture is essential for the national development. The pace of industrial development is very slow and in infant stage, which cannot integrate the whole national economy together due to climate variation, lack of capital, accessibility and market etc. of the country.

Though the Nepal is an agricultural country, Nepalese farmer are facing various constraints in the field of agriculture. Traditional and subsistence farming system is still in existence although people are adopting cash farming system. There are various factors which affect the production of fish, the absence of proper education of the farmer and shortage of fertilizer, technical knowledge, financial aids, market availability, and transportation facilities etc. The main factors that affect the production of fish is price factor, farmers are too conscious towards the price factor is reflected by the money which they receive. So to improve the quality prosuction of fish is also the problem facing the farmer in the study area.

Fish production is one of the important cash crops. But the fish production have not been highlighted as less priority is given to them by the government and the private sector too. The history of the fishing in the study area has been practiced since many years and gradually improving .

Being a profitable occupation than other traditional occupation, fish production has better prospects in the Pokhara Lekhanath Metropolition, but the production of fish in such a region as well as in study area specially in Begnas lake area has not increased to that extent should be. The rise and fall in its production was not taken seriously. Most of the farmers are involving in multiple farming and few are involving in single (specific) farming. It is the main constraint problem of the study area as well as a whole country for economic development.

This study is focused on the analysis of the following major problems:

i. What is the nature of farmers are attracted towards fish farming? What is the trend of fish production in study area?
ii. Are the labour, water resources and feeding adiquate to produce the fish ?
iii. What is the productivity level of fish production in study area?
iv. What about the cost and benefits of fish farming?
v. What are the problems associated with fish production ?

1.3 Objectives of the Study

The general objective of this study is to analyze the production and profitability of fish farming of Begnas Lake area of Kaski District. The specific objectives of this study are:

i. To find out the nature of farmers and examine the production trend of the fish farming in the study area.

ii. To study about the present situation of labour, water resources and feeding structure of fish farming in study area.

iii. To analyze the fish production function, cost and revenue of the fish farming.

iv. To examine the state of profitability in fish farming.

v. To find the problems and prospects of the fish farming in the study area.

1.4 Significance of the Study

In Nepalese context, the economic development of the country is almost synonymous to the agricultural development. Fish production has contribution to the local farmers in improving their socio- economic life. This research will try to study the condition of the fish farmers who are facing different problems like illusion of its profit, relation between inputs and output etc.

Besides other food grains and other commercial crops, fish is large quantity traditionally because of its economic significance. So it is essential to analyze its production process and on the basis of the finding what steps will be taken effectively to increase its productivity and encourage profitability. Consequently this study will be helpful in analyzing fish production in Pokhara Lekhnath Metropolitan of Kaski District. So this study helps those who are

interested to know about production of fish, its impact on farmers, present situation and marketing in the study area of the fish product.

The findings of the study may be useful for the planners, policy makers and implementers as well as change agents of fish marketing and production sectors. The studies may also be useful for the future researcher particularly in the study area.

1.5 Limitations of the Study

The limitations of the study are as follows:

i. The study covers only ward no 31 of Pokhara Lekhnath Metropolitan of Kaski District. So it can be representative to some extent only for plain area of mid-hilly region of western part of Nepal regarding fish farming but may not be generalized to the national level as a whole.

ii. This study is only related with the fish farming and its marketing system of the sample area.

iii. The main constraints are time factor as well as finance, due to which large sample has not been included to study.

This study is expected to reveal the trend of fish farming and enhance the farmers to motivate in fish farming so that they feel about the significance of commercial production over traditional multi farming.

1.6 Organization of the Study

This study has been divided into five chapters. First chapter deals with the introduction of the study. It includes the general backgrounds of the study, statement of the problem, objectives of the study, significance of the study, limitation of the study and organization of the study. Second chapter covers the review of literature. It includes the theoretical and empirical review of the fish

farming. Third chapter deals with the research methodology. It includes rational for the selection of study area, research design, nature and source of data, method of data collection, tools of data collection, population and sampling, specification of the model and method of data analysis. Fourth chapter deals with the data presentation and analysis. It includes the demographic distribution and social characteristics, production trend of fish and profit analysis with regression, cross analysis, major findings of the study and prospects of fish farming. Fifth chapter covers summery conclusion and recommendations.

CHAPTER II

REVIEW OF LITERATURE

Some conceptual and empirical studies are available in the national and international fish farming. In the context of Nepal some students and institutions have prepared research concerning fish production, cultivation and marketing. But very few have given their attention towards cost and benefit aspect. It has no doubt that the cost influences grew deal on the production quantity of any commodity as in fish production. Besides, encouragement and facilities to fish farmers also take an important part.

There are many literature and research papers available in the field of fish farming in Nepal. Most of the works are concerned with development of fish farming, production and problems. Few of them could be found about profit. It is general truth that cost and revenue influence significantly to the production of any commodity. Here some of the relevant literatures are reviewed.

2.1 Theoretical Review

The present study deals with the profit aspect of fish production. Every firm and industry wants to maximize the profit. Profit maximization is the short run or long run process by which a firm determines the price and output level that returns the greatest profit. There are several approaches to solve this problem. The total revenue minus total cost perspective relies on the fact that profit equals revenue minus cost and focuses on maximizing this difference and the marginal revenue is based on the fact that total profit reaches its' maximum point where marginal revenue equals marginal cost.

Mathematically,

Profit = Total Revenue – Total Cost

i.e. $\pi = TR - TC$

Or, Profit = (AR – AC) × Q

Where, AR is the average revenue, AC is average cost and Q is the total output.

Profit Maximization

- In classical economics it is assumed that firms will seek to maximize their profits. This occurs when the difference between TR – TC is the greatest.

- Profit maximization will also occur at an output where MR = MC

- When MR > MC, the firms is increasing its profits and Total Profit is increasing. When MR < MC total profit starts to fall· Therefore profit is maximized where MR = MC

Normal Profit

This occurs when TR = TC. This is the breakeven point for a firm. It is the minimum profit level to keep the firm in the industry in the long run

Supernormal Profit

This occurs when TR > TC

Whether to produce at all,

If AR > ATC The firm is making supernormal profits If AR = ATC The firm is making normal profits. In classical economics it is assumed that firms will seek to maximize their profits. This occurs when the difference between TR – TC is the greatest.

If AR < ATC but AR > AVC. It is making an operating profit, and is covering its variable costs. However it is making a loss because it cannot cover its fixed costs as well. In the short run it is best to keep producing because it has already paid for its fixed costs. It is at least making a contribution to its fixed costs.

If AR < AVC The firm is likely to shut down in the short run. (Watson and Getz, 1981).

2.1.1 Concept of Revenue

The amount of money that a company actually receives during a specific period, including discounts and deductions for returned merchandise. In business, revenue or turnover is income that a company receives from its normal business activities, usually from the sale of goods and services to customers. For non-profit organizations, annual revenue may be referred to as gross receipts. This revenue includes donations from individuals and corporations, support from government agencies, income from activities related to the organization's mission, and income from fundraising activities, membership dues, and financial investments such as stock shares in companies.

In general usage, revenue is income received by an organization in the form of cash or cash equivalents. Sales revenue or revenues is income received from selling goods or services over a period of time. Total revenue is the total receipts of a firm from the sale of any given quantity of a product.

It can be calculated as the selling price of the firm's product times the quantity sold, i.e. Total revenue = Price× Quantity, or letting TR be the total revenue function:

$$TR(Q) = P(Q) \times Q$$

Where Q is the quantity of output sold, and P (Q) is the inverse demand function (the demand function solved out for price in terms of quantity demanded). (A. Koutsoyannis, 1979)

- Total Revenue (TR):

This is the total income a firm receives. This will equal Price * Quantity

- Average Revenue (AR) = TR / Q

- Marginal Revenue (MR): The extra revenue gained from selling an extra unit of a good.

2.1.2 Concept of Cost

Real Cost: It covers both direct and indirect expenses including efforts made to produce and output i.e. it covers money cost and the efforts made by produces and labors.

Opportunity Cost: The opportunity cost alternatives cost of any good is the next best alternative good that are sacrificed.

Explicit Cost: It is cost paid by a producer for borrowing all factors of production to produce an output. For example, interest of capital, wages of labor and other overhead costs.

Implicit Cost: It is a cost of factor of production, which the producer himself owes. Thus total cost comprises total explicit cost plus total cost.

***Variable Cost*:** It is the cost of factor of production which could be varied to increase or decrease in output production. For instance, labor, raw materials, chemicals, etc. are variable factors and their cost is called variable cost.

Fixed Cost: It is the cost of those factors of production which cannot be varied on short run i.e. fixed. For example: machinery, plant, building of a firm entrepreneurship, salaries and administrative expenses.

Operating Money Cost: It is a cost spent by firm covering all its expenses to produce an output at covers the cost of labor, interest of capital, insurance charge, cost of raw materials and all other required to produce an output. In general, cost means operating money cost.

Theory of Cost: The relationship between cost and output is called cost function. The production function of the firm and prices of input determines the firm cost function. Thus, cost function is derived function from production function. We have two cost functions.

I) Short Run Cost Function

II) Long Run Cost Function

Short run cost distinguished two fixed cost and variable cost. In fact, short run cost is the cost over a period during which some factors of production are fixed. Fixed cost is that which continue if the firm is temporarily shot down, producing nothing at all, whereas variable cost are those that vary with the volume of output. In long run all is variable. Thus, the long runs costs are the costs over a period long enough to permit the change of all factors of production. Input-output relations in the production function are those of returns to scale.

The short run and the long run are not definite periods of calendar time. Strictly speaking, they are sets of conditions, not periods of time at all. Still, it is almost impossible to keep the idea of time out of analysis of the short run and the long run. So both in the short and the long run, the cost of production (total cost) is influenced

by various factors: that is to say, total cost is a multivariate function (Watson and Getz, 1981).

$C = f (Q, T, P……..)$

$C = f (Q, T, P, K…….)$

are the long run and the short run cost functions respectively. Where,

C= Total Cost

Q= Output

T = State of Technology

P = Price of Factors of Production

K = Fixed Factors.

A cost curve is a curve which describes the changes in cost as output changes. There are four important costs curves in economic theory. They are average cost AC, marginal cost MC, average variable cost AVC and average fixed cost AFC. These curves are of great significance especially in explaining pricing and equilibrium of firm. Graphically, costs could be represented in two dimensional diagrams. Other things being held constant, such curves imply that the cost is a function of output i.e. C = f (Q). These constants are called determinants of cost. Sometimes they are called shift factors, because, as they change their effect could be shown in the graph by the shifting of cost curve.

2.1.3 The Traditional Theory of Cost

According to the sets of conditions, the traditional theory of cost could be distinguished as the short run and the long run. In the short run, some inputs are fixed in the amount: a firm can expand and contract its output only by varying the amount of other inputs. Usually, fixed inputs are capital equipment and entrepreneurship. In the long run, all inputs are variable in amount: a firms output can range from zero to an indefinitely large quantity.

2.1.4 Cost under Short Run

In the short run traditional theory of cost, the total cost (TC) has been divided into two components. They are total fixed costs (TFC) and total variable costs (TVC).

TC = TFC + TVC

The fixed costs include items such as:

- Capital equipment
- Interests on investment in plants and equipment
- Most kinds of insurance

- Property taxes

- Depreciations and maintenances

- Salaries of administrative permanent staffs etc. And the variable costs include:

- Wages of labour

- Payments for raw materials and other goods bought

- Payments for fuel

- Interests on short term loans

- Excise taxes, if any and so on.

Diagrammatically, the total fixed cost is represented by a straight line parallel to the output x-axis. Whereas, the total variable cost takes the shape of inverse ‘s’ due to the application of the law of variable proportions. (A. Koutsoyiannis, 1979)

The law of variable proportions is related to the short run. The law comprises three stages of production. At the initial stage, the total production to a point increases at an increasing rate. That is more the variable factors employed, its productivity increases and the average variable cost (AVC) falls. This process continues till the optimal combination of fixed and variable factors is reached. Beyond this point, the total product continues to increases at a diminishing rate. At this stage, both marginal and average product of variable factor is diminishing but positive. Simultaneously, the average variable cost rises. This stage is very crucial and important because a firm will seek to produce in its range. This stage is known as diminishing return as both the average and marginal products of the variable factor continuously fall. After this, comes the stage of negative return. Since marginal product of a variable factor is negative i.e. below x-axis.

Since total cost (TC) is the sum of total fixed cost (TFC) and the total variable cost (TVC), average cost curves could be obtained from the total cost. Thus, average total cost (ATC), average fixed cost (AFC) and average variable cost (AVC) are found out by dividing the corresponding total costs by the level of output (Q).

Diagrammatically, the shape of both the ATC and AVC are U shaped due to law of variable proportion and the shape of AFC is rectangular hyperbola showing all its points are of same magnitude i.e. the level of TFC.

The concept of marginal cost (MC) occupies an important place in economic theory. Marginal cost is addition to the total cost caused by producing one more unit of output. It is the change in total cost (TC) which results from a unit change in output. Graphically, MC can be measured by the slope of total cost curve corresponding to that output by drawing tangent to it. As the TC is inverse S shape, the MC will be of U shaped. (A. Koutsoyiannis, 1979)

2.1.6 The Long Run Traditional Theory of Cost

In the long run, all cost will be variable. The firm's production function has no fixed inputs; the firm has no fixed cost. The firm expands its output by building and operating wholly new larger plants. Input-output relations are those of returns to scale (increasing, constant and decreasing). The long run average cost curve (LAC) is often called the panning curve, because a firm plants to produce any output in the long run by choosing a plant on LAC curve corresponding to the given output.

The LAC is the locus of points representing the least cost for producing the corresponding level of output. Each point representing the least cost for production the corresponding level of output. Each point on the LAC correspond to points on short run cost curves (SACs) which is tangent to LAC showing the minimum cost for producing the corresponding level of output. Thus, LAC is the locus of minimum points of SACs. LAC supports SACs from

below. No part of SACs lies below LAC. It envelopes SACs/ in fact, sometimes it is called envelope curve. Due to close proximity with laws of returns to scale, LAC also takes the form of U shape. Besides, external economies and diseconomies also affect the cost of production. The optimum level of output at minimum cost will be given by the point where LAC = LMC = SMC = SAC. (A. Koutsoyiannis, 1979)

2.1.7 Modern View of Cost

It is found quiet conflicting about the conventional and modern view regarding the shapes of cost curves. Conventional view clarifies that the shape of cost curves (AC, AVC and MC) whether in the short run or on the long run are of U shape. It is due to the application of the law of variable proportions and the laws of returns to scale.

The conventional U shape of cost curves have been questioned by some economists like George Stigler and Koutsoyiannis, both in the theoretical and empirical grounds/ back in 1939, G. Stigler wrote that the short run AVC was flat over a considerable range of output; firms build plants which permit some variations in output without change in the cost. Further, the greater attention has been given towards the shape of the long run cost curves in the economic literature, due to its implacability and applicability in the economies of large scale production. Nevertheless, Koutsoyiannis argued that, “the managerial diseconomies can avoid by the improved methods of modern science.” And any increase because of managerial diseconomies can be more than compensated by fall in costs because of technical economies. Therefore, the long run average cost curve is not U shaped, it is L shaped. (Cited in Poudel, 2012: 11)

2.2 Review of Related Studies

Some related studies are available in national international context. Out of these the review of most studies which are most essential for the study are listed below. Out of them most of the studies are related to fish and some are of other production.

In International Journal of Appliefd Sciences and Biotechnology (IJASBT), Gautem mentioned that abundant fresh water resources are very poorly utilized in Nepal. Much effort has been made by research institute, international aid agencies, government for aquaculture development but they are limited in terms of high biomass and quality production. Besides these, many private fisheries are running successfully in small scale production making profit. Participatory types of management have been successful in some reservoirs and water systems in many parts of country. In author's perspective, poor scientific knowledge on indigenous fish species, poor and unskilled manpower, lack of transportations and infrastructures, electricity facilities at local level are major problems for sustainable development of aquaculture. Lack of proper post-harvest facilities at local level are challenging issue for expanding the market demand and trade management in national and international market for produced fish. It needs to study on market behavior, interaction of fish with other market commodities, surveillance of consumer preference. They needed to be harmonized with fish production. But lack of concrete economic plan, policies, low economic status of a people, and political instability affects the market trend and this ultimately makes difference in price of fish produced and consequently the sustainability of those fish producing farms. Research and information regarding fish population dynamics needs to be study for cold water river, lake and reservoir fish. Fingerling availability is limited so it need to be fixed the standard mass production of fingerlins for commercial important species. Fishing method is all based on traditional no emission gears but they are less efficient, less scientific, difficult to control the mesh size etc. Fishing

gear should be monitored and controlled by responsible authorities to prevent from over exploitation of fish stock from natural water resources.

Food and Agricultural Organization (1997) states that *Neolissocheilus hexagonolepis*, commonly known as copper mahseer, is an important sport fish. In India this fish is known from northern Bengal under itsNepalese name `katli', and the fish is also present in Assam and Myanmar (Jhingran, 1982), and in the River Cauvery in Tamil Nadu (Chacko *et al.*, 1954; Alikuhni, 1957). It is known from Bangladesh, Pakistan, Thailand, Vietnam and China (Jayaram, 1981). *N. hexagonolepis* is abundant in most of the big rivers, lakes and reservoirs of Nepal from 250 m to 1500 m altitude, having a preference for water temperature 10^{o} - 30^{o}C (Raj and Swar, 1989). This species was also found in the River Narayani, Chitwan, from 50 m to 300 m, near Nepal's southern border (Edds, 1986). *N. hexagonolepis* is also reported from Tadi, Trisuli, Kali Gandaki drainage at elevations of up to 1440 m, from the Kosi tributaries - mainly from Sun Kosi, Indravati, Tamar and Arun rivers up to 1220 m, and from the River Bagmati up to 1350 m.

It states that in Nepal fish come from pond and cage culture, as well as from capture fisheries. The total fish production increased from 3530 t in 1981-82 to 21.879 t in 1995-96. During the same period fish production from capture fishery increased from 2780 t to 11,230 t . Much of this increase came from the irrigated paddy fields, wetlands, lakes and reservoirs, while capture from rivers has stagnated since 1986/87. Pond production in warm waters has doubled over the period 1986/87 to 1995/96. Between 1981/82 and 1995/96 the per capita fish production increased from 0.33 kg to 1.05 kg.

The future of the coldwater fishery will require more attention to be paid on the one hand to maintaining good conditions for fish in wild waters, and on the other hand to enhancing cold water fish stocks through regular releases in selected rivers, reservoirs and lakes of hatchery-produced stocking material. A

hatchery has been proposed for the Kali Gandaki `A' hydroelectric project. It is expected that this hatchery will produce mahseer, katle, snow trout (*S. richardsonii*), jalkapoor and some other indigenous fish species for stocking into the reservoir and its tail waters (Swar and Shrestha, J., 1996).

Sharma (2011) made a study entitled on 'An Economic Analysis of Orange Production in Syangja District: A Case Study of Ganeshpur VDC.' The main objective of the study is to estimate and analyze the production function of orange with labours and farmyard manure as the inputs. This study was mainly based on primary data to analyze the relationship between output and corresponding inputs. Secondary data are also included there in some cases. To estimate the production function of coffee in linear and nonlinear forms with labor based on the primary as well as secondary data. The raw data collected through the study are converted into logarithmic form and are presented in regression analysis hypothesis testing. The production function gives mathematical expression on the relationship between qualities of inputs and outputs. A Cub-Douglas production function is fitted to analysis the data collected. The study concluded that there is significant effect of human labor and farmyard manure on orange production and found that there is decreasing return to scale in orange production in case of traditional mode of production and focused on the significant factors affecting the orange production like chemical fertilizers, human labor, modern technology, farmyard manure etc.

According to FAO aquaculture has a relatively short history in Nepal. It was initiated in the mid 1940s on a small scale in ponds with indigenous Indian major carp seed from India. Further development began in the 1950s with the introduction of the exotic species common carp (*Cyprinus carpio*). Its breeding success in the 1960s followed monoculture practices and gained considerable popularity in the private sector. More significant progress was seen in the 1970s with the introduction and farming of three exotic Chinese carp species: silver carp (*Hypophthalmichthys molitrix*), bighead carp (*Aristichthys nobilis*)

and grass carp (*Ctenopharyngodon idellus*). Their breeding success in captivity has been a major breakthrough in the development of aquaculture in Nepal. Similarly, the induced breeding of three commercially valuable indigenous major carps: rohu (*Labeo rohita*), mrigal (*Cirrhinus mrigala*) and catla (*Catla catla*) were successfully established in the country. This success followed the polyculture system of production in ponds with seven species of fish with different feeding habits. This practice contributed considerably to increased production per unit area and higher economic benefits, which in turn attracted a large number of farmers. The actual development of this practice was seen from the beginning of the 1980s with the execution of the Aquaculture Development Project supported by the Asian Development Bank (ADB) and the United Nations Development Programme (UNDP). Over the years, pond aquaculture has developed as the most viable and popular aquaculture production system in Nepal and accounted for over 90 percent of the total production of 20 000 tonnes in 2003/2004. The major part of the pond fish production takes place in the southern part of the country, the Terai plain where 94 percent of the fish ponds are located.

Cage fish culture in lakes and reservoirs with herbivorous carps (major species: silver carp and bighead carp) was initiated with the support of FAO/UNDP and later the International Development Research Center (IDRC) Canada in the 1970s. The system has been quite successful in terms of utilizing natural productivity in fish production. However, studies are being undertaken to examine the viability of intensive culture of common carp and rainbow trout with supplementary feeding in cages. Carp polyculture in lake enclosures has been developed as a popular aquaculture activity. It has further underlined the potential role of lakes for increasing fish production. During 2003/2004 cage fish culture provided 204 tonnes of fish from 32 000 m^3 of cages, with an average yield of about 6 kg/m^3 of cage. The production from fish culture in lake enclosures during 2003/2004 reached 130 tonnes from an area covering 100 ha.

Rice-fish culture in the hills and valleys was introduced in the 1960s in Nepal. In spite of its potential, this practice has not taken off. In 2002/2003 this practice yielded 87 tonnes from an area covering 218 ha. With the application of improved management techniques and careful planning, this could be expanded significantly in the future.

Fish culture in the marginal agricultural land along irrigated areas, ditches, flood plains, swamps etc. has recently been developed to utilize these areas through increased participation of rural targeted communities in managing the resource for production. An extensive system of carp polyculture practice has been adopted in these areas. Fish production activities in such areas provide livelihood opportunities to the local communities and help improve the quality of the water bodies. There are about 12 500 ha of such areas available in the country, of which approximately 1 225 ha are currently being used for fish culture.

The culture of high-value cold water species, in particular rainbow trout (*Oncorhynchus mykiss*), has been an on-going activity for some years. Its technical feasibility has been proven, but production has not yet been introduced on a commercial scale.

In the article of Techno-economic Performance of Mechanised Fishing, in India mentioned that profitability of fishing operations are affected by fluctuations in quantities, composition of fish catch, changes in fish prices, prices of key inputs and changes in consumer demand. Information on economic performance of fishing units provides guidance to investors and bankers for arriving at credit and investment decisions. It will also support the government for designing and implementation of policies on incentives/subsidies to fishing sector and sustainable fisheries management. This study focused on the economic performance of mechanised fishing units operated from Karwar Fishing Harbour to identify the types of fishing units which are economically more viable. Profitability of fishing operations was assessed using different economic and financial indicators.

2.3 Research Gap

The researcher consulted the conceptual and empirical studies prepared on the fish production in and outside the country. Most of them have focused on the trend of marketing and production procedure. Some of them have targeted only on the role of the activity in national economy. These studies move around the methods of farming and marketing only.

No research has been made with the objectives to analyze the profitability of agriculture sector. The research consist the detail analysis of production function and cost function related to the fish production. It broadly calculates and defines the revenue and profit of the fish production of the area using different statistical methods.

CHAPTER III

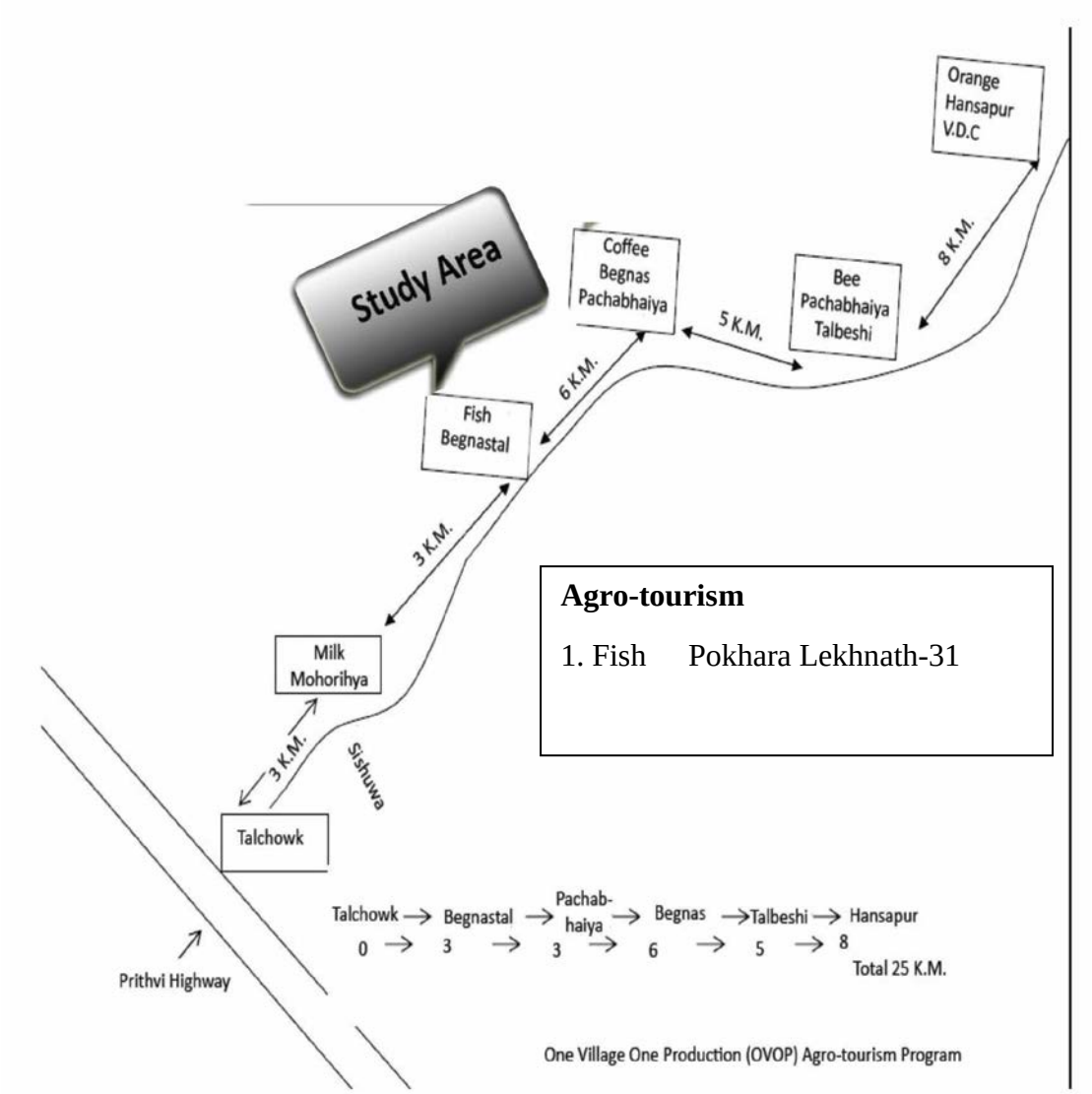
METHODOLOGY

3.1 Introduction

This is a micro level study of input, output analysis of fish production and its profitability of the farmers of Pokhara Lekhnath Metropaltian, Kaski. The basic objective of this study is to assess the characteristics of different inputs like human labour, land and grains in fish production. This chapter has included the rational for the selection of the study area, research design, nature and source of data, population and sampling, method of data collection, specification of variables, specification of the model used in the study and method of data analysis.

3.2 Rational for the Selection of the Study Area

Fish production is cash crop and plays significant role in the economy of Nepal. The study area is located in western part of Nepal, Gandaki Zone, Kaski district is the popular place for fish in Gandaki zone as well as in Nepal.



3.3 Research Design

This research attempts to analyze the profitability on fish production of local farmers on the basis of the specific objectives of this research. Mainly, the analysis has based on the result of the collected data where the specific area is defined. The researcher has been adopted descriptive and analytical research design. The research design basically designed to find the profit with the help of revenue and cost of fish farming. For this, primary data has been collected by the aids of direct personal interview with the set of interview schedule. Data available have been tabulated and interpreted in numerical values. Consequently, the relationship has been explained by correlation and regression

analysis. However, average, standard deviation, maxima- minima and percentage have been used wherever necessary.

3.4 Nature and Sources of Data

Data in research are categorized into two types, they are quantitative and qualitative. In the research, researcher applied quantitative data and it is a true fact the primary data has the close proximity with reality. Thus, to fulfill the objectives of the present study primary data was given emphasis between two types of quantitative data (primary and secondary). Primary data has been collected by personal interview and the field survey at Pokhara Lekhnath Metropolitan. However, to some extent, some of the secondary data (available from governmental and non-governmental organizations) have also been used to supplementary the analysis, wherever necessary.

3.5 Population and Sampling

In Pokhara Lekhnath Metropolitan ward no. 31, Begnas Lake Area is selected area as the study area as Lekhnath Chamber of Commerce has brought the concept of OVOP. The analysis concentrates mainly on the primary data. These data were collected by direct personal investigation, interview with general and key persons relating to fish farming and the field survey with the help of set of interview schedule. In the study are there are 90 farmers directly involving in fish farming. On the basis of fsih production, the household has been divided into five different strata (very low, low, medium high and very high) and 45 number of respondants of different strata has been selected by simple random sampling method in the condition to represent the strata. These selected respondents represent the sample of the present study. The condition of 45 households was analyzed interviewing with any member of the family in accordance with the convenience of the researcher.

3.6 Method of Data Collection

Generally four common methods will use in data collection procedure. They are direct personal investigation, indirect personal investigation, local reports and interview schedule. Out of which the method of direct personal interview and questionnaires will be used in the analysis, to minimize the chance of non-response and miss response error. For this the investigator reacher will visit door to door and the data will be collect.

3.7 Specification of the Model

The main theme of present analysis is to find out the profit from Fish farming. Firstly it is necessary to find out the total cost and total revenue.

3.7.1 Cost Function

The relationship between the total cost of fish production and the quantity of output will take as the model of the study. The linear, quadratic and cubic cost functions will be applied in the following terms.

$C = a + bQ$ (linear cost function)

$C = a + bQ + cQ^2$ (Quadratic cost function)

$C = a + bQ + cQ^2 + dQ^3$ (Cubic cost function)

Where C = Total cost Q = Output a = Constant (fixed cost)

The model specified above will establish a relationship in between the total cost of fish production and quantity of output. The necessary variables are defined as follows:

Total cost of fish Production (C):

The total cost comprises fixed cost and variable cost. Fixed cost includes land cost. Variable cost includes labour cost, feeding cost and tools and instrument cost.

Quantity of Fish output (Q):

The quantity of fish output is taken as an average per ropani per year. Test of significance of coefficients, standard errors and statistics have been utilized to interpret statistical significance of data.

The Cobb-Douglas production function has been used to analyse the data.

Mathematically,

$Q = b_0 L_1^{b1} L_2^{b2} F^{b3}$

$\log Q = \log b_0 + b_1 \log L + b_2 \log N + b_3 \log F$

Where,

Q = Output of fish

L = labour

N = Land

F = Feeding

The coefficients b_1, b_2 and b_3 are the output elasticitties of inputss Labour, Land and Feeding respectively.

3.7.2 Revenue Analysis

The amount of money that a company actually receives during a specific period, including discounts and deductions for returned merchandise. In business, revenue or turnover is income that a company receives from its normal business activities, usually from the sale of goods and services to

customers. For non-profit organizations, annual revenue may be referred to as gross receipts. This revenue includes donations from individuals and corporations, support from government agencies, income from activities related to the organization's mission, and income from fundraising activities, membership dues, and financial investments such as stock shares in companies.

In general usage, revenue is income received by an organization in the form of cash or cash equivalents. Sales revenue or revenues is income received from selling goods or services over a period of time. Total revenue is the total receipts of a firm from the sale of any given quantity of a product.

It can be calculated as the selling price of the firm's product times the quantity sold, i.e. total revenue = price × quantity,

or letting TR be the total revenue function:

$$TR(Q) = P(Q) \times Q$$

Where Q is the quantity of output sold, and P (Q) is the inverse demand function (the demand function solved out for price in terms of quantity demanded).

Total Revenue (TR): This is the total income received by a firm obtained as: TR = Price × Quantity.

3.7.3 Profit Analysis

After calculating the cost and revenue by above method, profit on fish production has been calculated by using formula;

Profit = Total Revenue – Total Cost i.e. $\pi = TR - TC$

3.8 Method of Data Analysis

The data collected from the field through interview were grouped, sub-grouped and classified as per the requrement of the objectives of the study. The systematic analysis has been made using quantitative techniques. Different statistical tools like percentage, mean, standard deviation, maxima and minima and regression analysis have been used. Mainly two methods; tabular method and regression analysis have been used to analyze the data.

3.8.1 Tabular Method

The data collected by researcher have been analyzed by dividing the collected data into different sectors and are tabulated them in different tables. General statistics and the descriptive analysis has been conducted by tabular method. Cross tabulation between two topics has been conducted in tabular method also. Frequency table with mean and standard deviation has been discussed.

3.8.2 Multiple Regression Analysis

Regression analysis is a mathematical measure of the average relationship between two or more variables in terms of the original units of the data. Thus, it can be said that regression is the estimation of value of prediction of one variable from the given value of other variables.

Multiple regression is the equation with two or more independent variables. Multiple regression equation is the algebraic relationship between one dependent variable and two or more than two independent variables. This relationship is used to estimate the value of dependent variable for the given value of independent variable. The general form of linear multiple regression equation is;

$$Y = b_0 + b_1X_1 + b_2X_2$$

Where, b_0, b_1 are parameters.

X_1, X2 = independent variables (feeding cost and instruments)

Y = dependent variable (fixed cost of land and fry)

b_0 = reression constant

$b_{1,}$ $b_{2,}$ = regression coeffiients

In this research there are three independent variables so the linear multiple regression equation is,

$Y = b_0 + b_1X_1 + b_2X_2$ ……. (1)

The value of constants b_0, b_1, b_2, b_3 including t-ratio, F-ratio, R, R^2 and adjusted R^2 have been calculated by using Excell program in computer.

CHAPTER IV

DATA ANALYSIS

4.1 Introduction

This chapter focuses on analytical part and interpretation of data. Characteristics, socio economic status, current status, cost and profit analysis, problems and prospects are the major parts of this topic.

4.2 Background Characteristics of Respondents

To affect the economic activities, demographic characteristics play an important role. Generally sex, family size, population structure, educational status, occupation are the factors to achieve the goal of research work which activates ecomonic as well as other activities of the people and nation as whole.

4.2.1 Social Characteristics of the Respondents

There are 90 families directly involved in fish farming in the study area. Though all the members of all families are not fully involved in this farm. Out of 90 farmers, 45(50%) of different strata have been selected as sample households for the study. Table 4.1 shows the statistics of respondents by their gender, caste, age, educational status, land used and annual income.

4.1.a

Frequency Table of Respondents by Their Gender and Caste

Characteristics	Categories	Frequency	Percentage
Gender	Male	34	75.6
	Female	11	24.4
Caste	Brahmin	20	44.44
	Chhetri	1	2.22
	Janjati	21	46.67
	Dalit	3	6.67

(Source: Field survey, 2073)

Form the table 4.1.a out of 45 sample farmers 34(75.6%) male and 11(24.4%) female are involved in aquaculture in the study area. It does not mean that females are not involving in the field. They are working jointly with male. In the survey of research area 20(44.44%) are *Brahmin*, 1(2.22%) are *Chhetri*, 21(41.67%) are *Janjati* and 3(6.67%) are *Dalit*. This shows that mostly *Janjati* and then *Bhramin* are involved in fish farm in the study area. The people of *Chhetri* caste are rarely found to involve in fish farming. *Dalit* are also less number in aquaculture.

4.1.b

Frequency Table of Respondents by Their Age

Characteristics	Categories	Frequency	Percentage
Age in Year	Less Than 30	4	8.9
	30-40	8	17.8
	40-50	20	44.4
	50 Above	13	28.8

(Source: Field survey, 2073)

Table 4.1.b shows the age distribution of respondent of the study area. It also has the significant role in the fish production. Out of 45 respondents (8.9%)

respondent farmers has the age below 30, 8 (17.8%) farmers has the age lies in between 30-40, the age of 20 (44.4%) farmers lies in between 40-50 and 13 (28.8%) farmers has the age 50 years and above. By the study of table we came to know that the majority of fish growers have the age above 40-50 years which is the economically efficient age.

4.1.c

Frequency Table of Respondents by Their Education

Characteristics	Categories	Frequency	Percentage
Education	Literate	5	11.1
	Primary Level	12	26.7
	Secondary Level	17	37.8
	bachelor and above	10	22.2

(Source: Field survey, 2073)

Education is one of the crucial parameters to uplift the economy. It helps to generate the living status, income opportunity, creative powers in the study area as well as national level. The condition of educational status in the study area (only sample households) is presented in the table 4.1.c This shows the information that 5 (11.1%) are literate, 12 (26.7%) are literate up to primary level. 17 (37.8%) farmers involved in fish farming have attended the secondary level education, 10 (22.2%) farmers have the qualification of college Level and above. It shows that educated people are not involved in fish farming. The majority of the fish farmers have the qualification below upto secpndary level. It may cause of traditional farming.

4.1.d

Frequency Table of Respondents by Their Annual Income

Characteristics	Categories	Frequency	Percentage
Annual Income in Rs ,000	Less Than 100	11	24.4
	100-200	7	15.6
	200-300	11	24.4
	300-800	8	17.8
	800 above	4	8.9

(Source: Field survey, 2073)

Total annual income of the respondents is explained by the table 4.1.d 11 (24.4%) respondents have the total annual income less than 100 thousand, 7 (15.6%) have income lies in between 100 - 200 thousand, 11 (24.4%) respondents have total annual income 200-300 thousand, 8(17.8%) have total income between 300-8000 thousand and 4 (8.9%) respondents have total annual income more than 800 thousand. This shows that more people (24.4%) have low annual income. Some are economically very poor as they have annual income less than 100 thousand and some are high annual income above 800 thousand.

4.1.e

Frequency Table of Respondents by Their Occupation

Characteristics	Categories	Frequency	Percentage
Occupation	Business	14	31.1
	Agricultural	22	48.9
	others	9	20

(Source: Field survey, 2073)

Occupation structure implies the income earning pattern of the people. Nepal is agricultural country. Most of the people depend upon this sector. Most of the

people are directly and indirectly involved in agriculture. This study also attempts to find out the present occupational status of the respondents.

Table 4.1.e shows that, out of 45 respondents 14 (13.1%) are engaged in business, 22 (48.9%) are in agriculture, 9 (20%) are in other service. It is found that majority respondents are engaged in agriculture. So, it is necessary to motivate them to farm cash crops that help to uplift their economic status.

4.3.2 Annual fish Production across Caste Group

In the study area people of different castes like Brahmin, Chhetri, Janjati and Dalit are involving in fish farming. The caste wise production trend of fish production of 45 respondents is explained with the help of table 4.2.

Table 4.2

Annual Fish Production by Caste and Ethnicity

Caste	Quantity of Fish In kg					Total
Brahmin	6 30	2 10	4 20	5 25	3 15	20 100
Chhetri	0 0	1 100	0 0	0 0	0 0	1 100
Janjati	11 52.4	7 33.3	0 0	1 4.8	2 9.5	21 100
Dalit	2 66.7	1 33.3	o o	o o	o o	3 100

**Figures in parenthesis denote percentage*

(Source: Field survey, 2073)

Table 4.2 shows the real composition regarding caste and annual fish production. The quantity of production is divided into very low (less than 500kg), low (500 – 1000kg), medium (1000 – 2000kg), high (2000-3000kg) and very high above 3000kg. Out of 45 respondents 20 are Brahmin among

which 6 (30.0%) produce very low amount of fish, 2 (10%) produce low, 4 (20%) produce medium, 5 (25%) high and 3 (15%) very high. Janjati produce high amount of fish annually.

There are 3 Dalit respondents out of 45 households among which 2 (66.7%) produce very low and 1 (33.3%) produce low amount of fish. None of the Dalit respondents produce the fisfh in medium and in large scale.

Similarly 21 respondents are Janajati among which 11 (52.4%) produce very low, 7 (33.3%) produce the fish in low scale, 1(4.8%) produce high scale and 2 (9.5%) produce very scale. None of the Janajati respondents produce medium scale of fish production. This shows that Janjati caste holds the first rank in comparison with others, Bhramin holds second rank and Dalit holds third rank in racial fish Production structure after Chhetri. Also shows that most of the growers are producing low amount of fish and only few are producing more. Chhetri and Dalit are no more interested for aquacultural due to the traditional, lack of education, awareness and property.

4.3.3 Annual fish Production by Landholding Size

In the study area the people holding different land size are involving in fish farming. On the basis of land holding size, fish production tend of 45 respondents is explained with the help of table 4.3.

Table 4.3

Annual fish Production by Landholding Size

land holding size (in ropani)	Fish production (in KG)					
	Less than 500	500-1000	1000-2000	2000-3000	3000 and above	Total
0-0.2	11 100	0	0	0	0	11 100
0.2-0.5	4 57.1	3 42.9	0	0	0	7 100
0.5-2.5	3 27.3	6 54.5	2 18.2	0	0	11 100
2.5-20	1 12.5	2 25	2 25	3 37.5	0	8 100
20 and above	0		0	3 37.5	5 62.5	8 100
Total	19 42.2	11 24.4	4 8.9	6 13.3	5 11.1	45 100

**Figures in parenthesis denote percentage*

(Source: Field survey, 2073)

Table 4.3 shows the real composition regarding landholding size of respondents and their annual fish production. The quantity of production is divided into very low (less than 500 kg), low (500 – 1000 kg), medium (1000 – 2000 kg), high (2000-3000 kg) and very high above 3000kg. Out of 45 respondents, 11 have less than 0.2 ropani water coverd area. All are produced less than 500kg of fish and more than 500kg of fish can not produce by this households annually. Likewise, among 7 respondents who have water area (0.2–0.5) ropani, 4(57.1%) produce very low, 3(42.9%) produce low amount of fish produce. There are 11 respondents out of 45 who have (0.5–2.5) ropani of surface area of water among which 3(27.3%) produce very low, 6(54.5%)

produce low, and 2 (18.2%) produce medium amount of fish. Similarly 8 respondents have (2.5-20) ropani surface area of wateramong which 1(12.5%), 2(25%) low 2(25%) medium and 3(37.5%) produce high amount of fish and the rest of 8 respondents holding 20 ropani and above among which 3(37.5%) produce high scale of amount, 5(62.5%) produce very high amount is produced annually.

The data depicts the relation between owneship of surface area of the water and the fish production. People do not have sufficient land to make pond for production of fish. Fish farmers are using the lake to produce the fish. The studies vividly visualizes that water area possession is proportionally related to the fish production.

4.3.4 Annual fish Production across Annual Income of Respondents

Income refers to the total earning capacity of a man over a year. It plays the vital role in people's involvement in agro activities. The researcher collected the information on participation of different economic level people on fish production to widen the studies and analyze with the help of table 4.4.

Table 4.4

Annual fish Production by Income Level

Total Annual Income(Rs,000)	Quantity of Fish(in kg)					total
	0-500	500-1000	1000-2000	2000-3000	3000 above	
0-100	77.87	22.22	00	00	00	1009
100-200	36.64	45.25	18.22	00	00	10011
200-300	55.65	22.22	11.11	11.11	00	1009
300-800	28.62	28.62	14.31	42.23	14.31	1007
800 above	14.31	28.60	00	02	57.14	1007
Total	42.219	24.411	8.94	13.36	11.15	10045

**Figures in parenthesis denote respondents*

(Source: Field survey, 2073)

Table 4.4 presents the comparative studies on fish production concerning to annual income. The number of respondents was 45 and they were divided into five-five different groups in terms of annual income and fish production respectively. Out of 9 persons having Rs(0 – 100) thousand annual income 7 persons grow (0–500)kg fish, which occupies 77.8 percent, 2 persons grow for (500 –1000)kg which holds 22.2 percent and no one grows more than 1000kg of fish. likewise out of 11 people collecting Rs(100–200) thousand as annual income 4 person grows (0–500)kg, 5 (500 –1000)kg, 2 (1000– 2000)kg and holding 36.3 percent, 45.2 percent, 18.2 percent respectively. Similarly, out of 9 people earning Rs (200 – 300) thousand 5 (0 – 500) kg, 2(500–1000) kg, 1(1000-2000)kg and 1 (2000-3000)kg grabbing 55.6 percent, 22.2 percent, 11.1 percent and 11.1 percent respectively. Out of the 7 people earning (300-800) 2

(28.6) household produce (0-500)kg 2(28.6) percent produce (500-1000)kg, 1(14.3) percent produce (2000-3000)kg and 1 (14.3) produce more than 3000kg of fish. And in the category of annual income from Rs8000 thousand to above, 1 persons produced (0 – 500) kg, 2 (2000 – 3000) kg, 4 produce 3000kg above fish having 14.3 percent, 28.6 percent, 57.1 percent respectively.

The table 4.4 clearly express the interaction between grow income and fish production. People of low income grow less fish and people having high income grow much fish.

4.3.5 Utilization of fish

Some farmers produced their fish with commercial point of view as well as self consumption but some of the farmers are involved multi farming and they do not focus in fish farming with commercial view. They used their production only for their self-consumption. But slowly they have been motivated to fish production with commercial view after receiving the better income by selling the fish. According to respondents, the use of fish in different topic is given in the table 4.5.

Table 4.5

Utilization of Fish

Use of Fish	Quantity in kg	Percentage
Self - Consumption	3500	5.2
Gift	2850	4.2
Sale	61460	90.6
Total	67810	100

(Source: Field survey, 2073)

Table 4.5 shows that out of total production of 67810kg, the large amount of fish or 61460kg (90.6%) was sold. Similarly, 2850kg (4.2%) was distributed as a gift and only 3500kg (5.2%) was self-consumed. According to respondents,

all the fish producer of the study area sold their production at market and field. The rate of fish is different according to the spacies of fish.

4.4 Analysis of Cost of Production

The farmers bear many direct and indirect expenses in his practice. Total cost constitutes mainly five components of cost which are separated to two well-known classes; fixed cost and variable cost.

There are two items that included in fixed cost. Rent of land is the first and that the cost of fry is the second item used as fixed cost. Also there are three items that included in variable cost. They are; labour, feeding and tools and equipment. The detail of the fixed, variable and total input cost used in the fish farming of the study area is given in the table 4.6.

Total cost of production comprises fixed cost and variable cost. Rent of land and cost of fry are taken as fixed cost. Whereas labour cost and feeding cost are taken as variable cost. The description is on the table 4.6.

Table 4.6

Descriptive Statistics of Different Items of Input per Year

Inpute Types	Particular	Minimum (in Rs)	Maximum (in Rs)	Average (in Rs)	Standard deviation (in Rs)
Fixed Cost	Land or Rent	500	575000	32546.67	94197.93
	Fry	6000	320000	69488.89	82404.66
Variable Cost	Labour	5000	360000	24400	69968.7
	Feeding	0	250000	32066.7	49720.8
	Instruments	4000	50000	18900	10155.5
Total	Total Fixed Cost	7500	875000	102035.6	146386.6
	Total Variable Cost	25000	620000	110944	112035
	Total Cost	32500	1052000	212980	218778

(Source: Field survey, 2073)

Fixed cost can't be changed in very short time. This is the cost which is borne by farmers wheather they produces fish or not. As the farmers invest Rs.2 to Rs 8 for per fry while buying, the above table 4.6 shows that the minimum cost for buying new fry is Rs.6000 and maximum is Rs.320000. Where its average cost is Rs.69488.89 and that of standard deviation is Rs.82404.66. Like this, minimum invest on land is Rs.500 and the maximum invest is Rs.575000 where its average cost is Rs.32546.67 and that of standard deviation is Rs.94197.93. Standard deviation means a measure of the dispersion of a set of data from its average value (mean). Here the values of standard deviation are greater than average value means the date is more spread apart.

Table 4.6, shows that most of the farmers spent maximum amount for labour. Fish growers spent minimum Rs.5000 and maximum Rs.360000 for labours. Out of 45 sampled households the average cost for labours is Rs.24400 and that of standard deviation is Rs.69968.7 like this, other variable costs are the cost of feeding and tools and equipment. For the feeding they spent minimum Rs.0 and maximum Rs.25000. Similarly for tools & equipment minimum Rs.4000 and maximum Rs.50000 where the average cost is Rs.18900 and standard deviation is Rs.10155.4 and Rs.49720.8 for feeding. Here also the standard deviation has greater value than average value due to long ranged data.

Table 4.6 also shows that most of the farmers spent more in variable input than in fixed inputs. The average cost for variable inputs is Rs110944 and that for fixed inputs is Rs146386.6. Farmers spent minimum Rs7500 and Rs25000 whereas maximum for Rs785000 and Rs620000 for fixed and variable inputs respectively. Altogether farmers spend minimum Rs32500 and maximum Rs105200.00 as total cost whose average cost is Rs212980.00 and that of standard deviation is Rs218778.00.

4.5 Revenue Analysis

The amount of money that the fish farmers actually receive during one year, without deducting the cost of production is called revenue. The detail of revenue received by farmers is listed in the table 4.7.

Table 4.7

Descriptive Statistics of Revenue from fish Farming per Year

Particular	Minimum	Maximum	Average	St. Deviation
Revenue from Fish	3200	1595000	375333.3	424738.8

(Source: Field survey, 2073)

Farmers earn the revenue from only selling of fish. Table 4.7 shows that growers receive minimum Rs3200 and maximum Rs1595000 from fish whose average value is Rs375333.3 and standard deviation is 424738.8.

4.6 Profit Analysis

Net profit gained by the fish farmers per year from fish farming has been calculated by deducting total cost per year from total revenue per year. The total profit from fish production is tabulated in the table 4.8.

Table 4.8

Descriptive Statistics of Profit from fish Farming per Year

Particular	Minimum	Maximum	Average	St. Deviation
Total Revenue	32000	1595000	375333.3	424738.8
Total Cost	32500	2052000	212980	218778
Total Profit	-7000	1019000	162353.3	242507.7

(Source: Field survey, 2073)

Table 4.9 shows that some people are in loss from fish farming and some are in more profit. The loss from fish is due to the lack of awareness about fish farming, its importance, lack of efficient man power in farming. Farmers gain minimum -Rs7000.00 and maximum Rs.1019000.00 from aquaculture as profit. The average profit is Rs.162353.30 and standard deviation is Rs.242507.70. Out of 45 households, six households face loss and rest of the respondents are in profit even if, sooe of them are involving in multi-farming in traditional way and other are involving commercially. Most of the farmers sell their production in the market and cmmerically involvong farmers sell to the middle man.

Here the respondents are divided into five different class on the basis of their annual fish production to show the average profit percentage of the respondents of different class. They are; very low, low, medium, high and very high. The farmers produce that fish poduction less than 500kg fish annually are categorized in very low, that grow in between 500kg to 1000kg are in low, the farmers that produce in between 1000kg to 2000kg are in medium, 2000kg to 3000kg high and more than 3000kg annually are categorized in very high class. The annual production of fish by the respondents and their profit percentage is discussed with the help of table 4.9.

Table 4.9

Average Profit of Respondents with their Classes

Quantity (inkg)	frequency	Average Profit	Average Profit %
0-500	19	25368.4	2.1
500-1000	11	78190.9	6.1
1000-2000	4	176000.0	13.8
2000-3000	6	290633.3	22.8
3000 and above	5	703200.0	55.2
Total	45	1273392.6	100

(Source: Field survey, 2073)

Table 4.9 shows the annual fish production and their profit percentage according to their quantity of production. Out of 45 respondents, 19 produces very low amounts of fish and their average profit is 225368.4 (2.1%). Likewise 11 respondents produce low amount of fish and their average profit is 78190 (6.1%), 4 respondents 176000 (13.8%), 6 have 290633 (22.8%) and rest of others 5 respondents got 1398000 (55.2%) profit. This shows that the farmers who produce more fish are more profitable than the growers that produce less. But most of the growers are still in illusion. They do not know about the value of fish and they are not motivating to aquaculture commercially.

4.7 Regression Model

$Y = 93255.8573 + 4.1365X_1 + 1.044X_2$

$S.E \quad (48615.1486) \quad (0.6180) \quad (0.459)$

$t - value \quad 1.9182^{*} \quad 6.6935^{*} \quad 2.2743^{*}$

$R = 0.8253$

$R^2 = 0.6811$

$\bar{R}^2 = 0.6215$

$F = 44.8603^{*}$

$X = 45 \qquad k = 3$

The regression model of fixed cost (land and fry) on feeding cost and labour cost shows that coefficients of feeding cost and labour cost are positive and significant at 5% level of significant with 42 degrees of freedom it shows that both feeding cost and labour cost have positive significant effect on fixed cost.

Since coefficient of multiple determination R^2 is 0.6811 which shows that 68.11% of the total valuation in fix cost is explain by variation in feeding cost and labour cost. Similarly the adjusted coefficient of multiple determination **(**$\bar{R}^2$) is 0.6215 which shows 62.15% of total variance in fix cost is explain by

the variance in feeding cost and labour cost likewise the F - statistic is estimated as 44.8603, which significant at 5% level with degrees of freedom 2 and 42. hence, it is concluded that the regression model is good fit.

4.8 Major Findings

From the collected data, observation in field survey, this study has succeeded to find out various facts and findings related to different aspects in the study area. Which ae as follows:

- Mostly Jalari and Brahimin are involved in fish farming than other caste.
- Most of the Jalari communities are dependent on fisharies activities and they are landless, living around the lakes.
- Farmers are farming fish in specially enclosure, pond and cage. Most of the fish farmers produce fish in lake. They have farm in Rupa lake and Begnas lake as cage and enclosure.
- The large number of farmers have small cage are found in study area.
- Appropriate size of fish fry are not available at the time. Though there are two fry production centre in study area. Farmers brought fries from India.
- Government has made a lot of policy and law regarding to the aquaculture but they are not properly implemented. The government hasn't conducted fish production and marketing program and encourage the farmesr to do aquaculture.
- The rate of fish is different of spicies of fish. The least price is Rs.240 and highest price is Rs.600. There are no difficulties for selling fish. The fish farmers sell their fish direct to consumer and nearby the market, Begnastal.

- The study of annual fish production across land holding size visualizes that land possession is proportionally related to the fish production. Due to highly cost of land, lack of people consciousness on fish production, expected involvement of land in aquacultural production has not been found.

- The farmers that produce in very low scale have 2.1 percent average profit, low scale have average profit 6.1 percent, medium scale have 13.8 percent, high scale have 22.8 percent and the farmers that grow in large scale have 55.2 percent average profit. That is higher amount profit is observed for the farmers that grow large scale than that of the farmers that grow in low scale.

- Generally the farmers do not record about the cost of production, selling and distribution expenses and income generate from. They also do not calculate their own labour, own feeding cost, land revenue depreciation, repairing and maintenance cost of their agricultural tools in the study area.

- There is no clear figure of employed persons and the amount of feeding.

- The popular system of fulfilling the labour requirement in the study area are labour exchange and hired labour.

- The regression model of fixed cost (land and fry) on feeding cost and labour cost shows that coefficients of feeding cost and labour cost are positive and significant at 5% level of significant with 42 degrees of freedom it shows that both feeding cost and labour cost have positive significant effect on fixed cost.

CHAPTER V

SUMMARY AND CONCLUSION

5.1 Summary

Aquaculture is an ecologically sound method of fish farming. An enclosure and cage fish can be produced in low cost fish technology living around the Begnas and Rupa lake. Fish farming is one of the significant components in study area. The necessity is felt to study the aspect of cost and revenue to analyze the profitability of fish production along with various factors influencing it. A micro level study has been done in Pokhara Lekhnath Metropolitan of Kaski district to find the profit from fish farming. This study has been divided into five chapters. The first chapter is an introduction of the study, which includes general background, historical background, Statement of the problem, Main objectives, Limitation of the study, Justification of the study and Organization of the study. Specific objectives of the study are to show the present situation of the fish farming in the study area, to analyze the state of profitability in fish farming and to find out the problems and prospects of the fish production in the study area.

The study is based mainly upon the primary data collection by means of direct personal interviews in the survey. For analysis and presentation of data various statistical tools have been employed including Microsoft Excel program of computer in order to calculate mean, standard deviation and percentage etc. The main objective of the study was to analyze the profitability of fish farming to suggest the fish farmers for better profitability on the basis of finding and recommend the best alternative method to increase the level of output with minimum increase in input.

The present study has been prepared on the basis of primary data collected by field survey and secondary data have been collected from government, semi-

government and non-government journals and publication. Sample primary data for the study were collected from selected 45 respondent of Pokhara Lekhanath Metropolitan at ward no. 31 by dividing the farmers into different classes and then by random sampling. Hence the relationship between total cost of fish production and output of fish was taken as the model of the study in particular linear, quadratic and cubic function and their solutions are summarized.

The analysis of the data are tabulated and discussed in the chapter of analysis and presentation of data. Various components of total fixed cost, total variable cost, total cost, total revenue and profitability of fish farming. The farmers that produce fish in very low scale have 2.1 percent average profit, low scale have average profit 6.1 percent, medium scale have 13.8 percent, high scale have 22.8 percent and the farmers that grow in large scale have 55.2 percent average profit. That is higher amount profit is observed for the farmers that produce the in the large scale than that of the farmers that in low scale. The physical relationship between inputs and output is called production function. Production not only depends upon the quantity of inputs but also depends upon the technique of production.

5.2 Conclusions

The profit analysis of fish farming concludes that the fish farmers have seen more profitable in the study area. The farmers who produce fish in large scale have seen more profitable than that of the small scale. It is found that people use the manure, feeding made by themselves which is more positive and best way so as to prevent people from health hazard. Although the growers of the study area have been facing many problems, they are still optimistic about better prospects of fish farming. Fish farms are sustainable and environment friendly fishes are raised naturally and free of diseases, pesticides and other harmful toxicants. Fish are an important source of food for people around the

world, either caught wild or farmed. Consumption of fish products in Nepal is increasing.

5.3 Recommendations

Fish production is one of the more important farm of income. Its development can increased the income of farmers in greater extent. It can be the important sector to generate employment for the persons. On the basis of finding drawn from this study, the following suggestions have been put forth for consideration of farmer and Ministry of Agriculture.

- The study found that the effect of human labour is a significant factor for fish production. Now a day young active and educated people are far from agricultural sector. Only the children, women and old persons are engaged in agriculture sector. The government and other organizations should motivate the energetic and educated people to engaged in agricultural sector to increase the production.

- Most of the farmers have not been keeping the record of inputs (fixed and variable inputs) and output so that they are unknown from their profit of fish farmers. Thus farmers should keep their account of input and output to know their profit from fish farming.

- Adequate research activities should be conducted and research outcomes should be implemented.

- After the research farmers have been found involving in traditional multi farming activities. It is suggested to all the concerned that fish farming is reliable ecologically suitable to Nepal, it can uplift the economic standard of people fast. So farmers should get training and knowledge. Due to the availability of water resource in the study area fish production has better prospects.

- In order to increase the large private sectors participation in fish farming, the government must adopt and implement private sectors friendly favorable and attractive policies to attract and involve them.

Appendix A

Interview Schedule

1. General introduction

Ward No.:

Name of the Village/Tole:

Date of interview:

2. **Name of the respondent:**

Age:

Sex:

Academic qualification:

Main occupation:

3. Family composition: (General Information)

S.N	Name	Age	Sex	Education	Occupation
1					
2					
3					
4					
5					
6					

4. Composition of fish farming :

Production Sector	Farming Area (in Ropani)	Annual production (in KG)	Annual income (in RS)	Cost of land RENT/OWN
Pond				
Enclosure				
Cage				
Paddy Field				
Others				

5. Production of food grains:

S.N	Production	Annual production (in ropani)	Total Cost of production (in RS)	Self Consumption	Profits
1	rice				
2	maize				
3	wheat				
4	millet				
5	other				

6. Starting of fish farming (in years). ……

7. What types of land is used for farming ?

a. Marshy land b. Swampy land

c. Peat land d. Lake

8. What is your purpose of fish farming?

a. Occupational b. Subsistence

d. Traditoinal d.others

9. Please provide information about the total input cost for fish production within one year?

S.N	Items	Quantity	Cost/Price
1	Labours		
2	Feeding		
3	Medicine		
4	Tools/Instruments		
5	Fry		
6	Others		

10. Do you sustain your family from the production of fish?

a. Yes

b. No

11. If no, how do you manage?

a. Loan b. Seasonal occupation

c. Job d. others

12. Did you get any training for this farming?

a. Yes b. No

13. Have you got any type of help from govt. or NGOs?

a. Yes b. No

14. If yes, what type of help did you get?

a. Technical c. Farming management

b. Irrigation d. Others.

15. Have you taken loan for fish farming?

a. Yes b. No

16. If yes,

Source of Loan	Amount	Interest Rate (in %)
a. Banking and financial institutions		
b. Co-operative society		
c. Money lenders		
d. Others		

17. Where do you sell your product?

SN	Market	Distance	transportation	time	Qty of selling	Total Amount
1						
2						
3						

18. Can you sell your production in time?

a. Yes b. No

19. If no, why?

a. Lack of market b. Lack of transport

c. Random Production d Others

20. Are you getting satisfactory price of your production?

a. Yes b. No

21. If not what are the causes?

a. Lack of suitable market d. Middle man agent b. High transportation cost

e. Others c. Lack of storage

22. What are the difficulties of market ?

a. Transportation c. Lack of storage b. Unsatisfactory price

d. Others

23. How much income did you have from selling the fish in the following three years?

S.N	Years	Income(in Rs)
1	2071	
2	2072	
3	2073	

24. Did you spend this income entirely on fish farming?

a. Yes b. No

25. Is it more profitable than cereal crop farming?

a. Yes b. No

26. What do you think about the future of fish farming?

a. Good c. Normal b. Bad

27. What are the problems for fish farmng in your view?

a.Marketing b.Transportion

c. Feeding d. Government policy

28. Do you have any suggestion about the fish farming to increase its' production and to make more profitable?

a. Market managment b. Extension of road network

c. Subsidy in fish farming materials d. Farmers fraindly policy

Appendix B

Estimated water surface area in Nepal

Resources of Natural Water	Estimated Area(in Ha)	Percentage (%)
Natural Water	401500	49.14
Rivers	395000	48.14
Lakes	5000	0.61
Reservoirs	1500	0.18
Village Ponds	6500	0.80
Marginal Swamps	11100	1.36
Irrigate Rice Field	398000	48.71
Total	817000	100

(Source: Directorate of Fisheries Development, 2011

Appendix C

Regression Statistics

Multiple R	0.825314034
R Square	0.681143255
Adjusted R Square	0.642150077
Standard Error	245483.0274
Observations	45

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	5.40673E+12	1.80224E+12	44.8603	5.14913E-13
Residual	42	2.531E+12	60261916730		
Total	45	7.93774E+12			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	93255.58731	48615.1486	1.91824133	0.061895	-4853.754563	191364.9292	-4853.754563	191364.9292
X Variable 1	4.136525204	0.617994681	6.693464086	4E-08	2.889361445	5.383688962	2.889361445	5.383688962
X Variable 2	1.043982689	0.459036204	2.274292702	0.02812	0.117610125	1.970355253	0.117610125	1.970355253

Appendix D

Data Sheet used for Regression Analysis

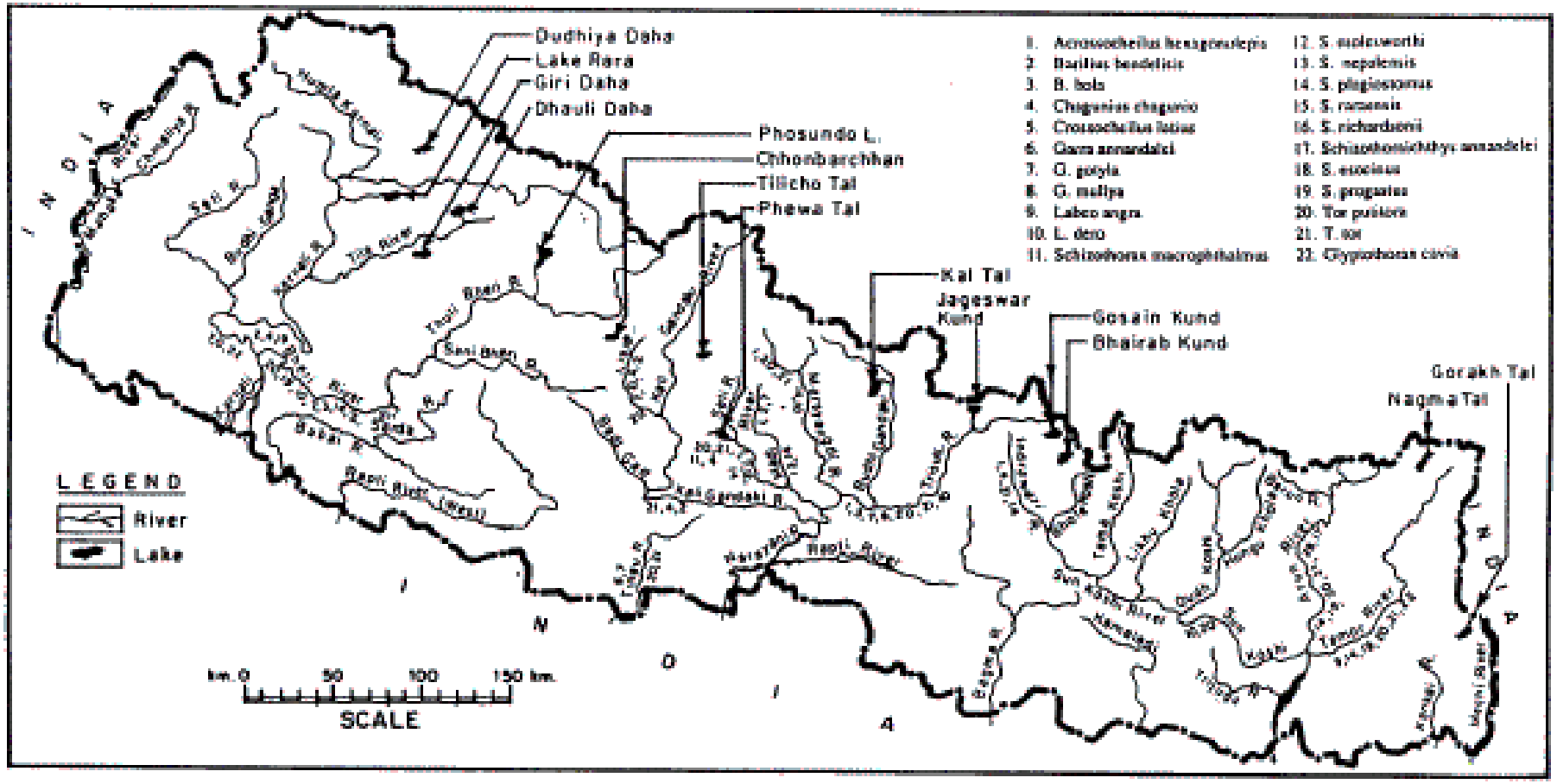
S.N	Area in Ropani	Total prod. (in Kg)	Total Revenue	Labour Cost	Cost of fry(in Rs)	Cost of tools (in Rs)	Cost of Feeding (in Rs)	Land (in Rs)	Total Cost of Production	Fixed Cost	Variable Cost
1	2	600	180000	72000	25000	15000	11000	20000	143000	163000	326000
2	12	5500	1595000	360000	70000	10000	250000	120000	810000	930000	1860000
3	20	3650	1095000	200000	75000	25000	80000	250000	630000	880000	1760000
4	11	2200	410000	130000	60000	30000	150000	110000	480000	590000	1180000
5	6	2000	560000	96000	55000	20000	30000	60000	261000	321000	642000
6	5	1500	450000	90000	60000	30000	35000	50000	265000	315000	630000
7	9	2000	560000	150000	70000	20000	200000	90000	530000	620000	1240000
8	2	800	240000	60000	30000	18000	20000	20000	148000	168000	336000
9	3	900	270000	84000	40000	15000	30000	30000	199000	229000	458000
10	4	1050	315000	90000	60000	20000	45000	40000	255000	295000	590000
11	2	700	210000	90000	35000	10000	25000	20000	180000	200000	400000
12	2	750	255000	120000	25000	25000	30000	20000	220000	240000	480000
13	0.18	220	88000	9000	6000	6500	25000	1500	48000	49500	99000
14	0.05	80	32000	9000	10000	6000	24000	500	49500	50000	100000
15	0.15	200	72000	7000	6000	4000	28000	1500	46500	48000	96000
16	0.55	800	240000	18000	14000	15000	35000	6000	88000	94000	188000
17	0.1	140	45000	10000	15000	10000	12000	1000	48000	49000	98000

S.N	Area in Ropani	Total prod. (in Kg)	Total Revenue	Labour Cost	Cost of fry(in Rs)	Cost of tools (in Rs)	Cost of Feeding (in Rs)	Land (in Rs)	Total Cost of Production	Fixed Cost	Variable Cost
18	0.25	300	100000	20000	40000	18000	15000	2500	95500	98000	196000
19	0.18	250	75000	15000	25000	10000	10000	1500	61500	63000	126000
20	0.33	450	144000	20000	42000	18000	35000	3500	118500	122000	244000
21	0.05	100	32000	5000	7000	12000	8000	500	32500	33000	66000
22	0.3	700	210000	18000	30000	20000	35000	3000	106000	109000	218000
23	0.42	650	208000	12000	40000	15000	25000	4500	96500	101000	202000
24	0.15	150	52500	10000	20000	8000	10000	1500	49500	51000	102000
25	0.15	200	60000	8000	25000	17000	15000	1500	66500	68000	136000
26	0.1	120	38000	18000	10000	4000	8000	1000	41000	42000	84000
27	0.15	150	52500	8000	15000	11000	12000	1500	47500	49000	98000
28	0.1	150	48000	8000	12000	10000	15000	1000	46000	47000	94000
29	0.2	300	105000	10000	20000	8000	25000	2000	65000	67000	134000
30	1.45	1800	540000	35000	100000	40000	70000	5000	250000	255000	510000
31	0.35	400	130000	12000	30000	15000	25000	3500	85500	89000	178000
32	60	2700	810000	60000	260000	30000	0	2500	352500	355000	710000
33	5	500	200000	8000	70000	20000	0	1200	99200	100400	200800
34	10	650	273000	27000	85000	28000	0	2000	142000	144000	288000
35	65	2500	875000	45000	300000	35000	30000	1500	411500	413000	826000
36	100	4500	1575000	160000	300000	17000	0	575000	1052000	1627000	3254000
37	100	5000	1500000	120000	320000	40000	0	1000	481000	482000	964000

S.N	Area in Ropani	Total prod. (in Kg)	Total Revenue	Labour Cost	Cost of fry(in Rs)	Cost of tools (in Rs)	Cost of Feeding (in Rs)	Land (in Rs)	Total Cost of Production	Fixed Cost	Variable Cost
38	60	3500	1225000	200000	250000	50000	0	1000	501000	502000	1004000
39	2	400	140000	15000	40000	25000	25000	1000	106000	107000	214000
40	40	2500	750000	45000	100000	20000	20000	1200	186200	187400	374800
41	14	750	240000	65000	40000	25000	30000	1200	161200	162400	324800
42	2	400	140000	20000	40000	10000	0	1000	71000	72000	144000
43	5	1000	350000	50000	100000	30000	0	1000	181000	182000	364000
44	2	400	150000	30000	50000	15000	0	1000	96000	97000	194000
45	10	700	250000	60000	100000	20000	0	1000	181000	182000	364000

Appendix E

Distribution of the Major Fish Species of Nepal



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