5.0 In this chapter the methodology of the study is presented. Section 1 specifies the data base. Section 2 gives the definition and the measurement of variables used. Section 3 deals with methods of analysis and Section 4 specifies the limitations of the study.

5.1 Data Base

The study is based upon the secondary data as well as primary data. The secondary data collected and used relate to the number of units enrolled. These data were collected for a period of 12 years from 1985 to 1996 and the sources are craft-wise report of District Industries Centre, Konam, Nagercoil and Area Directory of Handicrafts, Handicrafts Marketing and Service Extension Centre, Nagercoil, Ministry of Textiles, Government of India. Some more secondary informations were collected from the records available with the Office of the Collector, Kanyakumari District and the Office of the Central Statistical Organisation, Nagercoil.

The primary data were collected through an interview schedule from a random sample of 300 shell craft
units. The period for which data collected relate to 1995-96. The District had a total of 997 shell craft units and the list of all these units was obtained from the District Industries Centre. From the list, 300 units were selected using random sampling method.

5.2 Definition and Measurement of Crucial Variables Used in the Study

5.2.1 Output or Production

Generally production refers to the quantity of output produced by a firm or unit by combining various inputs during a given or specific period of time. In this study, production refers to the quantity of different varieties of shell craft articles produced during a day.

5.2.2 Measurement of Output

As the units (firms) do not maintain accounts for monthly or annual production and could not say specifically the number of days worked in 1995-96, production per day is used as output measure. Output can be measured either in physical terms or in terms of value added. The products produced by the shell craft units are heterogeneous. Besides, different units of the same product differ in size and quality so that different
prices are charged for the same product. Therefore output
is measured in value terms and not in physical units.
Value added is measured by subtracting raw material cost
and service expenses from total value of output.

5.2.3 Cost of Production

Total expenditure on production per day is taken as
cost of production and it is referred to as investment in
the study. Fixed capital is negligible in the industry
and hence it is not explicitly analysed in the study. In
the present study, cost of production is the sum of the
three costs, namely, i) material cost, ii) labour cost and
iii) other cost (service cost) incurred for transport and
packing per day.

5.2.4 Employment Pattern

Employment pattern in the shell craft industry is
studied by classifying labour in terms of i) occupational
status, ii) part-time and full-time and iii) sex and age.

Employment pattern (1) refers to classification of
workers on the basis of occupational status in the shell
craft industry. The classification is as follows: i) skilled, ii) semi-skilled and iii) unskilled.
A skilled worker is one who has undergone formal basic training in the shell craft either by master craftsmen or by the department under IRDP and TRYSEM scheme and have an experience of atleast 5 years and could attend to any production operation in shell craft industry.

A semi-skilled worker is one who has acquired some basic training and served for atleast one year in assisting the skilled workers in completing the finished shell products and also could manufacture simple items such as small or big door curtains independently.

An unskilled labourer is one who possess no skill but does simple operations requiring little experience of the job. The unskilled category assists the semiskilled and skilled workers and attend to minor works like arranging shells according to size and colour and making holes in them.

Employment pattern (2) refers to the classification of workers as part-time and full-time. Part-time workers are those who are engaged in shell craft activities at their homes during leisure time after completing the household chores.
Full-time workers are those workers who are engaged in shell craft production activities at the unit premises on regular basis.

Employment pattern (3) refers to classification of workers on the basis of sex and age. The classification is as follows: (i) male, (ii) female and (iii) child. The children below the age of fourteen engaged in shell craft are termed as child labour. In this industry child labourers are females only.

5.2.5 Profit

Generally profit refers to the income accrued to the entrepreneur for his services rendered in production.

In the present analysis, profit is computed as the difference between value of total output and total cost of production.

The term labourers, workers, artisans and shell craft persons are used interchangeably.

5.3 Methods of Analysis

An objective-wise method of analysis is given in the following paragraphs.
The main thrust of the study is directed towards the analysis of production structure, value of output produced, value added and the relationship between inputs and output produced, cost structure, its relationship with output level, employment pattern, marketing channels and profits.

The study may not be complete if it excludes the social and economic status of the owners of different shell craft units, who are the respondents of the present study. Accordingly, the study includes sex composition, community and religion, marital status, age structure, levels of literacy, living condition and household income including shell income of the entrepreneurs as is presented in the appendix.

5.3.1 An attempt has also been made to analyse the growth of the industry over a period of time (1985 to 1996) by fitting a trend line for the secondary data provided by the District Industries Centre, Kanyakumari district. The trend line takes the form

\[ Y = a + bt, \]

where,

- \( Y \) = Total number of shell craft units,
- \( t \) = Time in years,
- \( a \) = intercept and
- \( b \) = constant yearly increase in the number of shell craft units.
5.3.2 The shell craft industry is highly unorganised and hence the owners of different shell craft units do not maintain accounts. But they could supply information on per day output produced, raw material used, labour employed and other related variables. Hence per day output and cost of production are measured. Computation of annual data relating to these variables is not attempted as the owners of the units could not clearly say the number of days they have worked in the year of data collection (1995-96) in particular.

5.3.4 The first objective is directed towards the analysis of production and cost structure of shell craft industry in Kanyakumari district.

5.3.4.1 To study the relationship between output and inputs, Cobb-Douglas production function is chosen. It is the most popular form widely used in various research studies for the following reasons. Though it is exponential in form it can be estimated easily with a logarithmic transformation. Its exponents are the elasticity coefficients, the sum of which shows the returns to scale. Marginal productivity can also be calculated. Due to the mathematical and economic properties of Cobb-Douglas production function it has been
chosen to study the relationship between output and inputs. In this study the Cobb-Douglas production function of the following form has been estimated.

\[ Q = A X_{52}^{a1} X_{72}^{a2} X_{53}^{a3} e^{u} \]

where

- \( Q \) is the total output produced (in Rupees),
- \( X_{52} \) is material input used (in Rupees),
- \( X_{72} \) is the number of labourers employed,
- \( X_{53} \) is the other expenses in production (including packaging and transport cost),
- \( A \) is the index of efficiency,
- \( a1, a2 \) and \( a3 \) are the elasticity coefficients of \( X_{52}, X_{72} \) and \( X_{53} \) respectively.

If \( a1 + a2 + a3 > 1 \) Increasing returns to scale

If \( a1 + a2 + a3 = 1 \) Constant returns to scale

If \( a1 + a2 + a3 < 1 \) Diminishing returns to scale

5.3.4.2 The components of cost of production include expenses incurred on the production, selling and distribution of shell products. Capital as a factor of production has played a very negligible role in the shell craft industry. As a matter of fact in the present study cost of production implies the expenses incurred on labour, raw material, transportation and marketing of
shell products. Accordingly cost of production consists of three components, namely, labour cost, material cost and other costs. The component 'other costs' includes packaging and transport cost.

The cost output relationship has been estimated in the study using Linear, Quadratic and Cubic models. The algebraic forms of these models are as follows:

**Linear form**  \( C = a + bq + u \)

**Quadratic form**  \( C = a + bq + cq^2 + u \)

**Cubic form**  \( C = a + bq + cq^2 + dq^3 + u \)

Where

- \( C \) represents total cost in Rupees,
- \( q \) is the output in Rupees,
- \( a, b, c \) and \( d \) are constants and
- \( u \) is the disturbance term.

All the above 3 equations were estimated using the principle of least squares. The above 3 models were estimated with a view to select the best form satisfying economic and econometric criteria.

While the linear model has constant average and marginal costs, the quadratic and cubic models have
average and marginal costs as straight lines or 'U' shaped curves respectively. Second order condition for profit maximisation could be verified in case of U-shaped marginal cost curve and not possible in the other two forms.

5.4.5 The second objective is directed towards the analysis of employment pattern and wage structure in shell craft units.

5.3.5.1 Labour employed is measured in terms of number of persons employed. Employment pattern is studied in terms of the following classification

(i) unskilled, semi-skilled and skilled, (ii) part-time and full-time labourers and (iii) male, female and child.

5.3.5.2 To study the relationship between the different categories of labourers employed and the value added in production the following model is fitted.

\[ Q = AL_1^{\beta_1} L_2^{\beta_2} L_3^{\beta_3} e^u \]

Where

- \( Q \) = Value added in Rupees
- \( L_1 \) = number of skilled labourers
- \( L_2 \) = number of semi skilled labourers
- \( L_3 \) = number of unskilled labourers
A is the index of efficiency $\beta_1$, $\beta_2$ and $\beta_3$ are the elasticity co-efficients of $L_1$, $L_2$, $L_3$ respectively.

5.3.6 The third objective is to analyse marketing and profit of the shell craft industry.

5.3.6.1 Different channels of marketing of the shell craft products has been analysed.

5.3.6.2 Profit, by definition, depends on level of output produced, price of the product and total cost of production. Total cost of production and total output are highly correlated. In the shell craft industry, many firms produce more than one product and uniform price is not charged for the different units of the same product by the same firm, price could not be computed and used as a variable. To study the variables influencing profit, multiple linear Regression model is fitted using the variables 1) value added, 2) age of the entrepreneur, 3) age of the enterprises and 4) number of labourers employed per unit. As the Regression co-efficient of the age of the entrepreneur is not significant it has been excluded in the final model.

Age of the enterprise could influence profit. Along with increase in experience, the enterprise learns to make correct decisions after bearing risk and
uncertainty. Higher the age of the enterprise greater will be the possibility of earning profit.

It is normally expected that the higher the value added the higher the profit.

Number of labourers employed has a positive relationship with cost of production and hence may have negative relationship with profit.

As the variable 'age of the entrepreneur' has not moved directly or inversely with total cost of production, total value of output produced and total value added, it has not included in the multiple regression analysis.

5.4 Limitations of the Study

The present study is subject to the following limitations:

The study takes into account only sea-shell crafts and not shells of other types such as coconut shell and tortoise shell. Output is measured in value terms and not in physical units.
Computation of annual data relating to output, raw material, and cost of production is not attempted since entrepreneurs could not supply data as they do not maintain accounts either monthly or annually. Hence, per day (i) production, (ii) cost of production and (iii) profit are taken as the crucial variables.

The data utilised in the study are subject to recall bias and memory of the respondents.