SMALL SCALE INDUSTRY IN KERALA
An Analysis of Technical Efficiency in the Post Reform Period

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I hereby affirm that the work for this dissertation, ***"Small Scale Industry in Kerala: An Analysis of Technical Efficiency in the Post Reform Period"***, being submitted as part of the requirements of the MPhil Programme in Applied Economics of the Jawaharlal Nehru University, was carried out entirely by myself. I also affirm that it was not part of any other programme of study and has not been submitted to any other University for award of any Degree.

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29th June, 2007 **Sreepriya S.**

Certified that this study is the bona fide work of **Sreepriya S.**, carried out under our supervision at the Centre for Development Studies.

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Dedicated to my grandfather…

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ABSTRACT OF THE DISSERTATION

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The state of Kerala is industrially less developed and the growth of manufacturing sector in the state is relatively slow. The internal structure of the manufacturing industry of Kerala has continued to remain concentrated and lop-sided in nature. The industrial base is characterized by the dominance of local resource based traditional industries and inadequate shares of capital goods and modern industries. The small-scale industries (SSIs) of Kerala contribute a significant share in employment generation, production and number of units in the manufacturing industries when compared to the large-scale sector. This shows the relative importance of the small-scale sector in Kerala. But the growth of the SSIs in the state is restricted by the capital and technological constraints. So the need and scope for the development of the SSIs is of much relevance. The sustainability of the SSI sector in specific and the industrial sector as a whole depends on its efficient performance. This becomes more relevant in the context of liberalization. In this background, the present study attempts to analyse the technical efficiency of the SSIs in the reform period to identify the industry groups that are working efficiently and the factors that are contributing to the growth of those industries. The sector consists of both registered and unregistered firms and we do analyse the efficiency of both groups separately. The main objectives of the study are (i) To attempt a comparative analysis of the structural transformation took place in SSIs of Kerala with all- India in the pre and post reform period. (ii) To examine the technical efficiency of the registered small-scale industry groups in Kerala under liberalization. (iii) To analyze technical efficiency of the unorganised small-scale industry groups in Kerala under liberalization. The major data used in the study are Census Reports of Small-Scale Units, 1972-73,1987-88 and 2002-02 (DCSSI), firm level data of the SSIs registered under the Directorate of Industries for period 2005-06 and unit level data of the NSSO Report of Unorganized Manufacturing Sector in India (56^{th} Round, 2000-01). We have analyzed the technical efficiency of SSIs across industries using the Data Envelopment Analysis (DEA). The factors determining the technical efficiency of industries have been estimated using Tobit regression analysis. We tried to capture structural changes that took place in SSIs on the basis of the changes in the distribution of the number of units, employment, fixed capital investment and production across industry groups and at the state level. The fixed investment and output showed a significant increase in the post reform period at both all-India and Kerala. This accounts for the increasing modernization in the sector. But the growth in employment was very modest at the all-India level. The exports showed a significant growth over the period. The industry-wise analysis of all-India and Kerala showed that capital productivity substantially declined in all the groups in the post reform period in both cases. The labour productivity almost doubled in the post reform period for both all-India and Kerala since reforms. The inter-industry analysis of technical efficiency of registered SSIs in Kerala showed that Chemicals and chemical products industry was the relatively

efficient industry. The largest overall inefficiency has been observed in Transport Equipment and parts industry. Communication and equipment and Medical, Optical instruments, watches &clocks and Manufacture of textiles industries were observed to be relatively efficient in unorganized sector. The highest overall inefficiency level has been observed in Media and Publishing, and Basic metal industries. In order to explain the variation in technical efficiency among selected small industrial groups Tobit regression analysis has been employed. The result showed that subcontracting is statistically significant and so it has a positive effect on the technical efficiency of the industry. The variables like availability of electricity connection and power supply without interruption were also significant suggesting that these variables have a positive effect on the technical efficiency of the industries.

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Chapter I
Introduction

1.1. Background

The small-scale sector constitutes an important component of the manufacturing industry in India. This sector contributes about 40 per cent share in the national industrial output along with an 80 per cent share in industrial employment and nearly 35 per cent share in exports (Planning Commission, 2002). The promotion of small-scale industry remained as one of the major objectives of economic planning in India. The small scale industry was given a very high priority on account of their employment potential, comparatively low requirement of capital, short gestation period, use of traditional skills, useful links with medium and large scale sector, wide geographical dispersal, promotion of regional development, low per unit cost of employment, utilization of local resource, suitability of production of goods for mass consumption, mobilization of small savings, production of exportable products, etc. Small-scale units were protected through measures such as reservation of certain products for exclusive production in the small-scale sector, reservation of some of the products produced in the sector for purchase preference by government agencies, supply of scarce materials, input price concessions like lower interest rates and numerous fiscal measures such as excise duty exemptions and other tax concessions. Not surprisingly, these forms of favorable treatment of the small sector has led to widespread abuses of the system: "*Small industries in India have because of government policy been encouraged to remain small, and when they grow, to split so that they remain within the definition of small scale units, as a result of which they enjoy special protection and incentives*" (Rao, 1994).

The introduction of policy changes at the global, national and sectoral levels have radically changed the environment for the functioning of small industry (Balasubramanya, 2004, Tannan, 2002). In the liberalization era, the survival of Small-Scale Industry (SSI) depends on the improvement in its efficiency through adoption of

new technology and production of quality products. In order to get into the international production and trade networks, individual units have to satisfy the buyers' standards in terms of quality, price and delivery schedules (Tendulkar and Bhavani, 1997, Tannan, 2002). SSI units cannot survive as isolated units producing low quality products using obsolete technology.

In the above context the main issue is whether the small-scale industry will survive in the era of globalization withstanding the internal and external competition? What would be the future for small enterprises in India? How much competitive are these enterprises in the new environment? In this context, the efficiency with which the firm is functioning becomes very important. The present study will be focusing on this sole objective of technical efficiency of the small- scale industry groups in Kerala in the post reform period.

1.2. Overview of the Small Scale Sector

In this section we try to examine in brief the structure of the SSIs in all-India and Kerala. Small firms in India do not constitute a homogenous sector; it can be categorized as registered-unregistered, urban-rural, modern-traditional, larger-tiny etc. The sector has undergone changes in these aspects over time.

The registered units are those small manufacturing industries, ancillary units and small-scale service and business enterprises (SSSBEs) which are registered permanently with State Directorates of Industries/District industries centers where as those units that are not permanently registered are the unregistered units. According to third Census report of small-scale industries (2001-02), the registered units constitute only 13.07 per cent of the sector and rest of the units are in the unregistered sector.

The composition of the small-scale sector showed a long term change of declining trend of the traditional sector and growth of modern industries. The industries like textile products, wood furniture, paper and printing and metal products are the major modern industries contributing to the output. Among the traditional industries handicrafts and

handloom industries constitutes a major share of output. The locational distribution of small-scale units showed that the industries have been almost equally distributed in the rural and urban areas in both pre and post reform period.

At the all-India level, the share of small-scale industries (SSIs) in the overall small-scale sector was 92.24 per cent in pre liberalization period, which declined to 65.55 per cent after liberalization. The growth of SSSBEs (Small Scale Service and Business Enterprises) from 3.24 per cent to 34.5 per cent is another interesting factor. It shows the scope for growth of service-based units in the open economy framework. The units working as ancillaries also increased to 0.52 per cent to 5.08 per cent. The sectors like food products, wood products, rubber and plastics; chemicals and metal products remained the sectors with highest growth in the pre reform and post reform period. In the pre liberalization period, Maharashtra, Orissa, Himachal Pradesh were the three states with highest number of SSI units. By 2001-02, Tamil Nadu and Uttar Pradesh were the states with highest distribution of SSI units. In the case of employment generation, Tamil Nadu, Maharashtra and Uttar Pradesh remained as the major employment providing states and Maharashtra, Punjab and Uttar Pradesh were the states with highest production in the post reform period.

In Kerala, the small-scale sector showed a growth of more than five times in the post reform period compared to pre- reform period. The SSIs showed a decline from the pre-reform period 96.06 per cent to 58.41 per cent in the post reform period and SSSBEs showed an increase 3.57 per cent to 41.59 per cent. The ancillary units also showed an increase from 0.38 per cent to 3.44 per cent. This may be indicative of better scope for subcontracting in Kerala compared to all-India. The industrial base of Kerala has been narrow and there were no significant diversification over time. Food industry, metal products, chemicals and basic metals were the better performing sectors in the state. Ernakulam, Thrissur, Kollam and Thiruvananthapuram remained as the districts in which SSIs have been more prominent. We shall discuss more about Kerala situation in the following sections.

1.3. Definition of Small Scale Industries

The small-scale industries were not clearly defined at the time of independence. Before independence small-scale industry denoted the village based and the urban based cottage industry and manufacturing handicrafts (Bhatnagar, 1995). The Industrial Policy Resolution of 1948 and the First Five Year Plan document identified the small-scale industries as the industries, which do not come under the Factory Act. The small industries included those industries that used power and employed less than 10 workers or did not use power and employed up to 20 workers. During the First Five Plan the distinction between small and village industries was made. Small scale industries were defined as (i) those units which employed less than 50 workers, if using power; or (ii) less than 100 workers if not using power ;or (iii) having capital assets not exceeding Rs.5 lakhs. In1960, the employment criteria was dropped and the small-scale industries were defined in terms of investment in plant and machinery alone. As per the 1966 definition, all industrial units with a capital investment of not more than Rs.7.5 lakhs were categorized as small-scale industries. In 1982 the service oriented units were included in the small scale sector; provided they are set up in rural areas and towns with population less than 5 lakhs and the investment limit in plant and machinery below Rs.2 lakhs. In the New Small Enterprise policy announced in August 1991, the investment limit of small-scale industry was raised to Rs.60 lakhs. The investment limit was raised to Rs.300 lakhs during 1997 due to inflation. Later in 1999, the investment limit was reduced to Rs.100 lakhs (Prasad, 2004). In most countries, small- and medium-scale units are clubbed together for policy purposes and called SMEs. Hence, the Planning Commission Study Group on Development of Small Enterprises, which submitted its final report in May 2001, has suggested that tiny, small and medium establishments could be redefined in terms of investment limits of Rs 25 lakh, Rs 5 crore and Rs 10 crore respectively (Bhavani,2002). By the introduction of Micro, Small and Medium Enterprises Development (MSMED) Act of 2006, the concept of Small Enterprises was changed to

Small and Medium Enterprises. The definition of the small enterprises engaged in manufacture or production of goods has been revised as follows:

(i) a micro enterprise, where the investment limit in plant and machinery does not exceed twenty-five lakh rupees;

(ii) a small enterprise, where the investment limit in plant and machinery is more than twenty-five lakh rupees but does not exceed five crore rupees;

(iii) a medium enterprise, where the investment limit in plant and machinery is more than five crore rupees but does not exceed ten crore rupees.

The definition of the small enterprises engaged in providing or rendering services has been revised as follows

(i) a micro enterprise, where the investment in equipment does not exceed ten lakh rupees;

(ii) a small enterprise, where the investment in equipment is more than ten lakh rupees but does not exceed two crore rupees;

(iii) a medium enterprise, where the investment in equipment is more than two crore rupees but does not exceed five crore rupees.

The changes in the investment limits of the small-scale industries over the period are given in Table 1.1.

Table 1.1: Investment limit of the Small Scale Industry in India

Year	Investment Limits
1950	Up to Rs.5 lakhs in fixed assets
1960	Up to Rs.5 lakhs in plant and machinery
1966	Up to Rs.7.5lakhs in plant and machinery
1975	Up to Rs10 lakhs in plant and machinery
1980	Up to Rs.20 lakhs in plant and machinery
1985	Up to Rs.35 lakhs in plant and machinery
1991	Up to Rs. 60 lakhs in plant and machinery
1997	Up to Rs.300 lakhs in plant and machinery
1999	Up to Rs.100 lakhs in plant and machinery
2006	Up to Rs.5 crores in plant and machinery

Source: Engine of Growth 2002-03, DCSSI, MSMED Act 2006.

1.4. Conceptual Framework

The arguments put forward in favour of small-scale industries are their labor intensity and related positive distribution effects, their flexibility, the potential contribution to decentralization and their promotion of entrepreneurship etc. (Abid Hussain Report, 1997). The small scale industries are promoted in the developing countries along with the large industries due to the certain peculiarities of it like (i) large industries are capital intensive and capital accumulation takes time (ii) small scale industries have a low capital output ratio as compared to the competing modern large industries, even though the large industries have lower cost per unit of output. The promotion of small-scale industries also ensures the mobilization of latent capital and checks over-urbanization and concentration of incomes (Subrahmanian and Kashyap, 1975). In developing countries with scarcity of capital and abundant supply of labor small-scale industries are more appropriate as they have a higher output-capital ratio than the larger scale units. The small-scale industries are supported also on the ground that they are less capital intensive than large enterprises though the productivity is lower (Bhatnagar, 1995).

The theoretical justification favoring SSEs in developing countries is the static efficiency argument, which states that the allocative efficiency of SSEs is supposedly higher from a social point of view because they face lower wage and higher capital costs than larger enterprises reflecting the social cost of labor and capital. The dynamic arguments favoring SSEs are mainly the following: Firstly, the small-scale firms are more innovative. Secondly, there is 'seed bed' argument, to the effect that an economy fully dominated by large firms cannot sustain for long and so a thriving small-scale sector is vital (Little et.al, 1988). Small-scale sector functions like the 'seedbed' for new enterprise and entrepreneurial talent, a source of new lifeblood and ideas, and potential growth to maintain a spur of competition. It prevents stagnation because there is existence of conditions in which new businesses can be started from which the firms of the future can grow (Waite, 1973). Seed bed industries promote indigenous entrepreneurship, and they have the ability to stimulate a spinning- off process (Lackey, 1998).

The difference between small and large-scale industries is most often associated with the scale of production rather than technique. When maximization of income in the long run is the main objective, the maximization of surplus in the short run is very essential so that it can be invested to yield more income in the long run. But the small-scale industries are in a disadvantageous position as compared with the large industries in the case of income created in the short run (Sandesara 1993). In the case of economies of scale, large industries are more beneficial than small-scale industries. Small-scale industries have low economies of scale due to its small size when compared to large industries

Finally, the relationship between large and small firms are not always competitive they can be complementary too. The small and large firms can support each other through subcontracting (Subrahmanian and Kashyap, 1975). It is difficult for the small firms to sustain alone in the competitive environment. But they have access to the competitive labor market. On the other hand large firms could potentially invest in developing the competitive factors, but they lack of the advantage of access to the low cost labor market. Thus the linkages between small and large firms are beneficial to both types of firms.

1.5. Policy on Small Scale Industry in India

The present section gives a brief sketch of the policies initiated by the government of India for the development of the Small Scale Industry (SSI). The SSIs has been given a prominent place under the planning regime, basically on the employment generation and balanced industrial development argument. Reservation of items for the exclusive production, purchase preference by the government and special financial and fiscal incentives has been the major policy support measures. In India, a major reform process has been under way since July 1991 to liberalize the regulations on domestic economic transactions. Some of these reforms were the abolition of licensing requirements for investments for majority of industries, opening of hitherto reserved areas of public sector to the private sector, reduction in price controls, reforms in capital markets, etc. All these policy reforms have taken away the closed and assured markets of the Indian industry

exposing it more and more to the market competition. Though the reforms are yet to touch the policies directly relating to the small-scale sector, new economic policies have already exposed this sector to market competition indirectly. Financial sector reforms have squeezed the benefits of lower interest rates, credit guarantee schemes and priority sector lending. De-licensing along with the reduction in price controls has taken away the special advantage of obtaining scarce raw materials at nominal prices. Added to these would be the recent technological advancements made the SSIs to face large competition. Liberalisation of numerous regulations on the domestic economic transactions exposed the enterprises, small or large, to market competition to a greater extent while globalisation of the economy resulting in intensifying the market competition. Various policy initiatives of the government of India for the promotion of Small Scale Industries via its industrial policy resolutions are summarised in Appendix 1.

1.6. Review of Literature

The promotion of small-scale industries has been a major objective of the India's developmental plan. There exists a large volume of literature dealing with the different aspects of the SSIs in India and abroad. The studies can be categorized as those, which are dealing with traditional industries, modern industries, performance of small scale industries and relationship between small and large industries. In the Indian scenario, SSIs has been one of the areas, which attracted many researchers, and there have been some interesting review studies by Subrahmanian and Kashyap (1975), Suri (1988), Sandesara (1988), Desai and Taneja (1993) and Gang (1992). These surveys provided significant insights into the logical foundations of academic enquiries and policy architecture in this sub-sector of the economy. In the present section, we critically review some of the important studies at the international, national level and regional context. We may also review emerging issues like subcontracting and clustering in the small-scale sector as well.

The village and small industries (VSI) sector consists broadly of (i) traditional industries and (ii) modern small-scale industries.

Literature on Traditional Industries

The traditional industries (viz. handlooms, khadi and village industries, sericulture, handicrafts and coir) are generally artisan-based, located mostly in rural and semi-urban areas, involve lower levels of investment in machinery and provide largely part-time employment. They are highly labour intensive. Dhar and Lydall (1961) cited industries like food stuffs, tobacco products, wool textile, silk textile, miscellaneous textiles, wood and wood products, leather and leather products as traditional industries.

Studies on the traditional industries in India during the 1950s and 1960s were concerned mainly with the choice of technique and the role of SSIs in the context of Mahalanobis strategy of large-scale industrial promotion (Raj, 1986; Sen, 1957; Vakil and Brahmanada, 1956; Rudra, 1956 and Biswas, 1957). The complementary role of the SSIs particularly cottage industry in the context of high employment generation has also been emphasized in the literature. The choice of technique debate had clarified the theoretical rationale and the criteria for technological choice, but it remained inconclusive in view of the recognition that optimality depends on a number of factors including wage rates, working capital requirement, foreign exchange requirement, time preference and reinvestability of surplus.

There were studies, which evaluated the performance of the traditional and village industries[1]. These studies concluded that traditional and village industries were performing poorly and the government policies were not having the intended effect (Mehta Committee, 1964; and Dutt Committee Report, 1969). Deficiencies were pointed out with regard to employment generation, regional dispersal, technological levels and capital equipment (Dhar, 1958; Lakdawala and Sandesara, 1960; Papola and Misra, 1980 and Singh,1961). This led to the recognition of the need for technological upgradation in

[1] See L.K. Mitra for a detailed survey on performance evaluation of SSIs in India.

the traditional small-scale sector. Other problems facing the enterprises like marketing and finance, raw material supplies were also noted (Shetty, 1963; Mc Crory, 1956 and Singh, 1961). The coexistence of the small and large industries in were also identified (Waardenburg, 1988; de Haan, 1988; Banerjee,1988; and Suri,1988).

The problems faced by traditional industries in terms of low productivity and obsolete technology continued to attract the attention of researchers (Mehta, 1969 and Morris et.al 2001). Despite the policy initiatives of government, technology upgradation has not proceeded very far. These industries are sustaining because of the slow industrialization of the country and as industrialization proceeds they will die out in the long run. This has been a major lacuna for the traditional sector in India. Thus, research carried out so far has generally pointed out that traditional industries have fared poorly, calling in to question an entire set of premises on which policies of protection and subsidies have been based.

Literatures on Modern Small Scale Sector

Modem small-scale industries are those, which mainly use power-operated appliances and machinery, have some technological sophistication, are generally located close to or in the urban areas and are better integrated with the large-scale units. They employ hired labour and use modern machinery to produce modern goods. Modern small industries manufacture a wide variety of goods from simple items to sophisticated items such as television; electronics control system, and various engineering products, particularly as ancillaries to large industries (Subrahmanian and Kashyap, 1975).

The studies on modern small-scale industries can be categorized as those dealing with their (i) performance, and (ii) scale and efficiency relative to large- scale industries.

Performance of Small Scale Industries

The growth performance of this component of small scale sector has been impressive (Sandesara,1969; Government of India Sixth Five Year Plan). The profitability and

capital efficiency in the small-scale industries was found much higher than the corporate sector (Nagaraj, 1985). There was a significant rise in the registered small-scale units in the mid-sixties and engineering and chemical industries contribute over half of the total value added by the sector. Impressive growth rates of employment and value added across industry groups were recorded in the 1980s (Ramaswamy, 1994). But there was no substantial change in the structure of SSI sector over the period 1972 to 1987-88. The study examined the wages and labor productivity in various industry groups and found that the bulk of SSI employment is characterised by low wage employment. The estimated output share of reserved items in industries has not increased showing that production of reserved items is not a dominant production activity of SSIs units.

The size distribution of the manufacturing firms and the employment and output concentration has also attracted the attention of researchers. Sundaram and Tendulkar (1988) found that in four industry groups (jute; hemp and mesta; basic metals and alloys; electrical machinery; and transportation equipment) the large firms were dominant with its value added share exceeding 87 per cent and employment share exceeding 70 per cent; the small firm sector and unregistered workshops is not dominant in any industry grouping. The three industry groups' (repair services, miscellaneous manufacturing and textile products), share exceeded 45 per cent in terms of value added and 32 per cent in terms of employment of the urban household sector. In four other industry groups (wood; leather; wool and synthetics; and metal products), shares in value added exceeded 20 per cent. The rural household sector dominated in terms of employment in six industry groups (wood; miscellaneous textile products; leather; food; beverages and tobacco; and non-metallic minerals). They concluded that employment is concentrated in the smallest firms while value added is concentrated in the, largest firms.

There have been drastic policy changes in the early 1990s, which had led to a series of studies in the SSIs sector as well. Bhavani (2002) showed that economic policy reforms made it inevitable for these industries to integrate with the global industry by getting into their global commodity chains for which they have to upgrade themselves in terms of the

physical technology employed. Balasubramanya (2004) showed that the growth of small industry in the transitional period of 1990s has come down in terms units, employment and output. But the growth rate of exports increased steadily till the early 90s but then declined considerably. The study emphasized that the increasing presence of Transnational Corporations (TNCs) in the country would open up new opportunities for sub-contracting/outsourcing for the small industries. This is because FDI has flown into industries such as telecommunications, transportation, electrical equipments (including computer software), metallurgical industries, automobiles, among others, where opportunities for obtaining sub-contracting/outsourcing are high for small industry.

Government programmes for promotion of SSIs such as industrial estates, provided the focus for some studies (Alexander, 1963; Bredo,1962; Kashyap and Tiwari,1982 and Bandopadhyaya,1963). The evidence was mixed as some estates did relatively well, while on the other hand, it was becoming apparent that certain malpractices like "absentee capitalism" was emerging. Further, the ability of the industrial estate programme to be a vehicle of regional dispersal of industry appears questionable in the light of experience.

Scale and Efficiency

The production efficiency of a firm refers to its performance in the utilization of resources. It is a general perception that small firms are less efficient in production. The modern small-scale sector was compared with that of large-scale units for the measurement of efficiency. The statistical evidence did not yield a clear relationship between size and efficiency. A number of studies on efficiency of SSIs in India were undertaken (Dhar and Lydall ,1961; Hajra,1965; Sandesara,1966 and 1969; Mehta ,1969; Bhavani, 1991; Goldar,1985 and 1988; Little, Mazumdar and Page,1991 and Ramaswamy,1990). Most of the earlier studies used the partial productivity ratios for a measure of the relative efficiency of SSIs.

While Dhar and Lyndall (1961) and Sandesara (1969) reported that the output/ capital ratio was relatively less favorable for small scale units, these conclusions were

contradicted by Mehta (1969). There have been problems with regard to the assumptions of the study, but the general conclusions suggest that modern small-scale enterprises do not possess any superiority with regard to capital saving.

A major focus of studies in this area has been the firm size and productivity. In a large number of industries, small units are relatively inefficient compared to the large units (Goldar, 1988). The index of relative efficiency was found to be positively correlated with relative capital intensity, which implies that small scale units are inefficient in those industries in which the difference in the capital labour ratio between small and large units are relatively small. Little, Mazumdar and Page (1991) found a fall in the skill-intensity as firm size increased, implying that many small-scale industries are intensive in the use of unskilled, rather than skilled, labor. As for the sources of variations in technical efficiency, four variables: the average experience of the labor force, the age of the capital stock, the experience of the entrepreneur and the level of capacity utilization, are found to be significant in one or more industries. Bhavani's study (1980) revealed that the capital productivity of SSI units is lower than that of large-scale units suggesting efficiency differences in line with the findings of Dhar and Lyndall (1961) and Sandesara (1969).

Bhavani (1991) highlighted that the performance of size groups with respect to their best observed performance increases with the increase in size up to certain size class and then declines. Ramaswamy (1994) did not find a positive relation between capital labour ratio and employment size. Partial factor productivity of labor and capital did not exhibit significant relationship with employment size of establishments. Positive relationship was found between capital labor ratio and investment size. The study found lack of systematic relationship between establishment size and relative factor productivity that shows that technical efficiency difference between establishments within small-scale sector of the Indian industry may not be substantial.

There have been attempts to analyze the interregional differential in efficiency of SSIs using total factor productivity approach (Nath, 1998). The study showed that in Maharashtra and Madhya Pradesh, most of the SSIs are relatively more efficient than in

other states. On the other hand, in Andhra Pradesh, Bihar, Kerala, Tamil Nadu and West Bengal they are relatively less efficient. In other states, some industries have efficiency indices greater than unity and others less than unity. A use-based classification of industries reveals that consumer durable industries have some of the highest average efficiency indices and relatively smaller coefficient of variations. It could be because of greater diffusion of technical knowledge, more uniform demand for the products across the states. On the other hand, the intermediate product industries and the consumer non-durable industries have wider variations in their relative efficiency indices across states. In case of the intermediate product industries, it could be ascribed to greater variation in technological knowledge and opportunities for vertical integration among the states. Relative efficiency is positively correlated with relative size, but is significantly so only in three industries: Non-Ceramic Bricks, Iron and Steel Casting and Structural Metal Products.

There have been attempts to test the empirical validity of Verdoons law (relationship between growth in factor productivity and the growth in output) in the Indian context as well (Sindhu 1999) .The time series analysis showed that Verdoon's law is applicable to the SSI sector for the period 1981-93 where as it is not applicable to the SSI sector for the period 1973-81.The study showed that Verdoon's law has less applicability to the SSI sector in India as different sets of data provide different results.

The relationship between the Small Scale and Large Scale Industries

Subcontracting is one of the ways in which economies with a substantial presence of large-scale industry have been successfully developed small sector. If the large-scale modern firms find it cheaper or easier to have portions of their product subcontracted to small firms on either on full time basis or per-item basis, this may provide another avenue for the small-scale producer. If the small-scale firm is producing a commodity that is complement of the nearby modern firm, then this provides another source of survival potential for the firm, especially if the small scale firms buffers itself against cyclical

orders by developing its own retail market. Sit (1982) argued that state policies encouraged small-scale factories through product reservation and other promotional measures like concessional credit for fixed and working capital and fiscal incentives. A large number of products were reserved exclusively for small-scale producers and large firms were not allowed entry into those product lines. The policy facilitated outsourcing by creating a small-scale sector capable of producing numerous intermediate and final products with simple technology. The supportive role of the SME sector can be direct complementarity (vertical linkage) of the small firms within themselves or vertical linkage with larger firms.

Watanbe and Susmme (1974) pointed out that the success of small-scale industries in spite of their low efficiency coefficients is very much due to the subcontracting relationship between large and small units, and the patronage given by large units to small units. Morris et.al (2001) observed that since the large firms are quality conscious, they may act as conduits of technology for the small subcontracted firms. The competitive strength of these small firms essentially derives from selling cheap owing to the schism in the labour market and from economies of specialisation and owner supervision. Nanjundan (1994) argued that the closer and greater relationship between large and small enterprises is likely to be strengthened. He emphasized the need to encourage independence of small sub-contractors and reduction of exploitation by eliminating or removing unfavorable rates of payment, delayed payments etc.

Balasubramanya (2004) emphasized the promotion of inter-firm linkages which is another issues deserving more recognition. In India, the increasing presence of Transnational Corporations (TNCs) would open up new opportunities for sub- contracting/outsourcing. The potential of such outsourcing opportunities must be tapped to the maximum possible extent to the advantage of small industry. The small firm can get technological inputs and technology through sub-contracting relationship with large firms on a continuous basis. The scheme of establishing Sub-Contracting Exchanges (SCXs) by Non-Government Organizations (NGOs) and Industry Associations was launched in February 1995

(DCSSI, 1999). One of the major objectives of sub-contracting exchanges is to develop sub-contracting relationship between small and large firms.

According to the Abid Hussain Committee Report (1997) subcontracting is the most efficient way of increasing greater labour market flexibility but its successful development is dependent on large firms being able to transfer the know how for quality production to the ancillary units and to build up a relationship of healthy inter firm cooperation. Industrial policies in the past have often resulted in the segmentation of markets between large and small-scale producers. Little, Mazumdar and Page (1991) reported for India that large-scale sector fed the higher end of the market with capital intensive technology and the small-scale sector produced inferior goods for the lower end of the domestic market with its lower capital intensity. Indeed, policy measures in India at the time created an environment in which the two sectors often viewed each other as adversaries, which prevented linkages between them. Amita Shah (1994) examined the linkages between small and large industry on the basis of a case study of Textile Machinery Parts Manufacturing (TMP) industry in Ahmedabad. The major findings of the study were: (i) The incidence of inter-firm linkages is limited to about one third of the small scale firms; (ii) Among various forms of linkages the marketing linkages are the most predominant (iii) The linkage relationship has been a positive factor in determining the performance of the small scale firms; (iv) Personal contacts play an important role in inter-firm linkages, thus benefits of linkage relationship are mainly confined to a small social-group of industrialists; (v) While the small scale suppliers operate under a highly competitive market, the buyers often enjoy oligopolist's advantage; hence the gains of competitive efficiency tend to favor the large scale sector.

Bose (1996) argued that the traditional industries such as coir, cashew, handlooms, beedi, fish processing, vegetable and fruit processing in Kerala exemplified the reverse process of factory system turning into a decentralized system of production in the unorganized sector via subcontracting. The dynamics of these trades can be categorized into three phases from the second half of the 19^{th} century up till the 1980s. In the first phase,

factories characterized the mode of production. In coir, cashew and fish processing, the factories also practiced internal contracting. In plantation industry, there prevailed labour only subcontracting .In the second phase, there was a partial or complete shift in processing from factory level to cottage/ domestic level as a sharp reaction to the radical working class movement and to escape from labour laws and to minimize costs and supervision time in the context of stiff competition. In the third phase, there was a transplantation of production on mechanized basis or on subcontract to the State of Tamil Nadu where lower wages and weaker trade unionism prevail.

Joseph (1995) examined the various facets of organizational structure of the diamond polishing industry in Kerala. The case study showed that subcontracting network is the mainstay of the organizational structure of the industry. The system of subcontracting lends an efficient mechanism for the supply of raw diamonds as well as the marketing of the fished diamonds. Kaippachery (2005) analyzed the economic and social sustainability of rural industries in Kannur district in Kerala. The study found that the textile units having linkages with units in Bangalore, Germany and France are more profitable and dynamic than the rest.

Clustering

Clustering of small-scale industries attracted attention in recent years as it leads to interaction between firms through specialization and sharing of services. Abid Hussain Committee Report (1997) suggested that cluster developmental approach would enable support services at the industrial clusters. This approach has maximum demonstrative effect and up gradation of even one individual unit technologically has its impact on the whole cluster down the line. Clustering offers agglomeration economies that allow small-scale industries to participate profitably and competitively in wide trade networks (Berry and Sandee ,2001).

The industrial clustering and networking are also of great importance for the development of small industries in the competitive world. Clusters offer SSIs external economic

advantages, including economies of scale and of scope. Co-operation between agents within clusters and networks, through the sharing of information, resources, knowledge and technical expertise, and other forms of joint action reduce transaction costs and further enhance competitiveness as well as accelerate learning and technical innovation (Nadvi, 1995).

Pillai (2001) analyzed the performance of the pump manufacturing cluster in Coimbatore and rubber manufacturing cluster in Kottayam. The study found that in Coimbatore cluster intensity of subcontracting was higher than in Kottayam cluster. In Coimbatore cluster, all segments in the industry tended to subcontract and manufacture components and parts whereas in Kottayam cluster, though all segments subcontracted, the proportion of inputs and processes subcontracted was low. In Coimbatore, majority of units contracting out components and parts resorted to strategy of direct approach, where the terms and conditions of subcontracting were settled through negotiations. In Kottayam, producers tend to rely on immediate access channels like friends and relatives for entering into subcontracting.

Clustering in the cotton knitwear industry in Tiruppur has enabled small enterprises to break into export markets for high volume and low to medium quality cotton knitwear goods (Cawthorne, 1995). In this case, it was not the dynamics of clustering per se that led to success but rather the existence of clustering in a facilitatory macroeconomic environment. Baskar (2001) analyzed the Tiruppur cluster and concluded that interfirm networks contributed to flexibility in production and it lead to greater division of labour, facilitating the rise of individual firms specialising in specific processes, new technology etc.

Sukumaran (2004) found lack innovative behavior and inter- firm collaboration in clusters in Kerala. Clustering does not seem to be playing any role facilitating division of labour, diffusion of technical information and other kinds of cooperation between enterprises leading to higher over all efficiency. Absence of small scale service

establishments, input suppliers, low purchasing power etc. seemed to have prevented innovation in the cluster thereby compelling them to adopt a sweatshop strategy.

Studies on SSIs in Kerala

Kerala has lagged behind in achieving higher levels of industrialization, which was studied by many researchers. Studies have identified the prominence of small-scale industries in the manufacturing sector of the state. In this section we review the major studies on the SSI in Kerala.

Thampy (1990) analyzed the wage-cost hypothesis for Kerala's small-scale industrial sector. The study found that higher labour costs are inhibiting the growth of the majority of the industry groups in the small-scale sector. Also, the high wage costs and psychic costs have resulted in retarding industrial investment in the sector. Subrahmanian and Pillai (1994) examined the structural change and growth performance of small industry in Kerala with relative to India comparing the first and second Census of small-scale industrial units. The study gives an overall picture of the size, employment, productivity etc of small-scale industries in Kerala .The study showed that Kerala's share in all India declined in 1987-88 as compared to 1972-73 in respect of all growth indicators. The study showed that labor and capital productivity declined as compared to India under the period of study the rate of capacity utilization was relatively lower in Kerala when compared to other states even in the dominant industries like food products, wood products and rubber products. The study points out that Kerala small scale units accounted for 4.4 per cent of total number in the country contributed proportionately more to aggregate exports (6.7per cent) in which much of the export earning was accounted by food products.

Kaippanchery (2005) analyzed the economic sustainability of the rural small-scale enterprises in an Industrial Development Plot in Kannur district of Kerala on the basis of primary data collected for the period 1991-2002. The study has found that the industries have done well in terms of employment, earning position, competitiveness and raw material availability but fared badly in output, productivity, investment adequacy, market

demand and diversification of products. It was also found that the non-agro based units have performed better than the agro –based units after liberalization.

It is clear from the above discussion that there are relatively limited studies available on the performance of the small-scale industry in the post reform period in relation to the pre reform period. The present study would be an attempt to fill this gap. Further, the regional dimension of the SSIs is also very significant to examine since these industries were promoted mainly with the objective of balanced regional development. There are wide variation in the performance at the sectoral level, hence the analysis of efficiency across sectors within the SSI gets an added importance. The present study attempts to analyse the impact of liberalization on the growth and efficiency of small- scale industry groups at the regional level.

1.7. Statement of the problem

The state of Kerala is well known for its remarkable development in the field of human development[2]. The state is far ahead of other states in literacy, low infant mortality and high life expectancy. But the state is industrially less developed and the growth of the manufacturing sector is relatively slow. The high ranking in the per capita consumption expenditure should have provided the required market for the products of the manufacturing sector. Yet the performance of the manufacturing sector of Kerala has been relatively poor. The internal structure of the manufacturing industry of Kerala has continued to remain concentrated and lop-sided in nature. There has not been any significant change towards diversification. The industrial base is characterized by the dominance of local resource based traditional industries and inadequate shares of capital goods and modern industries (Subrahmanian, 2003).

Currently, the manufacturing sector contributes about 21per cent of the Net State Domestic Product (NSDP) of Kerala (Third Census Report of Small Scale Industries, 2001-02). The SSIs of Kerala contributes a significant share in employment generation,

[2] See CDS/UN (1975) for detailed discussion.

production and number of units in the manufacturing industries. It accounts for nearly one half of the income and employment generated in the manufacturing sector. There is need to examine the performance of the small scale sector in Kerala for it appears that in the specific context of the state, this sector emerges as a potentially powerful sector for industrial growth, wider spread of economic activities as well as maximum use of resources in the region.

Again, the sustainability of the SSI sector in specific and the industrial sector as a whole depends on the efficiency with which it functions. This appears very crucial in the present competitive environment. In this background, the present study attempts to analyse the technical efficiency of the small-scale industries in the reform period to identify the industry groups that are working efficiently and the factors that are contributing to the growth of those industries in the context of structural transformation. We assume technical efficiency as a measure of how efficiently technology is employed to convert the inputs to achieve a given level of output. The small-scale sector consists of both registered and unregistered firms and we do analyse the efficiency of both groups separately.

1.8. Objectives of the study

(i) To attempt a comparative analysis of the structural transformation taken place in SSIs of Kerala with all- India in the pre and post reform period.

(ii) To examine the technical efficiency of the registered small-scale industry groups in Kerala under liberalization.

(iii) To analyze technical efficiency of the unorganised small-scale industry groups in Kerala under liberalization.

1.9. Major Data Sources of Small Scale industries and their limitations

The major data sources on the small-scale industries in India are Census of Small-Scale Units (DCSSI), Survey on Unorganised Manufacturing Sector in India of National Sample Survey Organization (56th Round ,2000-01), Annual Survey of Industries,

National Accounts Statistics, Economic Surveys (Ministry of Finance), Hand Book of Statistics on Indian Economy and Census of Population.

The present study relies mainly on the All-India Census of Small Industrial Units undertaken by the Development Commissioner of Small Scale Industries (DCSSI), for analyzing the growth and structural changes in the SSIs at the all-India level as well as Kerala state. The DCSSI has published three Census reports, first one in 1973-74 with 1972 as the reference year, second one in 1989-91 with 1987-88 as the reference year and third in 2002-03, with 2001- 02 as the reference year. The coverage of the first Census was restricted to units registered with State Directorate of Industries. The modern small-scale units were defined as those having capital investment of Rs 7.5 lakhs or less in terms of original value in plant and machinery having Rs 10 lakh or less in the case of ancillary units. The frame for the first survey included 2.58 lakh units that were reported to be registered up to November 30, 1973. Out of these registered units, data could be collected from only 1.4 lakh working units. The remaining were closed, non-traceable or outside the purview of SIDO. The survey gave data on employment, capital investment, capacity utilization and production of small-scale industries both at all India and state level. The frame for the second survey included 9.86 lakh units out of which data collected from only 5.82 lakh working units. The modern small-scale units were defined as those having investment in fixed assets in plant and machinery does not exceed Rs.60 lakhs. The second Census of small scale industrial units provide data on employment, investment, working capital, capacity, production, exports, raw materials, energy consumption etc. The report also provides the distribution of closed units by reasons of closure. Some important characteristics like output, investment in fixed assets, gross and net value added and employment are given for 100 leading industries classified at 4-digit level of NIC. In the third Census all units NIC 1998 was used in this Census as against 1970 classification for the second Census. The third Census for the first time, apart from covering the registered sector, the unregistered SSI sector was also included in the survey .A sample size of 2.16 lakh units was fixed for the sample, but actually 167655

enterprises were surveyed. The modern small-scale units were defined as those having investment in fixed assets in plant and machinery does not exceed Rs.100 lakhs. The Census provides data on employment, fixed assets, and exports of small-scale units. The number of units, output and employment of leading 200 industries are given 4-digit level of NIC. It also provides product wise 5 digit disaggregated data at the district level. The products are classified using the ASICC code, which is aggregated to industry wise data using NIC 1987 for making it comparable with last Census data. The data of the three Censuses are converted to NIC 98 for making it comparable and is converted to 1993-94 constant prices.

There are a number of limitations for comparing the three Census reports of DC(SSI): Firstly, the annual data on key parameters like number of units, production, and employment at the all-India level may not be realistic as it is based on a sample of a two per cent of the working units. Secondly, the investment limit has undergone constant upward revision, which makes inter-temporal comparison difficult. And finally the mortality rate of SSI is very high (Saluja, 2004).

We can also summarize many data limitations of the third All India Census on small-scale industries compared to the earlier Censuses.

(1) Unlike the earlier Census, the third Census does not give net or gross value added of the SSIs.

(2) The third Census provides the data in terms of top 20 industries which constitutes only 34 per cent of the gross output, number of units, employment and exports of the small scale industries which makes difficult to make industry wise estimations.

(3) The industry wise disaggregated data are not given in the Census; instead product wise data at the district level are provided which makes the comparison with last Census difficult.

It is clear from the above stated limitations that the Census data was not sufficient to measure the technical efficiency of the SSIs. So the present study used the data of

registered SSIs in Kerala from the Directorate of the Industries. This source provides data on the output, investment, employment and raw material cost of the SSIs at the firm level. The latest data of the SSIs registered under the Directorate of Industries as per 2005-06 has been used for the analysis.

We use the unit level data of NSSO 56th Round (2000-01) for analyzing the efficiency of the unorganized sector in Kerala. All manufacturing enterprises, which are not covered under Annual Survey of Industry, are being considered as the unorganized sector. The Sampling Frame is the EC '98 with enterprise/ establishment level data is taken as the frame for the survey for the whole of India except Orissa and Karnataka. NSSO data source does not classify small-scale industries on the basis of investment in plant and machinery. The data is collected for three different categories of enterprises. Firstly, Directory Employment Establishments (DME), which belong to manufacturing or repairing industry and employs a total of six or more workers where at least one is a hired worker. Secondly, Non Directory Manufacturing establishments (NDME), which belong to manufacturing or repairing industry and employs a total of five workers or less of which one is a hired worker employed on a fairly regular basis. Thirdly, Own Account Manufacturing enterprises (OAME), which belong to manufacturing or repairing industry and is operated without the help of a hired worker employed on a fairly regular basis. The NSSO 56th round gives data on variables like number of units, number of workers, fixed assets, value added and output for industries at the state level. The variables like employment, number of units, value added, fixed assets, subcontracting details, data of the problems faced by the firms, etc were taken for the study.

The time series data on the number of units, employment, production and exports of small-scale industry were available in the Economic Surveys (Ministry of Finance). The share of small industry in National Income is estimated from Annual Survey of Industries of Central Statistical Organization and Hand Book of Statistics on Indian Economy (RBI, 2001).

1.10. Methodology

The overall performance and contribution of small industry has been analyzed in terms of the percentage change in units, employment, production and exports. The partial productivities of the SSIs with respect to the major inputs of labour and capital were estimated. Partial and total factor productivity estimates were based on the assumption that a production function accurately describes the maximum output available from a given input vector. We have analyzed the technical efficiency of SSIs across industries using the Data Envelopment Analysis (DEA). The source of technical efficiency is estimated using Tobit regression analysis. The detailed methodology of DEA and Tobit analysis is mentioned in chapter III and IV respectively.

1.11. Chapter Scheme

Having covered the importance of the study, statement of the problem, main objectives and data sources in the introduction chapter, the second chapter focuses on the growth and structural changes that have taken place in the SSIs at all-India as well as in Kerala during the post reform period compared with the pre reform period. The third chapter deals with the technical efficiency of the registered SSIs in Kerala. The technical efficiency and the sources of efficiency of the unorganized manufacturing enterprises in Kerala are examined in the fourth chapter. The fifth chapter gives the summary and major conclusions of the study.

Chapter II

Structure and Growth of Small Scale Industry in India and Kerala: Analysis of Pre and Post Reform Period

There are many studies looking at the performance of the small-scale sector in India and Kerala at the pre reform and post reform period[1]. But most of the studies on SSIs in India were done on the pre liberalization period and there are not many studies using the third Census of small-scale industries, this adds more significance to our analysis. The regional performance of the SSIs is also very significant since these industries were promoted mainly with the objective of balanced regional development. It will help to understand whether liberalization has resulted in convergence or divergence of regional performances. Such an exercise may be very useful particularly in the case of Kerala since it is an industrially backward state and scope for large manufacturing enterprises is very limited. The importance of SSIs in utilizing the skilled labour and latent resources in the state also cannot be neglected (Subramanian and Pillai, 1994). In this chapter, we intend to analyse the growth and structural changes that have been undertaken in SSIs, using the comparative statistics from Census, at the national level and regional level, with special reference to Kerala[2].

This chapter attempts to understand the performance of small-scale industrial sector in the post reform period in comparison with the pre-reform period. An analysis of the SSIs in Kerala in relation to all-India will provide insights on the performance dimensions of Kerala with respect to all India and with that of other states. In the first section we examine the growth performance of the SSI sector at the all-India level and in Kerala under two different policy regimes. Growth performance will be measured in terms of the number of units, fixed capital investment, gross output, net value added and the number of employment generated. Another important characteristic feature of the SSIs has been the structural changes in terms of the distribution of small industry spatially and also at

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[1] See Sandesara (1993), Ramaswamy (1994), Subramanian and Pillai (1994) and Balasubramanya (2004).

[2] Subrahmnaian and Pillai (1994) had done a comparative study of SSIs in Kerala and all-India based on the first two Censuses. The present chapter follows a similar approach incorporating the details of the third Census report also.

industry level, in terms of the number of units, employment, fixed capital investment and production. In the second section, we do analyse the structural change that has taken place in India at the regional and industry level. The third section addresses the structural changes that have taken place in Kerala. The sickness of small-scale industries has been another major facet of this sector and an analysis of this is done in the fourth section. The fifth and last section gives the summary of the chapter. The analysis of this chapter is based on the *first, second and third Census reports of small-scale industries.*

2.1. Structure and Growth of Small Scale Industry in India and Kerala

We start our analysis by looking at the economic profile of the small-scale industries in India to understand its economic and social significance in the economy. The detailed profile on the SSIs in India and Kerala based on the all India Census reports of small-scale industries are given in Table 2.1. The number of small manufacturing enterprises had recorded a compound annual growth rate (CAGR) of 6.33 per cent at the all-India level and 13.26 per cent in Kerala. More than half of the units are urban based at the all-India level over both points of time whereas majority of the units in Kerala are located in rural areas. There is only a slight decline in the percentage of rural units in Kerala after reforms. It shows that liberalization has not led to the concentration of the small-scale industries to urban area. One of the major changes that have taken place due to reforms is the sharp reduction in the small–scale manufacturing units and the growth of service-based units. The Small Scale Service and Business Enterprises (SSSBEs) have grown at rate of nearly 20 per cent at national level and in Kerala. This can be due to the service-based growth of Kerala economy, which has accentuated the growth of service based SSIs with the opening up of the economy. The ancillary units also showed an increase of nearly 17 per cent in the post reform period. This shows the increasing tendency of subcontracting to the small-scale sector in India under liberalization, which was identified by other studies also like Sahu (2007), Balasubramanya (2004) and Sharma and Dash (2006).

Table 2.1: Profile of the Registered Small Scale Industries

Characteristics	India			Kerala		
	1987-88	2001-02	CAGR	1987-88	2001-02	CAGR
Size of the sector (Working Units)	582368	1374974	6.33	25717	146988	13.26
Rural Units	42.17	44.30	0.35	70.00	66.80	-0.33
SSIs	96.24	65.55	-2.71	96.06	58.41	-3.49
SSSBEs	3.24	34.45	18.39	3.57	41.59	19.17
Ancillary among SSIs	0.52	5.08	17.68	0.38	3.44	17.04
Nature of Activity						
Manufacturing/Assembling/ Processing	65.40	63.45	-0.22	75.55	58.11	-1.86
Repairing, Maintenance, Services and Others	34.60	36.55	0.39	24.46	41.59	3.86
Type of Organization						
Proprietary	80.48	88.85	0.71	82.00	92.87	0.89
Partnership	16.84	7.21	-5.88	15.00	4.73	-7.91
Pvt. Company	2.10	2.42	1.02	1.15	0.71	-3.39
Co-operatives	0.30	0.34	0.90	1.17	0.82	-2.51
Others	0.30	1.17	10.21	0.51	0.80	3.27
Units Managed By						
Women	7.69	8.32	0.56	6.00	19.7	8.86
SC	6.84	7.85	0.99	1.26	4.24	9.05
ST	1.70	3.53	5.36	0.16	0.93	13.40

Note: Figures give percentages to total of the relevant variable
Source: All- India Census of Small Scale Industries, 2001-02

Manufacturing/assembling/processing units showed a diminution in share where as the repairing, maintenance and services units showed growth in the post liberalization period. Further, in organizational set-ups of SSIs proprietary SSIs are dominant, followed by partnership SSI units in both points of time. The number of units managed by women in the registered sector increased notably in Kerala after reforms. The units run by Scheduled Tribes (ST) increased in the national level, while, the number of units run by Scheduled Castes (SC) and Scheduled Tribes showed a substantial growth in Kerala.

Given the structure of the SSIs and its major characteristics, we will analyze the growth of the sector over the periods in order to understand how the sector is coping up with challenges and changes in the intensifying competitive environment since 1991. Table 2.2 gives the performance of small-scale industries over the period 1972-2002.

Table 2.2: Growth of Registered Small Scale Industries: 1972-73-2001-02

Variable	India					Kerala				
	1972- 73	1987-88	2001-02	CAGR 1972-73 to 1987-88	CAGR 1987-88 to 2001-02	1972- 73	1987- 88	2001-02	CAGR 1972-73 to 1987-88	CAGR 1987-88 to 2001-02
No. of working Units	159321	582368	1374974	9.03	6.33	6903	25717	146988	9.16	13.26
Fixed Investment (Rs. lakhs)	6368.84 (0.66)	16380.67 (1.60)	55661.92 (6.68)	6.50	9.13	374.83 (0.71)	734.62 (1.51)	2328.11 (3.36)	4.59	8.59
Gross production in output (Rs. lakhs)	15717.03 (1.63)	75721.67 (7.38)	123251.85 (14.78)	11.05	3.54	983.42 (1.86)	1811.37 (3.72)	3040.91 (4.39)	4.16	3.77
Net Value Added (Rs. lakhs)	50785.02 (5.28)	18081.53 (1.76)	NA	-6.65	NA	307.65 (0.58)	430.19 (0.88)	NA	2.26	NA
Employment (No.)	1653178 (10)	3665810 (6)	6163479 (4)	5.45	3.78	126514 (20)	169309 (7)	540260 (4)	1.96	8.64
Exports	908.76 (4.96)	4403.56 (0.43)	7463.62 (167.6)	11.09	3.84	316.75 (NA)	317.27 (85.83)	346.49 (155.21)	0.01	0.63

Note: (i) All the value figures are deflated at constant 93-94 prices.
(ii) Figures in parentheses shows per unit value of the original values
(iii) The figures in parentheses of exports represents per unit exports of the exporting units only.
Source: Own Analysis, Based on All India Census of Small Scale Industries, 1972-73, 1987-88 and 2001-02.

Table 2.2 gives a comparative picture of the growth of the SSI in the post reform period in comparison with the pre reform period at all-India and Kerala. The growth rate of working units have shown a decline in the Compound Annual Growth Rate(CAGR) from 9.03 per cent to 6.33 per cent at the national level in the post reform period but in the case of Kerala there was an increase from 9.16 per cent to 13.26 per cent. The fixed investment showed a significant increase in the post reform period at both all-India and Kerala. This accounts for the increasing modernization in the sector. In the case of production, the per unit production increased from 1.63 per cent in 1972-73 to 14.78 per cent in all-India and in Kerala from 1.86 per cent to 4.39 per cent respectively. But the CAGR of output declined in post reform period in the both cases. The growth in employment was very modest in all-India and Kerala. The per unit employment declined from 10 persons in 1972-73, to 4 persons, in 2001-02. In the case of Kerala also the per unit employment reduced to 4 persons in the post reform period compared to 20 in 1972-73 and 7 in 1987-88. This clearly gives a worrying picture of declining employment intensity of the small-scale industry in India. The exports showed a significant growth

over the period. The per unit exports of the sector have grown at a considerably high rate. The major exporting items of the country were the textiles and textile products, food products, leather products etc. The contribution of these sectors to the exports remained prominent through out the period. The result of the analysis goes well in tune with the various studies using other data sources such as Balasubramanya (2004) and Kawadia, et.al (2005).

Having analyzed the growth in output, investment and employment in the previous section, we analyze the various ratios in order to have a better understanding of the dynamics of the small- scale industry, the results of which are given in Table 2.3.

Table 2.3: Selected Ratios of Small Scale Industry

Item	India					Kerala				
	1972-73	1987-88	2001-02	Growth Rate 1	Growth Rate 2	1972-73	1987-88	2001-02	Growth Rate 1	Growth Rate 2
Production/ Investment in Fixed assets (Rs. lakhs)	2.47	4.62	2.21	4.26	-5.13	2.62	2.47	1.31	-0.39	-4.43
Production / Employment (Rs. Thousand)	1.57	11.72	32.98	14.34	7.67	0.91	5.64	11.95	12.90	5.51
Employment/ Rs 1 lakh Investment in fixed Assets	15.67	3.94	0.67	-8.79	-11.89	28.70	4.37	1.09	-11.79	-9.43
Investment in Fixed assets / employment (Rs. Thousand)	63.80	253.59	1489.29	9.64	13.48	34.84	228.88	914.98	13.37	10.40

Note: (i) All the value figures are in Rs. lakhs and employment in numbers
Source: Own Analysis, Based on All-India Census Reports of Small Scale, 1972-73,1987-88 and 2001-02

The Table 2.3 gives the relative performance in terms of output-capital ratio, output-labor ratio, labor intensity and capital intensity[3]. In the case of all-India, the output-capital ratio has increased at a compound annual growth rate(CAGR) of 4.26 per cent in the pre-

[3] Output-capital ratio is measured as the ratio of gross output to fixed capital and output-labour ratio as the ratio of gross output per worker. The capital intensity is measured, as the ratio of capital to labour and labour intensity is ratio of labour per unit of capital invested.

reform period but in the post reform period it declined by -5.13 per cent. The industry-wise analysis of all-India showed that capital productivity (output-capital ratio) substantially declined in all the groups in the post reform period[4]. In the case of Kerala also there was a substantial decline in capital productivity of industries after reforms[5]. The labour productivity (output-labour ratio) has almost doubled in the post reform period for both all-India and Kerala since reforms. This implies that under the reform period, the contribution of labour towards overall productivity is increasing in relation to capital. In the case of India, except industries like textile products, chemical and chemical products and basic metal industries, all the industries showed an improvement in output-labour ratio. This ratio has increased in the case of Kerala also, except in textile industries and chemical and chemical products industry. But the growth rate reduced to half in the post reform period compared to pre-reform period in both all-India and Kerala. Taking the relative performance of the variables, we can find that the output- capital ratio and output-labour ratio in Kerala was less than even one half of the all-India level in 1987-88 and 2001-02.

The labor intensity declined from 15 persons employed for an investment of one lakh of rupees in 1972-73 to 1 person in 2001-02 at all-India level and from 28 persons to 1 person in Kerala. The capital intensity had gone up substantially at all-India and Kerala. The reduction in labour employed reveals a very worrying picture. The main purpose of promoting the sector was absorption of abundant labour in the country. The notable reduction in labour intensity and higher growth of capital intensity can be attributed to the increasing modernization that has been taken place in the sector, which had led to increased substitution of labour with capital.

Given the growth performance of the SSI sector in India and Kerala in the post reform period compared to pre-reform period at the macro level in this section, we do examine the structural changes that have taken place in both cases in a detailed way in the following section.

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[4] The details of industry wise output-capital ratio of India are given in table 2.7.
[5] The details of industry wise output-capital ratio of Kerala are given in table 2.11.

2.2 Structural changes in Indian SSIs

In this section we analyze the structural changes that have undertaken in the SSIs at all-India level over time. We examine the performance of the sector at regional level as well as at the industry level.

2.2.1. Regional Performance of SSIs in India

Balanced regional industrial development has been one of the major objectives of the planned economic regime in India. One of the major reasons for the promotion of SSIs through various incentives has been this balanced regional development argument. Whether the initiation of reforms in the economy has improved or reduced the distribution and performance of the sector will be analyzed in this section. Table 2.4 presents the selected indicators of small-scale industries for major Indian states during 1987-88 and 2001-02 periods.

In the pre liberalization period, 1987-88, Madhya Pradesh, Tamil Nadu and Uttar Pradesh were the three states with highest number of SSI units. In the post reform period also, Tamil Nadu and Uttar Pradesh remained as the states with highest distribution of SSI units. The position of Kerala improved from 12^{th} to 3^{rd} after reforms. The total employment generated in the sector was 36.66 lakhs. In the case of employment generation, Tamil Nadu, Maharashtra and Uttar Pradesh contributed 42 per cent of the total employment. Gujarat, Andhra Pradesh, Karnataka and Punjab accounted for another 27 per cent. These states remained as the major employment providing states in the pre liberalization and post liberalization period. Kerala's share was 4.33 per cent in 1987-88, which increased to 8.77 per cent of total employment by 2001-02. Maharashtra, Tamil Nadu, Uttar Pradesh, Gujarat and Andhra Pradesh were the states with highest contribution to SSI production in 1987-88, they accounted for 54 per cent of the total production. Maharashtra, Punjab, Haryana and Uttar Pradesh were the states with highest production in the post reform period. Kerala was in 12^{th} position in both points of time. The analysis shows that the states that were better performing in the case of the SSIs in

terms of number of units, employment and output were the industrially well developed states. The rank correlation coefficient gives positive results, which indicates there was no significant change in the ranking of the states. This implies that states which are better performing continues to perform well in the changed environment and the states, which are worse performers continue to perform poorly.

Table 2.4: Growth in Number Units, Employment and Production of SSIs across Major states

States	Number of Units			Employment			Production		
	1987-88	2001-02	Growth rate	1987-88	2001-02	Growth rate	1987-88	2001-02	Growth rate
Andhra Pradesh	6.73 (7)	4.65 (9)	-2.61	7.53 (7)	6.22 (7)	-1.36	8.6 (4)	6.31 (6)	-2.39
Assam	0.76 (16)	1.07 (14)	2.47	0.94 (15)	1.05 (15)	0.79	0.70 (15)	0.57 (15)	-1.46
Bihar	5.98 (8)	3.83 (10)	-3.13	7.56 (5)	2.22 (13)	-8.38	2.04 (13)	0.49 (16)	-9.69
Gujarat	5.91 (9)	10.2 (4)	3.98	7.56 (6)	9.39 (4)	1.56	8.35 (5)	5.18 (8)	-3.35
Haryana	4.01 (13)	2.91 (12)	-2.26	2.88 (13)	3.91 (11)	2.21	4.1 (10)	7.42 (4)	4.33
Himachal Pradesh	1.19 (15)	0.8 (16)	-2.80	0.7 (16)	0.61 (16)	-0.98	0.57 (16)	1.05 (14)	4.46
Karnataka	6.96 (6)	8.12 (5)	1.11	6.65 (8)	7.74 (6)	1.09	5.88 (8)	4.39 (9)	-2.07
Kerala	4.41 (12)	10.73 (3)	6.56	4.33 (10)	8.77 (5)	5.17	2.65 (12)	3.19 (12)	1.33
Madhya Pradesh	12.69 (1)	7.50 (6)	-3.69	4.33 (11)	4.05 (10)	-0.48	4.58 (9)	3.65 (11)	-1.61
Maharashtra	5.12 (10)	5.42 (7)	0.41	9.71 (2)	10.23 (2)	0.37	17.48 (1)	17.03 (1)	-0.19
Orissa	1.42 (14)	0.89 (15)	-3.28	1.89 (14)	1.31 (14)	-2.58	1.53 (14)	1.6 (13)	0.32
Punjab	7.79 (5)	4.77 (8)	-3.44	5.62 (9)	5.47 (8)	-0.19	6.46 (6)	9.64 (2)	2.90
Rajasthan	4.98 (11)	3.12 (11)	-3.28	3.34 (12)	3.24 (12)	-0.22	3.4 (11)	5.51 (7)	3.51
Tamil Nadu	9.82 (2)	13.3 (1)	2.19	14.63 (1)	14.31 (1)	-0.16	10.5 (2)	7.41 (5)	-2.46
Uttar Pradesh	9.15 (3)	12.06 (2)	1.99	9.52 (3)	9.44 (3)	-0.06	8.67 (3)	8.26 (3)	-0.35
West Bengal	7.89 (4)	2.02 (13)	-9.27	8.51 (4)	4.13 (9)	-5.03	5.89 (7)	4.2 (10)	-2.39
Rank correlation	Between 1987-88 to 2001-02 0.717**			Between 1987-88 to 2001-02 0.812**			Between 1987-88 to 2001-02 0.826**		

Note: (i) The figures represent percentage shares.
(ii)The figure in parentheses represent the respective ranks
*(iii)** denotes significance at 1per cent level.*
Source: Own Analysis, Based on All-India Census Reports of Small Scale, 1987-88 and 2001-02

2.3. Industry wise performance of SSIs

The structural dynamics of the small-scale industry can be captured by analyzing the industry wise performance of the SSIs over three points of time. We do limit our analysis in terms of share of employment and output at the all India level.

Table 2.5 summarizes the industry wise share in employment of the small scale industries over the period 1972-73 to 2001-02. The industries are ranked according to the employment generation of those industries. As per the first Census report the metal products, chemical products and machinery and parts were the industry groups with highest employment potential. In 1987-88 the employment potential was found highest in food products, metal products and chemical products.

Table 2.5: Industry wise share in employment (Ranks)

Description	1972-73	1987-88	2001-02
Metal Products	1	2	5
Chemical and Chemical Products	2	3	3
Machinery and Parts Except Elect	3	4	7
Food Products	4	1	1
Basic Metal Industries	5	6	4
Wood Products	6	5	2
Paper Products and Printing	7	7	6
Transport Equipments and Parts	8	11	8
Rubber and Plastic Products	9	9	10
Hosiery And Garments	10	8	12
Electrical Machinery and Parts	11	10	11
Leather Products	12	12	9
Rank Correlation between 1972-73 to 1987-88 :			0.902***
Rank Correlation between 1987-88 to 2001-02 :			0.762***
Rank Correlation between 1972-73 to 2001-02 :			0.741***

*Note: *** denotes, Significant at 1 per cent level.*
Source: Own Analysis, Based on All-India Census Reports of Small Scale, 1987-88 and 2001-02

In the post reform period, it is observed that industries like food products, wood products and chemical products stood highest in the ranking. These industries are more labor intensive than the other industry groups. The rank correlation between the employment

potential of these industries were estimated for the three periods. The result showed significance for the three periods showing that the share of employment by the industries remained almost same over the period.

Table 2.6 gives the industry wise share in the output of the small scale industries at the All-India level. The industries that are contributing highest share of the output of the SSIs in 1972-73 were metal products, chemical products and basic metal industries. In 1987-88 and 2001-02 the highest share was constituted by food products and metal products. In the post reform period the transport and equipment industry also found to have a significant share. The rank correlation between the output shares of these industries were estimated for the three periods. The rank correlation showed significant result for the period 1972-73 and 1987-88, positive but insignificant result for the period 1987-88 to 2001-02 showing that there was no perfect correlation in the share of output of industries under both periods. This shows that there was a change in the ranking of the industries in terms of output.

Table 2.6: Industry wise share in Output (Ranks)

Industry Groups	1972-73	1987-88	2001-02
Metal Products	1	4	2
Chemical and Chemical Products	2	2	5
Basic Metal Industries	3	3	4
Machinery and Parts Except Elect	4	7	8
Hosiery And Garments	5	8	12
Food Products	6	1	1
Electrical Machinery and Parts	7	5	11
Rubber and Plastic Products	8	6	9
Transport Equipments and Parts	9	11	3
Paper Products and Printing	10	10	6
Wood Products	11	9	7
Leather Products	12	12	10
Rank Correlation between 1972-73 to 1987-88:			0.762***
Rank Correlation between 1987-88 to 2001-02:			0.427
Rank Correlation between 1972-73 to 2001-02:			0.336

*Note: *** denotes, Significant at 1 per cent Level.*
Source: Own Analysis, Based on All-India Census Reports of Small Scale, 1987-88 and 2001-02

In Table 2.7, we examined the output-labour ratio and output-capital ratio of the industry groups at the all-India level. The analysis substantiates the results of the all-India picture of these ratios we have estimated in table 2.3. The industry wise analysis showed that the labour productivity of the industries showed growth except in the case of industries like textiles and textile products, chemical and chemical products and basic metal industries. In the rest of the industries the ratio improved but the growth rates between two points of time showed that, in the post reform period the growth rate declined substantially. The capital productivity of all the industry groups showed a sharp decline in the post reform period. This implies that labour is contributing relatively more towards overall productivity of the sector.

Table 2.7: Industry Wise Selected Ratios

Industry Groups	Output-labour Ratio					Output-capital Ratio				
	1972-73	1987-88	2001-02	Growth Rate 1	Growth Rate 2	1972-73	1987-88	2001-02	Growth Rate 1	Growth Rate 2
Food Products	1.18	1.95	3.75	3.40	4.78	27.16	7.01	2.75	-9.22	-6.48
Textiles and Textile Products	0.21	1.12	0.18	11.94	-12.40	4.30	6.36	1.09	2.82	-11.83
Wood Products	0.11	0.83	0.88	14.56	0.41	2.42	4.39	1.41	4.35	-7.79
Paper Products and Printing	0.14	0.87	2.40	12.89	7.47	1.45	2.71	1.39	4.56	-4.67
Leather Products	0.28	1.27	1.90	10.63	2.93	7.77	7.07	3.01	-0.68	-5.91
Rubber and Plastic Products	0.19	1.35	3.33	14.19	6.63	1.88	3.53	0.90	4.62	-9.33
Chemical and Chemical Products	0.22	1.69	1.25	14.62	-2.12	3.43	6.02	1.98	4.09	-7.63
Basic Metal Industries	0.27	2.23	1.68	15.15	-1.98	3.45	7.04	1.80	5.22	-9.28
Metal Products	0.16	0.98	4.06	13.04	10.66	2.50	4.13	2.72	3.66	-2.94
Electrical Machinery andParts	0.23	1.91	3.25	15.16	3.86	2.81	5.83	2.00	5.35	-7.36
Transport Equipments and Parts	0.16	1.10	6.41	13.63	13.43	2.08	3.89	2.84	4.59	-2.23

Source: Own Analysis, Based on All-India Census Reports of Small Scale Industries, 1987-88 and 2001-02

Another interesting aspect is the export performance of the sector. SSI Sector plays a major role in India's present export performance. It contributes about 45 to 50 per cent of the Indian exports. Direct exports from the SSI sector account for nearly 35 per cent of total exports. Besides direct exports, it is estimated that small-scale industrial units contribute around 15 per cent to total exports indirectly. This takes place through merchant exporters, trading houses and export houses. They may also be in the form of

export orders from large units or the production of parts and components for use for finished exportable goods. The product groups where the SSI sector dominates in exports are sports goods, readymade garments, woolen garments and knitwear, plastic products, processed food and leather products.

It is interesting to observe that export intensity of the SSI has increased during the post reform period. We have used the data provided by Reserve Bank of India and Ministry of Small Scale Industries to trace the growth over the years. As given in Table 2.8, there was a consistent increase in the export intensity of small scale industries in the liberalization era. In the 1980s, the export intensity of the SSIs, which is the percentage of output exported, was only 5 per cent. Since liberalization, it showed a drastic increase from 12.26 per cent in 1990-91 to 27.57 per cent by 2002-03. This shows that opening up of the economy has led to a significant increase in the market for the SSI products at the international level.

Table 2.8: Export Intensity of Small Scale Industries

Year	Production (Rs. Crore)	Exports (Rs. Crore)	Export Intensity
1980-85	37560	2080	5.54
1985-90	91900	4780	5.20
1990-91	78802	9664	12.26
1991-92	80615	13883	17.22
1992-93	84413	17784	21.07
1993-94	98796	25307	25.62
1994-95	122154	29068	23.80
1995-96	147712	36470	24.69
1996-97	167805	39248	23.39
1997-98	187217	44442	23.74
1998-99	210454	48979	23.27
1999-00	233760	54200	23.19
2000-01	261297	69797	26.71
2001-02	282270	71244	25.24
2002-03	311952	86013	27.57

Note: The export intensity figures are in percentages
Source: Calculated using Reserve Bank of India and Ministry of Small Scale Industries, Govt. of India

Having analyzed the growth and structure of the SSIs in all India level and at the regional level, we will examine the changes that have undertaken in SSI sector of Kerala in the next section.

2.4. Performance of small scale industries in Kerala –pre and post reform period

The manufacturing sector contributes about 21 per cent of the Net State Domestic Product (NSDP) of Kerala. Of this, the small industry sector has performed exceedingly well and enabled Kerala to achieve a wide measure of industrial growth (Third Census Report on Small Scale Industries, 2001-02). The SSIs of Kerala contributes a significant share in employment generation, production and number of units in the manufacturing industries when compared to the large-scale sector. It accounts for nearly one half of the income and employment generated in manufacturing. This shows the relative importance of the growing small-scale sector in Kerala.

2.4.1. District wise distribution and growth of registered SSI in Kerala

In this section we analyze the district wise performance of small-scale industries of Kerala in terms of the indicators like number of units, employment and output for the pre and post reform period. The registered units of the small-scale industries are only taken in to consideration since data of unregistered units were not included in the second Census data.

Table 2.9 shows the distribution of number of units, employment and output of the SSI units in Kerala across the different districts. During the pre reform period, more small-scale industries were situated in districts like Ernakulam, Thrissur, and Kozhikode with a share of 34.17 per cent of the total SSI units. The districts with less number of SSI units were Idukki and Wayanad with a lower share of 1.94 and 1.91 per cent respectively. In post reform period, the districts with largest number of SSI units are Thrissur, Alapuzha and Kasargode with 33.57 per cent of the total units and the districts like Kollam and Wayanad with low share of SSI units. The districts like Kasargode, Idukki and Alapuzha

grown at a rate of 34.08, 24.95 and 23.49 per cent. Kollam together constituted a share of 9.37 of the total SSI units in 1987-88, which declined to 2.18 per cent of the total.

Table.2.9: District wise share in relevant variables: Growth and distribution of shares

Name of the District	No. of units				Employment				Output			
	1987-88	2001-02	Distri-bution of Growth in shares	CAGR	1987-88	2001-02	Distri-bution of Growth in shares	CAGR	1987-88	2001-02	Distri-bution of Growth in shares	CAGR
1	**2**	**3**	**4 (3/2)**	**5**	**6**	**7**	**8(7/6)**	**9**	**10**	**11**	**12(11/10)**	**13**
Kasargode	2.3 (12)	10.62 (3)	4.62	11.50	1.52 (13)	6.97 (6)	23.50	11.48	1.61 (11)	2.46 (12)	1.53	3.07
Kannur	7.74 (9)	6.81 (9)	0.88	-0.91	5.96 (9)	6.65 (9)	5.73	0.79	4.53 (9)	5.08 (10)	1.12	0.82
Wayanad	1.91 (14)	1.95 (14)	1.02	0.15	1.85 (11)	1.73 (14)	8.14	-0.49	0.83 (14)	1.15 (14)	1.39	2.36
Kozhikode	9.38 (3)	7.98 (6)	0.85	-1.15	8.96 (4)	8.68 (5)	4.98	-0.23	8.02 (6)	9.34 (5)	1.16	1.09
Malappuram	6.17 (10)	6.73 (10)	1.09	0.62	3.71 (10)	6.62 (10)	9.17	4.23	6.4 (8)	7.6 (6)	1.19	1.24
Palakkad	8.03 (7)	7.46 (7)	0.93	-0.52	7.32 (5)	6.93 (7)	4.86	-0.39	9.32 (4)	6.66 (7)	0.71	-2.37
Thrissur	11.42 (2)	12.22 (1)	1.07	0.48	12.09 (3)	11.7 (2)	4.97	-0.23	12.54 (2)	12.08 (3)	0.96	-0.27
Ernakulam	13.37 (1)	9.44 (5)	0.71	-2.46	13.86 (2)	10.91 (4)	4.04	-1.70	22.84 (1)	17.22 (1)	0.75	-2.00
Idukki	1.94 (13)	3.12 (12)	1.60	3.45	1.19 (14)	2.86 (12)	12.29	6.43	0.99 (13)	2.9 (11)	2.92	7.98
Kottayam	9.15 (5)	7 (8)	0.76	-1.89	6.96 (6)	6.73 (8)	4.96	-0.24	6.82 (7)	9.4 (4)	1.38	2.32
Alappuzha	7.98 (8)	10.73 (2)	1.34	2.14	6.46 (8)	11.75 (1)	0.14	4.36	9.22 (5)	12.5 (2)	1.36	2.20
Pathanamthitta	2.93 (11)	3.3 (11)	1.13	0.85	1.85 (12)	2.59 (13)	7.17	2.42	1.41 (12)	1.66 (13)	1.18	1.17
Kollam	9.37 (4)	2.18 (13)	0.23	-9.89	22.21 (1)	4.81 (11)	1.11	-10.35	11.23 (3)	5.66 (9)	0.50	-4.78
Trivandrum	8.31 (6)	10.47 (4)	1.26	1.66	6.81 (7)	11.08 (3)	8.35	3.54	4.24 (10)	6.29 (8)	1.48	2.86

Note: (i) The figures represent percentage shares
(ii)The figures in parentheses represent the respective ranks
(iii) CAGR of absolute values between time points 1987-88 and 2001-02 is given
Source: Own Analysis, Based on Census of Small Scale Industries (Kerala Report) ,1987-88 and 2001-02

The total employment created in the sector showed a growth rate of 13.9 per cent from 1987-88 to 2001-02. According to second Census (1987-88) highest number of employment was generated in Kollam. The other districts like Ernakulam and Thrissur also showed higher employment potential and least employment generating districts were

Idukki and Wayanad. In 2001-02 the districts, which provide highest employment in SSI sector, were Alapuzha, Thrissur and Thiruvananthapuram and lowest in Pathanamthitta. The total output in small-scale sector in Kerala increased at a growth rate of 13.99 per cent between 1987-88 and 2001-02. The districts which contributed highest to output in 1987-88 were Ernakulam, Thrissur and Kollam which constituted 46.61 per cent of the total output and the districts which contributed lowest to the total output where Idukki and Pathanamthitta. By 2001-02 the districts, which contributed highest, were Ernakulam, Alapuzha and Thrissur constituting 41.8 per cent of the total output and the states with lowest SSI production were Pathanamthitta and Wayanad.

Taking the distribution of growth in the post reform period compared to pre-reform period, Kasargode district was found have highest growth in terms of number of units and employment. Wayanad, Malappuram, Thrissur, Idukki, Alappuzha, Pathanamthitta and Thiruvananthapuram also showed growth in the number of units. All districts, except Alappuzha showed a growth in the employment generation in the post reform period compared to pre reform period. Palakkad, Kollam, Thrissur and Ernakulam showed a decline in the proportion of output produced in the later period.

The two digit industry wise distribution of SSI units for the two sub periods is analyzed to understand the changes in the structure of industrial production in Kerala in the pre liberalization and post liberalization period, the result of which is given in Table 2.10. All the industries, except basic metal industry and food products showed a growth in employment generation in the post reform period compared to pre-reform period where as, only the basic metal industries was characterized by a sharp reduction in fixed investment and production.

In 1987-88 the largest share of the fixed investment in the pre-reform period was in food products, which was about 20.43 per cent of the total fixed investment in the SSIs. The largest share of the output was also produced in this sector, which constituted 40.46 per cent of the total. In the post reform period also food industry was the major output producing group but its share declined to 20.78 per cent. This may be attributed to the

reduction in the investment in this sector to 7.61 per cent of the total in the post reform period. In the pre-reform period the sector was providing 27.2 per cent of the total employment, with the reduction in investment it reduced to 4.56 per cent. The other industries having highest share of investment in 1987-88 were the wood products and chemical products with 14.83 and 12.85 per cent share respectively. These industries produced 15.84 per cent and 9.34 per cent of the total output.

Table 2.10: Industry wise distribution and growth of registered SSI in Kerala

Industry Group	Fixed Investment			Production			Employment		
	1987-88	2001-02	CAGR	1987-88	2001-02	CAGR	1987-88	2001-02	CAGR
Food Products	20.43	7.61	-6.81	40.46	20.78	-4.65	27.2	4.56	-11.98
Beverages, Tobacco products	1.16	3.21	7.54	0.52	2.89	13.03	0.87	4.05	11.61
Textiles	1.25	4.23	9.10	0.32	1.18	9.77	0.08	2.20	26.71
Textile products	2.32	6.61	7.77	2.15	8.30	10.13	4.70	17.67	9.92
Wood Products	14.83	15.39	0.27	15.84	12.38	-1.74	15.40	14.02	-0.67
Paper Products and Printing	10.69	8.78	-1.40	4.71	6.01	1.76	0.76	6.23	16.22
Leather and Leather Products	0.26	1.58	13.76	0.20	2.07	18.17	0.39	1.72	11.18
Chemicals and Chemical products	12.85	8.52	-2.89	9.34	10.48	0.83	6.01	14.02	6.24
Rubber, Plastic and Petroleum Products	6.69	15.39	6.13	7.81	12.3	3.30	8.30	5.16	-3.34
Non-Metallic Mineral Products	9.72	12.76	1.96	5.06	8.55	3.82	13.92	14.03	0.06
Basic Metal Products	2.04	0.01	-31.60	1.70	0.43	-9.35	1.28	0.02	-25.70
Metal products	9.56	8.28	-1.02	6.42	6.02	-0.46	8.27	8.57	0.25
Transport Equipments and Parts	1.25	0.89	-2.40	0.86	0.91	0.40	0.86	0.71	-1.36

Note: (i) The figures represent percentage shares
(ii) CAGR of absolute values between time points 1987-88 and 2001-02 is given
Source: Own Analysis, Based on Census of Small Scale Industries (Kerala Report) ,1987-88 and 2001-02

In the post reform period the industry groups with highest share of fixed investment are Wood Products, Rubber and plastic products and Non-Metallic Mineral Products, which constitutes 43.54 per cent of the total. These sectors were the major output producing industries also, next to food products. In the post reform period the employment generation is highest in textile products with a share of 17.67 per cent of the total. The other industries were Non-Metallic Mineral Products, Wood Products and Chemical and

Chemical Products with about 14 per cent share each. It is interesting to note that the highly output and employment generating sectors were those with high investment level.

In the table 2.11 we examined the output-labour ratio and output-capital ratio of the industry groups in Kerala for two points of time.

Table 2.11: Industry wise selected ratios of Kerala

Industry Group	Output-labour ratio			Capital-labour ratio		
	1987-88	2001-02	Growth Rate	1987-88	2001-02	Growth Rate
Food Products	1.03	5	11.77	6.03	3.14	-4.55
Manufacturing of Textiles	2.86	0.57	-10.84	0.78	0.32	-6.20
Textile products	0.32	0.50	3.37	2.82	1.44	-4.68
Leather and Leather Products	0.35	1.29	9.77	2.32	1.50	-3.05
Wood Products	0.71	0.95	2.05	3.26	0.92	-8.60
Paper Products and Printing	0.43	1.04	6.46	1.34	0.79	-3.74
Non-Metallic Mineral Products	0.90	0.95	0.36	1.85	1.67	-0.73
Metal products	0.78	2.18	7.62	4.25	0.78	-11.39
Basic Metal Products	0.25	0.65	7.04	1.59	0.77	-5.03
Chemicals and Chemical products	0.92	0.21	-9.97	2.54	0.33	-13.49
Transport Equipments and Parts	0.54	0.75	2.44	2.05	0.84	-6.19

Source: Own Analysis, Based on Census of Small Scale Industries (Kerala Report) ,1987-88 and 2001-02

The industry wise analysis showed that the output-labour ratio of the industries showed growth in the post reform period relative to pre-reform period, except in the case of industries like Manufacturing of Textiles and chemical and chemical products. But the output-capital ratio of the all the industry groups showed a sharp decline in the post reform period. This analysis also confirms the results of the macro picture of these ratios for Kerala which we have calculated in Table 2.3.

The sickness/closure of the small-scale sector is an issue that carries importance in the context of removal of protection and reservations given to the sector. The increasing number of sick and closed units is one of the major problem faced by the SSI sector in India as well as Kerala. The next section addresses the sickness of the SSIs at national level and in Kerala.

2.5. Sickness in the SSI sector

Studies have identified sickness in both large and small industries in India from very early periods[6]. The closure or debilitated existence of an industrial unit involves heavy cost to the society: it renders its manpower idle; lays waste scarce financial and material resources invested in land and buildings, machinery and equipment inventories and stocks. The social cost involved is much more. Recognizing that scarce resources were locked up in unviable units on a large scale, the Government of India eventually enacted special legislation to tackle the problem, namely, the Sick Industrial Companies (Special Provisions) Act, 1985. Apart from determining sickness, the main objectives of this act were to expedite the closure of unviable units and the revival of potentially viable units (Falk, 2005). In spite of the all the government supports and policies, the sickness continues in the industrial sector.

The small-scale sector suffers from a high rate of mortality and growing incidence of sickness. The definition of sickness in SSI sector has undergone several changes over time. The Census reports are not strictly comparable because in the last Census report, the data has been collected for closed units and the aspect of sickness was not covered. In this section, we consider only the third Census report, which give a detailed picture of industrial sickness among the SSIs in India. The latest definition of sickness given by the Working Group on Rehabilitation of Sick Units set up by the RBI (Kohli committee) is given below. This definition is followed in the third Census report of the small-scale industries.

A small-scale industrial unit is considered as sick when

(a) If any of the borrowal accounts of the unit remains substandard for more than six months, i.e. principal or interest, in respect of any of its borrowal accounts has remained over due for a period exceeding one year will remain unchanged even if the present period for classification of an account as substandard is reduced in due course.

Or

[6] See Thavaraj (1977); Datt (1979); Falk (2005) ; Nayak and Misra (2006).

(b) There is erosion in the net worth due to accumulated losses to the extent of 50 per cent of its net worth during the previous accounting year

Using the definition of sick units given by Kohli Committee appointed by the RBI, i.e., number of units with erosion of net worth by more than 50 per cent or delay in repayment of institutional loan by more than 12 months, it was found in the Third Census that 1,04,769 units (1 per cent) were sick. It is essential to know the reasons for sickness/ incipient sickness for better policy formulation. Table 2.12indicates the reasons given by the units suffering from sickness/ incipient sickness.

Table 2.12: Reasons for sickness in SSIs at all-India

Reasons	Total SSI Sector	Regd. SSI sector	Un Regd. SSI sector
Lack of demand	66	58	69
Shortage of working capital	46	57	43
Non-availability of raw material	12	12	12
Power shortage	13	17	12
Labor problems	5	6	4
Marketing problems	36	37	36
Equipment problems	11	9	12
Management problems	4	5	3

Note: (i) The values represent percentages

(ii) The total in each column will exceed 100 per cent, as some units have reported more than one reason

Source: All India Census Report of Small-Scale industries, 2001-02

From the table, it is clear that the major factors that led to the sickness in the SSI sector were lack of demand, shortage of working capital and marketing problems. About 65 per cent of the sick/ incipient sick units were facing lack of demand, followed by 45 per cent facing shortage of working capital and 36 per cent facing marketing problems in both registered and unregistered sector.

2.5.1. Sickness across major Indian states

It is important to have an understanding of the distribution of industrial sickness across regions. In Table 2.13, we examine the sickness across major states in India according to different criteria. The top five States in terms of number of sick units were West Bengal, Kerala, Maharashtra, Karnataka and Andhra Pradesh with a total share of 59.53 per cent. Incipient sickness measured in terms of continuous decline in gross output over three

consecutive years was 7.14 per cent. The top five States in this category were Kerala, Tamil Nadu, Andhra Pradesh, Karnataka and Maharashtra with a total share of 55.42 per cent. Combining the three criteria, i.e., units with erosion of net worth by more than 50 per cent or delay in repayment of institutional loan by more than 12 months or continuous decline in gross output over three consecutive years, it was found that about 7.82 per cent units were suffering from sickness/ incipient sickness. The top five States were same as in the case of incipient sickness, viz., Kerala, Tamil Nadu, Andhra Pradesh, Karnataka and Maharashtra with a total share of 54.28 per cent. Out of the units having outstanding loan with institutional sources, it was found that about 17.8 per cent units were sick. The top five States in this category were West Bengal, Kerala, Maharashtra and Karnataka.

Table 2.13: Sickness in the Major States

Name of State/ UT	Sick units (where there is erosion of net worth or delay in repayment of instl. Loan)	Incipient sick units (continuous decline in gross output)	Sick/ incipient sick units (erosion of net worth or delay in repayment of instl. Loan or continuous decline in gross output	Sick units as per RBI criteria (among units with outstanding instl. loan where there is erosion of net worth or delay in repayment of instl. Loan)
Andhra Pradesh	6.04(5)	9.76(3)	9.27(3)	4.1(6)
Assam	1.23(15)	1.01(16)	1.02(16)	0.98(15)
Bihar	1.85(14)	2.50(12)	2.50(12)	1.89(11)
Gujarat	1.93(12)	5.22(9)	4.98(9)	1.53(14)
Haryana	1.89(13)	2.07(14)	2.07(14)	1.87(13)
Himachal Pradesh	0.61(16)	1.13(15)	1.09(15)	0.68(16)
Karnataka	9.20(4)	9.03(4)	9.07(4)	9.90(4)
Kerala	14.64(2)	18.61(1)	17.80(1)	15.28(2)
Madhya Pradesh	3.98(9)	5.43(8)	5.34(7)	3.80(9)
Maharashtra	13.70(3)	6.62(5)	7.31(5)	14.17(3)
Orissa	4.11(8)	2.33(13)	2.42(13)	4.04(7)
Punjab	2.16(11)	5.60(7)	5.28(8)	1.89(12)
Rajasthan	2.19(10)	5.05(10)	4.8(10)	2.08(10)
Tamil Nadu	4.93(6)	11.40(2)	10.84(2)	4.02(8)
Uttar Pradesh	4.61(7)	3.05(11)	3.13(11)	4.3(5)
West Bengal	15.96(1)	5.71(6)	6.92(6)	18.28(1)

Note: Figures in parentheses represent percentage share.
Source: All India Census Report of Small-Scale industries, 2001-02

2.5.2. Sickness in the SSI sector of Kerala

The third Census report shows that about 145996 (32.24 per cent) units in Kerala were suffering from sickness. The top five districts in terms of number of sick units are Kasargode, Thiruvananthapuram, Alappuzha, Thrissur and Kannur with a total share of 55.84per cent. In this section we examine the current status of sickness and the reasons for the sickness in the SSI sector of Kerala.

Table 2.14 shows the sickness in the SSI sector of Kerala according to the 2001-02 Census report. In the registered sector 6.21 per cent of the units are sick and in the unregistered sector 2.03 per cent of the units are sick. The incipient sickness among units is very high that 34.41 per cent of the registered units and 29.15 per cent unregistered units are sick. About 78.59 per cent of the units are sick due to lack of demand for their products followed by 38.4 per cent facing shortage of working capital and 33.62 per cent facing marketing problems.

Table 2.14: Reasons for Sickness in the SSI sector of Kerala (percentages)

Reasons	Total SSI Sector	Regd. SSI sector	Unregd. SSI sector
Lack of demand	36.97	45.25	42.72
Shortage of Working Capital	24.96	17.45	20.87
Non-availability of raw material	6.67	9.46	8.50
Power Shortage	4.66	2.62	1.57
Labor Problem	1.85	1.36	1.59
Marketing Problem	18.73	17.39	18.28
Equipment Problem	4.14	4.71	4.57
Management Problem	2.02	1.76	1.90

Note: (i) The values represent percentages
(ii)The total in each column will exceed 100 per cent, as some units have reported more than one reason
Source: Census of Small-Scale Industries (Kerala Report), 2001-02

The distribution of sick units across the districts is given in Table 2.15. Using the definition given by Kohli Committee, that is number of units with erosion of net worth by more than 50 per cent or delay in repayment of institutional loan by more than 12 months was found highest in districts like Kasargode, Thiruvananthapuram, Alapuzha, Thrissur

and Kannur with a total share of 55.84 per cent. Incipient sickness measured in terms of continuous decline in gross output over three consecutive years, was found higher in districts like Kasargode, Thrissur, Thiruvananthapuram, Alapuzha, and Kannur with a total share of 55.21 per cent.

Table 2.15: Percentage distribution of sick/ incipient sick units in the total SSI sector in Kerala

Name of the district	Sick Units	Incipient Sick	Sick/incipient sick units	Sick units as per RBI criteria
Kasargode	16.20	18.42	17.74	12.10
Kannur	8.33	7.39	7.62	8.82
Wayanad	2.46	3.96	3.88	2.77
Kozhikode	8.15	6.31	6.30	8.63
Malappuram	1.80	4.90	4.79	1.94
Palakkad	7.17	6.38	6.49	8.18
Thrissur	9.55	12.48	12.40	10.23
Ernakulam	5.14	6.69	6.63	5.42
Idukki	7.26	3.76	4.03	8.31
Kottayam	8.11	6.76	6.81	7.65
Alappuzha	9.80	7.93	8.08	10.84
Pathanamthitta	1.56	3.35	3.28	1.57
Kollam	2.51	2.67	2.60	2.75
Thiruvananthapuram	11.95	8.99	9.27	10.78
Total	100.00	100.00	100.00	100.00

Note: The figures represent percentage of the relevant variable.
Source: Census of Small Scale Industries (Kerala Report), 2001-02

2.6. Summary and Conclusion

In this chapter we have analysed the impact of economic reforms on the growth and performance of SSIs in India as well as Kerala. A comparative analysis of the of the growth rates for pre- liberalization period (1987-88) and post liberalization period (2001-02) for parameters such as number of units, employment, fixed investment, output and exports have been carried out. We tried to capture structural change that took place in SSIs on the basis of the changes in the distribution of the number of units, employment, fixed capital investment and production across industry groups and at the state level. Our results indicate that liberalization has not led to the concentration of SSI units in the urban areas. Due to reforms there was a sharp reduction in the small–scale manufacturing units

and a significant increase in SSSBEs and the ancillary units. This shows the increased role of service based firms and subcontracting to the small-scale sector. Manufacturing/ assembling/ processing units showed a diminution in share where as the repairing and maintenance and services units showed growth in the post liberalization period. The ancillary units also showed an increase of nearly 17 per cent in the post reform period. This shows the increasing tendency of subcontracting to the small-scale sector in India and Kerala.

The fixed investment and output showed a significant increase in the post reform period at both all-India and Kerala. This accounts for the increasing modernization in the sector. But the growth in employment was very modest at the all-India and Kerala. The employment intensity of the small-scale industry in India showed a declining trend. The exports showed a significant growth over the period. The industry-wise analysis of all-India showed that output-capital ratio substantially declined in all the groups in the post reform period. In the case of Kerala also there was a substantial decline in output-capital ratio after reforms. The output-labour ratio almost doubled in the post reform period for both all-India and Kerala since reforms. In the case of India, except industries like textile products, chemical and chemical products and basic metal industries, all the industries showed an improvement in output-labour ratio where as in the case of Kerala, this ratio has increased in all industries except textiles and chemical and chemical products industries. But the growth rate reduced to half in the post reform period compared to pre-reform period in both cases. Taking the relative performance of the variables, we can find that the output- capital ratio and output-labour ratio in Kerala was less than even one half of the all-India level in 1987-88 and 2001-02. The sickness of units continues to be a major problem faced by the industry. The major factors that lead to sickness in the SSI sector were lack of demand, shortage of working capital and marketing problems.

The high incidence of sickness suggests the inefficient operations in the SSI sector. The inefficient use of the resources is a problem faced by this sector. It is worthwhile to undertake an inter-industry analysis to examine the real dynamics of the sector in terms of

efficiency. As said earlier, the SSI sector can be categorized as registered and unregistered sector. The next chapter deals with the efficiency of the SSIs in the registered sector, followed by the analysis on the unregistered sector in Chapter IV.

Chapter III

Technical Efficiency of Registered Small-Scale Industry in Kerala

The efficient and productive use of the existing resources is one of the most important sources of growth of an economy. The basic objective of this chapter is to analyze the technical efficiency of 17 major registered small-scale industrial groups in Kerala. In order to estimate the technical efficiency, it is essential to have data on value added of the industries. The Third Census report of the small-scale industries published in 2001-02 does not provide data on value added of the SSIs. So in the present study we have used the data of the registered SSIs collected from the Directorate of Industries. This source provides data on the variables such as employment, fixed assets, output and raw material cost of the registered SSIs. We have used the latest data (2005-06) for finding out the industries, which were working efficiently in Kerala since liberalization. By using the latest data the actual impact of the reforms could be captured, because even after liberalisation the reservation and protection given to the sector continues in recent times[1]. We have analyzed the technical efficiency of SSIs across industries using the Data Envelopment Analysis (DEA). However, the sources of technical efficiency for the registered SSI units were not estimated because of the lack of data of the variables, which determines efficiency. These details are available for the unorganised sector; hence we did this exercise for the unorganized units. The following chapter deals with this.

The chapter is structured in the following way. The first section of the chapter discusses the Data Envelopment Analysis in measuring technical efficiency. The second section deals with the partial productivities of the industries for 2005-06. The third section deals with the results of overall, pure and scale technical efficiency scores. The fourth section gives the summary of the chapter.

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[1] As per Ministry of Small Scale Industries, Government of India, as on 13th March 2007, 114 items are still reserved for exclusive production in the SSI sector. The major industry groups are Food and allied Industries, Wood and Wood products, Paper products, Plastic products, Chemical and Chemical products, Glass and Ceramics, Electrical Machines including Electronics and Electrical components.

3.1. Measurement of Technical Efficiency

Technical efficiency is defined as a measure of how efficiently the inputs are transformed to a given level of output. An industry /firm is technically efficient if it could produce the same output using fewer inputs, or more output using the same inputs. For estimating technical efficiency mainly two approaches are followed-the econometric approach and the data envelopment analysis. The econometric methodology has taken two routes: one has been to estimate the flexible functional forms without giving much importance to the needed econometric properties of the cost or production functions and the equilibrium arising from optimization. The other has been to impose the properties and the equilibrium conditions and estimate the efficiency. These parametric approaches have the major disadvantage that they require an explicit functional form for the technology as also for the distribution of the inefficiency terms. An alternative non-parametric measure, which does not assume any functional form, is the Data Envelopment Analysis (DEA)[2].

The non-parametric method was introduced as DEA by Charnes, Cooper and Rhodes (1978) on the basis of the framework of Farell (1957), who argued that it is practical to measure productive efficiency based on a production possibility set consisting of the conical hull of input-output vectors. This implies that certain properties of a production function assume importance for the estimation procedure without, however, creating the need to specify a functional form and to estimate its parameters. DEA is based on the estimation of efficiency variations with reference to a frontier. This is referred to as deterministic approach because the stochastic component of the model is entirely contained in the (in) efficiency term.

The advantage of DEA over the parametric approach is that firstly, the input-output regression estimated by Ordinary Least Squares (OLS) technique results in average or expected level of outcome given certain inputs instead of the desired maximum achievable outcome [Soteriou et al. (1998)]. Secondly, non-parametric analysis does not

[2] See S.C. Ray (2004) for a detailed discussion of parametric and non parametric measures of efficiency estimation.

require a priori functional specification of the unknown technology or distribution assumptions about the error term that may cause potential specification error. The multiple outputs and variable returns- to- scale of production provide meaningful technical and scale efficiency measures for each Decision Making Units (DMUs) without having data on input price or costs. Thirdly, DEA is particularly amenable for small sample studies where firms tend to produce reasonably comparable types of outputs. Basically, a non-parametric approach uses linear programming technique to measure efficiency of operating units with the same objective. It measures efficiency based on the concept of technical efficiency, where efficient firms are those that use less of every input to produce the given amount of output inputs as compared to other firms or linear combination of firms (Bala, 2007).

Data Envelopment Analysis

Data Envelopment Analysis (DEA) calibrates the level of technical efficiency on the basis of an estimated discrete piece-wise frontier (efficiency frontier). In all instances, these Paretoefficient DMUs located on efficiency frontier, compared to others, minimise the use of productive resources given the outputs (input-oriented measure), or maximise the output given the input size (output oriented measure) and are called the 'best practice performers" or reference units within the sample of DMUs. These Pareto efficient DMUs have a benchmark efficiency score of unity that no individual DMU's score can surpass. Further, this efficiency frontier provides a yardstick against which to measure the relative efficiency of all other decision-making units that do not lie on the frontier. The DMUs, which do not lie on efficiency frontier, are deemed relatively inefficient and each receives a score between zero and one. The efficiency score of each DMU can be interpreted as the radial distance to efficiency frontier. In short, DEA forms a non – parametric surface frontier over the data points to determine the efficiency of each decision making unit relative to this frontier.

Data envelopment analysis constructs a liner or piece-wise linear frontier using input/output combinations of firms in the sample and calculates efficiency measure based on deviations from that frontier. Figure I illustrate the DEA method of calculating production frontiers and efficiency measures for a sample of four firms with input-output combinations at points B, C, D and F. The constant returns to scale frontier is simply a ray though the origin that envelops the data. In this case the production frontier is the ray OC. The full efficient firm at point C lies on the frontier and thus overall technical efficiency for this firm equals one. The other three firms operate inside the frontier and are thus inefficient. For the firms operating at point F, overall technical efficiency is defined by GH/GR.

To divide overall technical efficiency into pure technical inefficiency and scale inefficiency, the DEA approach constructs a variable returns to scale (VRS) frontier[3]. For the four firms in Figure, the VRS frontier is the piecewise linear frontier ABCD. Clearly, this more general form of technology envelops the data most closely. Pure technical efficiency is defined on the basis of the variable returns to scale technology. Because firms B,C, and D lie on this frontier, they receive a pure technical efficiency score of one or 100 per cent, while F is inefficient by this criteria as well. Pure technical efficiency is measured by the ratio of the inputs required on the variable returns to scale frontier to those used by the firm. Thus, the relative efficiency of firm F is given by pure technical efficiency = GJ/GF

Although Firms B and D are efficient in terms of pure technical efficiency, neither is considered overall technically efficient because they operate on an inefficient scale. Both firms could produce more output per unit of input by adopting the scale employed by the firm C. Using this logic, a measure of pure scale efficiency can be obtained by taking the ratio of scores for overall technical efficiency and pure technical efficiency. Pure scale efficiency for firm F in figure is GH/GJ. In other words, to measure the most productive scale size, technical inefficiency is first eliminated by moving from point F to point J on

[3] See Burki, Abid A. and D. Terrell (1998) and S.C. Ray(2004) for detailed description of DEA methodology

production frontier and then measuring the divergence in the input from the constant returns to scale frontier. This implies that 1- GH/GJ measures the percent of input reduction that could occur if this firm was producing at the most efficient scale. Thus, point C is the only scale efficient point in Figure 1.

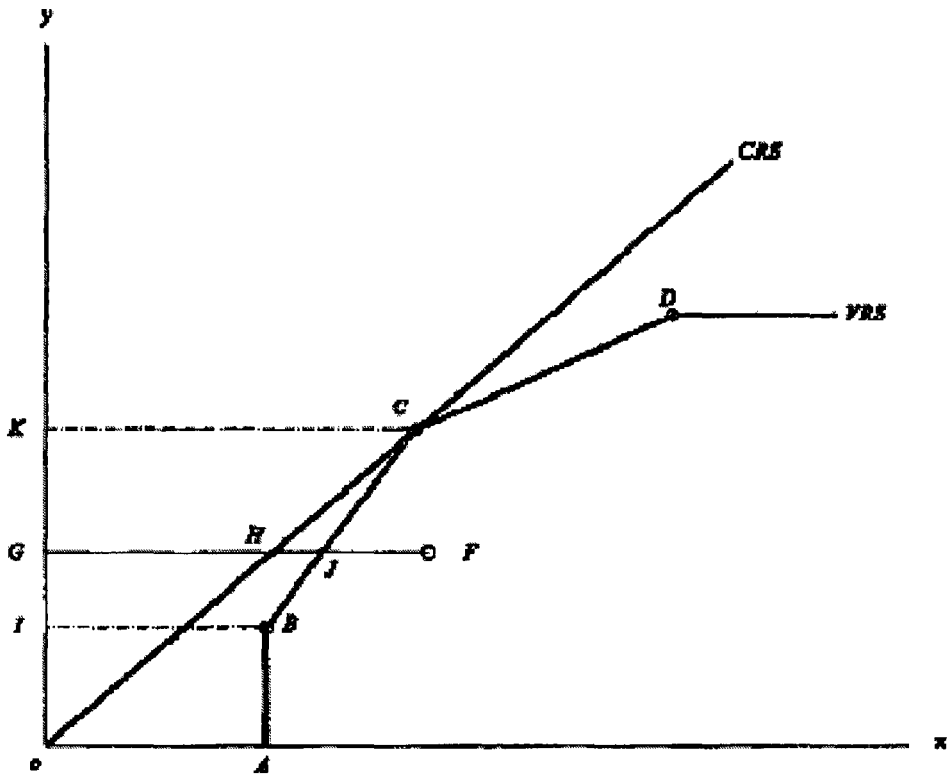

Figure 1. *Measuring technical and scale efficiencies.*

Assuming constant returns-to-scale (CRS), strong disposability of inputs and outputs and convexity of the production possibility set, the overall technical efficiency (OTE) of the *i-th* DMU (decision making unit) can be obtained from the following input-oriented DEA model.

$\min \theta_i^{CRS}, \lambda\, \theta_i^{CRS}$

subject to $-y + Y\lambda \geq 0,$

$\theta_i^{CRS} x_i - X\lambda \geq 0,$

$\lambda \geq 0$ ..... (i)

Where, θ_i^{CRS} is a TE measure of the I-th firm under CRS and λ is a N x 1 vector of constants. A separate linear programming (LP) problem is solved to obtain the TE score for each N DMUs in the sample. If $\theta^{CRS}=1$, the DMU is on the frontier and is technically efficient under CRS. If $\theta^{CRS} < 1$, then the DMU lies below the frontier and is technically inefficient.

The CRS DEA model detailed above provides the *overall technically efficiency* (OTE) and is only appropriate when all firms are operating at an optimal scale. The use of CRS specification when not all firms are operating at the optimal scale, results in measure of TE that are confounded by scale efficiencies (SE). The use of variable returns-to-scale (VRS) permits the calculation of devoid of these SE effects.

The CRS linear programming problem can be easily modified to account for VRS by adding the convexity constraint: $N1'\lambda=1$ to the model (i) to provide:

$\min \theta_i^{VRS}, \lambda\, \theta_i^{VRS}$

subject to $-y + Y\lambda \geq 0,$

$\theta_i^{VRS} x_i - X\lambda \geq 0,$

$N1'\lambda=1$

$\lambda \geq 0$ .....(ii)

Where, θ_i^{VRS} is a efficiency measure (popularly known as *pure technical efficiency* (PTE)) of the *i-th* DMU under VRS and N1 is a N x 1 vector of ones.

This approach forms a convex hull of intersecting planes which envelope the data points more tightly than the CRS conical hull and thus provides pure technical efficiency scores (θ^{VRS}), which are greater than, or equal to technical efficiency scores under CRS (θ^{CRS}).

A measure of scale efficiency (SE) of the *i-th* DMU can be obtained as:

$$SEi = \frac{\theta_i^{CRS}}{\theta_i^{VRS}}$$

Where SE=1 indicates scale efficiency or CRS and SE < 1 indicates scale inefficiency (Bala, 2007).

3.2. Partial productivities of the industries

This section deals with the capital intensity (K/L), capital productivity (Y/K) and labour productivity (Y/L) of the 17 registered SSIs in Kerala. Capital intensity is measured as is measured as the ratio of capital to labour. Capital productivity is measured as the ratio of gross value added to fixed capital and labour productivity is the ratio of gross value added per worker.

Table 3.1 gives the partial productivities of the registered SSI units for the period 2005-06. Rubber and Plastic products, Wood products and Medical, Optical instruments, watches & clocks industries found to be highly capital intensive industries where as Communication and equipment and apparatus Fur and Wearing Apparel; Dressing and Dyeing of fur are found to be more labour intensive.

The Chemicals and chemical products, Manufacture of Textiles, Wearing Apparel; Dressing and Dyeing of Fur are the industries having higher capital productivity. Transport Equipment and parts, wood products and rubber and plastic products industries have lower capital productivity. Chemicals and chemical products, basic metal industries and non-metallic mineral products are industries with higher labour productivity. The labour productivity is lower in industries like transport equipments and communication and equipment industry.

Table 3.1: Partial Productivities (Rs.) of Registered SSIs in 2005-06

Industry Group	Capital Intensity	Capital productivity	Labour productivity
Food Products	100.60 (12)	39.34 (5)	3957.32 (6)
Manufacture of Textiles	40.60 (15)	106.79 (2)	4335.96 (5)
Wearing Apparel; Dressing and Dyeing of Fur	21.40 (17)	95.49 (3)	2047.91 (10)
Tanning and Dressing of Leather	146.30 (9)	23.11 (9)	3380.59 (7)
Wood products	2177.50 (2)	0.34 (16)	741.28 (13)
Paper products and printing	94.80 (13)	23.34 (8)	2211.47 (9)
Media and Publishing	184.10 (8)	2.7 (13)	497.85 (15)
Chemicals and chemical products	144.90 (10)	137.85 (1)	19967.21 (1)
Rubber and Plastic products	2534.60 (1)	0.93 (15)	2357.51 (8)
Non-metallic mineral products	237.10 (5)	29.55 (6)	7006.42 (3)
Basic metal industries	206.30 (6)	92.06 (4)	18991.03 (2)
Fabricated metal products, except machinery and equipments	185.30 (7)	24.22 (7)	4488.69 (4)
Office, Accounting and Computing machinery	114.30 (11)	11.35 (11)	1297.26 (11)
Communication and equipment and apparatus	24.70 (16)	12.04 (10)	298.04 (16)
Medical, Optical instruments, watches &clocks	403.40 (3)	2.61 (14)	1053.37 (12)
Motor vehicles, Trailers and semi-trailers	55.10 (14)	11.25 (12)	619.59 (14)
Transport Equipment and parts	245.10 (4)	0.18 (17)	43.88 (17)

Note: Figures in the parentheses represent ranks of the industries
Source: Own calculation using the data of registered SSI units from Directorate of Industries

3.3. Results of Technical Efficiency of Small Scale industries (2005-06)

In this section we analyse the technical efficiency of SSIs for the period 2005-06.The data for the analysis is aggregated from the firm level data of units registered under the Directorate of Industries of Kerala in 2005-06. The empirical results of overall technical efficiency (OTE), pure technical efficiency (PTE) and scale efficiency (SE) for the industry groups are given.

Table 3.2 presents the overall technical efficiency scores for 17 major small-scale industries. The average of overall technical efficiency scores for the industries is 0.299. This implies that on average these industries are producing only 29.9 percent of output that could be produced with their current level of input resources. This indicates that the level of overall technical inefficiency is about 70 percent. This suggests that by adopting best practices these industries can on average reduce their inputs of labour and capital by 70 per cent. However the potential reduction in inputs from adopting best practices varies from group to group.

Table 3.2: Overall Efficiency of Major Small Scale Industries (2005-06)

Industry Group	Overall Technical Efficiency	Rank	Capital Intensity	Share of Value Added
Chemicals and chemical products	1.00	1	144.9	23.48
Basic metal industries	0.95	2	206.3	5.11
Manufacture of Textiles	0.77	3	40.6	5.95
Wearing Apparel; Dressing and Dyeing of Fur	0.69	4	21.4	9.57
Non-metallic mineral products	0.35	5	237.1	11.45
Food Products	0.29	6	100.6	29.93
Fabricated metal products, except machinery and equipments	0.22	7	185.3	9.50
Paper products and printing	0.17	8	94.8	0.92
Tanning and Dressing of Leather	0.17	9	146.3	0.72
Rubber and Plastic products	0.12	10	2534.6	2.44
Communication and equipment and apparatus	0.09	11	24.7	0.02
Office, Accounting and Computing machinery	0.08	12	114.3	0.03
Motor vehicles, Trailers and semi-trailers	0.08	13	55.1	0.18
Medical, Optical instruments, watches and clocks	0.05	14	403.4	0.15
Wood products	0.04	15	2177.5	0.22
Media and Publishing	0.02	16	184.1	0.35
Transport Equipment and parts	0.00	17	245.1	0.00
Average of overall technical efficiency score :0.299				
Average of capital intensity (Rs.) : 406.83				

Source: Own calculation using the data of registered SSI units from Directorate of Industries

Of the 17 industries, Chemicals and chemical products has been observed to be relatively efficient with overall technical efficiency score equal to one and remaining 16 industrial groups were found relatively inefficient with overall technical efficiency scores less than

one. The Chemicals and chemical products industry constitutes 23.48 per cent of the total value added of the registered sector. The overall technical efficiency scores are above average in industries like Basic metal industries, Manufacture of Textiles, Wearing Apparel; Dressing and Dyeing of Fur and Non-metallic mineral products. These industries which were above average have been contributing 55.56 per cent of the value added, which shows that more than half of the value added of the registered SSI sector is produced efficiently. None of the industries, which were efficient, was found to be capital intensive. The amount of technical inefficiency varies drastically across the industrial groups. The largest overall inefficiency has been observed in Transport Equipment and parts industry. But this industry contributes only a very minor share of the total output.

The overall technical efficiency decomposed to pure technical efficiency and scale efficiency is given in the following section. The pure technical efficiency reflects whether production operations are efficient or not and thus reflects a sort of managerial efficiency that is, the capability of management to convert resources into output. On the other hand, the scale efficiency indicates that whether industry is working at optimal size or not. Table 3.5 represents pure technical efficiency scores of the industries.

It has been found that the Food Products has become efficient under pure technical efficiency score, which was inefficient under overall technical score. Chemicals and chemical products industry remained efficient. Other industries like Basic metal industries, Communication and equipment and apparatus and Office, Accounting and Computing machinery also attained pure technical efficiency score equal to one which was less than one as per overall technical efficiency score. So these industries have become efficient under variable returns- to- scale (VRS), which were inefficient under constant returns to scale (CRS). The industries with technical efficiency score equal to one contribute 58.57 per cent of the value added of the industry.

The average pure technical efficiency score for the industrial group is 0.54. This showed that on average these industries are producing only 54 per cent of output that could be

produced with their current level of input resources. Transport Equipment and parts, Manufacture of Textiles, and Wearing Apparel; Dressing and Dyeing of Fur industries have pure technical efficiency scores above this. The industries with pure efficiency score above average constitute 74.09 per cent of the output implying that a major share of the value added is produced under efficient managerial expertise. Here, all these industries were having capital-labour ratio was less than average showing that all are less capital intensive.

Table 3.3: Pure Efficiency of Major Small Scale Industries (2005-06)

Industry Group	Pure Technical Efficiency	Rank	Capital Intensity	Share in Value Added
Food Products	1.00	1	100.6	29.93
Chemicals and chemical products	1.00	1	144.9	23.48
Basic metal industries	1.00	1	206.3	5.11
Office, Accounting and Computing machinery	1.00	1	114.3	0.03
Communication and equipment and apparatus	1.00	1	24.7	0.02
Transport Equipment and parts	0.92	2	245.1	0.00
Manufacture of Textiles	0.80	3	40.6	5.95
Wearing Apparel; Dressing and Dyeing of Fur	0.70	4	21.4	9.57
Non-metallic mineral products	0.36	5	237.1	11.45
Tanning and Dressing of Leather	0.26	6	146.3	0.72
Fabricated metal products, except machinery and equipments	0.23	7	185.3	9.50
Paper products and printing	0.22	8	94.8	0.92
Motor vehicles, Trailers and semi-trailers	0.20	9	55.1	0.18
Medical, Optical instruments, watches &clocks	0.20	10	403.4	0.15
Rubber and Plastic products	0.13	11	2534.6	2.44
Wood products	0.11	12	2177.5	0.22
Media and Publishing	0.05	13	184.1	0.35
Average of pure technical efficiency scores: 0.54				
Average of capital intensity (Rs.) : 406.83				

Source: Own calculation using the data of registered SSI units from Directorate of Industries

Media and Publishing, Wood products and Rubber and Plastic products industries were the highly inefficient industry as per the pure technical score. These industries were inefficient due to managerial inefficiencies.

Table 3.4 presents the scale efficiency scores of the selected small industrial groups. The average efficiency is 0.59, which shows that inefficiency from the minimum efficient scale is about 40 percent on average. Chemicals and chemical products industry is scale efficient with technical efficiency score equal to one. Wearing Apparel; Dressing and Dyeing of Fur, Non-metallic mineral products, Fabricated metal products, except machinery and equipments, Manufacture of Textiles, Basic metal industries, Rubber and Plastic products, Communication and equipment and apparatus, Paper products and printing, and Tanning and Dressing of Leather industries have efficiency score above average.

Table 3.4: Scale Efficiency of Major Small Scale Industries (2005-06)

Industry Group	Scale Technical Efficiency	Rank	Capital Intensity	Share in Value Added
Chemicals and chemical products	1.00	1	144.9	23.48
Wearing Apparel; Dressing and Dyeing of Fur	0.99	2	21.4	9.57
Non-metallic mineral products	0.99	3	237.1	11.45
Fabricated metal products, except machinery and equipments	0.98	4	185.3	9.50
Manufacture of Textiles	0.97	5	40.6	5.95
Basic metal industries	0.95	6	206.3	5.11
Rubber and Plastic products	0.88	7	2534.6	2.44
Paper products and printing	0.77	8	94.8	0.92
Tanning and Dressing of Leather	0.64	9	146.3	0.72
Media and Publishing	0.46	10	184.1	0.35
Motor vehicles, Trailers and semi-trailers	0.41	11	55.1	0.18
Wood products	0.35	12	2177.5	0.22
Food Products	0.29	13	100.6	29.93
Medical, Optical instruments, watches &clocks	0.26	14	403.4	0.15
Communication and equipment and apparatus	0.09	15	24.7	0.02
Office, Accounting and Computing machinery	0.08	16	114.3	0.03
Transport Equipment and parts	0.00	17	245.1	0.00
Average of scale technical efficiency scores:0.59				
Average of capital intensity (Rs.) :406.83				

Source: Own calculation using the data of registered SSI units from Directorate of Industries

Among the efficient industries only Rubber and Plastic products industry was found to be capital intensive. The industries, which were having scale efficiency, score above average

accounted for 69.14 per cent of the value added. Thus, it is clear that more inefficiency in the output produced in the sector is created due to operations under sub optimal size than managerial inefficiency. The largest scale inefficiency is found in Transport Equipment and parts, Office, Accounting and Computing machinery and Communication and equipment and apparatus.

Chemicals and chemical products, Manufacture of Textiles, Wearing Apparel; Dressing and Dyeing of Fur and Basic metal industries were found to be both pure and scale efficient. Since the overall technical efficiency score is a product of pure technical efficiency and scale efficiency scores, the relative sizes of these scores provide evidence as to the source of inefficiency. We find that the mean pure technical inefficiency for all the 17 industries is 0.54 and the mean scale inefficiency 0.59 and the standard deviation of pure technical efficiency scores is 0.38 and the scale efficiency scores is 0.37. The difference between the pure and scale efficiency score is very slight and so the inefficiency of the SSI units in 2005-06 can be attributed to both under utilization of inputs or the selection of incorrect input combinations and inappropriate returns- to-scale. It is clear from the analysis that 25.91 per cent of the value added produced inefficiently were due to managerial inefficiency where as 30.86 per cent of the inefficiency in value added has been created due to scale inefficiencies.

3.4. Summary and Conclusion

This chapter aimed to evaluate the extent of inter-industry differentials in technical efficiency of registered SSIs in Kerala for 2005-06. We have used data of those industries registered, which have been registered under the Directorate of Industries. The technique of Data Envelopment Analysis has been utilized for obtaining overall technical efficiency, pure technical efficiency and scale efficiency scores for the 17 industry groups of small scale sector.

Chemicals and chemical products industry was observed to be relatively efficient with overall technical efficiency score equal to one. The average of overall technical efficiency

scores for the industries in 2005-06 was 0.299. This implies that on average these industries are producing only 29.9 percent of output that could be produced with their current level of input resources. This indicates that the level of overall technical inefficiency is about 70 percent. The industries which were above average have been contributing 55.56 per cent of the value added, which shows that more than half of the value added of the registered SSI sector is produced efficiently. The largest overall inefficiency has been observed in Transport Equipment and parts industry.

The average pure technical efficiency score for the industrial group was found to be 0.54. The industries with pure efficiency score above average constitute 74.09 per cent of the output implying that a major share of the value added is produced under efficient managerial expertise. The industries which were having scale efficiency score above average accounted for 69.14 per cent of the value added .It showed that more inefficiency in the production in the sector is due to operations under sub optimal size than managerial inefficiencies. Chemicals and chemical products, Manufacture of Textiles, Wearing Apparel; Dressing and Dyeing of Fur and Basic metal industries were the only industries found to be both pure and scale efficient. One of the interesting results of the analysis was that majority of the technically efficient industries were not capital intensive. It implies that the general opinion of small-scale sector is not efficient since they were less capital intensive is not always right. The analysis showed that even though they are highly labour intensive they are efficient.

Chapter IV

Technical Efficiency in Unorganized Small Scale Sector in Kerala

The presence of the unorganised sector in the industrial sector cannot be ignored in a developing country like India. The number of units and the employment generation in this sector is very high. In 2000-01, this sector constituted 86.4 per cent of the employment, 25.2 per cent of gross value added, 20.5 per cent of fixed capital and 16.9 per cent of total output of whole manufacturing sector. In Kerala, this sector accounts for 80.3 per cent of employment, 32.7 per cent of gross value added, 34.5 per cent of the fixed capital and 17.4 per cent output of the whole manufacturing sector (Sharma and Dash, 2006). It is significant to look at the structure and performance of the unorganised manufacturing industries in the liberalisation era. The present chapter deals with the structure and efficiency of the small-scale industries in the unorganised sector of Kerala. The analysis of the chapter is based on the *unit level data of National Sample Survey Organisation (NSSO) 56th Round, 2000-01.* Technical Efficiency is measured using the Data Envelopment (DEA) analysis. The sources of the technical efficiency are estimated using Tobit regression.

The first section deals with the composition of unorganised manufacturing units in India and the structure of the unorganised sector across states. In the second section we analyse structure of the unorganised sector in Kerala. The third section examines the technical efficiency of the industries in the unorganised sector of Kerala. The fourth section tries to find out the factors affecting technical efficiency of the industries. The fifth section summarises the findings of the chapter.

4.1. Structure of the Unorganised Manufacturing Sector in India

This section analyses the structure of the unorganized manufacturing sector (UMS) in India. The UMS units can be categorized as Directory Employment Establishments, Non Directory Manufacturing Establishments and Own Account Manufacturing Enterprises. Directory Employment Establishments (DME) are those establishments which belong to

manufacturing or repairing industry and employs a total of six or more workers where at least one is a hired worker. Non Directory Manufacturing Establishments (NDME) are those establishments which belong to manufacturing or repairing industry and employs a total of five workers or less of which one is a hired worker employed on a fairly regular basis. Own Account Manufacturing Enterprises (OAME) are those establishments which belong to manufacturing or repairing industry and is operated without the help of a hired worker employed on a fairly regular basis.

Table 4.1 looks at the share of unorganized manufacturing sector in the Indian manufacturing sector as a whole (organized plus unorganized) and the share of different of different categories of enterprises (OAME, NDME and DME) within the unorganized Sector. Further, the share of unorganized sector in the manufacturing sector across states is brought out.

Table 4.1: Percentage Share of Different Categories of Enterprises within the Unorganized Sector

Sector	Units	Workers	Gross Value Added	Fixed Capital	Output
Within the Unorganized manufacturing sector (combined)					
OAME	86.1	67.6	42.3	36.2	27.1
NDME	5.3	8.1	13.8	30.3	20.5
DME	3.8	17.4	32.7	33.5	52.3
Within the Unorganized manufacturing sector (rural)					
OAME	92.7	79.8	63.1	59.2	53
NDME	5.3	8.1	13.8	16.8	14.5
DME	2.1	12.1	23.1	24	34.7
Within the Unorganized manufacturing sector (urban)					
OAME	70.9	45.2	25.8	25.4	14.5
NDME	21.3	27.7	33.9	36.7	23.5
DME	7.9	27.1	40.3	37.9	60.5

Source: Estimated using ASI (Summary Results Factory sector and NSSO (56th Round), 2000-01

Within the UMS, Own Account Manufacturing Enterprises (OAME) constitutes the major share of the number of units and number of workers employed. It accounts for 86 per cent of the total number of units, 68 per cent of the workers employed, 42 per cent of the value added and 27 per cent of the output of the UMS. Therefore, it seems that OAME is absorbing the workers who are displaced from the agriculture. The analysis of

UMS by location rural and urban adds strength the argument. Among the rural UMS, OAME accounts for 93 per cent of the number of units, 80 per cent of the employment, 63 per cent of the gross value added, 59 per cent of the fixed capital and 53 per cent of the output. The urban OAME constitutes 71 per cent of the units, 45 per cent of the workers contribute only 26 per cent of the value added and 15 per cent of the output.

The Non Directory Manufacturing Establishments (NDME) accounts 5 per cent of the UMS, which employ 8 per cent of the workers and 14 per cent of the value added. They contribute 21 per cent of the output and 25 per cent of the value added. In the rural area, NDME with 5 per cent of the number of units and 8 per cent of the workers employed produces 14 per cent of the value added and 15 per cent of the output. In the urban area, NDME constitutes 21 per cent of the units of the unorganized sector, employs 28 per cent of the workers and 34 per cent of value added. Directory Employment Establishments (DME) constitutes only 4 per cent of the total UMS in India but they contribute 52 per cent of the total output of the UMS. In the rural area, DME with 2 per cent units and 12 per cent employment produces 23 per cent of the value added and 35 per cent of the output. DME in the urban area constitutes 8 per cent units and 27 per cent of the employment and 40 per cent of the value added and 61 per cent of the output.

Table 4.2 gives the state wise share of number of units and employment of UMS across the major states. The states like Uttar Pradesh, West Bengal, Tamil Nadu, Maharashtra, Andhra Pradesh and Gujarat have the highest number of units in the UMS. Obviously, the same states contribute more to the employment also. The categorization of the UMS on the basis of the area of operation (rural and urban) also shows that the number of units and employment is highest in states like Uttar Pradesh, West Bengal and Andhra Pradesh. In urban areas, the share of the UMS is less compared with the rural areas. The share of UMS is comparatively less in Kerala compared to the other states.

Table 4.2: Percentage Share of Number of Units and Employment in Unorganized Manufacturing Sector in major states

States	Number of Units			Employment		
	Rural	Urban	Total	Rural	Urban	Total
Andhra Pradesh	10.1	7.9	9.4	9.9	7.0	8.9
Bihar	9.1	3.3	7.4	8.6	2.7	6.5
Goa	0.2	0.1	0.1	0.2	0.1	0.2
Gujarat	2.1	5.8	3.2	2.3	7.1	4.0
Haryana	0.8	1.8	1.1	0.7	1.8	1.1
Himachal Pradesh	0.8	0.1	0.6	0.6	0.1	0.4
Karnataka	5.8	6.8	6.1	5.3	5.8	5.5
Kerala	3.5	1.7	3.0	3.5	1.7	2.9
Madhya Pradesh	6.0	5.3	5.8	5.5	4.6	5.2
Maharashtra	5.6	11.2	7.3	5.2	13.2	8.0
Orissa	7.7	1.3	5.8	8.6	1.0	5.9
Punjab	1.6	3.0	2.0	1.4	3.1	2.0
Rajasthan	3.3	4.6	3.7	2.7	3.8	3.1
Tamil Nadu	7.1	13.4	9.0	7.0	13.5	9.3
Uttar Pradesh	14.5	13.4	14.2	16.0	13.5	15.2
West Bengal	17.8	12.7	16.3	18.4	11.1	15.8

Source: Computed from unit level data of NSSO 56th Round

The Table 4.3 shows the labour productivity (Y/L), capital productivity (Y/K) and capital intensity (K/L) of the UMS across major states. The states like Punjab, Haryana and Maharashtra have the higher labour productivity of more than Rs.25000 followed by states like Himachal Pradesh, Goa and Rajasthan having labour productivity in the range between Rs.20000 to 25000. The states like Kerala and Tamil Nadu also have higher labour productivity as compared to the all-India average. The other states have less labour productivity and Orissa has the lowest of Rs. 5459 only.

The states with capital productivity nearly one and over are Bihar, Orissa and West Bengal and these are the states which have lower labour productivity also. Similarly the states like Haryana, Punjab, and Himachal Pradesh with lower capital productivity were the states with highest labour productivity. The capital intensity is higher in states like Haryana, Punjab, Maharashtra, Gujarat and Himachal Pradesh where as in states like Orissa, West Bengal, Bihar, Andhra Pradesh, Madhya Pradesh and Uttar Pradesh show labour intensiveness in their UMS.

Table 4.3: Labour productivity, capital productivity and capital-labour ratio of the UMS across states

State	Labour Productivity	Capital Productivity	Capital Intensity
Andhra Pradesh	11906	0.71	16831
Bihar	12629	0.99	12748
Goa	21082	0.47	45295
Gujarat	27967	0.59	47073
Haryana	26838	0.34	78155
Himachal Pradesh	21234	0.45	46798
Karnataka	14375	0.60	23777
Kerala	18966	0.56	33637
Madhya Pradesh	10635	0.60	17832
Maharashtra	25552	0.49	52118
Orissa	5459	1.00	5458
Punjab	29928	0.39	76056
Rajasthan	20366	0.55	36817
Tamil Nadu	17542	0.51	34563
Uttar Pradesh	12964	0.62	20976
West Bengal	12523	1.08	11552
All-India	16233	0.58	27761

Source: Computed from unit level data of NSSO 56th Round

4.2. Unorganized manufacturing Enterprises in Kerala

In this section we analyses the structure and performance of UMS in Kerala. The share of different categories of the UMS in terms of number of units, employment, fixed assets and gross vale added are examined in Table 4.4.

Within the UMS, Own Account Manufacturing Enterprises (OAME) constitutes the major share of the number of units and DME accounts for the number of workers employed. The OAME constitutes 57.12 per cent of the number of units, 25.93 per cent of employment and 12.11 per cent of the output produced. In rural areas, OAME accounts for major share of the number of units, 27.94 per cent of the labour employed and 13.75 per cent of the output. In urban areas, the number of units under OAME is less compared to the rural area. But it accounts for 23.21 per cent of the employment and 10.48 per cent of the output.

Table 4.4: Percentage Share of Different Categories of Enterprises within the Unorganized Sector

Sector	Units	Employment	Fixed Assets	Gross Value Added
Within the Unorganized manufacturing sector (combined)				
OAME	57.12	25.93	12.06	12.1
NDME	29.34	30.64	32.52	31.44
DME	13.54	43.27	55.42	56.46
Within the Unorganized manufacturing sector (rural)				
OAME	61.58	27.94	13.97	13.75
NDME	25.3	26.52	27.75	27.86
DME	13.12	45.54	58.28	58.39
Within the Unorganized manufacturing sector (urban)				
OAME	50.73	23.21	10.47	10.48
NDME	35.13	36.23	36.48	54.58
DME	14.15	40.56	53.05	34.93

Source: Computed from unit level data of NSSO 56th Round

The NDME accounts for 29.34 per cent of the UMS in Kerala but it contributes 30.64 per cent of the employment and 31.44 per cent of the output. The NDME constitutes 25.3 per cent of the UMS in rural areas and 35.13 per cent in urban areas. The output produced in these enterprises has been very high compared to the number of units and employment. DME is found to be more prominent in Kerala apart from the picture we saw in the all-India level. DME constitutes only 13.54 per cent of the units under UMS but it accounts for 43.27per cent of the employment and 56.46 per cent of the output. In rural and urban areas also we can see that the employment and output generated in this category is very high.

Table 4.5, gives the number of units, employment, fixed capital and value added across districts. The districts like Ernakulam, Alappuzha, Thiruvananthapuram and Thrissur have the highest number of UMS and the employment generated in this sector is also very high in these districts. The share of UMS is very less in districts like Idukki, Pathanamthitta and Kasargode and obviously their share in employment is also very low. The investment in UMS is significantly higher in Ernakulam and consequently the output is also highest in this district. This is followed by other states like Thiruvananthapuram, Kozhikode, Alappuzha and Thrissur.

Table 4.5: District wise share of the Number of Units, Employment , Fixed Capital and Value Added

Districts	No. of units	Employment	Fixed Capital	Value Added
Kasargode	4.56	2.59	1.36	1.57
Kannur	7.11	6.78	3.52	6.25
Wayanad	8.57	1.28	1.21	1.37
Kozhikode	8.31	8.61	9.05	9.57
Malappuram	6.05	5.33	5.77	5.14
Palakkad	5.72	5.31	5.91	6.02
Thrissur	9.11	10.38	8.09	8.37
Ernakulam	13.36	19.06	33.05	27.49
Idukki	2.09	1.26	0.92	1.36
Kottayam	5.22	4.84	5.66	6.00
Alappuzha	10.29	13.53	7.50	9.39
Pathanamthitta	2.29	1.74	1.82	1.43
Kollam	7.14	7.54	4.09	4.32
Thiruvananthapuram	10.18	11.75	12.05	11.70

Source: Computed from unit level data of NSSO 56th Round

Table 4.6 shows the labour productivity (Y/L), capital productivity (Y/K) and capital intensity (K/L) of the UMS across the districts in Kerala . The states like Ernakulam, Kottayam and Palakkad have the higher labour productivity of more than Rs.30000 followed by states like Kozhikode, Idukki, Wayanad and Thiruvananthapuram having labour productivity in the range between Rs. 25000 to 30000. The other districts have less labour productivity and Kollam and Kasargode has the lowest.

Table 4.6: Labour productivity, capital productivity and capital-labour ratio of the UMS across districts

State	Labour Productivity	Capital Productivity	Capital Intensity
Kasargode	16316.05	0.572542	28497.55
Kannur	24749.87	0.879090	28153.98
Wayanad	28875.67	0.560711	51498.29
Kozhikode	29865.60	0.524560	56934.57
Malappuram	25881.09	0.441527	58617.25
Palakkad	30487.53	0.505362	60328.07
Thrissur	21663.36	0.512588	42262.70
Ernakulam	38753.14	0.412496	93948.01
Idukki	29125.48	0.735561	39596.30
Kottayam	33324.77	0.525804	63378.67
Alappuzha	18634.72	0.620835	30015.58
Pathanamthitta	22159.17	0.391288	56631.38
Kollam	15414.94	0.524738	29376.42
Thiruvananthapuram	26770.90	0.481724	55573.14

Source: Computed from unit level data of NSSO 56th Round

The districts with capital productivity nearly one are Kannur, Idukki and Alappuzha and these are the districts which have lower labour productivity also. Pathanamthitta, Ernakulam, Malappuram and Thiruvananthapuram are the districts with the lowest capital productivity. Ernakulam, Kottayam and Palakkad are districts where UMS are more capital intensive and the districts like Kannur, Kasargode and Kollam are found to be more labour intensive.

4.2.1 Partial productivities of the industries in the unorganized manufacturing sector

The capital intensity, capital productivity and labour productivity of the major industries are shown in Table 4.7. The capital intensity is measured as the ratio of capital to labour. Capital productivity is measured as the ratio of gross value added to fixed capital and labour productivity as the ratio of gross value added per worker.

The capital intensity is highest in Medical, Optical instruments and clocks, Office and Accounting Machinery and Rubber and Plastic products industries. The industries like Manufacture of Textiles, Wearing Apparel, Dressing and Dyeing of Fur and Transport Equipment and parts are highly labour intensive. The capital productivity is highest in Manufacture of Textiles industry. Industries like Medical, Optical instruments and clocks, Transport Equipment and parts and Communication and equipment and apparatus also have high capital productivity. Media and Publishing and Basic metal industries are found to have low capital productivity. Wood products and Paper products and printing are also industries with less capital productivity. Medical, Optical instruments and clocks and Office and Accounting Machinery were found to have high labour productivity. Rubber and Plastic products and Motor vehicles, Trailers and semi-trailers industries also have high labour productivity. Labour productivity is very low in Manufacture of Textiles industry, Wearing Apparel, Dressing and Dyeing of Fur and Basic metal industries. It is interesting to find that the industries, which were highly, labour intensive showed less labour productivity and industries, which were highly capital intensive showed higher labour productivity. Thus, it can be concluded that as the industry is more capital intensive, its labour becomes more productive.

Table 4.7: Partial productivities of the industries in the unorganized manufacturing sector

Industry Group	Capital-Labour Ratio	Labour Productivity	Capital Productivity
Manufacture of Textiles	21419.48 (17)	16110.149 (17)	0.75 (1)
Medical, Optical instruments and clocks	218202.15 (1)	159934.97 (1)	0.73 (2)
Transport Equipment and parts	41575 (15)	29313.43 (10)	0.71 (3)
Communication and equipment and apparatus	46232.72 (14)	28050.61 (12)	0.61 (4)
Tanning and Dressing of Leather	62208.76 (12)	35336.6 (6)	0.57 (5)
Motor vehicles, Trailers and semi-trailers	82067.76 (6)	42095.41 (4)	0.51 (6)
Rubber and Plastic products	113534.16 (3)	57832.1 (3)	0.51 (7)
Food Products	64447.75 (10)	32519.71 (8)	0.5 (8)
Office and Accounting Machinery	118952.38 (2)	58911.43 (2)	0.5 (9)
Non-metallic mineral products	56732.70 (13)	27357.84 (13)	0.48 (10)
Fabricated metal products, except machinery and equipments	72958.44 (7)	34255.39 (7)	0.47 (11)
Wearing Apparel; Dressing and Dyeing of Fur	37040.33 (16)	17341.46 (16)	0.47 (12)
Chemicals and chemical products	84403.40 (5)	38051.04 (5)	0.45 (13)
Paper products and printing	69178.63 (9)	28837.49 (11)	0.42 (14)
Wood products	63175.95 (11)	24931.06 (14)	0.39 (15)
Basic metal industries	69421.43 (8)	22401.43 (15)	0.32 (16)
Media and Publishing	107325.32 (4)	30787.55 (9)	0.29 (17)

Source: Computed from unit level data of NSSO 56th Round

4.3. Technical Efficiency in Unorganized Small Scale Sector in Kerala

This section deals with the technical efficiency of major small-scale industrial groups in the unorganized manufacturing sector of Kerala. It discusses the empirical results relating with partial productivities of the industries, overall technical efficiency (OTE), pure technical efficiency (PTE), scale efficiency (SE) and returns- to-scale in major small industrial groups. In order to compute the various efficiency score, the data on output and

input variables viz., output of the industry (output variable), number of employees (input variable), fixed assets (input variable) and raw material cost (input variable) , for 17 major industry groups has been used. The data for the analysis are taken from the NSSO 56th Round, 2000-01.

Table 4.8 presents the overall technical efficiency scores for 17 major small-scale industries. The average of overall technical efficiency scores for the industries is 0.69. This implies that on average these industries are producing only 69 per cent of output that could be produced with their current level of input resources. This indicates that the level of overall technical inefficiency is about 31 per cent. This suggests that by adopting best practices these industries can on average reduce their inputs of labour and capital by 31 per cent.

Table 4.8: Overall Efficiency of Major Small Scale Industries in UMS

Industry Group	Share in Value Added	Overall Technical Efficiency Score	Overall Technical Efficiency Rank	Capital Intensity
Manufacture of Textiles	12.70	1.00	1	21419.48
Medical, Optical instruments, watches and clocks	2.07	1.00	1	218202.20
Transport Equipment and parts	0.11	0.95	2	41575.00
Communication and equipment and apparatus	0.62	0.82	3	46232.72
Tanning and Dressing of Leather	1.66	0.77	4	62208.76
Motor vehicles, Trailers and semi-trailers	1.07	0.70	5	82067.76
Rubber and Plastic products	8.54	0.69	6	113534.20
Food Products	23.79	0.68	7	64447.75
Manufacture of Office, Accounting and Computing Machinery	0.17	0.67	8	118952.40
Non-metallic mineral products	8.29	0.65	9	56732.70
Fabricated metal products, except machinery and equipments	9.33	0.64	10	72958.44
Wearing Apparel; Dressing and Dyeing of Fur	11.52	0.63	11	37040.33
Chemicals and chemical products	3.78	0.61	12	84403.40
Paper products and printing	1.26	0.57	13	69178.63
Wood products	9.08	0.53	14	63175.95
Basic metal industries	0.04	0.44	15	69421.43
Media and Publishing	5.95	0.39	16	107325.30
Average of overall technical efficiency score : 0.69				
Average of Capital Intensity : 78169.2				

Source: Computed from unit level data of NSSO 56th Round

Out of the 17 industrial groups Communication and equipment and Medical, Optical instruments, watches and clocks, and Manufacture of textiles industries has been observed to be relatively efficient with overall technical efficiency score equal to one and remaining 15 industrial groups were found relatively inefficient with overall technical efficiency scores less than one. In industries like Transport Equipment and parts, Communication and equipment and apparatus, Tanning and Dressing of Leather and Motor vehicles, Trailers and semi-trailers, the overall technical efficiency scores are above average. These industries, which were above average, contribute only 26.77 per cent of the value added, which shows that 73 per cent of value added in the unorganized SSI sector are produced inefficiently. All these industries have capital-labour ratio below its average of 78169.2, except Medical, Optical instruments, watches and clocks industry. The technical inefficiency varies drastically across the industrial groups. The largest overall inefficiency has been observed in Media and Publishing, and Basic metal industries.

Further, the overall technical efficiency can be decomposed to overall technical efficiency and scale efficiency. Table 4.9 represents pure technical efficiency scores of the industries.

It has been found that the Communication and equipment and apparatus and Medical, Optical instruments, watches and clocks and Manufacture of Textiles remains highly efficient under pure technical efficiency score also. Other industries like Rubber and Plastic products, Food Products, Basic metal industries and Transport Equipment and parts also attained pure technical efficiency score equal to one, which was less than one as per overall technical efficiency sore. So these industries have become efficient under variable returns- to- scale (VRS), which were inefficient under constant returns to scale (CRS).

Table 4.9: Pure Efficiency of Major Small Scale Industries in UMS

Industry Group	Share in Value Added	Pure Technical Efficiency Score	Rank	K/L
Food Products	23.79	1.00	1	64447.8
Manufacture of Textiles	12.70	1.00	1	21419.5
Rubber and Plastic products	8.54	1.00	1	113534.2
Basic metal industries	0.04	1.00	1	69421.4
Medical, Optical instruments, watches and clocks	2.07	1.00	1	218202.2
Transport Equipment and parts	0.11	1.00	1	41575.0
Manufacture of Office, Accounting and Computing Machinery	0.17	0.91	2	118952.4
Fabricated metal products, except machinery and equipments	9.33	0.87	3	72958.4
Non-metallic mineral products	8.29	0.84	4	56732.7
Communication and equipment and apparatus	0.62	0.83	5	46232.7
Tanning and Dressing of Leather	1.66	0.77	6	62208.8
Wearing Apparel; Dressing and Dyeing of Fur	11.52	0.76	7	37040.3
Chemicals and chemical products	3.78	0.73	8	84403.4
Wood products	9.08	0.71	9	63176.0
Motor vehicles, Trailers and semi-trailers	1.07	0.70	10	82067.8
Paper products and printing	1.26	0.57	11	69178.6
Media and Publishing	5.95	0.53	12	107325.3
Average of technical efficiency score :0.835				
Average of Capital Intensity : 78169.2				

Source: Computed from unit level data of NSSO 56th Round

The average pure technical efficiency score for the industrial group is 0.835. This shows that these industrial groups are producing 83.5 per cent of output that could be produced by their input resources. Industries like Manufacture of Office, Accounting and Computing Machinery and Fabricated metal products, except machinery and equipments industries have pure technical efficiency scores above these .The industries with efficiency score above average accounts for 65.04 per cent of the total value added produced in the UMS. Other industries are having score below this. In the case of pure efficiency also, we can see that only Medical, Optical instruments, watches and clocks industry is capital intensive, all other industries working efficiently are labour intensive. Paper products and printing is the highly inefficient industry as per the pure technical score and industries like Non-metallic mineral products, chemicals and chemical products and Transport Equipment and parts also have efficient scores below the average score.

Table 4.10 gives the scale inefficiency scores in selected small industry groups. It has been found that Medical, Optical instruments, watches and clocks and Manufacture of Textiles, Tanning and Dressing of Leather, Paper products and printing and Motor vehicles, Trailers and semi-trailers industries have scale efficiency, out of which only Medical, Optical instruments, watches and clocks had capital-labour ratio above its average. Basic metal industries and Food Products are inefficient as per scale efficiency score.

Table 4.10: Scale Efficiency of Major Small Scale Industries in UMS

Industry Group	Share in Value Added	Scale Efficiency Score	Rank	K/L
Manufacture of Textiles	12.7	1.00	1	21419.5
Medical, Optical instruments, watches and clocks	2.07	1.00	1	218202.2
Tanning and Dressing of Leather	1.66	1.00	2	62208.8
Paper products and printing	1.26	1.00	3	69178.6
Motor vehicles, Trailers and semi-trailers	1.07	1.00	4	82067.8
Communication and equipment and apparatus	0.62	0.99	5	46232.7
Transport Equipment and parts	0.11	0.95	6	41575.0
Chemicals and chemical products	3.78	0.84	7	84403.4
Wearing Apparel; Dressing and Dyeing of Fur	11.52	0.83	8	37040.3
Non-metallic mineral products	8.29	0.78	9	56732.7
Wood products	9.08	0.75	10	63176.0
Manufacture of Office, Accounting and Computing Machinery	0.17	0.74	11	118952.4
Media and Publishing	5.95	0.73	12	107325.3
Fabricated metal products, except machinery and equipments	9.33	0.73	13	72958.4
Rubber and Plastic products	8.54	0.69	14	113534.2
Food Products	23.79	0.68	15	64447.8
Basic metal industries	0.04	0.44	16	69421.4
Average of technical efficiency score:0.832				
Average of Capital Intensity: 78169.2				

Source: Computed from unit level data of NSSO 56th Round

There are substantial variations in the scale efficiency among the industrial groups. The average efficiency is 0.832, which shows that inefficiency from the minimum efficient scale is about 16.7 per cent on average. The industries above average efficiency score contribute 34.79 per cent of the value added. It implies that only 34.79 per cent of the

value added is produced efficiently. It is clear from the analysis that due to managerial inefficiency 34.96 per cent of the value added was produced inefficiently where as due to scale inefficiencies 65.21 per cent was produced inefficiently. Manufacture of Textiles and Medical, Optical instruments, watches and clocks were the only industries which were both pure and scale efficient. The Medical, Optical instruments, watches and clocks was found to be highly capital intensive where as Manufacture of Textiles industry was highly labour intensive still technically very efficient.

We find that the mean pure technical inefficiency for all the 17 industries is 0.835 and the mean scale inefficiency 0.832 and the standard deviation of pure technical efficiency scores is 0.156 and the scale efficiency scores is 0.161. The difference between the pure and scale efficiency score is very slight and so the inefficiency of the unorganised units in 2005-06 can be attributed to both under utilization of inputs or the selection of incorrect input combinations and inappropriate returns- to- scale.

One of the main objectives of this chapter was to identify the factors that determine efficiency of industries in the unorganised sector. In the following section we run a Tobit analysis using the unit level data of the unorganized manufacturing enterprises in Kerala to find out the exogenous variables that attribute to efficiency of the industry. The unit level data help us to analyse the firm level dynamism of the sector.

4.4. Sources of Technical Efficiency

In this section we try to find the factors that attributed to the efficiency of the industries. A simple linear model is not appropriate because the efficiency scores obtained from the DEA model are censored. A simple application of the OLS estimation may produce biased results if there is a significant position of the observations equal to one (Bala, 2007). So we use a Tobit model, also known as censored regression model, which handles data that is skewed and truncated. The standard Tobit model can be defined as follows for observation (industry) i:

$y_i^* = \beta' x_i + \varepsilon_i$

$y_i = y_i^*$ if $y_i^* > 0$, and

$y_i = 0$, other wise ,

Where, $\varepsilon_i \sim N(0, \sigma^2)$, x_i and β are vectors of explanatory variables and unknown parameters , respectively. The y_i^* is a latent variable and y_i is the dependent variable. Following Loikkanen and Susiluota (2002), the dependent variable y_i is the DEA efficiency score.

The explanatory variables, which are used to explain technical efficiency, are subcontracting, availability of electricity connection, no power failure, marketing problem and organizational set up. The variable subcontracting explains whether the firm is subcontracted or not. It helps to understand the effect of subcontracting on efficiency of the industries. It is hypothesized that subcontracting has a positive influence on the efficiency of the industry. The other variables like availability of electricity connection, no power failure, marketing problem and organizational set up are also hypothesized as having a positive effect on the technical efficiency. The dependent variable is the technical efficiency score that we obtained from DEA analysis. We estimated the following censored Tobit regression:

$\Theta_i = \beta_0 + \beta_1$ SUBCONT + β_2 AVAILB ELEC + β_3 NO POWER FAILURE + β_4 MARKET PRB+ β_5 ORG SET UP

$\Theta_i =$ 0.6753331+0.0225515*SUBCONT + 0.0367198* AVAIL ELECT +
(8.81) *(2.92)*

0.0458765* NO POWER FAILURE.
(6.89)

Note: 1 Figures in parentheses are t-values

*2 * indicates the significance of regression coefficient at 1 per cent level of significance.*

The result of Tobit estimation showed that subcontracting was statistically significant and so the hypothesis that it has a positive effect on the technical efficiency of the industry is true. The variables like availability of electricity connection and no power failure were

also significant. It shows that these variables have a positive effect on the technical efficiency of the industries. In other words, non-availability of electricity connection and power cut causes inefficiency in industries. The variables marketing problem and organizational set up were found to be statistically insignificant. The following are the key observations, which can be derived from Tobit regression analysis:

1. Subcontracting has a significant positive effect on the technical efficiency. Thus, the industries that are subcontracting have higher technical efficiency.
2. The variables like electricity connection and no power failure are also significant. It shows that these variables have a positive impact on the technical efficiency of the industries.

4.5. Summary and Conclusion

The study aims to evaluate the extent of inter-industry differentials in technical efficiency of unorganized manufacturing enterprises in Kerala. The unit level data of the NSSO 56th Round (2000-01) survey report on unorganized sector has been used for the study. The technique of Data Envelopment Analysis has been utilized for obtaining overall technical efficiency, pure technical efficiency and scale efficiency scores for the seventeen major industries in the UMS. It has been observed that mean overall technical efficiency 0.69 implying that extent of technical inefficiency is equal to 31 per cent. Out of the 17 industrial groups Communication and equipment and Medical, Optical instruments, watches and clocks and Manufacture of textiles industries has been observed to be relatively efficient with overall technical efficiency score equal to one and remaining 15 industrial groups were found relatively inefficient with overall technical efficiency scores less than one. The highest overall inefficiency level has been observed in Media and Publishing, and Basic metal industries.

Further, the overall technical efficiency has been decomposed to (i) pure technical efficiency and (ii) scale efficiency. It has been found that the Communication and equipment and apparatus, Medical, Optical instruments, watches and clocks and Manufacture of Textiles remains highly efficient under pure technical efficiency score

also. Other industries like Rubber and Plastic products, Food Products, Basic metal industries and Transport Equipment and parts also attained pure technical efficiency score equal to one, which was less than one as per overall technical efficiency sore. The scale efficiency is highest for Medical, Optical instruments, watches and clocks and Manufacture of Textiles industries. Basic metal industries and Food Products are inefficient as per scale efficiency score.

The detailed inter- industry efficiency analysis helped us to locate the efficient and the inefficient industries, both in the registered and unregistered SSIs. In the registered sector, Chemicals and chemical products, Basic metal industries, Manufacture of Textiles, Wearing Apparel; Dressing and Dyeing of Fur and Non-metallic mineral products were the industries relatively efficient as per overall efficiency scores. These industries, except manufacture of textiles, were found to be inefficient in the unorganized sector. Basic metal industry, which was efficient in registered sector, was found to be highly inefficient in the unregistered sector. It was found that the inefficiency of the basic metal industry in the unregistered sector was caused by scale inefficiency or operations at sub optimal size. Transport Equipment and parts industry, Media and Publishing and Wood products were found to be highly inefficient in both organized and unorganised sector. As in the registered sector, in the unorganized sector also the capital intensity was found to be less correlated with the efficiency scores.

In order to explain the variation in technical efficiency among selected unregistered small industrial groups Tobit regression analysis has been employed. The result showed that subcontracting is statistically significant and so it has a positive effect on the technical efficiency of the industry. The variables like availability of electricity connection and power supply without interruption (without power failure) were also significant suggesting that these variables have a positive effect on the technical efficiency of the industries.

Chapter V
Summary and Conclusion

In the liberalized environment the SSIs are facing competition and there is an apprehension as to how they are performing and sustaining. But given the social and economic condition of India the relevance and role of small-scale sector cannot be ignored. It still plays an instrumental role in reducing regional imbalances, rising inequalities. SSIs can play the role of a catalyst by creating an infrastructure for the growth of industries, in terms of capital formation and entrepreneurship development, which may lead to structural transformation of backward regions from predominantly agriculture-based economic activities to industrial activities. Recognizing the contribution of the sector to the Indian economy, the present study has been carried out with the following objectives:

(i) To attempt a comparative analysis of the structural transformation take place in SSIs of Kerala with all- India in the pre and post reform period.

(ii) To examine the technical efficiency of the registered small-scale industry groups in Kerala under liberalization.

(iii) To analyze technical efficiency of the unorganised small-scale industry groups in Kerala under liberalization.

The study used the *All-India Census Reports of Small Industrial Units, firm level data of the SSIs registered under the Directorate of Industries, and the unit level data of NSSO 56th Round (2000-01) survey report.* The first chapter is an introductory one explaining the importance of small-scale industries and the problems faced by the SSIs under liberalisation. There is also a discussion of the definitional changes that have taken place over the period. During the First Five Year Plan small scale industries was defined on the basis of employment criteria and later in 1960 the criteria was changed to investment in plant and machinery. According to the act of 2006, the concept of Small Enterprises was changed to Small and Medium Enterprises. The conceptual framework of large firms versus small firms was also discussed. The chapter also outlined the importance of SSIs

in Kerala. The SSIs of Kerala contributes a significant share in employment generation, production and number of units in the manufacturing industries when compared to the large-scale sector. It accounts for nearly one half of the income and employment generated in the manufacturing sector, therefore the thrust area of industrial development in Kerala appears to be the small scale sector.

The second chapter deals with the growth and structural changes that have taken place in the SSI in all-India and Kerala. A comparative analysis of the growth rates for pre liberalization period (1987-88) and post liberalization period (2001-02) for parameters such as number of units, employment, fixed investment, output and exports has been carried out. We tried to capture structural change that took place in SSIs on the basis of the changes in the distribution in terms of the number of units, employment, fixed capital investment and production in industry groups and at the state level. The variables like number of units, fixed investment and output showed a growth in the post reform period but the employment generation showed a declining trend both in all-India level and Kerala. The reduction in employment of the sector in spite of the increase in the number of SSIs is a matter of concern. The capital intensity has gone up substantially but the labor intensity has declined in all –India as well as in Kerala. The role of the SSIs in generation of employment will be an issue in future. The growth of fixed investment in the post reform period shows the modernization of the sector.

Taking the state wise performance, those, which are performing, better in the SSI sector are the industrially developed states. It means that the role of SSIs in ensuring regional balances and equitable distribution of income do not appear profound. At the all-India level, Food Products, Metal Products, Transport Equipments and Parts were the industries having highest share of output in the post reform period. It is observed that the industries like food products, wood products ranked high in the employment generation. Kerala is ranked third in production and twelth in employment generation at the all-India level. In the state Food products, Wood products and Chemical and chemical products were the major sectors contributing to the total output. Textile products industry, Non-Metallic

Mineral Products, Wood Products and Chemical and Chemical Products were the highly employment intensive sectors.

The third chapter analyzed the technical efficiency of 17 major registered SSIs in Kerala for 2005-06. We have analyzed the technical efficiency of SSIs across industries using the Data Envelopment Analysis (DEA). Examining the overall efficiency of the registered SSI sector it was seen that the majority of the industries, which were relatively efficient, were the highly labour intensive industry groups. The result showed that more inefficiency in the production in the registered sector is due to operations under sub optimal size than managerial inefficiencies. Chemicals and chemical products, Manufacture of Textiles, Wearing Apparel; Dressing and Dyeing of Fur and Basic metal industries were found to record both pure technical and scale efficiency.

The fourth chapter focused on the structure and efficiency of the small-scale industries in the unorganised sector of Kerala. Analyzing the partial productivities in the unorganized sector it has been found that labour productivity varies directly with capital intensity and inversely with capital productivity in most of the industries. An increase in the labour productivity in this sector can alleviate poverty in the rural and urban areas. Manufacture of Textiles and Medical, Optical instruments, watches and clocks were the only industries, which were both pure technical and scale efficient. The result showed that more inefficiency in the production in the unorganised sector is due to operations under sub optimal size than managerial inefficiencies. The industries, which were relatively efficient as per overall efficiency scores in the registered sector, except manufacture of textiles, were found to be inefficient in the unorganized sector. Transport Equipment and parts industry, Media and Publishing and Wood products were found to be highly inefficient in both organized and unorganised sector. As in the registered sector, in the unorganized sector also the capital intensity was found to be less correlated with the efficiency scores.

In order to explain the variation in technical efficiency among selected small industrial groups in the unorganized sector, Tobit regression analysis has been employed. The result showed that in the unorganized sector, the firms, which were working under contract,

were working more efficiently compared to the firms, which do not. This emphasizes the need to strengthen the inter-linkages between the small and the large enterprises. The variables like availability of electricity connection and no power failure were also found significant. It shows that non-availability of electricity connection and power failure causes inefficiency in industries.

Policy Implications

An important feature of India's Industrial policy since Independence has been the promotion of SSIs through various incentives and direct policy supports. The major policy initiative have been the reservation of certain items for exclusive production in this sector, reservation of some of the products produced in the sector for purchase preference by government agencies, supply of scarce materials, input price concessions like lower interest rates and numerous fiscal measures such as excise duty exemptions and other tax concessions. The liberalization policies initiated since 1991 has radically changed the policy environment in which these industries are functioning. The small-scale sector will have to compete in the domestic as well as the international market. Many of the support systems for protection and promotion of the small-scale sector has been slowly relaxed. The list of products reserved for exclusive production in SSI sector has been reduced over the years. As on 13th March 2007, 114 items are reserved for exclusive production in the SSI sector. The major industry groups are Food and allied Industries, Wood and Wood products, Paper products, Plastic products, Chemical and Chemical products, Glass and Ceramics, Electrical Machines including Electronics and Electrical components.

In this context, our results indicate that the de-reservation has not affected the relative efficiency of the industry groups in Kerala. The policy change thus does not show a direct implication on the SSI sector. Even after de-reservation, the industry groups are relatively efficient compared to the reserved items. Thus in the changed regime, the government should play a facilitating role than a protective one. Government should take care of marketing and technological constraints of these small enterprises and provide them with

the necessary infrastructural and credit support, especially in rural areas. Non-availability of electricity connection and power failure was found to have a negative effect on the efficiency and performance of SSIs in Kerala. Government should formulate policies for ensuring electricity connection and uninterrupted power supply, so that these firms can perform more efficiently.

The industries like Chemicals and chemical products, Basic metal industries, Manufacture of Textiles, Wearing Apparel; Dressing and Dyeing of Fur and Non-metallic mineral products were found to be efficient in registered sector, where as Communication and equipment, Medical, Optical instruments, watches and clocks and Manufacture of textiles were the relatively efficient industries in the unorganized sector. Among these industries, only the Chemicals and chemical products are reserved items while others are getting gradually de-reserved. So these sub-sectors exhibiting greater efficiency in production should be supported by adequate incentives on a priority basis. The analysis showed that labour has been more productive in the capital-intensive sectors. The support from the government side in accessing modern technology can improve the performance. It was also found that some labour intensive industries are more efficient. From our results it is clear that Food Products, Wood Products, and Textile products, Non-Metallic Mineral Products and Chemical and Chemical Products were the highest employment generating sectors in Kerala. So the government should give more incentives for these labour intensive sectors, from the point of employment generation. Transport Equipment and parts industry, Media and Publishing and Wood products were found to be highly inefficient both in the organized and unorganised sector. The government should formulate suitable policy measures for the revival of these industries.

Another notable feature of this sector under liberalization has been the rapid growth of Small Scale Service and Business Enterprises (SSSBEs) both in Kerala as well as at the all India level. State government should formulate adequate policies so that it can take the advantage of its skilled labour force by promoting knowledge based and service based industries. The growth of ancillary units is also a positive feature. In the competitive

environment, small-scale sector cannot sustain in isolation instead they can act as complementary to the large enterprises. Subcontracting would lead to higher labour utilization in the organized and unorganized sector. Our results also show that the subcontracted firms are more efficient than others.

The statistics of closure of units gives an alarming picture. The main reasons identified were lack of demand for their products, shortage of working capital and marketing problems. A more discriminating support from state side for the promotion of the sector, especially for the new, sick and weak units is called for the long viability and health of the sector. To make the SSIs productive and efficient in future, policy measures need to be directed towards ancilliarisation of industries, development of clusters and networking.

References

Abraham, S. (1984), 'Development Of Small Scale Industries In Bihar', Capital Publishing House, New Delhi.

Albin,Alice(1990), "Manufacturing Sector In Kerala-Comparative Study Of Its Growth And Structure" , *Economic And Political Weekly*,September,Vol.25,No.37.

Alexander, P.C. (1963), 'Industrial Estates In India', Bombay .

Annavajhula J.C.B (1987), "Subcontracting In Television Industry: A Case Study Of Keltron"S TV Factory And Its Small-Scale Subcontractors", *Unpublished Mphil Thesis*, Centre For Development Studies, Trivandrum.

Annavajhula J.C.B. (1996), "Subcontracting, Industrialization And Laboring Conditions In India: An Appraisal", *The Indian Journal Of Labour Economics*", Vol.39, No.1.

Bala Neetu And Cheema C.S (2001), "Relative Efficiency Of Small Scale Sector In India: An Application Of Mathematical Programming Technique", *Asian Economic Review*, Vol.No.43 (3).

Bala, Neetu (2007), '*Economic Reforms and Growth Of Small Scale* Industries', Deep and Deep Publications, New Delhi.

Balasubrahmanya, H.(1995), "Discussion: Small Industry Reservation Policy", *Economic and Political Weekly*, Vol.30, No45.

Balasubrahmanya, H.(2006)," Small Scale Industry In India Under Globalization: Does Solace Lie In Technology And Innovation?", Paper Presented At The Max Planck India Workshop On Entrepreneurship, Innovation And Economic Growth, Indian Institute Of Science, Bangalore .

Bandopadhya, Kalyani (1963), 'Industrialisation Through Industrial Estates', Book Land Private Limited, Calcutta.

Bedi, Jatinder ,S. And Purnendu Banerjee, K., (2007), "Discrepancies and Validation of Indian Manufacturing Data", *Economic And Political Weekly*, Vol.42, No. 10

Berry, A., E. Rodriguez, and H. Sandee (2001). 'Small and Medium Enterprise Dynamics in Indonesia', *Bulletin of Indonesian Economic Studies*, Vol.37, No.3.

Bhatnagar,Veena (1995), '*Small Scale Industry: Concept, Status and Policy'*, Kaveri Books , New Delhi.

Bhattacharya,S.N. (1986), 'Development Of Small Scale And Cottage Industries-The Indian Experience', Metropolitan Book Co (P) Ltd, New Delhi.

Bhavani, D. A. (1991), "Technical Efficiency in Indian Modern Small Scale Sector: An Application of Frontier Production Function", *Indian Economic Review*, Vol. 26, No.2.

Bhavani, T.A (2002),"Small-Scale Units In The Era Of Globalization- Problems And Prospects", *Economic And Political Weekly,* Vol.37, No.29.

Biswas ,A.K (1957), "Optimal Technique In A Multi Sector Economy", *The Economic Weekly*, August.

Bredo,William(1962) , 'Industrial Estates', Collier Macmillan Limited , London.

Burki, Abid A. And D. Terrell (1998), "Measuring Production Efficiency of Small Firms in Pakistan", *World Development,* Vol. 26, No. 1.

Cawthorne P M (1995) "Of Networks and Markets: The Rise of A South Indian Town: The Example Of Tiruppur's Cotton Knitwear Industry", *World Development* Vol. 23, No.1.

CDS/UN (1975), 'Poverty, Unemployment and Development Policy: A case study of selected issues with Reference to Kerala, Centre for Development Studies, Trivandrum.

Chadha, V and P.S. Sandhu (1987), "State Industrial Service Consultancy in Punjab", *Journal of Institute Of Economics Research*, Vol. 22, No.2.

Chadha,V. (1995), "Technological Modernisation Of Small Scale Sector In India", *Journal Of Institute Of Economics Researc*h, Vol.36,No.3.

Charnes, A., W.W. Cooper And E.Rhodes (1978), "Measuring The Efficiency Of Decision Making Units", *European Journal Of Operations Research* 2.

Chowdhary, A.H.M.N (1990), "Small and Medium Industries In Asian Developing Countries", *Asian Development Review,* Vol.18, No.2.

Datt, Ruddar(1979), "Sickness In Indian Industry", *Social Scientist*, Vol. 8, No. 4.

De Haan, H. H., (1988), "Sugar Processing In India: The Scope For Intermediate Technology", In K. B. Suri (Ed.) Small Scale Enterprises In Industrial Development: The Indian Experience, Sage Publications, New Delhi.

Desai R.D. and S.P. Kashyap (1979), " Factor Use of Efficiency in Small Scale Firms: A Study of Industrial Estate in Gujarat", *Vishleshen,* Vol.5.

Desai, A V and Nisha Taneja (1993), "Small Firms in Indian Industry: Economic Characteristics and Functioning", *Journal of Indian School of Political Economy*, Vol.5, No.2

Dhar, P.N (1958), '*Small Scale Industries in Delhi*', Asia Publishing House, Bombay.

Dhar P.N. and H.F. Lyndall (1961), 'The Role of Small Enterprises in Economic Development', Asian Publishing House, Bombay.

Dutt Committee Report (1969), 'Report of the Indian Licensing Policy Inquiry Committee', Government Of India, Ministry Of Industry, New Delhi.

Edwards, R and Reich, M. And Gordon, D., (ed) (1975), '*Labor Market Segmentation*', Lexington Books, Lexington (Mass.).

EPW Research Foundation (2003), 'Domestic Product of States of India: 1960-61 to 2000-01', *Economic and Political Weekly Research Foundation*, Mumbai.

Falk, Rahel(2005): "Industrial Sickness In Indian Manufacturing", *Doctoral Dissertation*, Department of Economics, Ruprecht-Karls University.

Farell ,M.J.(1957), "The Measurement Of Productive Efficiency", *Journal of Royal Statistical Society,* Series A, Vol.120, Part III.

Gnag, Ira, N. (1992), "Small Firms Presence in Indian Manufacturing, *World Development*, Vol.20, No.9.

Gang, Ira. N. (2000), "Small Firms in India: A Discussion of Some Issues" In Mookherjee, D.(Ed.), '*Indian Industry: Policies And Performance*', Oxford University Press, New Delhi.

Goldar, B .N., (1985) , "Unit Size and Economic Efficiency: A Study of Small Scale Washing Soap Industry In India", *Artha Vijnana*, Vol.27, No. 1.

Goldar, B. N., (1986), 'Productivity Growth in Indian Industry', Allied Publisher Pvt. Ltd. New Delhi.

Goldar B.N. (1988), "Relative Efficiency of Small Scale Industries in India", in Suri, K.B.(ed.), *Small Scale Enterprise in Industrial Development: The Indian Experience*, Sage Publications, New Delhi.

Goldar, B.N. and D.B. Gupta (1989), 'Industrialising India's North Eastern Region: A Study Of District Industry Centers', Institute of Economic Growth and National Institute of Public Finance And Policy, New Delhi.

Government Of India (1963), "Development Of Small Scale Industries In India: Prospects, Problems and Policies", *Report Of The International Perspective Planning Team (Sponsored By Ford Foundation)*, Ministry Of Industry.

Government of India (1976), *All India Report on the Census of Small Scale Industries,* Development Commissioner, Small Scale Industries, Ministry Of Industry, New Delhi, Vol. I & II.

Government of India (1977) 'Report of the Indirect Taxation Enquiry Committee', Ministry of Finance, New Delhi (Chairman: L.K. Jha).

Government of India (1988), 'Report on the Second All India Census of Small Scale Industrial Units', Development Commissioner, Small Scale Industries, Ministry Of Industry, New Delhi.

Government of India (1997), "Report of The Expert Committee on Small Enterprises, (Chaired By Abid Hussain), Ministry Of Industry, And New Delhi.

Government of India (2001), 'Handbook of Industrial Policy and Statistics, 2001', Office of the Economic Adviser, Ministry Of Commerce and Industry, New Delhi.

Government of India (2002), "Small Scale Industries In India-An Engine Of Growth, Office Of DC(SSI)N, Ministry Of SSI, New Delhi.

Government of India (2004), 'Final Results: *Third All India Census Of Small Scale Industries',* Development Commissioner, Small Scale Industries, Ministry Of Industry, New Delhi.

Government of India (2005), 'Mid Term Appraisal of the Tenth Five Year Plan (2002 – 07)', Planning Commission of India, New Delhi.

Government of India: "Economic Survey" Various Issues, Ministry Of Finance, New Delhi.

Government of Kerala (1988), 'State level report on the Second All India Census of Small Scale Industrial Units', Directorate of Industries and Commerce, Government of Kerala, Thiruvananthapuram.

Government of Kerala (2004), 'State level report on the Third All India Census of Small Scale Industrial Units', Directorate of Industries and Commerce, Government of Kerala, Thiruvananthapuram.

Government of Kerala, Economic Review (Various Issues), The State Planning Board, Thiruvananthapuram.

Hajra, S. (1965), "Firm Size And Efficiency In Measuring Industries", Economic *And Political Weekly*, Vol. 28.

Hayashi, Mitsuhiro (2001), "The Role of Subcontracting in SME Development in Indonesia: Micro- Level Evidence From The Metal Working And Machinery Industries", *Journal Of Asian Economics*", Vol.13.

Heemst, J.J. (1984), "Sub-Contracting Between Small-Scale Enterprises in Developing Countries: A Note", *The Journal of Industrial Economics,* Vol.32, No.3.

Joseph, Tomy (1995), "Some Recent Trends in Small Scale Industries: A Case Study of Diamond Industry in Kerala", *Unpublished M Phil Thesis*, Centre for Development Studies, Trivandrum.

Kaipacherry, Sudheesh (2005), "Environmental, Economic And Social Sustainability Of Rural Industries", *Unpublished PhD Thesis*, Department Of Economics, University Of Kerala.

Kannan,K.P, (1990), "Kerala Economy At The Cross Roads?" , *Economic And Political Weekly*,September,Vol.25,No.35

Kashyap,S.P And B.S.Tiwari (1982), 'Shaping Of Diamonds In Gujarat', Sardar Patel Institute of Economic and Social Research, Ahmedabad.

Katrak, Homi (1999), "Small-Scale Enterprise Policy In Developing Countries: An Analysis Of India's Reservation Policy", Journal *of International Development*, Vol. 11, Issue 5.

Kawadia, Ganesh, Manasranjan Dashmishra And Hitendra Bargal (2005), "Growth Trends And Performance of Small Scale Industries In India", *The ICFAI Journal Of Industrial Economics,* November

Kimura, Fukunari. (2001), "Subcontracting and the Performance of Small and Medium Firms in Japan", *World Bank Institute,* Stock No. 37192

Kumar, Mukesh.And Trupti Mishra (2002), "Sources of Technical Efficiency in Indian Small-Scale Industry: Frontier Production Function Techniques", The ICFAI Journal of Applied Economics, Vol. 1, No. 1.

Lackey , Steven Brent (1998), "Examining The Seedbed Potential Characteristics Of Certain Manufacturing Industries: A Case Study Of House Boat Manufacturing Firms In The Lake Cumberland Region Of Kentucky" , TVA Rural Studies Programme, *Staff Paper 98-7.*

Lakdawala, D.T . And Sandesara, J.C. (1960), "Small Industry in A Big City: A Survey in Bombay", University of Bombay.

Lazeron, M. (1990), "Subcontracting As an Alternative Organizational Form to Vertically-Integrated Production", International Institute for Labour Studies, *Discussion Papers.*

Little ,I.M.D (1998) , "Resource Use Efficiency And The Small Scale Enterprise" , In K. B. Suri (Ed.) *Small Scale Enterprises In Industrial Development : The Indian Experience*, Sage Publications, New Delhi .

Little. I.M.D, D. Majumdar And J.N. Page (1991), 'Small Manufacturing Enterprises: A Comparative Study Of India And Other Countries', Oxford University Press, New York.

Loikkanen, H.A. And I. Susiluota (2002), "An Evaluation of Economic Efficiency of Finnish Regional by DEA and Tobit Model, A Paper Presented at 42nd Congress Of European Regional Science Association, Dortmund, Germany.

Mani, Sunil (1996), "Economic Liberalization and Kerala's Industrial Structure: An Assessment of Investment Opportunities", *Economic and Political Weekly*, Vol.24, No.31.

Mc Crory, J.T (1956) , 'Small Industry In A North Indian Town', Delhi.

Mehta Committee Report (1964), 'Powerloom Inquiry Committee Report', Government of India, Ministry of Industry, New Delhi.

Mehta, B. V. (1969), "Size And Capital Intensity in Indian Industry", *Oxford Bulletin Of Economics And Statistics*, Vol.31, No.3.

Meller, Patricio, and Marfan, Manuel (1981), "Small and Large Industry: Employment Generation, Linkages, and Key Sectors", *Economic Development and Cultural Change,* Vol. 29, No.2.

Mitra, L.K.(1967), 'Employment And Output In Small Enterprises In India', Calcutta.

Mohan, Rakesh (2001), *'Small Scale Industry Policy in India: A Critical Evaluation'*, National Council Of Applied Economic Research Centre, New Delhi

.Mohan, Rakesh (2002), "Small Scale Industry Policy in India: A Critical Evaluation", in A. O. Krueger (Ed.) 'Economic Policy Reforms and the Indian Economy',Oxford University Press, New Delhi.

Morris, Sebastian et.al (2001), *"The Growth and Transformation of Small Firms in India"*, Oxford University Press, New Delhi.

Mukherjee Neela. (2000), "World Trade Organization and Small and Medium Enterprises from Developing Country's Perspective: A Study of Indian Small Scale Industries", *Indian Economic Journal*, Vol. 48, No.2.

Nadvi, Khalid (1995), "Industrial Clusters and Networks: Case Studies of SME Growth and Innovation", *Paper Commissioned By the Small and Medium Industries Branch,* UNIDO.

Nagaraj,R. (1984), "Subcontracting In Indian Manufacturing Industries-Analysis, Evidence and Issues", *Working Paper*, No.192, Centre for Development Studies, Trivandrum.

Nagaraj, R (1985), "Trends in Factory Size In Indian Industry, 1950-1980, Some Tentative Inferences", *Economic and Political Weekly*, Review of Management, Vol. 20, No. 8.

Nanjundan (1994), "Changing Role of Small Scale Industry", *Economic and Political Weekly, Vol.29, No.22.*

Nath, Hiranya, K (1996), "Relative Efficiency Of Modern Small Scale Industries in India: An Inter-State Comparison", *Unpublished M. Phil. Dissertation*, Jawaharlal Nehru University, New Delhi.

National Sample Survey Organisation (2002) Report No. 477(56/2.2/1), Unorganised Manufacturing Sector in India: 2000-2001, Key Results, Government of India, New Delhi

National Sample Survey Organisation (2002), 'Unorganised Manufacturing Sector in India 2000-2001: Input, Output and Value Added', NSSO 56th Round (July 2000 – June 2001), Report Number 480, Government of India, New Delhi.

Nayak, S.S and R.N. Misra(2006), "Sickness In Small-Scale Industrial Units And Its Revival", *Orissa Review,* September – October .

Nelson, A. (1978), 'Guidelines For The Establishment Of Industrial Estates In Developing Countries', United Nations, New York.

Nikaido Yuko. (2004), "Technical Efficiency of Small Scale Industry-An Application of Stochastic Production Frontier Model", *Economic and Political Weekly*, Vol.39 (6).

Nirmala Banerjee (1988), "Small and Large Units: Symbiosis Or Matsyanyaya?" in K. B. Suri (Ed.) 'Small Scale Enterprises In Industrial Development: The Indian Experience', Sage Publications, New Delhi.

Oomen M.A. (1972), 'Small Industry In Indian Economic Growth- A Case Study Of Kerala', Himalaya Publishing House, New Delhi.

Page, J. M., Jr. (1984), "Firm Size and Technical Efficiency: Application Of Production Frontiers to Indian Survey Data", *Journal Of Development Economics,* Vol.16.

Panda S.C. (1996), *Entrepreneur Development In Small Scale Industries,* Anmol Publications, Pvt Ltd, New Delhi.

Papola,T.S. and V.N. Misra (1980), "Aspect of Rural Industrialization", *Economic and Political Weekly*, Vol.15, Issue 41-43.

Papola,T.S. (1981) , "Industrialization ,Technological Choices And Urban Labour Markets" In Bagchi,A.K And N.Banerjee(Ed.), '*Change And Choice In Indian Industry'*, Calcutta, Bagchi and Co.

Pareek H.S.(1979), 'Financing Of Small Scale Industry in A Developing Country', Capital Publishing House, New Delhi.

Pillai, Mohanan P. (2001), "*Performance Of Industrial Clusters*", Centre For Development Studies, Trivandrum.

Piore, M. (1980) "The Technological Foundation Of Dualism And Discontinuity", in Piore, M. (ed.), 'Dualism And Discontinuity In Industrial Societies', Cambridge University Press, Cambridge.

Prasad,C.S.(2004), 'Small And Medium Enterprises in Global Perspective; Employment Generation And WTO', New Century Publications, New Delhi.

Raj, K.N (1956), "Small Scale Industries-Problems of Technological Change", *Economic And Political Weekly,* Vol. 8, No. 15.

Ramaswamy K.V (1994), "Small Scale Manufacturing Industries in India. Some Aspects of Size, Growth and Structure, *Economic And Political Weekly*, Vol.29 No. 9.

Rao, S. L. (1994), 'Industry and Economic Reforms 1991-1994', *National Council Of Applied Economic Research, Working Paper No. 50*, New Delhi.

Ray , Subhash C (2004), "Data Envelopment Analysis-Theory And Techniques For Economics And Operations Research" , *Cambridge University Press* ,Cambridge.

Reddy I.C.C. (1990), 'Financing Of Small Scale Industries in India', Himalaya Publishing House, New Delhi.

Rudra, A. (1956), "The Problems of Technological Choice", *Economic and Political Weekly,* May.

Sahoo Sukanta Kumar (2003), "Small Scale Manufacturing Industries in India", *Indian Economic Journal,* Vol.51, No.1.

Sahu,P.P. (2007), "Subcontracting in India's Small Manufacturing Enterprises: Problems And Prospects", *ISID Working Paper* ,No: 2007/01.

Saluja, M. R. (1988), 'Data Base Of The Unorganised Manufacturing Industry: An Appraisal',in K B Suri (Ed.), *Small Scale Enterprises In Industrial Development: The Indian Experience*, Sage Publications, New Delhi.

Saluja,M.R.(2004), " Industrial Statistics In India- Sources, Limitations And Gaps", *Economic And Political Weekly*, Vol.39, No.48.

Sandee,Henry And Piet Rietveld (2001), "Upgrading Traditional Technologies in Small-Scale Clusters :Collaboration And Innovation Adoption in Indonesia" , *The Journal Of Development Studies* , Vol .37 , No. 4.

Sandesara, J. C. (1966), "Scale And Technology in Indian Industry", *Oxford Bulletin Of Economics And Statistics,* Vol.28.

Sandesara, J. C. (1969), "Size and Capital Intensity in Indian Industry: Some Comments", *Oxford Bulletin Of Economics And Statistics,* Vol.31, No.1.

Sandesara J.C. (1982), 'Efficiency of Incentives for Small Industries', Industrial Development Bank of India, Bombay.

Sandesara J.C. (1988), Small Industry Development Programmes In India – Efficacy, Explanations and Lessons: Some Filed Studies, In Suri, K.B (Ed.) *Small Scale Enterprise In Industrial Development: The Indian Experience,* Sage Publications, New Delhi.

Sandesara J.C. (1993), "Modern Small Industry 1972 and 1987-88; Aspects of Growth And Structural Change", *Economic And Political Weekly,* Feb 6.

Sanghvi R.L.(1979), 'Role Of Industrial Estates In Developing Economy', Multi-Tech Publishing Company, Bombay.

Sen, Amartya. K (1957), "A Short Note on The Ambar Charkha", Economic *and Political Weekly*, November.

Shah,Amita. (1994), "Inter-Firm Scalar Linkage in India: A Class within the Small Scale Industry", *Small Business Economics*, Vol. 6, Issue 3

Sharma,R.K And Abinash Dash (2006) , " Labour Productivity In Small Scale Industries In India : A State-Wise Analysis", *The Indian Journal Of Labour Economics*, Vol.49, No.3.

Shetty, M.C. (1963), "Small Scale And Household Industries in A Developed Economy" , Bombay.

Sidhu Hina.(1999), "Application Of Verdoons Law To The Small Scale Sector In India", *Indian Economic Journal*, Vol. 47, No. 2.

Singh, Baljit (1961), 'The Economics Of Small Industries-A Case Of Small Industrial Establishments Of Moradabad', New Delhi.

Sit,V.F.S.(1982),"Dynamism in Small Industries-The Case of Hong Kong", *Asian Survey* ,Vol.22,No.4.

Somasekhar N (1975), 'The Efficiency of Industrial Estates in India', Multi-Tech Publishing Company, Bombay.

Soteriou, A.C., (et al), (1998), "Using DEA to Evaluate the Efficiency of Secondary Schools: The Case of Cyprus", *International Journal of Educational Management,* Vol.12, No.2.

Subrahmanian, K.K And S.P. Kashyap(1975), "Small Scale Industry :A Trend Report, A Survey Of Research In Economics", Indian Council Of Social Science Research ,New Delhi.

Subrahmanian K.K. (1976), "Linkages Of Small Scale Industry : Implications For Employment Generation", *The Indian Journal Of Labour Economics*, Vol.19.

Subrahmanian K.K., and Pillai Mohanan, P., (1987), "Kerala's Industrial Backwardness : An Exploration Of Alternative Hypothesis", *Economic And Political Weekly*,Vol.21,No.14.

Subrahmanian, K.K. And Pillai Mohanan, P., (1994), "Modern Small Industry in Kerala: A Review Of Structural Change And Growth Performance", *Working Paper*, No. 254, Centre For Development Studies, Trivandrum.

Subrahmanian,K.K. (1990), "Development Paradox In Kerala-An Analysis Of Industrial Stagnation", *Economic And Political Weekly*,Vol.25,No.37.

Subrahmanian,K.K. and Azeez Abdul,E.,(2001), "Industrial Growth In Kerala: Trends And Explanation" , *Working Paper* , No.310, Centre for Development Studies, Trivandrum.

Subrahmanian,K.K.(2003), 'Regional Industrial Growth Under Economic Liberalization', Manak Publications, New Delhi.

Sukumaran, (2004), 'Small Firm Clustering and Local Economic Development in Kerala: A Study of Two Clusters', Unpublished Project Report, Kerala Research Programme on Local Level Development, Centre for Development Studies, Trivandrum.

Sundaram And Tendulkar (1988) An Approximation to The Size, Structure Of Indian Manufacturing Industry", in KB Suri (Ed.) *Small Scale Enterprises In Industrial Development: The Indian Experience*, Sage Publications, New Delhi.

Suri, K.B (ed.) (1988), 'Small Scale Enterprises In Industrial Development: The Indian Experience', Sage Publications, New Delhi.

Tannan, S.K (2002), "Impact of WTO On The Small Scale Sector In India", *Chemical Business,* February.

Tendulkar Suresh, D and Bhavani T.A(1997), "Policy On Modern Small Scale Industries: A Case Of Government Failure", *Indian Economic Review*, Vol.32, No.1.

Thampy,M.M. (1990), "Wage.Cost And Kerala's Industrial Stagnation: A Study Of Organised Small-Scale Sector", *Economic And Political Weekly*,Vol.25,No.37.

Thavaraj, M. J. K.(1977) , "Has Indian Industry Turned The Corner?", *Social Scientist*, Vol. 5, No. 6/7.

Vakil,C.N. And Brahmananda, P.R.(1956), 'Planning For An Expanding Economy', Bombay.

Vepa R.K.(1998), 'Modern Small Industry in India: Problem and Prospects', Sage Publications, New Delhi.

Vepa R.K. (1973), 'Industrial Estates: A Tool for Development of Backward Areas', *Asian Productivity*, Vol.7.

Vijayabaskar,M. (2001), "Industrial Formation Under Conditions of Flexible Accumulation; The Case of Knitwear Node in Southern India" , *Unpublished Phd Thesis*, Centre For Development Studies, Trivandrum.

Waite, David (1973), "The Economic Significance of Small Firms", *The Journal of Industrial Economics*, Vol. 21, No. 2.

Wardenburg, George J (1988), "Small Scale Leather Manufacturing in Agra: A Case Study in Small Scale Industry in India's Development", In K. B. Suri (Ed.) *'Small Scale Enterprises In Industrial Development: The Indian Experience'*, Sage Publications, New Delhi.

Watanbe and Susmme (1974), 'Reflections on Current Policies for Promoting Small Enterprises and Subcontracting', *International Labour Review*, Vol.110, No.5

Appendix 1

Industrial Policy	Key Features
Industrial Policy Resolution 1948	The government stressed the role of SSIs for balanced industrial growth, better utilization of local resources and creation of employment opportunities. The primary responsibility for developing small industries by creating infrastructure has been provided to state governments.
Industrial Policy Resolution 1956	Policy support to cottage, village and small industries by differential taxation or direct-subsidies and integration of SSIs with that of large-scale industry. In order to improve the competitive strength of SSIs, 128 items were exclusively reserved for production in SSIs, and 166 items were reserved for exclusive purchase by government from this sector.
Industrial Policy Resolution 1977	a) 504 items were reserved for exclusive production in the small-scale industries. b) The concept of District Industries Centres (DICs) was introduced so that in each district a single agency could meet all the requirements of SSIs under one roof. c) Technological upgradation was emphasized in traditional sector. d) Special marketing arrangements through the provision of services, such as, product standardization, quality control, market survey, were laid down.
Industrial Policy Resolution 1980	a) Integrated industrial development between large and small sectors. Industrially backward districts were identified for faster growth of existing network of SSIs. b) "Nucleus plants" in each industrially backward district replaced the "district industries centres c) Agricultural base was to be strengthened by providing preferential treatment to agro-based industries.
Industrial Policy Resolution 1991	The basic thrust of this resolution was to simplify regulations and procedures by delicensing, deregulating and decontrolling. a) SSIs were exempted from licensing for all articles of manufacture. c) Equity participation by other industrial undertakings was permitted up to a limit of

	24 percent of shareholding in SSIs. d) Priority was accorded to small and tiny units in allocation of indigenous and raw materials. f) Market promotion of products was emphasized through co-operatives, public institutions and other marketing agencies and corporations.
Industrial Policy on SSI 2001-02	The investment limit was enhanced from Rs 1 crore to Rs 5 crore for units in hosiery and hand tool sub sectors. b) The corpus fund set up under the Credit Guarantee Fund Scheme was increased from 125 crore to 200 crore. c) Credit Guarantee cover was provided against an aggregate credit of Rs 23 crore till December 2001. d) 14 items were de-reserved in June 2001 related to leather goods, shoes and toys. e) Market Development Assistant Scheme was launched exclusively for SSI sector.
Industrial Policy on SSI 2003-04	a) 73 items were de-reserved in June 2003; these consist of chemical and their products, leather and leather products, laboratory reagents etc. b) Selective enhancement of investment in plant and machinery from Rs 1 crore to Rs 5 crore. c) The composite loan limit for SSI was raised from Rs 25 lakhs to Rs 50 lakhs. d) The limit of dispensation of collateral requirement was raised from Rs 15 lakhs to Rs 25 lakhs on the basis of good track record and financial position of the unit. e) 60 clusters were identified in July 2003 for focused development. f) Small and Medium Enterprise (SME) fund of Rs 10000 crore was set up under SIDBI to solve the problem of inadequate finance for SSIs. g) Laghu Udyami Credit Card Scheme was liberalized.
Policy initiatives on SSI 2004-05	a) The national commission on Enterprises in the Un-organized/Informal Sector was set up in September 2004. b) 85 items were de-reserved in October 2004. c) The Small and Medium Enterprise (SME) fund of Rs 10000 crore was started

	by SIDBI since April 2004, with 80% of the lending for SSI units. The interest rate was 2% below the prevailing Prime Lending Rate (PLR) of the SIDBI. e) The Reserve Bank of India raised the composite loan limit from Rs 50 lakhs to Rs 1 crore.
Policy package for SME 2005-06	a) The Ministry of Small Scale Industries has identified 180 items for dereservation. b) Small and Medium Enterprises were recognized in the services sector, and were treated on par with SSIs in the manufacturing sector. c) The emphasis was laid on Cluster Development model not only to promote manufacturing but also to renew industrial towns and build new industrial townships.

Appendix 1I

Definitions used in the present study

The definition of different segments in the small-scale sector, which are used in the present study, is given below.

(i) Small Scale Unit:

An industrial undertaking in which the investment in plant and machinery, whether held on ownership terms or on lease/hire-purchase basis, does not exceed Rs. 10 million (Rs. 1 crore) is regarded as a small-scale undertaking. In this study only manufacturing units are undertaken for analysis.

(ii) Modern Small Scale Industries

These cover SSI units [both in the Factory and Non/Factory sectors] and power loom units. Such units mostly use power driven machinery and possess superior production techniques. Units in this sub-sector are generally located in close proximity to large industrial centers or urban areas. These industries are moving away from the traditional products to knowledge-based products.

(iii)Traditional Small Scale Industries

This sector comprises tiny and cottage industry segments like handlooms, khadi and village industries, handicrafts, sericulture and silk, rubber and coir. These units are labor-intensive, are generally located in rural and semi-urban areas and are artisan based. Usually the capital invested is also nominal.

(iv) Tiny Enterprises:

A unit is treated as a tiny enterprise where the investment in plant and machinery does not exceed Rs. 2.5 million (Rs. 25 Lakhs) irrespective of the location of the unit. Many shops, schools, parlors, Photostat and STD booths in your vicinity are all examples of tiny units.

(v) Ancillary Industries:

An industrial undertaking which is engaged or is proposed to be engaged in the manufacture or producing of parts, components, sub-assemblies, tooling or intermediates;

or the rendering of services is termed as an ancillary undertaking. The ancillary undertaking is required to supply or render or propose to supply not less than 50 percent of its production or services, as the case may be, to one or more other industrial undertakings as the case may be. The investment in plant and machinery, whether held on ownership basis or on lease or on hire purchase, should not exceed Rs. 10 million.

(vi)Women entrepreneurs Enterprise

An industrial enterprise which is managed by one or more women entrepreneurs in proprietary concersns , or in which she/ they individually or jointly have a share in captal of not less than 51 percent as partners / share holders .

(vii)Small Scale Service and Business Enterprises (SSSBEs)

An industry-related service and business enterprise with investment up to Rs. 5 lakh in fixed assets excluding land and building.

(viii) Unorganized sector: All manufacturing enterprises, which are not covered under ASI will be considered to constitute the unorganized sector. In the unorganized sector, in addition to the proprietary or partnership enterprises, enterprises run by cooperative societies, trusts, associations, private and public limited companies also included.

(ix)Proprietary enterprises are those where an individual is the sole owner of the enterprise. **Partnership** is defined as the 'relation between persons who have agreed to share the profits of a business carried on by all or any one of them acting for all'. Partners may be from the same household or they may be from different households. **Co-operative society** is a society that is formed through the co-operation of a number of persons (members of the society) to benefit the members. The funds are raised by members' contributions/ investments and the profits are shared by the members. The government or government agency can also be a member or shareholder of a registered co-operative society but this fact cannot render the society into a public sector enterprise for the purpose of the present survey. A **limited company** can be either private or public company. A private company means a company which by its Articles (a) RESTRICTS the right to transfer its shares, if any, (b) LIMITS the number of its members (not including its employees) to 50 (c) PROHIBITS any invitation to public to subscribe for

any shares or debentures of the company. Pubic company means a company which is not a private company.

(x)Worker: A worker is defined as one who participates either full time or part time in the activity of the enterprise. The worker may serve the enterprise in any capacity - primary or supervisory. He/she may or may not receive wages/ salaries in return to his/ her work incidental to or connected with the entrepreneurial activity.

(xi)Working owner: In the case of owner of the proprietary or partnership enterprises, personally work in the enterprise on a fairly regular basis

(xii)Hired worker: A hired worker is a person employed directly or through any agency on payment of regular wage/ salary in cash or kind. Apprentices, paid or unpaid, are treated as hired workers. Paid household workers, servants and resident workers of the enterprise are also considered as hired workers for the purpose of making entry against this item.

(xiii)Fixed assets: Fixed assets are assets held for the purpose of producing or providing goods or services and they are not held for resale in the normal course of entrepreneurial activities. These cover all goods, new or used that have a normal economic life of more than one year from the date of purchase. Fixed assets include assets used for production, transportation, living or other facilities (recreation etc.).