

Chapter 23

Introduction to Fisheries Economics

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Introduction

Economics is derived from the Latin words 'eikos' and 'nemein' which means 'to manage household' and is a social science concerned with the production, distribution, and consumption of goods and services. It dealt with how people allocate scarce resources for production, distribution, and consumption, both individually and collectively. There have been various streams of thought that have influenced the growth of this field of enquiry and are termed 'classical', 'neo classical', 'modern' etc. and the stream of knowledge and enquiry evolves.

Adam Smith is considered the father of Classical economics who propounded theories regarding the study of the nature and causes of national wealth and considered wealth getting and spending behaviour as the primary objective of economics. Alfred Marshall a Neo classical economist was the first to shift the focus of economics from 'wealth' to 'welfare', and called it "the study of mankind in the ordinary business of life; it examines that part of individual and social action which is most closely connected with the attainment and with the use of the material requisites of well-being".

Professor Lionel Robbins defines "Economics is the science that studies human behavior as a relationship between ends and scarce resources which have alternative uses". It was not confined to the industry and market and it related to the basic levels of social business interactions, barter, and loans.

Prof. Paul. A. Samuelson defined it as:

"Economics is the study of how people and society end-up choosing, with or without, the use of money, to employ scarce productive resources that could have alternative uses to produce various commodities and distribute them for consumption, now or in the future among various persons or groups". Costs and benefits of improving patterns of resource allocation were analyzed.

In Indian history, Arthashastra by Kautilya has chapters on politics, governance, welfare, economics, protecting key officials and king, gathering intelligence about hostile states, forming strategic alliances, and conduct of war and includes ancient economic and cultural details on agriculture, mineralogy, mining and metals, animal husbandry, medicine, forests and wildlife.

Significance, Scope and Areas

It is understood that resources are scarce but wants tend to be unlimited which calls for optimal allocation of resources. This leads to a choice to be made and how best to make them looking at the impacts on various aspects like income, savings, wages, employment, money, banking, inflation, which has both individual and societal dimensions. Various theories, methods and analytical techniques are used to optimize the utilization of the available resources and reduce wastages. For the stability of an economy it is essential for any country or society to have sound economic practices to survive and prosper in the long run.

The scope of the subject is wide and varied and has application in business, environment, natural resource management (including agriculture and fisheries), human resource management, marketing, etc.

The broad areas under which it is studied are as follows:

- Microeconomics, which focuses on the behaviour of individual consumers and producers
- deals with individuals, households, firms and industries or individual prices, wages or incomes.
- economic motives and behaviour patterns of individual consumers and producers involved in organizing and operating individual business firms or industries.
- Macroeconomics, which examine overall economies on a regional, national, or international scale.
- economic system as a whole, of the aggregate consumption and demand and of the aggregate saving, investment and employment in the economy. It deals with aggregates and averages of the system rather than individual items in it

Economic systems and processes

An economic system is a means by which societies or governments organize and distribute available resources, services, and goods across a geographic region or country. Economic systems regulate the factors of production, including land, capital, labor.

The two major economic systems: capitalism and socialism but most countries use some combination of the two known as a mixed economy. In pure capitalism, there is private ownership, and markets and prices coordinate and direct economic activity. At the other end of the spectrum is complete control by the state. In a mixed economy, there are elements of both these systems at play, e.g. India where both government controlled and private economic activities function side by side.

The basic questions of economics system are:

- What to Produce?

Should a society direct most of its resources to the production of military equipment or to other items such as food, clothing, or housing?

- How to Produce?

Should a society direct most of its resources in machinery or use less machinery to employ more workers and lower unemployment?

- For Whom to Produce?

Once a society decides what to produce and how to produce it they must decide who is going to get it and who is going to share in what is produced.

Economic processes include actions, and operations that involve the production and sale of goods and services. Activities can be the following:

- Primary: uses natural resources directly to provide the basic raw materials for industry
- Secondary: uses raw materials to produce or manufacture something new.
- Tertiary: provides services to people and businesses

- Quaternary: knowledge-based part of the economy, which typically includes knowledge-oriented economic sectors such as information technology; media; R&D; information-based and knowledge-based services - consultation, education, financial planning, blogging, and designing

Basic Concepts

Presented below are a few basic concepts:

Demand and supply

It is now clear that wants are unlimited and the resources to satisfy these wants are limited and have alternative uses. The want satisfying power of a good or service is called its utility. By production we actually generate utility which on consumption is destroyed or met. Demand and supply analysis helps to understand production and consumption of goods and services. Demand is the desire for a commodity or service supported with necessary purchasing power and willingness to pay a price for it. It is always with reference to price and time. When the demand schedule, that is the demand for a particular product at a particular price, is plotted in a graph, the demand curve obtained. Demand curve slopes downwards indicating that other things remaining constant, a fall in price will cause an increase in demand and a rise in price will lead to a fall in demand.

The law of demand reveals the relationship between the price of a commodity and the quantity demanded of it in a market. The law of demand states that other things being equal, the quantity demanded of good increases with a fall in price and vice versa. Thus, quantity demanded varies inversely with price.

The term supply refers to the quantity of a good offered for sale at a given price. Like demand, supply is always with reference to a price and a point of time. In case of supply and price, a direct, relationship exists. The law of supply states that other things remaining equal, as the price of a commodity increases, its supply also tends to increase. The supply curve has a positive slope and it moves upwards to the right.

There are several determinants of both demand and supply. Demand is dependent on (i) Price of the good, (ii) Price of the substitute goods, (iii) Income of the consumer and (iv) Tastes and preferences of the consumer. The determinants of supply are (i) Price of the good which is to be

supplied, (ii) Price of other goods, (iii) Prices of factors of production, (iv) Number of producers or sellers, (v) Entry of new firms, (vi) Technology, (vii) Government policy etc.

Costs

Costs are the expenditure or money spent on an item or for a specific purpose or cause. Costs are of various types. Capital cost are expenditure incurred on capital items like land, buildings, vehicles, machineries and equipment, farm or firm infrastructure, etc.

Costs can be fixed or variable. Variable costs are costs incurred on an item or input which varies with the level of output. This could include costs of inputs. In aquaculture it could be manure, Lime, fertilizer, feed, cost of fingerlings, fuel, power, wages, etc. Fixed costs incurred on an item does not vary with the level of output and includes depreciation, interest on capital and variable costs, repairs and maintenance costs, taxes etc.

- Total cost: Variable + Fixed costs
- Average cost: Total cost divided by total output. Mean cost of producing one unit of the output.
- Marginal cost: It is the cost incurred on one more or additional unit of the product.
- Opportunity cost: It is the next best alternative foregone

Income/ benefit refers to the sale proceeds of an individual or firm.

- Total Income = Total Yield (kg) x Unit price (Rs/per unit of output)
- Net Income = Total Income - Total Cost
- Average Income = Total income/ Yield
- Marginal income is the income obtained from one additional unit of the output.

Benefit-Cost ratio (BCR)

It indicates the returns on a rupee of investment or expenditure

Cost - benefit ratio (Variable cost basis) = Total income/ Total variable cost

Cost - benefit ratio (Total cost basis) = Total income/ Total cost

BCR over 1 indicates that the activity is profitable.

Application in Fisheries

Fisheries play a significant role in the economy and in supporting the livelihood of an estimated 14 million people in the country. It contributes to national income, to food fish production, provides livelihood support and employment, is a foreign exchange earner, and contributes to incomes in other ways like eco-tourism. The fisheries sector as a system has a macro level dimension in its contribution to the national economy etc. At the process level, we can look at it from the production, distribution, consumption angle. Fisheries Economics thus can be very basically defined as the production, distribution, and consumption of fish and seafood and all financial aspects of the fishing and seafood industry (including aquatic life in fresh water).

- Production – how fish/ or any other product is produced
- Distribution – how fish/ or any other product is marketed/ traded
- Consumption – how fish/ or any other product is consumed

Production is the transformation of one or more inputs into one or more outputs by creation of utilities (satisfying goods and services; and need not necessarily be matter). Utilities are

- (i) form utility - changing its physical form
- (ii) place utility - transporting it to another place
- (iii) time utility – stored to be used or traded later
- (iv) possession utility - value customers have while buying a product.

Factors of production include basic ‘inputs’ like land, labour, capital and organization and these factors have a price which can be rent, wage, interest etc. While asking the basic question on what, how and how much to produce, we also need to understand the premises like wants being unlimited and resources being scarce and a choice to be made. The factors of production or the inputs have alternative uses and through judicious decision making the best use of these resources need to be made. The relation emanating from the basic questions are as follows:

What to Produce? (Product-Product relationship)

How to produce? (Factor-Factor relationship)

How much to produce? (Factor-product relationship)

Factor-product relationship

Production results in transformation of one or more inputs into one or more outputs and the production function explains the functional relationship between the inputs used and output obtained. A very simple production function is given below:

- If Y refers to the fish produced and x_1 , x_2 , x_3 and x_4 refer to the inputs used, then the production function is specified as follows:

$$Y = f(x_1, x_2, x_3, x_4, \dots) \text{ [Cobb-Douglas production function]}$$

Production functions vary with the type of production and associated factors and assumptions. Appropriate functional forms need to be used to draw meaningful conclusions. Several functional forms like linear, log linear, quadratic, polynomial, parabolic, etc. are used and a suitable one can be identified based on the analytical requirements. Functional form could be decided on the basis of scatter plots, reveals how the input and output data are distributed and indicates the overall trend

A simple production function in aquaculture (say, carp culture) could look like the following:

In carp culture, the quantity of fish farmed represents the output for which various inputs like seed, feed, fertilisers etc. are used.

The Cobb-Douglas production function in carp culture could be specified as follows:

$Y = f(m, u, s, f, r, g, l)$ where,

Y = output of farmed carps in kg/ha.

m = cattle manure in kg/ha

u = urea in kg/ha

s = super phosphate in kg/ha

f = stocking density in numbers/ha

r = rice bran in kg/ha

g = groundnut oil cake in kg/ha

l = labour in man days

Marketing

Market is the very basic foundation on which the capitalist economy rests and operates. The price for a commodity is determined by the nature of the market. The price can be regulated by state or determined in open market. The buyer and seller can meet, negotiate and transact over an agreed price. Marketing is another dynamic area of study in the sector, both the domestic marketing and international trade