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Winter School on

Towards Ecosystem Based Management of Marine Fisheries – Building Mass Balance Trophic and Simulation Models

INFORMATION ONLY

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Technical Notes

21

FISHERIES ECONOMICS – CASE STUDIES

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Economics is the study of how human beings in a society go about achieving their wants and desires. It is also defined as the study of allocation of scarce resources to satisfy individual wants or desires. The latter is perhaps the best way to broadly define the study of economics in general. Economists analyse questions and issues on the basis of trade off i.e. they compare the cost and the benefits of every issue and make decisions based on those costs and benefits. Broadly, economics may be divided into macroeconomics and microeconomics. Macroeconomics as the name suggests is the study of the overall economy and its aggregates such as Gross National Product, Inflation, Unemployment, Exports, Imports, Taxation policy etc. Microeconomics deals with individual actors in the economy such as firms and individuals. Further the market is perhaps the most important and complex institution playing a vital role in the decision making process of any economy. The major point is that firms operate in different types of markets and use the well-established principles of managerial economics to improve profitability. Managerial economics draws on economic analysis for such concepts as cost, demand, profit and competition. It attempts to bridge the gap between the purely analytical problems that intrigue many economic theorists and the day-to-day decisions that managers must face. It offers powerful tools and approaches for managerial policy.

The application of economic principles is highly essential to take rational policy decisions in marine fisheries for optimum exploitation, equitable distribution, efficient marketing and evolving alternate management strategies. The monetary returns of fishery enterprises depend on the economic efficiency of resource use in production. Cost minimisation and profit maximisation are the inter related twin objectives of any productive venture to increase the economic efficiency. The welfare of the people should be taken into consideration and an equitable distribution of benefits to the entire society should be assured in all developmental strategies. The economic impact of alternate, management strategies on the primary and secondary sectors vis-a-viz Socio-economic status of the people also requires proper assessment for the implementation of fishery policies. Fishery Economics in India is gaining importance in recent years due to its high applicability for evolving appropriate fishery polices and management decisions

Some cost concepts

Cost concepts are not important for decision making but the accounting approach nor is the economic approach completely acceptable when decision making is involved. Costs must be considered in various ways, depending on the decision at hand. All the cost concepts need to be considered in such a way so as to help make sound decisions. The decision maker should try to discover the "relevant" costs by asking what cost are relevant to a particular decision at hand, and the decision maker is not necessarily bound by

traditional concept constructed for other purposes. Some of the important cost concepts that are relevant for managerial decision are briefly discussed below

Actual costs and opportunity costs

Actual cost are those costs, which a firm incurs while producing or acquiring a good or service like raw materials, labour, rent etc. Suppose, we pay Rs/150 per day to a worker whom we employ for 10 days, then the cost of labour is Rs. 1500. Sometimes the actual costs are also called acquisition costs or outlay costs.

On the other hand, opportunity cost is defined as the value of a resource in its next best use. In other words the next best alternative use of any factor of production is known as its opportunity cost. For example Mr. X is currently working with a firm and earning Rs. 2 lakhs per year. He decides to quit his job and start his own small business. Alth0ugh, the accounting cost of Mr. X's labour to his own business is 0, the opportunity cost is Rs. 2 lakhs per year. therefore, the opportunity cost is the earnings he foregoes by working of his own firm. One may ask you that whether this opportunity cost is really meaningful in the decision making process. As we see that the opportunity cost is important simply because, if Mr X cannot recover this cost from his new business, then he will probably return to his old job

Opportunity cost can be similarly defined for other factors of production. For example, consider a firm that owns a building and therefore do not pay rent for office space. If the building was rented to others, the firm could have earned rent. The foregone rent is an opportunity cost of utilising the office space and should be included as part of the cost of doing business. Some times these opportunity costs are called as alternative costs.

Explicit and implicit costs

Explicit costs are those costs that involve an actual payment to other parties. Therefore, an explicit cost is the monitory payment made by a firm for use of an input owned or controlled by others. Explicit costs are also referred to as accounting costs. For example, a firm pays Rs. 100 per day to a worker and engages 15 workers for 10 days, the explicit cost will be Rs. 15,000 incurred by the firm. Other types of explicit costs include purchase of raw materials, renting a building, amount spent on advertising etc.

On the other hand, implicit costs represent the value of foregone opportunities but do not involve an actual cash payment. Implicit costs are just as important as explicit costs but are sometimes neglected because they are not as obvious. For example, a manger who runs his own business foregoes the salary that could have been earned working for someone else as we have seen in our earlier example. This implicit cost generally is not reflected accounting statements, but rational decision-making requires that it be considered. Therefore, an implicit cost is the opportunity cost of using resources that are owned or controlled by the owners of the firm. The implicit cost is the foregone return, the owner of the firm could have received had they used their own resources in their best alternative use rather than using the s recourses for their own firm'' production.

Private costs and social costs

A further distinction that is useful to make –especially in the public sector- is between private and social costs. Private costs are those that accrue directly to the individuals or firms engaged in relevant activity. Social costs, on the other hand, are passed on to persons not involved in the activity in any direct way (i.e, they are passed on to society at large). Consider the case of a manufacturer located on the bank of a river who dumps the waster in to water rather than disposing it of in some other manner. While the private cost to the firm of dumping is zero, it is definitely harm full to they society. It affects adversely the people located down current and incur higher costs in terms of treating the water for their use, or having to travel a great deal to fetch potable water. If these external costs were included in the production costs of a producing firm, a true picture of real, or social costs of the output would be obtained. Ignoring external costs may lead to an inefficient and undesirable allocation of resources in society.

Fixed and variable costs

Fixed costs are that part of the total cost of the firm which does not change with output. Expenditures on deprecation, rent of land and building, property taxes, and interest payment on bonds are examples of fixed costs. Given a capacity, fixed costs remain the same irrespective of actual output. Variable costs, on the other hand, change with changes in output. Examples of variable costs are wages and expenses on raw material.

However, it is not very easy to classify all costs into fixed and variable. There are some costs, which fall between these extremes. They are called semi variable costs. They are neither perfectly variable nor absolutely fixed in relation to changes in output. For example, part of the depreciation charges is fixed, and part variable. However, its very difficult to determine how much of depreciation cost is due to the technical obsolescence of asset and hence fixed cost, and how much is due to the use of equipments and hence variable cost. Nevertheless, it does not mean that it is not useful to classify costs into fixed and variable. This distinction is of great value in break-even analysis and pricing decisions. For decision-making purposes, in general, it is the variable cost, which is relevant and not the fixed cost.

To an economist the fixed costs are overhead costs and to an accountant these are indirect costs. When the output goes up, the fixed cost per unit of output comes, down, as the total fixed cost is divided between larger units of output.

Total average and marginal costs

Total cost (TC) of a firm is the sum-total of all the explicit and implicit expenditures incurred for producing a given level of output. It represents the money value of the total resources required for production of goods and services. T.C. = TFC + TVC

Average cost (AC) is the cost per unit of output. That is, average cost equals the total cost divided by the number of units produced (N). If TC = Rs. 500 and N -= 50 then AC = Rs.10

Marginal cost (MC) is the extra cost of producing one additional unit. At a given level of output, one examines the additional costs being incurred in producing one extra unit and this yields the marginal cost.

The total cost concept is useful in break-even analysis and finding out whether a firm is making profit or not. The average cost concept is significant for calculating the per unit profit. The marginal and incremental cost concepts are needed in deciding whether a firm needs to expand its production or not. In fact, the relevant costs to be considered will depend upon the situation or production problem faced by the manager.

Production function and Economic efficiency

Production process involves the transformation of inputs into output. The input could be land, labour, capital, entrepreneurship etc. and the output could be goods or services,. In a production process managers take four types of decisions: (a) whether to produce or not, (b) how much output to produce, (c) what input combination to use, and (d) what type of technology to use. In general a given output can be produced with different combination of inputs. A production function is the functional relationship between inputs and output. It shows the maximum output which can be obtained for a given combination of inputs. It expresses the technological relationship between inputs and output of a product. In general, we can represent the production function for a firm as:

$$Q = f(x_1, x_2, \ldots\ldots x_n)$$

Where Q is the maximum quantity of output, $x_1, x_2, \ldots\ldots x_n$ are the quantities of various inputs, and f stands for functional relationship between inputs and output

Economic Efficiency and Technical Efficiency

A firm is technically efficient when it obtains maximum level of output form any given combination of inputs. The production function incorporates the technically efficient method of production. A producer cannot decrease one input and at the same time maintain the output at the same level without increasing one or more inputs. When economists use production function, they assume that the maximum output is obtained from any given combination of inputs. That is, they assume that production is technically efficient.

On the other hand, we say a firm is economically efficient, when it produces a given amount of output at the lowest possible cost for a combination of inputs provided that the prices of inputs are given. Therefore, when only input combinations are given, we deal with the problem of technical efficiency; that is, how to produce maximum output. On the other hand, when input prices are also given in addition to the combination of inputs, we deal with the problem of economic efficiency; that is, how to produce a given amount of output at the lowest possible cost.

One has to be careful while interpreting whether a production process is efficient or inefficient. Certainly a production process can be called efficient if another process produced the same level of output using one or, more inputs, other things remaining constant. However, if a production process uses less of some inputs and more of others, the economically efficient method of producing a given level of output depends on the prices

of inputs. Even when two production processes are technically efficient, one process may be economically efficient under one set of input prices, while the other production process may be economically efficient at other input prices.

Special features of fish marketing and marketing efficiency

1. Greater uncertainties in the production of fish and hence in the supply of fish
2. High perishability of fish
3. Assembling of fish form too many coastal landing centres.
4. Too many species and too many demand patterns
5. Wide seasonal and spatial variations in price.
6. Disequilibrium of demand and supply
7. Difficulty in maintaining the quality of fish
8. Lack of preservation and storage.
9. Lack of minimum facilities at marketing centres.
10. Lack of transportation facilities.
11. Seasonal abundance and scarcity of different varieties of fish
12. Lack of information on price and production.

Measures of marketing efficiency

1. Price spread
2. Marketing cost
3. Marketing margin
4. Producer's share in the consumer's rupee

Economic feasibility and efficiency analysis

Many methods are used - some are better than others in certain context. They are only tools for decision making and cannot be substituted for judgement of facts that cannot be quantified. The measures mainly used are

I. profit

The profit is the difference between the revenue and total cost

= Total revenue – Total cost

II. Net operating income

= Total revenue – variable cost

III. Capital turnover ratio

This ratio is used to measure the rate at which income is generated per rupee of capital invested. This ratio is calculated as follows

$$= \frac{\text{Gross income}}{\text{Capital Investment}}$$

A ratio of 40 would indicate that for every rupee invested 40 paise in income was generated Generally higher the turn over the greater the net income

IV. Pay back period

The time required to recover the initial investment out of the expected earnings from the investment before any allowance for depreciation

T = C/E

Where T = The Pay back period (Year)

C = Initial investment cost

E = Profit before depreciation.

V. Rate of return

The average annual return of an investment is measured by this method

$$\frac{\text{Annual profit + Interest}}{\text{Initial Investment}} \times 100$$

If the rate of return is higher than the opportunity cost of capital investment then the money is utilised efficiently in this investment

There are several uses of applying the above tools and production function depending on their specific needs. It can be used to compute the least-cost combination of inputs for a given output or to choose the input combination that yields the maximum level of output with a given level of cost. There are several feasible combinations of input factors and it is highly useful for decision-makers to find out the most appropriate among them. The production function is useful in deciding on the additional value of employing a variable input in the production process. So long as the marginal revenue productivity of a variable factor exceeds it price, it may be worthwhile to increase its use

Model Question:

A farmer engaged in giant freshwater prawn culture in a 5 hectare farm incurred a capital investment of Rs. 5 lakhs. He can have two crops in an year. He will be incurring an operating expense of Rs. 2lakh towards seed, Rs. 2 lakh towards feed, Rs.50,000/- towards labour charges and another Rs. 50,000 towards miscellaneous expenses per crop. The farmer gets an avenge yield of 2.5 tonnes of *M. rosenbergii* per crop fetching a price of Rs. 300 per kg. Whether the prawn farm is running on (I) profit or loss or (iii) No profit no loss basis. Justify.

Answer

I		**Capital Investment**	= Rs. 5,00,000
II		Average Fixed Cost (Annual)	
	i.	Depreciation lease value of land (a. 10% of the capital cost)	= Rs. 50,000
	ii.	Interest (a. 15%of investment)	= Rs. 75,000
		Total fixed cost (TFC)	= Rs. 1,25,000
III.		**Average variable cost (crop)**	
	i.	Seed	= Rs. 2,00,000
	ii.	Feed	= Rs. 2,00,000
	iii.	Labour charges	= Rs. 50,000
	iv.	Misc. Expenses	= Rs. 50,000
		Total	= Rs. 50,00,000
IV		**Total Variable Cost (TVC)** (Annual –5,00,000 x 2)	= Rs. 10,00,000
V		**Total Cost (T.C) = {TFC + TVC}**	= Rs. 1,25,000
		+	Rs. 10,00,000
			= Rs. 11,25,000
VI		**Revenue**	
	i.	Yield per crop	= 2.5 tonnes of, *M. rosenbergii*
	ii.	Price per Kg	= Rs. 300
	iii.	Gross revenue per crop (2500 x 300)	= Rs. 7,50,000
	iv	Total Revenue (TR) {Annual –7,50,00 x 2}	= Rs. 15,00,000
VII		**Total profit (T.P) {T.R. – T.C.}** (15,00,000 – 11.25.000)	= Rs. 3,75,000

Pay back period = $\frac{5,00,000}{3,75,000 + 50,000}$ = 1.2 years

Rate of return = $\frac{3,75,000 + 75,000}{5,00,0000} \times 100$ = 90%

The farm is running on high profit. Since the acquisition cost of Rs. 5 lakh incurred for fixed expenditure is only the prevailing interest rate of about 10% and the business is earning higher rate of return than this, it is advisable to continue