CHAPTER - IV
METHODOLOGY

This chapter contains the reason for selecting the study areas, period of study, sampling procedure, methods of data collection, statistical tools used in this study and limitations of the study.

Research methodology is a way to systematically solve the research problem. It may be understood as a science of studying how research is done scientifically. In it we study the various steps that are generally adopted by a researcher in studying his research problem along with the logic behind them. It is necessary for the researcher to know not only the research methods/techniques but also the methodology. Researchers not only need to know how to develop certain indices or tests, how to calculate the mean, the mode, the median or the standard deviation or chi-square, how to apply particular research techniques, but they also need to know which of these methods or techniques, are relevant and which are not, and what would they mean and indicate and why. Researchers also need to understand the assumptions underlying various techniques and they need to know the criteria by which they can decide that certain techniques and procedures will be applicable to certain problems and others will not. All this means that it is necessary for the researcher to design his methodology for his problem as the same may differ from problem to problem.

Allen (1978) describes methodology in a vivid fashion. It becomes first an approach towards inquiry and then later evolves into particular methods of
techniques. In the applied use it is concerned with selecting specific technical tools and techniques for collecting data and analyzing it. In the theoretical use it is concerned with the philosophical field of inquiry that can be used to conceptualize the problem under study\(^1\).

Fishing industry plays a vital role in generating employment, augmenting protein rich food and earning sustainable foreign exchange. Tamil Nadu ranks fourth in the total fish production in the country. A conventional idea of a sustainable fishery is that it is one that is harvested at a sustainable rate, where the fish population does not decline over time because of fishing practices. Thus sustainable fishery is influenced by various factors. So, it is quite difficult to formulate any methodology for studying such a complete subject. However, for this study the following methodology is followed. Both qualitative and quantitative aspects are dealt with here. The qualitative aspects include an enquiring process of understanding the sustainable fishery problems through the reported view of respondents of fishermen. In the quantitative aspects, the growth of fish production and growth fish and fish products exports are studied through collected data from fishery department and then analyzed with appropriate statistical tools.

**Selection of the Study Area**

The present study is “A study on the Environmental Economic Analysis of Fisheries Sector in Thoothukudi District of Tamil Nadu”. The following are the reason for the selection of Thoothukudi District of Tamil Nadu for this study. The geographical position, economic and environmental
resources and fishing Harbour of Thoothukudi District are very favourable for growth of fisheries. In many fisheries, current rules and regulations are not strong enough to limit fishing capacity to a sustainable level. This is particularly the case for the high seas, where there are few International fishing regulations. This is necessitated to select Thoothukudi district.

**Period of Study**

This study takes the task of analyzing an environmental economic impact of fisheries and the data collected related to growth of fisheries in the study area. The secondary data were collected from Fishery department, Govt. of Tamil Nadu. It covers a period of 20 years that is 1995 to 2014. The study takes the task of analyzing the environmental economic analysis of fishing industry in Tamil Nadu. For the purpose, primary data were collected from Thoothukudi district sample villages in 2015. This study follows survey method which is recommended by fisheries experts.

**Sampling Procedure**

1. The procedure adopted for this project is purposive sample method.
2. The listing of respondents from both households and dealers outlet is spread across 6-8 areas within each city.
3. Appointments will be fixed during listing and respondents interviewed at home.

The research must decide the type of sample researcher will use i.e., Researcher must decide about the technique to be used in selecting the items for the sample. In fact, this technique or procedure stands for the sample
design itself. There are several sample designs out of which the researcher must choose one for his study. Obviously, Researcher must select that design which, for a given sample size and for a given cost, a has a smaller sampling error\(^2\).

For this research work, simple random method is used. To gather relevant information’s from the fishermen, simple random method is used. As this study is basically an environmental economic study, to assess the views of the fishermen households is the study areas.

For the purpose of convenience and adequate representation, a total of 550 fishermen were selected for analysis, that is 275 samples from Kayalpattinam and another 275 sample from Manappad

**Collection of Data**

The basic problem of research is to collect data and facts relating to a particular phenomenon under study, whether the research is in business, economics or social sciences. The investigation is the person who conducts the research. Investigator is a trained and efficient researcher. The researcher counts or measures the characteristics under study for further analysis. The respondents are the persons from whom the information is collected. The research units are the items on which the measurement is taken. Collection of data is process of enumeration together with the proper recording of results. The success of research is based upon proper collection of data. This study essentially has made use of both primary and secondary data.
Primary Data

Primary data refers to information gathered first-hand by the researcher for the specific purpose of the study. It is raw data without interpretation and represents the personal or official opinion or position. Primary sources are most authoritative, since the information is not filtered or tampered. Data collected from individuals can be made through interviews, observation etc.

Tools of Analysis

Statistical tools methods and statistical data are indispensable in research work. An environmental science researcher extensively depends upon statistical methods in drawing conclusions. One can say with confidence that there is hardly any research finding without Statistics. But even to understand the problem, statistical analysis is a must. Whenever researcher thinks of research, researcher has to think of statistics statistical tools have universal applicability. All the activities and research works are connected with statistical data. The following statistical tools are used in this research work.

Relevant statistical information’s such as population, Socio-economic profiles, weather conditions were collected from the Department of Statistics, Chennai. The Taluk and District level particulars were collected from Thoothukudi District Taluk Office.

Various Books, periodicals, Reports, Thesis etc., were also referred from Libraries such as University of Madras, Madras Institute of Development Studies, Madras School of Economics and Guru Nanak College.
The requirements of the data are the details regarding the facilities available for fishery development. To realize the salient features of fisheries in the study areas, data about the profile of fisheries problems were gathered from the various literature of Tamil Nadu Fisheries Development Corporation, Chennai.

In order to study the growth rate of fish production, number of fishing boats both mechanized and non-mechanized secondary data for 20 years (1995 -2014) were collected from Fisheries Department, Tamil Nadu.

1. Growth Rates

Definition of ‘Growth Rates’ The amount of increase that a specific variable has gained with in a specific period and context. For investors, this typically represents the compounded annualized rate of growth of a company’s revenues, earnings, dividends and even macro concepts such as the economy as a whole.

The important Variants of growth rate (i) simple growth rate (ii) Liner growth  (iii) Compound growth and (iv) Arima model growth models.

i. Simple Growth Rate

Simple growth rate is used to calculate low much growth in a particular area. It is also known as simple percent change. It is used to calculate how much employee’s growth is in a particular company. Simple growth rate is also used to compare growth rate of two different areas³.
Simple growth rate refers to the percentage increase over the previous year.

\[ g = \frac{y_t - y_{t-1}}{y_t - 1} \times 100 \]

Where, \( g \) is the growth rate and \( y_t \) and \( y_{t-1} \) are the values of the variable \( y \) in year \( t \) and \( t-1 \) respectively.

Simple growth rate = (“present value – past value”)

= (“Past value”) \times 100

ii. Trend growth Rate

The trend rate of growth is the average sustainable rate of economic growth over a period of time. For example, in the UK, the trend rate has tended to be about 2.5 percent. The trend rate of growth is the rate of economic growth that can be maintained without inflationary pressures.

Linear Growth Rate

The percent change from one period to another is calculated from the formula:

\[ PR = \frac{(V_{\text{present}} - V_{\text{past}})}{V_{\text{past}}} \times 100 \]

Where,

\[ PR = \text{Percent Rate} \]

\[ V_{\text{present}} = \text{Present (or) Future Value} \]

\[ V_{\text{past}} = \text{past (or) Present value} \]
The annual percentage growth rate is simply the percent growth divided by N, the number of years.

Linear growth rate model are the system attributes. It is represented by variables and the activities by mathematical functions that interrelate the variable in linear form.

\[ Y_1 = (a=b)^t \]

Linear growth Means that it grows by the same amount in each time step.

4. Compound Growth Rate

The exponential trend equation which directly gives a constant rate of increase / decreases per unit of time is sometimes called the “Geometric” or compound growth Rate\(^4\).

Compound growth rates were estimated by fitting exponential trend equation of the following type.

\[ Y = ab^t \] \hspace{1cm} (1)

Where

Y = production / Export

t = Time variable in years

a = constant

and b = \((1 + r)\)

Where, r = Compound growth rate
The equation (1) takes the linear form by taking logarithms of both sides of the equation as follows:

\[ \log y = \log a + t \log b \]

Compound growth rate is computed using the following formula.

\[ \text{Compound Growth Rate (CGR)} = (\text{Antilog (Log b)} - 1) \times 100 \]

**Chi-Square Test \( (x^2) \)**

Chi-Square is examining the relationship between two attributes. The \( x^2 \) test is one of the simplest and most widely used non-parametric tests in statistical work. The symbol \( x^2 \) is the Greek letter chi. The quantity \( x^2 \) describes the magnitude of the discrepancy between theory and observation.\(^5\).

It is defined as:

\[ x^2 = \sum - \frac{(O - E)^2}{E} \]

Where, \( O \) indicates the observed frequency and \( E \) and indicates expected frequency.

The expected frequency can be calculated from the following equation.

\[ E = \frac{RT \times CT}{N} \]

\[ E = \text{Expected frequency} \]
\[ RT = \text{The Row total for the row containing the cell.} \]
CT = The column total for the column containing the cell.
N = The total number of observations.

**Ratios**

In the simplest possible form, a ratio is a quotient or the numerical quantity obtained by dividing one figure by another. Ratios make comparisons of one magnitude with another as multiples or as fractions and thus aid in the interpretation of research data. They are one of the simplest and most commonly used basic techniques in research.

Result of one number (or quantity divided by another, Ratios are the simplest mathematical (Statistical) tools that reveal significant relationships hidden in mass of data, and allow meaningful comparisons, some ratios are expressed as fractions or decimals, and some as percentages.

**Percentage**

Ratio or proportions with the base 100 are more easily understood and compared.

**Rates**

A ratio between two magnitudes usually shown over a period of time is called a rate or rate of change. This is a special kind of ratio which measures the rate of change over a period of time.

(i) a measure, quantity or frequency, typically one measured against another quantity or measure.
(ii) a fixed price paid (or) changed for something
Mean

The mean deviation is also known as the average deviation. It is the average difference between the items in a distribution and the median or mean of that series.

\[ \bar{X} = \frac{\sum X}{N} \]

It is calculated by totaling the values of the observations and dividing that total by the number of observations.

Descriptive Statistics

Any treatment of data which aims at summarizing it and presenting it in a way that facilitates its interpretation. Descriptive statistics does not involve generalizations. It includes measures of central tendency, measures of variation, measures of position, measures of association, frequency tables, and various graphical representations, as well as measures of skewness and kurtosis.

Limitations of the Study

The present study is subjected to the following limitations.

1. The study particularly analyzes the Socio-economic and environmental factors influencing Marine fishing sector only. It may not truly represent the case of other types of Inland fisheries. However, it should be noted that since the principles of sustainable fishery the same for all types of fishery sector, this limitation may not be considered as a major limitation.
2. The study had taken only 550 fishermen sample that is 275 each from Kayalpattinam and Manappad to analyze the Socio-economic and environmental problems in the study areas. This sample size may not be too adequate to explain the sustainable behavior of the fishermen in the study areas. However, any research work is constrained by time and resources. Hence, this choice can be considered as adequate basis of these constraints.

3. This study is very critical in the sense that it is subjected to recall bias of the respondents due to limitations of human memory.

**Recapitulation**

This chapter has presented the details regarding the selection of the study areas, period of study the sampling procedure used, the types of data collection for the study and the tools used to analyze the collected data. Thus this chapter has become the basis for this study.
REFERENCES


5. Illavarasan, et.al., Marine Fish catching and fish marketing of fishermen in Tamil Nadu and India, Vol.13.5.may 2013.