PERFORMANCE OF SMALL SCALE INDUSTRIES IN INDIA IN THE POST-LIBERALIZATION ERA

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Abstract

The small scale industries sector occupies a strategic position of unique importance in the Indian economy. It has played a vital role in full filling the socio economic objectives of the nation. It has emerged as a powerful tool in providing relatively larger employment for a given unit of investment, equitable distribution o f wealth and removal of regional economic disparities. Considering the importance of the small scale industry an attempt has been made in this work to analyze the growth and development of small scale industry in India. In the present study an attempt has been made to estimate the relative efficiency of different inputs by using partial factor productivity of labour and capital for the small scale industry in India during the post liberalization period. Further an attempt has been made to estimate the influence of output and technology on factor productivities with the help of multiple regression frame work. The study also aims to examine and analyze production function in small scale industry in India during the liberalization era. It includes the estimation of partial elasticities of output with respect to labour and capital, returns to scale, technological progress and the sources of output growth at India.

Introduction

Small scale industry has been accorded an important place in the national economy by the national decision makers. Small units generate employment at relatively small capital cost, mobilize resources of capital and skill at micro levels and are expected to meet the rising demand for various goods and services required by the economy. Small scale industry forms an important sector constituting nearly 40 percent of the total output in the private sector. Much more significant is the employment generation capacity of small scale industry.

The small-scale industries are labour - intensive and provide employment to nearly 1.86 crores persons in the country. The emphasis on Village and Small-Scale Industries (SSIs) has always been an integral part of the Indian Industrial strategy, more so after the Second Five Year Plan. Small-Scale industries would play an important role as producer of consumer goods and absorber of surplus labour thereby addressing to the problems of poverty and unemployment. Other advantages of small industries are that they ensure a more equitable distribution of national

income, enhance balanced regional industrial development, act as a nursery for entrepreneurship and facilitate mobilization of local resources.

Government of India had been supporting the promotion of Small-Scale Industries through deliberate policies such as protection from large-scale industries, capital subsidies, differential tax treatment, reservation etc. Industrial undertakings other than the small-scale industrial undertakings engaged in the manufacture of items reserved for exclusive manufacture in the small-scale sector are required to obtain an industrial license and undertake an export obligation of 50 per cent of the annual production. However, the condition of licensing is not applicable to such industrial undertakings operating under 100 per cent Export Oriented Undertakings Scheme, the Export Processing Zone and the Special Economic Zone Schemes.

Advantages of Small Scale Industries

SSI is especially specialized in the production of consumer commodities. Small scale industries can be characterized with the special feature of adopting the labor intensive approach for commodity production. As these industries lack capital, so they utilize the labour power for the production of goods. The main advantage of such a process lies in the absorption of the surplus amount of labor in the economy that was not being absorbed by the large and capital intensive industries. This, in turn, helps the system in scaling down the extent of unemployment as well as poverty. It has been empirically proved all over the world that Small Scale Industries are adopt in distributing national income in more efficient and equitable manner among the various participants in the process of good production than their medium or larger counterparts.

Small Scale Industries help the economy in promoting balanced development of industries across all the regions of the economy. This industry helps the various sections of the society to hone their skills required for entrepreneurship. Small Scale Industries act as an essential medium for the efficient utilization of the skills as well as resources available locally. Realizing the importance of small scale industries in Indian economy, the government is trying to develop this industry keeping in mind to increase employment, to prevent unequal distribution of income and to develop capital investment.

Industrial undertakings with investment in plant and machinery up to Re. 1 crore qualify for the status as small-scale with effect from 24 December 1999. The investment limit for tiny units is Rs. 25 lakhs. The Small-Scale Industry sector has emerged as a dynamic and vibrant sector of the Indian economy in recent years, displaying phenomenal growth in the field of production, employment and dispersed development in general and exports in particular. There are nearly 34 lakhs Small-Scale Industries in the county accounting for about 40% of the gross value of output in the manufacturing sector and about 34% of the total exports of the country. It provides employment to nearly 186 lakhs persons, which is second only to agriculture. The Small-Scale sector contributes amply to other socio-economic aspects such as reduction in income inequalities, product diversification, and dispersed development of small industries and linkage with other sectors of the economy.

India operates today in sheer size what is perhaps the largest small industries programme in any developing country. Small scale sector as a priority sector of the national economy is protected and promoted in a number of ways. The growth of small industry has been sought to be promoted over years through various government policies and measures. However, presently the small scale industrial sector suffers from a high rate of mortality and growing incidence of

sickness. According to latest estimates, the percentage of sick unit in the small scale industry varies from ten to fifty percent in various states. The closure of debilitated existence of an industrial unit involves heavy cost to the society: it renders idle its manpower; lays waste scarce financial and material resourced invested in land and buildings, machinery and equipment inventories and stocks. The social cost involved is much more

.

Scope of the Study

Considering the importance of the small scale industry an attempt has been made in this work to analyze the growth and development of small scale industry in India. In the present study an attempt has been made to estimate the relative efficiency of different inputs by using partial factor productivity of labour and capital for the small scale industry in India during the post liberalization period. Further an attempt has been made to estimate the influence of output and technology on factor productivities with the help of multiple regression frame work.

The study also aims to examine and analyze production function in small scale industry in India during the liberalization era. It includes the estimation of partial elasticities of output with respect to labour and capital, returns to scale, technological progress and the sources of output growth at India.

Objectives

The main objectives of the study are:

- To study the trends and growth of small scale industry in India during the post liberalization period.
- To measure the efficiency in small scale industry using partial factor productivity indices.
- To estimate the returns to scale and technological progress in Small scale industry using Cobb-Douglas production function.
- To characterize the trends in inputs, output and other related variables in Small scale Industry in India in order to bring out the growth in the industry.
- To examine the relative contributions of labor and capital in output growth in India and
- To suggest necessary measures based on the findings of the study.

Methodology for the Present Study

The study is based on both primary and secondary data. The basic data regarding the small scale industry in India are collected from Economic Survey of India, Handbook of Statistics on the Indian economy (Reserve Bank of India), Commissioner, Department of Industries and commerce, Chennai, Tamilnadu Economic Appraisal Reports, published by the Evaluation and Applied Research Department, Government of Tamilnadu.

In order to test the objectives of the study, the important statistical and mathematical tools such as mean, coefficient of variation, correlation, regression models, etc are used. Growth of small scale industries in India are analyzed by computing percentage rate of change and trend rate of growth.

The study also examines weather the growth rate was accelerating or decelerating. The percentage rates of change units, production , employment, investment and export by taking year to year changes which would reveal the period of higher rate of increase in small scale industry in India. It is measured as follows:

$$\frac{Pt - Pt\text{-}1}{Pt\text{-}1} \times 100$$

Where Pt refers to current year value and Pt-1 refers to the previous year value. The trend rates of growth have been estimated in semi-log form.

That is

$Y = a e^{bt}$ (or)

$\text{In } Y = a_1 + b_1 t + u_1$ (1) and

$Y = a e^{bt} + ct^2$ (or)

$\text{In } Y = a_2 + b_2 t + b_3 t^2 + u_2$ (2)

Where Y is the variable for which the trend rate of growth is to be estimated and t is the time. The coefficient of t^2 in equation (2) will exhibit accelerating or decelerating trend in the dependent variable. u_1 And u_2 are the error terms.

Fluctuations in the production, employment and investment in India are studied by estimating the coefficient of variation. Coefficient of variation is calculated by using the following formula:

$$C.V = \frac{\sigma}{\bar{X}} \times 100$$

Where σ = standard deviation and

$\bar{X}$ = arithmetic mean.

The various partial productivity ratios and total factor productivity index are measured as

Labour Productivity

Here the labour productivity for India are measured in the following

$$LP = \frac{Output}{Employment}$$

Capital Productivity

In this study we measure the capital productivity for India we use the following methods.

$$CP = \frac{Output}{Investment}$$

Cobb-Douglas Production Function

In order to determine the production function, at India for the small scale industry during the study period the following Cobb-Douglas Production Function has been fitted.

Cobb-Douglas production function is used to estimate the input elasticities, neutral technical progress and returns to scale.

$V = A\ La\ K^b$

When transformed into log form, we have

$\text{Log } V = \text{Log } A + a \log L + b \log K + u$ (1)

Where V is the output, L is employment and K is investment. A, a and b are constants. U is the error term. A and b are determined by the method of least squares. The equation (1) doesn't measure the technical progress. Hence an exponential trend has been incorporated in the equation (1) in order to account for and measure neutral technological change.

$\text{Log } V = \text{Log } A + a \text{ Log } L + b \log K + ct + u$ (2)

Where A, a, b and c are constant.

Marginal Productivity of Labour and Capital

Marginal Productivities of labour and capital have been computed for each individual year for the study period India by the following formulae.

M.P.L. = a (V/L)

M.P.K = b (V/K)

On the other hand if the Cobb-Douglas production function is of the form $V = A\ L^a\ K^{1-a}$, then the marginal productivities of labour and capital are:

M.P.L = a (V/L)

M.P.K = (1-a) V/K

Performance of Small Scale Indutry In India

The Small-Scale Industries (SSI) gathered momentum along with industrialization and economic growth in India. It started growing due to the vision of our late Prime Minister Jawaharlal Nehru who sought to develop core industry and have a sustaining sector in the form of small-scale enterprises. Being a labor-intensive sector, they offer a higher productivity of capital than capital-intensive enterprises due to low investment per worker. The SSI today constitutes a very important segment of the Indian economy as they help in dispersal of industries, rural development and the decentralization of economic power.

In this section, the dimensions of growth of small scale industries during the study period is discussed on the basis of the selected variables, number of units, production, investment and Employment for India.

Number of Units:

The various aspects of small scale industry such as number of units, production, investment, Employment and export from small scale industry are given in Table 1, for India during the period from 1991-92 to 2007-08. The number of registered small scale industries in operation had been nearly doubled in India during the study period. In India it increased from 70.63 lakhs units in 1991-92 to 133.70 lakhs units in 2007-08. During the period between 1991-92 and 2007-08 the number of registered small scale units had increased by an annual compound

rate of growth of 42.2 percent in India. (See table 3). It is the clear from Table 4 that over the study period the number of registered units had increased at increasing rates in India.

The average annual percentage rate of registered small scale units in India had increased by 4.07 percent during the study period. The coefficient variation showed the fluctuations in the number of units at India. It was 20.06, percent during the study period in India.

Investment

Table 1clearly exhibits the investment in small scale units in India. It is evident from the table that the investment of small scale industries steadily increasing from the first year of study period i.e. 1991-92 to the last year of the study period i.e. 2007-08 in India as the number of units increased. The average investment in India was 149361.47 lakhs during the study period. Over the study period the average percentage rate of increase in investment was 4.61percent in India. The co-efficient of variation shows that the fluctuations in investment in small scale industries were low in India. Investments of small scale industries in India had registered at an annual compound rate of growth of 4.3 percent during the study period. It will be seen from the Table 8 that the investments in small scale industries in India had increased at an increasing rate by 0.1 percent over the study period.

Production

Small scale industries production in India was 13.1 percent over the study period. (See Table 5). It will be seen from Table 6 that over the study period the production of registered units had increasing at decreasing rate in India. The annual average small scale industries production was 280221.53 crores in India during the study period (see Table 1). The average annual percentage rate of growth of production of small scale industries is given in Table 2.

Over the study period the average percentage rate of increase in production was 14.51percent in India. The coefficient variation showed the fluctuations in the production as 64.67 percent during the study period in India.

Employment

The growth of Employment, in this industry, showed an increasing trend. Growth of Employment in India during the study period is given in Table 9. Employment in small scale industries India had registered an increasing trend at an annual compound rate of 4.10 percent during the study period.

The growth rate of Employment in India had increased at a decreasing rate. (See Table 10). Over the study period, average annual percentage rate of increase in Employment was 4.12 percent in India. Clear increasing trend is noticed during the study period. The coefficient variation showed the fluctuations in the Employment at India. It was 20.54 percent during the study period in India.

Exports

It is seen from Table 11 that during the study period the exports had increased at an annual compound rate of growth of 15.5 percent in India. The exports of small scale industries in India had increasing at deceasing rate of 0.1 percent during the study period respectively. Over the study period the average annual percentage rate of increase in exports was 18.62 percent. Further, the fluctuation with regard to exports was 75.55 percent in India during the study period. (Table 1)

Table No 1.Performance of The SSI Sector In India

Year	Total SSI Units (Lakh nos.)	Fixed Investment (Rs. crores)	Production (Rs. crores)	Employment (lakh persons)	Export (Rs. crores)
1991-92	70.63	100351	80615	165.99	13883
1992-93	73.51	109623	84413	174.84	17784
1993-94	76.49	115795	98796	182.64	25307
1994-95	79.6	123790	122154	191.4	29068
1995-96	82.84	125750	147712	197.93	36470
1996-97	86.21	130560	167805	205.86	39248
1997-98	89.71	133242	187217	213.16	44442
1998-99	93.36	135482	210454	220.55	48979
1999-2000	97.15	139982	233760	229.1	54200
2000-01	101.1	146845	261297	238.73	69797
2001-02	105.21	154349	282270	249.33	71244
2002-03	109.49	162317	314850	260.21	86013
2003-04	113.95	170219	364547	271.42	97644
2004-05	118.59	178699	429796	282.57	124417
2005-06	123.42	188113	497842	294.91	150242
2006-07	128.44	207307	585112	312.52	182538
2007-08	133.7	216721	695126	322.3	202017
Average(X)	**99.02**	**149361.47**	**280221.53**	**236.09**	**76076.06**

S.D	19.86	33638.41	181222.23	48.48	57473.4
C.V	**20.06**	**22.52**	**64.67**	**20.54**	**75.55**

Source: **Ministry of Micro, Small & Medium Enterprises, Government of India**.

Table 2.Annual percentage rate of growth of Small Scale Industries In India from 1991-92 to 2007-08.

Year	Total SSI Units	Fixed Investment	Production	Employment	Export
1991-92	-	-	-	-	-
1992-93	4.07	9.24	4.71	5.33	28.10
1993-94	4.07	5.63	17.04	4.46	42.30
1994-95	4.07	6.90	23.64	4.79	14.86
1995-96	4.07	1.58	20.92	3.42	25.46
1996-97	4.07	3.82	13.60	4.00	7.62
1997-98	4.07	2.05	11.57	3.55	13.23
1998-99	4.07	1.68	12.41	3.46	10.21
1999-2000	4.07	3.32	11.07	3.88	10.66
2000-01	4.07	4.90	11.78	4.21	28.78
2001-02	4.07	5.11	8.03	4.44	2.07
2002-03	4.07	5.16	11.54	4.36	20.73
2003-04	4.07	4.87	15.78	4.31	13.52
2004-05	4.07	4.98	17.90	4.11	27.42
2005-06	4.07	5.27	15.83	4.37	20.76
2006-07	4.07	4.67	17.53	4.23	21.50
2007-08	4.07	4.55	18.80	3.03	10.67
Annual average percentage rate of change	**4.07**	**4.61**	**14.51**	**4.12**	**18.62**

Source: **Computed**

Table .3.Growth Rate of Number of Units of SSI (India)

$$\text{Log } (U)_t = b_0 + b_1 t + u$$

Dependent variable	Regression constant	Coefficient of Time (t)	R^2	F
Units(U)	4.22 (76139.73)	0.048 (7375.205)	1.00	5.4E+07

Source: computed. ***Significant at 5 percent level.**

Table4. Growth Rate of Number of Units of SSI (India)

$$\text{Log } (U)_t = b_0 + b_1 t + b_2 t^2 + u$$

Dependent variable	Regression constant	Coefficient of Time (t)	Coefficient of Time square (t^2)	R^2	F
Units(U)	4.22 (76139.73)	0.04 (2690.4)	3.76 E-06 (4.707)	1.00	5.4E+07

Source: computed. ***Significant at 5 percent level.**

Table 5.Growth Rate of Production in SSI units (India)

$$\text{Log } (P)_t = b_0 + b_1 t + u$$

Dependent variable	Regression constant	Coefficient of Time (t)	R^2	F
Production (P)	11.17 (392.1)	0.131 (47.1)	0.993	2209.961

Source: computed. ***Significant at 5 percent level.**

Table 6.Growth Rate of Production in SSI units (India)

$$\text{Log (P)}_t = b_0 + b_1 t + b_2 t^2 + u$$

Dependent variable	Regression constant	Coefficient of Time (t)	Coefficient of Time square (t^2)	R^2	F
Production (P)	11.17 (234.26)	0.135* (11.05)	.000 (-0.329)	0.993	1039.33

Source: computed. ***Significant at 5 percent level.**

Table 7.Growth Rate of Investment in SSI units (India)

Log (I)t = b 0 + b1 t+ u

Dependent variable	Regression constant	Coefficient of Time (t)	R^2	F
Investments (I)	11.503* (392.1)	0.043* (26.365)	0.979	695.1

Source: computed. ***Significant at 5 percent level.**

Table 8 Growth Rate of Investment In SSI Units (India)

$$\text{Log (I)}_t = b_0 + b_1 t + b_2 t^2 + u$$

Dependent variable	Regression constant	Coefficient of Time (t)	Coefficient of Time square (t^2)	R^2	F
Investments (I)	11.55 (486.8)	0.029 (4.79)	.001 (2.39)	0.985	459.58

Source: computed. ***Significant at 5 percent level.**

Table 9 Growth Rate of Employment in SSI Units (India)
Log (Em) = $b_0 + b_1 t + u$

Dependent variable	Regression constant	Coefficient of Time (t)	R^2	F
Employment (Em)	5.07 (1232.38)	0.041 (100.883)	0.999	10177.37

Source: computed. ***Significant at 5 percent level.**

Table 10 Growth Rate of Employment in SSI Units (India)
Log (Em) t = b 0 + b1 t+ b2t2 + u

Dependent variable	Regression constant	Coefficient of Time (t)	Coefficient of Time square (t^2)	R^2	F
Employment (Em)	5.08 (1232.38)	0.038* (24.03)	0.000 (1.98)	0.999	6081.36

Source: computed. ***Significant at 5 percent level.**

Table 11 Growth Rate of Exports in SSI units (India)
Log (Ex) t = b 0 + b1 t+ u

Dependent variable	Regression constant	Coefficient of Time (t)	R^2	F
Exports (Ex)	9.568* (202.56)	0.155* (33.640)	0.987	1131.67

Source: computed. ***Significant at 5 percent level**

Table 12 Growth Rate of Exports in SSI units (India)
Log (E) t = b 0 + b1 t+ b2t2 + u

Dependent variable	Regression constant	Coefficient of Time (t)	Coefficient of Time square (t^2)	R^2	F
Exports (E)	9.534* (121.59)	0.166* (8.27)	-0.001 (-0.556)	0.987	539.91

Source: computed. ***Significant at 5 percent level**.

Partial Factor Productivities

The phenomenon of technical efficiency is measured and its trend is examined in terms of simple ratios. The ratio of output to an input is known as partial productivity ratio. There are as many partial productivity indices as there are factors of production. The most important and most often used are the partial productivity indices of labour and capital.

Labour Productivity

Briefly we have discussed the methods that can be followed for the calculation of labour productivity in Chapter I. It is responsible to remember here those methods for a while to find the labour productivity in India. Labour Productivity in India is measured by gross value of production per Employment. On this we have calculated labour productivity for 17 years from 1991-92 to 2007-08 for India

Labour Productivity indices measured from gross value of production per Employment are given in Table 13. Labour productivity, Production/ Employment had registered an annual compound rate of 9.01percent in India over the study period. It is to be pointed out that India had experienced the highest rate of increase in labour productivity. A faster rate of increase in labour productivity was attributed to increase in value of production of small scale industries coupled with decrease in Employment which resulted in increase in capital intensity.

INVESTMENT PRODUCTIVITY

Partial productivity ratios mainly refer to the labour and capital productivity indices which are most often used. So far we have analyzed the labour productivity in detail, in terms of gross value of production per Employment. Now we shall direct our attention to capital productivity, considering gross value of production per unit of investment, production/fixed investment in India. Investment productivity measured in terms of production/fixed investment is given in Tables 13. Capital productivity had increased at an annual compound rate of 8.75 percent in India.

A higher rate of increase in capital productivity in India might be due to higher rate of growth of value of production. It is clear from Table 5 that value of production had registered at an annual compound rate of growth of 13.1 percent in India during 1991-92 to2007-08.

Year	Production/ Employment	Production/ Investment
1991-92	100	100
1992-93	99	96
1993-94	111	106
1994-95	131	123
1995-96	154	146
1996-97	168	160
1997-98	181	175
1998-99	196	193
1999-2000	210	208
2000-01	225	222
2001-02	233	228
2002-03	249	241
2003-04	277	267
2004-05	313	299
2005-06	348	329
2006-07	386	351
2007-08	444	399
Annual Compound Growth rate	**9.01 (33.21)**	**8.75 (31.55)**

Table 13 Partial Factor Productivity Indices (India)

Source: Computed **Value in parenthesis is‘t’ value**

Production Function Analysis of Small Scale Indutry in India

Production function is an engineering relationship between inputs and outputs which shows for a given level of technology the maximum output which can be achieved with the application of given level of inputs. The production function analysis of an industry provides answers to i) Whether the industry in question enjoys the economies or diseconomies of scale; ii)

Whether firms purchase and utilize factor inputs in the most efficient way which helps in making inter-regional comparisons in resource allocation; iii) Whether returns on a particular factor input are increasing or decreasing so as to ascertain the desirability of subsidizing or taxing the particular input, and/ or iv)Whether there exists any substitution possibility between inputs.

A production function is the relationship between the quantities of inputs and outputs for efficient production by all possible processes set up as a functional form. A production function may then be specified as follows:

$V= f(K, L)$ for $K \geq O$ and $L \geq O$

Where V is output, K and L are the capital and labour inputs respectively.

The production function is assumed to be differentiable and for which K and L are specified to take on non-negative magnitudes. The production function portrays the level of output, the marginal and average productivities of factors and marginal rate of substitution between pairs of factors, for all relevant patterns of factor inputs.

A well behaved production function must possess certain basic properties:

i. The first neo-classical criterion of a well behaved production is that any increase in inputs should have a positive effect on output. i.e., marginal product of labour and capital should be positive.
ii. The second criterion is that the rate of change of each marginal product should be negative.
iii. A third criterion is that a well behaved production function should be able to show any degree of economies or diseconomies of scale.

The specific form of production function may be Cobb-Douglas and/or CES. The essential difference between the two is that Cobb-Douglas assumes that the elasticity of substitution is always equal to one. In CES can take any value from zero to infinity. This study mainly analyses factor productivities, marginal productivities of capital and labour, relative factor shares, returns to scale, rate of neutral technological change and elasticity of substitution of small scale industry in India, Tamilnadu and Erode. The Production functions have been fitted to the time series of aggregate data for small scale industry in India.

Consider the Cobb-Douglas production function

$V = A L^a K^b e^{ct}$ ……. (1)

Where V = Production
L = Number of persons employed
K = Investment
T = Time variable

C = Co-efficient of time variable

A and b are partial elasticities of output with respect to employment and investment respectively.

For the purpose of finding out the estimates of input elasticity, neutral technical progress and returns to scale, Cobb-Douglas production function in log linear form is used. Its log transformation is specified below.

$$\text{Log } V = A + a \log L + b \log K + ct + u \quad \ldots\ldots\ldots\ldots (2)$$

The estimates of A, a, b and c have been obtained by the method of ordinary least squares. The estimates of the parameters of the production function for All India are tabulated in Table 14.

Dependent variable (P)	Regression constant	Coefficient of (Inv)	Coefficient of (Emp)	Coefficient of Time (t)	R^2	F
Production	5.34 (1.07)	0.507 (1.16)	-0.285 (0.473)	0.109 (5.76)	0.994	1132.68

Table 14 $\text{Log (Pro)}_t = b_0 + b_1 \text{ Inv} + b_2 \text{ Emp} + b_3 t + u$

Source: Computed

- Value of 'a' indicates that Co-efficient of wage rate is significant at five percent level.
- Durbin Watson Statistics indicates that there is no auto correlation at 1 percent level.
- Figures in brackets are standard error.

The goodness of fit (R^2) for the regression equation corresponding to All India is 91%. The value of Durbin Watson Statistics indicates that there is no auto correlation at 1 percent level. From Table 14 it may be observed that the co-efficient of investment (b_1) is insignificant for the regression equation at India. The insignificant investment co-efficient implies that the effect of investment on output is insignificant.

In the estimate of equation (1) the co-efficient of employment is insignificant for the regression equation corresponding to India. Elasticity of output with respect to employment is found to be statistically significant at 5 percent level. From Table14, it is evident that the co-efficient of time trend is insignificant for the regression equations corresponding to India. It is positive but insignificant. Since the time trend which is to measure technical progress itself is insignificant the Cobb-Douglas production function without time trend is considered to be the best fit. It leads to the inference that there had been no technical progress in the industry during the study period. The insignificant values of the co-efficient of investment may be due to multi-co linearity problem, since the independent variables are highly correlated.

In the estimates of equation (1) the co-efficient of time trend is insignificant, hence time variable is dropped from the equation (1). Therefore the following Cobb-Douglas Production function is fitted to know the elasticities of output with respect to labour and capital and returns to scale.

$$V = A L^a K^b \quad \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

When transformed into Log form

$$\text{Log } V = A + a \text{ Log } L + b \text{ Log } K + u \quad \ldots\ldots\ldots (4)$$

Where V = Production

L = Number of persons employed

K = Investment

u = Error term.

The estimates of A, a and b have been obtained by using the method of ordinary least squares (OLS). The estimates are given in Table 15

Table 15
Unconstrained Form of Cobb-Douglas Production Function (India)
Log V = A + a Log L + b Log K + u

Dependent variable	Regression constant	Coefficient of		R^2	F
		Employment	Investment		
Production	-3.448 (-0.939)	0.522* (5.455)	-0.285 (0.473)	0.993	1050.28

Source: computed. **Significant at 5 percent level**

- Value of 'a' indicates that Co-efficient of employment is significant at five percent level.
- Value of 'b' indicates the co-efficient of investment is insignificant at five percent level.
- Figures in brackets are standard error.

The goodness of fit (R^2) for the regression equation corresponding to India is 99.3 percent. The value of F Statistics indicates significant at five percent level from Table 15 It may be observed that the co-efficient of investment (b) is insignificant for the regression equation at India. The insignificant investment Co-efficient implies that the effect of investment on output is insignificant.

In the estimate of equation (4) the co-efficient of employment is significant for the regression equation corresponding to India. Elasticity of output with respect to employment is found to be statistically significant at 5 percent level. From Table 15, it is evident that the Cobb-Douglas production function without time trend is considered to be the best fit. It leads to the inference that there had been no technical progress in the industry. The insignificant values of the co-efficient of investment may be due to multi-co linearity problem, since the independent variables are highly correlated.

Regarding the investment elasticity of output, the co-efficient is statistically insignificant. The low value of co-efficient of investment in Table 15 may arise due to cumulative effect of the following factors:

The deepening of investment has decreased the value of coefficient of investment. During the study period the investment in small scale industry had increased at an annual compound rate of 4.03 percent at India. Variations in relative prices and changes in the industrial structure have been responsible for increasing capital deepening.

i. Entry of large number of new industrial units and the full capacity utilization of which is yet to be achieved.
ii. Existence of a large number of uneconomic units in many part of the country which are carrying on production with worn out machineries. This may be the cause for low value of capital coefficient.
iii. The low value of investment co-efficient may be due to multi-co linearity and measurement errors in the investment.

Marginal Productivity of Factors Of Production

The concept of marginal product refers to the addition to output by a unit increment in any one input, ceteris paribus. The marginal products are useful in an inter-temporal comparison of efficiency of inputs, their comparative utilization and in the determination of the point of factor saturation[3]. Marginal productivity of a factor is variable over time. It varies directly with the corresponding variation in input-output ratio. Marginal productivities of employment and investment have been computed for each during the period from 1991-92 to 2007-08

If the Cobb-Douglas production function is of the form $V=A\ L^a\ K^b$, then the marginal productivities of labour and capital can be arrived by differentiating partially the function V with respect to labour and capital. The marginal productivities of labour and capital are arrived as follows.

$$\frac{\partial V}{\partial L} = M.P.L = a\frac{V}{L} \qquad \ldots\ldots. (4)$$

$$\frac{\partial V}{\partial K} = M.P.K = b\ \frac{V}{K} \qquad \ldots\ldots.. (5)$$

MP_L and MP_K are the marginal productivities of employment and investment respectively.

Table 16
Marginal Productivities of Input Factors (India)

Region	M.P.L.(Average)	M.P.K.(Average)
India	3.56	-1.13

Source: Computed

From the estimated production function [equation (3) of Table 15] the values 'a' and 'b' are substituted at each observation for All India for the period1991-1992 to 2007-08.Then the MP_L and MP_K have been computed at geometric mean for India. From the Table 16 one can observe that the average marginal productivity of employment is larger than the average marginal productivity of investment for All India.

Sources of Output Growth

In the production function analysis, the coefficients of the variables are simply the partial elasticity of output with respect to factor inputs. They will not help us directly to find out the

relative contribution of factors of production to output growth. Nevertheless, the data on inputs and outputs together with the coefficient of employment and investment could be used to quantify the relative contributions. This measure is important for policy determination. Following Subramanian (1986) the relative contribution of employment and investment can be determined as below:

$$R_L = \hat{a} \frac{\sum_{i=1}^{n} |\blacktriangle \log L_i|}{\sum_{i=1}^{n} |\blacktriangle \log V_i|} \quad \ldots (6)$$

$$R_K = \hat{b} \frac{\sum_{i=1}^{n} |\blacktriangle \log K_i|}{\sum_{i=1}^{n} |\blacktriangle \log V_i|} \quad \ldots (7)$$

Where a^ and b^ are the estimates of labour and capital coefficients. Using the relations (6) and (7), the sources of output growth for the small scale industry under study have been determined for l India level and the results are given in the Table 17

Table 17
Sources of Output Growth for the Small Scale Industry At India

Region	Relative Contribution of Labour in percentage	Relative Contribution of Capital in percentage
India	53	13.5

Note: 100 – (RL + RK) represents the relative contribution of other factors.

From the Table 17 it will be noticed that the relative contribution of employment to value added is higher than that of investment at All India. It is also supported by 'factor elasticity' (refer Table 15) and 'marginal productivity' at national level. From this it follows that ceteris paribus, increase in labour productivity is attributed to capital intensity at national level with regard to small scale industry. As labour is relatively more efficient than capital, it suggests that the industry has the potentiality of absorbing labour force for small scale industry at national level.

Conclusion

From the foregoing analysis one may derive the following conclusions which seem to be most relevant that could be taken as a guideline for the future expansion of the small scale Industry.

The elasticity of substitution between capital and labour is unity which implies that the relevant form of production function at All India for small scale Industry is the Cobb-Douglas.

From our findings, the labour elasticity of output is found to be a more important factor than capital in terms of 'factor elasticity', 'marginal productivity' and 'relative contribution' to the output growth at India for small scale Industry. Further increase in labour productivity is attributed to capital deepening.

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