CHAPTER - I

SYNOPSIS OF THIS STUDY

1.0. INTRODUCTION

In this age of mechanisation, automation and prefabrication, it is
surprising to find that one material makes an important contribution to the
construction sector, through the efforts of illiterate village craftsmen. This
material is brick. Construction sector is regarded as one of the backbones of
the development process mainly because of its multiplier effect in other
sectors of the economy. Building materials form the single largest input in the
construction sector accounting for about 50.0 to 80.0 per cent of the total
value of construction. Although, part of the building materials may be
produced in large-scale units, there is considerable production of building
materials such as bricks, which are produced at the local level, employing
local men and resources. For locally produced building materials, notably,
those produced at the rural level are much less known. Bricks are widely
produced and used in different regions- rural, semi-urban and urban, mainly
due to (i) demand for it and (ii) the availability resources for its production.

Generally, building activities can be grouped into three main
categories: modern, conventional and traditional. Each category makes its
own pattern of demand for building materials. The first category often requires
sophisticated and high cost building materials. For the other two, the structure
of demand is somewhat different and diversified. The use and choice of
building materials by the traditional sector, generally associated with rural
areas, is largely influenced by the suitability and local availability of such
materials. The conventional sector, often found in semi-urban and urban
areas, is based partly on traditional building materials, but mostly influenced
by modern building materials such as cement, reinforced concrete, aluminum,
gypsum, steel, glass, plastic and plywood.
Many developing countries, including India, have geared their construction efforts towards the establishment of the infrastructure needed for economic development in the form of highways, major townships, irrigation works, bridges, office buildings and housing, for which building materials had to be produced within the region (Keddie and Cleghorn 1980). It is noticed that mostly housing and other buildings were constructed out of locally available natural resources, and materials manufactured locally. These include wood, mud, brick, stone, lime, clay-tile, bamboo and thatches. Although still widely used in rural areas, many of these traditional building materials have been partially replaced by modern construction materials. However, there is still a strong demand for more traditional building materials such as bricks, lime and timber. Unfortunately, little is known about the traditional building construction sector’s use of locally available building materials. In India, statistics on production or use of traditional building materials such as bricks are almost non-existent and figures which are available, are mainly based on estimates. This is uniformly true in the case of bricks - the subject of the present study.

In the foreseeable future, there will be an increasing need for housing, particularly in the rural, semi-urban and urban areas. To provide shelter for all and to build durable and affordable housing, part of the focus of attention will have to be on the provision of available and affordable building materials such as bricks. In India, there is a need for providing cheap, good quality, local building materials such as bricks and tiles. These are the materials most people are accustomed to and therefore looking for. If locally produced, using local resources, which are often renewable, the cost of transport will be low and income will be generated at the local level. Therefore, the development and promotion of the production of building materials such as bricks locally deserves better attention.
1.1. BACKGROUND OF THE STUDY

Bricks are often considered stronger than other wall materials, having superior thermal properties, a long service life and they are pleasing to the eye. Besides, bricks are based on local resources that can be easily obtained and processed, using minimum of capital investment, while employing large number of people such as brick makers and brick layers. Compared with modern building materials, bricks are relatively cheap, although the price of brick does depend on the quality. From the environmental point of view, too bricks and tiles are less of a problem than the modern building materials. The exploitation of the raw materials used for the production of bricks and tiles requires very little energy. Moreover, the traditional building materials are produced using low or non-sulphur energy sources in the form of fuelwood, crop residues, agricultural wastes, rice husk etc. Production of traditional building materials is therefore less harmful than oil and coal used for the production of cement, iron etc. Although indiscriminate cutting of trees for fuelwood and consumption may result in environment degradation, and we can manage it with proper planning and by being environment conscious. Trees can be managed as it is a renewable resource, unlike coal, oil and gas, which are non-renewables and their indiscriminate use creates permanent scare on the earth.

A wide variety of brick making technologies are used throughout the world. These vary from very simple manual operations, which are age-old clamp kilns to the sophisticated fully mechanised (now-a-days), computerised, tunnel kilns. The latter, although common in developed countries, are rare in developing countries. Bricks are produced at the cottage, village and rural enterprise levels (FAO, 1988), with different production technologies which vary with the size and scale of production. In general, small brick units normally use Clamp Kilns, while the larger brick units almost exclusively use Bull Trunch Kilns. At the cottage and village unit levels, the technology in general, is simple; bricks are hand-moulded, sun-dried and then fired in a pit or Clamp Klin. Almost all operations are manual like moulding, drying, stacking, arranging and burning of the green bricks (Refer Flow Chart-1).
Brick industry is labour intensive and it creates a larger number of jobs particularly during the slack agricultural season. The work is seasonal, attracts migrant labourers from rural areas. Brick industry is characterised by distinct division of labour, starting from moulding, till extraction of the packed bricks from the kiln. The division of labour may be classified as: moulders, spreaders, loaders, stackers, levelers, firemen and unloaders. It has been estimated that an individual labour can dig, mix and mould the clay for about 350-400 bricks per day. (Buchanan. 1985). Women are involved in the
unskilled labour part of brick making such as transporting the bricks to and from the kiln, but some are employed in skilled works such as moulding, drying, stacking etc. The brick labourers normally live on the brickyard itself in temporary shelters and take care of all aspects of the manufacturing process of bricks. The setting of the kiln and firing the kiln, the most important parts of the brick making, which to a great extent influence the quality of bricks, are normally entrusted to the skilled male labourers.

Brick industry is generally energy intensive and bricks are fired using various sources of energy. These include firewood, sawdust, rice husk, coal and natural gas. Energy, labour and raw materials appear to be the principal production cost item, while depreciation, maintenance and indirect labour supervision account for ancillary production cost of bricks (Dome, 1990). Brick industry is scattered and located in rural and semi-urban areas widely, the larger units are however concentrated near the urban centres. It is a well-known fact that clay is the basis for brick production. Local clay is used to produce bricks. Sand is sometimes added to get the right properties. Clay is either dug from the owner’s land or from fields or ponds or tanks or banks of the river. Clay is often not transported. This is particularly valid for small-scale brick units, which produce bricks near the clay pit; the green bricks (dry bricks) are either transported to the kiln or are fired in a temporary kiln built on the site. On average a traditional brick unit producing about 41,000 bricks per firing, usually requires 1.31 tonnes of clay. That is, on average a brick requires 3.2 kg of soil (Field observation, 2003). Fired bricks are visually sorted and graded into first, second and third class bricks. Burned bricks are graded according to the quality of burning and breakages and all of them stacked separately and the pricing varies per thousand bricks. Normally, bricks are sold to retailers directly to contractors and through them to individuals and users.
STATEMENT OF THE PROBLEM

Brick industry is facing a number of problems. These include increasing cost and shortage of fuelwood, increasing cost of alternative fuels such as rice husk and coal. Problems in finding adequately skilled labour, lack of extension services to develop or adopt more effective production technologies, lack of co-operation among brick makers, lack of formal training, competition from concrete unit etc. (Koopmans, 1987) Besides, brick units, particularly small scale brick units face problems in finding working capital which force the brick entrepreneurs to buy raw materials on credit, borrow money from money lenders, pre-sell the bricks or produce on orders only. For those producers, who have bargaining power and have their own resources (financing, access to their own clay, fuel etc.) brick making may be profitable, but most of the small brick units, it appears to be a marginal business, in particular for those that have problems in obtaining working capital. Yet another major problem faced by the brick units is that their unorganized nature and actually a very little is known about it. The banking sector and the government treat the brick units as a “foreign discipline” and as a result, little finance is made available to the unit in the form of loans. Workers in the brick units constitute one of the poorest and weaker sections of the rural society. Essentially, agricultural labourers or marginal and small farmers, combining agricultural wage work, they migrate from one village to another and from one district to another in search of employment. The second largest sector, after the construction sector, absorbing such a floating labour force is the brick unit (Jayoti Gupta, 2003). Low wages, inhuman living conditions, lack of social security and health facilities, unsafe working conditions, long hours of work, loss of freedom of movement and loss of right to sell labour at prevailing market rates etc., are the general problems of the brick workers. According to FAO, the brick making units in five countries (Bangladesh, India, Indonesia, Nepal and Pakistan) employ more than two million people directly in production and probably many more are employed in related activities such as transportation of clay, fuel and bricks, sales as well as in construction as brick layers. In general, the data on brick unit are based on estimates and sometimes “guesstimates”. During the rainy season and during the harvesting time.
owners of bricks units find it difficult to attract sufficient labour, because the wages they offer tend to be low. This makes brick production seasonal. All the facts explained above is universally applicable to the traditional brick units—small brick units—the core subject of this study.

Based on the field visits and observations, it is evident that brick unit is diverse, entrepreneurial, but not always innovative. A major problem common to all brick units are that very little is known about these brick units. This is surprising, considering that the unit forms an integral part of the construction sector and contributes significantly to the economy. With this background, an attempt is made for a detailed analysis and understanding of the traditional brick units in Madurai district.

1.3. THE OBJECTIVES

Keeping the above considerations in view, the objectives of the present study are set as follows:

* to study the socio-economic status of traditional brick unit entrepreneurs in Madurai district;

* to analyse the cost-function (cost-output relations) of the traditional brick units in terms of their location and production size;

* to examine the nature of labour employment and the wage structure in the traditional brick units;

* to find out the optimum production size of the traditional brick units for attaining the Break-Even Point; and

* to identify the problems, if any, faced by the traditional brick units and suggest suitable measures for improving the operational efficiency of traditional brick units.
1.4. JUSTIFICATION / RATIONALE OF THE STUDY

Madurai District in Tamil Nadu is endowed with natural resources enabling for mass production of bricks. Almost all the brick kilns are cottage and small scale traditional skill oriented enterprise. It is estimated that there are 307 such brick kilns and about 730 labours are employed per firing. Rs.803.91 lakhs worth of bricks are produced annually to serve the local demand of the urban and semi-urban centres of the Madurai District. Nevertheless, both brick entrepreneurs and brick workers are highly disorganized, vulnerables, and prone to exploitation. Moreover, they face problems with respect to procurement of raw materials, production, processing and marketing of bricks, capital requirement and skill up gradation. They use their traditional knowledge and indigenous technology, which result to lower their productivity. With this background an attempt is made to address a few issues such as:

- What are the socio-economic conditions of traditional brick unit entrepreneurs?
- How did they acquire the vocational skills and entrepreneurial talents essential for brick enterprising?
- Do they operate their brick unit profitably? Are there any variations and differences in the cost functions and resultant break-even, affecting the economic viability of their brick units?
- How do they manage their brick units competing with the large-scale machanised brick Industries?
- What do they expect for their business survival? and related other issues are attempted. Addressing the above issues require a field based in-depth analysis. Hence, this study.
1.5. THE METHODOLOGY

I.5.1. Study Area

Madurai district is located in between 9° 30'00" and 10° 30'00" north latitudes and 77° 28'00" and 78° 28'00" east longitudes, covering the total area of 3741.73 sq.km. The district is bounded by Theni district in the west, Virudhunagar district in the south, Sivagangai district in the east, and Tiruchirapalli and Dindigul districts in the north. (Map.1 and Appendix 2)

This study, by its very nature, is an empirical and descriptive one, confining to the traditional brick units, functioning in seven taluks, namely, Madurai South, Madurai North, Melur, Vadipatti, Usilampatti, Thirumanagalam, and Peraiyur of Madurai district, Tamil Nadu, India. The district-Madurai is purposively selected for the present study, which provides good database.

Madurai South Taluk is located in the Southern and the Eastern side of Madurai city and it has seven firkas. The climatic condition remains the same as that of Madurai District. According to 2001 census, the population was 1,196,806 of which 50.63 per cent were male and 49.37 per cent were female.

Madurai North Taluk located north of Madurai city, consists of 12, Firkas. According to 2001 census, the total population of the taluk was 3,46,552 of which the male population was 50.68 per cent and Female population was 49.32 per cent.

Melur Taluk is one of the notable and unique taluks in Madurai district. It has seven firkas and it is located on the eastern side of the Madurai city. According to 2001 census, the population was 2,51,103 of which 49.89 per cent of them are male and 50.11 per cent are female.

Vadipatti Taluk is located in the northern part of Madurai district. It has seven firkas. The total population according to 2001 census was 2,10,023. The male population was 50.28 per cent and female population 49.72 per cent.
Usilampatti Taluk is yet another notable and unique taluk in Madurai district. It is located on the western part of Madurai city and nearer to western ghats. It has five firkas. Most parts of the taluk are drought areas. Except Usilampatti, all other areas are villages. According to 2001 census, the total population of the taluk was 178211 of which 51.65 per cent were male and 48.35 per cent were female.

Thirumangalm Taluk is located on the southern side of Madurai city. It has six firkas. The population of taluk according to 2001 census was 1,95,231. Of the total male population was 51.15 per cent and female population was 49.85 per cent.

Peraiyur Taluk is located very near to the Western Ghats. It has 6 firkas. The total population of the taluk, according to 2001 census was 1,84,353 of which male population was 50.23 per cent and female population was 49.77 per cent.

1.5.2. Sources of Data and Methods of Data Collection

This study is mainly based on primary data, collected through a well-structured and pre-tested interview schedule (Appendix-1). The schedule was administered to elicit information and data from traditional brick unit entrepreneurs. The interview schedule was designed so as to overcome the recall bias to the maximum extent possible through various checks. The data and information cover the areas such as socio-economic status of traditional brick unit entrepreneurs, production and production process of bricks, cost structure of brick units, labour, employment and wage structure, sales volume and sales value of bricks, profit etc.

The primary data at the traditional brick units level was collected from 307 traditional brick unit entrepreneurs, who are involved in production of bricks during 2003. Hence, it is to be noted that this study is a cross sectional analysis of data at one point of time. Therefore the researcher adopted the census method and interviewed all the brick unit entrepreneurs in the seven taluks of Madurai District.
The traditional brick units under operation during the year 2003 were identified with the assistance of Village Administrative Officers (VAOs), brick unit entrepreneurs, brick moulders and the Presidents of the Village Panchayats.

The collected data and information have been analysed in terms of location (Taluk wise) and production size wise. The details about the number of traditional brick units (both taluk wise and production size wise) and number of firing in each category are given in the tables 1.1 and 1.2. The data given in the tables are self-explanatory.

### TABLE 1.1
CLASSIFICATION OF TRADITIONAL BRICK UNITS ACCORDING TO THE TALUKS WITH NUMBER OF FIRINGS

<table>
<thead>
<tr>
<th>Location (Taluk)</th>
<th>No. of Brick Units</th>
<th>Per cent</th>
<th>Number of Firings</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Madurai South</td>
<td>54</td>
<td>17.6</td>
<td>276</td>
<td>13.5</td>
</tr>
<tr>
<td>Madurai North</td>
<td>48</td>
<td>15.6</td>
<td>240</td>
<td>11.8</td>
</tr>
<tr>
<td>Melur</td>
<td>43</td>
<td>14.0</td>
<td>138</td>
<td>6.8</td>
</tr>
<tr>
<td>Vadipatti</td>
<td>41</td>
<td>13.4</td>
<td>297</td>
<td>14.6</td>
</tr>
<tr>
<td>Usilampatty</td>
<td>48</td>
<td>15.6</td>
<td>351</td>
<td>17.2</td>
</tr>
<tr>
<td>Thirumangalam</td>
<td>36</td>
<td>11.7</td>
<td>374</td>
<td>18.3</td>
</tr>
<tr>
<td>Peraiyur</td>
<td>37</td>
<td>12.1</td>
<td>363</td>
<td>17.8</td>
</tr>
<tr>
<td>Total</td>
<td>307</td>
<td>100</td>
<td>2039</td>
<td>100</td>
</tr>
</tbody>
</table>

*SOURCE: Computed from the primary data

### TABLE 1.2
CLASSIFICATION OF TRADITIONAL BRICK UNITS ACCORDING TO THE PRODUCTION SIZE WITH NUMBER OF FIRINGS

<table>
<thead>
<tr>
<th>Production Size (000 bricks)</th>
<th>No. of Brick Units</th>
<th>Per cent</th>
<th>Number of Firings</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-30</td>
<td>99</td>
<td>32.3</td>
<td>887</td>
<td>43.5</td>
</tr>
<tr>
<td>31-45</td>
<td>86</td>
<td>28.0</td>
<td>447</td>
<td>21.9</td>
</tr>
<tr>
<td>46-60</td>
<td>66</td>
<td>21.5</td>
<td>429</td>
<td>21.0</td>
</tr>
<tr>
<td>61-75</td>
<td>28</td>
<td>9.1</td>
<td>141</td>
<td>7.0</td>
</tr>
<tr>
<td>76-90</td>
<td>28</td>
<td>9.1</td>
<td>135</td>
<td>6.6</td>
</tr>
<tr>
<td>Total</td>
<td>307</td>
<td>100</td>
<td>2039</td>
<td>100</td>
</tr>
</tbody>
</table>

*SOURCE: Computed from the primary data

Besides, secondary and documentary sources (books, journals, monographs, research reports, mimeographs, plan documents, records maintained by VAOs and Village Panchayats) were also referred to and data collated for simple analysis and interpretation. Consultations and participatory
dialogues were also used for understanding the science and economics of traditional brick units.

1.5.3. Tools and Techniques Used for Data Analysis

The field survey data have been coded, tabulated, edited and then selected for analysis and interpretation. Simple statistical tools like average, percentage, correlation etc., were used for data analysis and interpretation. In addition, the managerial economics tools such as Break Even Analysis has been used to find out the optimum production size of the different traditional brick units in the study area.

1.6. TERMS AND CONCEPTS USED IN THE STUDY

Green Bricks: Bricks formed into shape but not baked.

Burnt Bricks: Baked bricks that are ready for sale.

Clamp Kiln: Clamp kiln does not have permanent kiln structure. As such the capacity of the clamp kiln is flexible. Depending upon the demand for bricks in the market and capital availability, the production capacity can be changed and thus the size of the clamp kiln. The clamp consists essentially of a pile of green bricks interspersed with combustible material over a hard foundation. A clamp kiln is made up of several layers of bricks. Air holes or openings (50 x 50 c.m.) are kept at the bottom of two opposite sides of the kiln through which the fire is initiated.

Clay: The sand having plasticity, porosity and flexibility and can be used for the production of bricks is known as clay. It is the raw material for production of bricks.

Poorambokku Land: It is not owned by the private but owned by the government.
Size: Size of brick unit means physical volume of production of bricks per firing.

Low Value - Weight Ratio: Low value - weight ratio means low sale rate (price) per unit weight of product. Brick is a low value - weight ratio product. It was observed in the study area that the normal weight of a brick produced by the traditional brick unit is 3.100 kgs and its sale value at the kiln site is Rs.1.02 per brick.

Productive Capital: Productive capital in the brick unit is the total capital which includes both fixed capital and working capital.

Fixed Capital: Current market value of fixed assets is the fixed capital. Fixed assets in the brick unit includes thatched sheds, tools, equipments, kiln structure, moulding frames, baskets, tarpalin, trally etc. Fixed capital excludes land and building. All the fixed assets are valued at the current market prices prevailing at the time of data collection.

Working capital: The term working capital refers to the capital required for day-to-day operations of the brick kiln.

Depreciation on Fixed Assets: Depreciation is a reduction in the value of fixed assets. It arises owing to the wear and tear of an asset in the course of its use. The depreciation of fixed assets is calculated by the straight-line method in which current market value of the fixed assets is divided by the remaining life (in years) of the assets.

Rent: It includes rent for land and buildings. For owned land and buildings rent was imputed at market rates.

Interest: It is the actual interest paid by the producers for the borrowed capital and interest imputed for own capital at the rates of 8.5 per cent. The opportunity cost of own capital was obtained by using the interest rate charged by the nationalised banks in the study area at the time of data collection.
Cost: Cost is the amount, measured in money, or cash expended or other property transferred, services performed or liability incurred, in consideration of goods or services received or to be received. Thus cost represents the resources that have been or must be sacrificed to attain a particular objective.

Fixed cost: It does not vary with the volume of production.

Variable Cost: It varies almost in direct proportion to the volume of production or sales.

Raw Material Cost: It is the expense on clay, soil, sand and water. If the inputs are owned by the producer, their prices are imputed at the prevailing market prices.

Fuel and Power Cost: It is the expense of the brick unit used on items like firewood, and electricity.

Wage Cost: Wage Cost means wages paid to all the labourers involved in digging the earth, (loading and unloading of the clay, soil, sand and the firewood), moulding, drying and stacking of green bricks, supervision of moulding operations, carrying the green bricks to the kiln (by head load), piling the green bricks inside the kiln, spreading soil over the top surface of kiln and unloading the burnt bricks from the kiln. Wages for family labourers are imputed at the market rates.

Miscellaneous Cost: Miscellaneous cost includes repair and maintenance cost, expenses on puja items, licence fee, rent for land, bonus, gifts offered to the labourers during festivals time (Pongal and Deepavali).

Marginal Cost: Marginal cost is the cost of producing extra unit of output. It is the amount by which total cost increases when one extra unit is produced or the amount of cost, which can be avoided by producing one unit less. In other words marginal cost means “the amount at any given volume of output by which aggregate costs are changed, if the volume of output is increased or decreased by one unit.”
Price: It is the exchange value of commodity or service in terms of money. The exchange value is called “price”.

Profit: The difference between the total revenue and total cost is profit. Total revenue means money realised by sales of goods viz., bricks. The total cost consists of all direct and indirect expenses incurred for production and sale of bricks. Cost also includes sales promotional expenses.

Profit-Volume Ratio: The Profit Volume Ratio is usually called P.V. ratio. It is one of the most useful ratios for studying the profitability of business. The ratio of contribution to sales is the PA/ ratio. It may be expressed in percentage. Therefore, every organisation tries to improve the P.V. ratio of each product by reducing the variable cost per unit or by increasing the selling price per unit. The concept of P.V. ratio helps in determining Break-Even-Point, profit at any volume of sales, sales volume required to earn a desired amount of profit etc. The formula for Profit-Volume Ratio is

\[
\frac{\text{Contribution}}{\text{Sales}} - \frac{\text{Variable cost}}{\text{Sales}} \times 100
\]

Break Even Analysis: The Break-Even Point and Break-Even Chart are two methods of Break-Even Analysis. In a narrow sense, it is concerned with Break-Even Point and in a broad sense, it includes Break-Even Chart also. Break-Even Analysis is also known as cost-volume-profit analysis. It is one of the tools of financial analysis, whereby, the impact on profit of the changes in volume, price, costs and mix can be estimated with reasonable accuracy. Break-Even Point is equilibrium point or balancing point of no-profit and no-loss. This is the point at which loss ceases and profit begins. This is a point where income is exactly equal to expenditure.

Break Even Point: Break Even Point refers to the point where total cost is equal to total revenue. It is a point of no profit and no loss. This is also a minimum point of production where total costs are recovered. If sales go up beyond the Break Even Point, organisation makes a profit, if sales comedown, a loss is incurred. The formula for
Break Even Chart: The technique of Break-Even Analysis can be made easy with the help of graph or mathematical formula. Graphical representation of Break-Even Point (or cost-volume-profit) is known as Break-Even Chart. It shows the profitability or otherwise of an undertaking at various levels of activity and indicates the points at which neither profit nor loss is made.

Contribution: Contribution is the difference between sales and variable cost and it contributes towards fixed costs and profit. It helps in sales and pricing policies and measuring the profitability of different proposals. In other words

\[
\text{Contribution} = \text{Sales} - \text{Variable cost}
\]

or

\[
\text{Contribution} = \text{Fixed cost} + \text{Profit}
\]

Margin of Safety: Margin of safety is the excess of sales over the break even sales. It can be expressed in absolute sales amount (or) in percentage. It indicates the extent to which the sales can be reduced without incurring loss. A large margin of safety indicates the soundness of the business. The formula for the Margin of Safety (MOS) is

\[
\text{MOS} = \frac{\text{Profit}}{\text{Present sales} - \text{Break even sales} \times \frac{\text{PA/ ratio}}{\text{PA/ ratio}}}
\]

Operating Cycle: Operating cycle indicates the duration of time required between purchase of inputs and conversion of debtors into cash.

1.7. SCOPE OF THE STUDY

The study has been undertaken with a view to examine the present status of traditional brick units, which supply considerable portion of brick requirements of the construction sector. Moreover, the traditional brick units are unnoticed by the government and not governed by the policies, rules and regulations. This kind of study could open the eyes of the governments (Local, State and Centre) which can formulate suitable, viable and appropriate policy
for sustainable development of traditional brick units in the near future. The study also highlights the major problems faced by the traditional brick units and suggests sound mechanisms to improve their economic, environmental and operational efficiency.

1.8. LIMITATIONS OF THE STUDY

This study is confined to the traditional brick units in seven taluks of Madurai district and does not cover the large scale-modern chamber brick units that are also functioning in the study area. This is, because, traditional brick units are entirely different from large scale-modern chamber brick units - in terms of scale, size and technology, capital and investment, labour and fuel, techniques and mechanisms. Under these circumstances, the researcher has exclusively dealt with the traditional brick units and purposively avoided studying the large scale - modern chamber brick units. Conscious efforts have been made at each stage for eliciting detailed information about the economic analysis of traditional brick units in the study area.

1.9. THE ORGANISATION OF THE THESIS

The outcome of the study has been presented in five chapters. The first chapter provides a brief introduction, a background of the study profile and statement of the problem, the objectives, the methodology, the scope and the limitation of the study. The second chapter presents an overview of the science of bricks covering physical and chemical properties of bricks. The third chapter describes the review and appraisal of literature. The fourth chapter brings out the discussion and results regarding the socio-economic status of the traditional brick unit entrepreneurs and also the analysis of data collected from the traditional bricks units in terms of their location and production size. The summary of findings, suggestions and conclusion is presented in the last chapter.
REFERENCES


GOVERNMENT OF INDIA: Census of India, 2001

