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PRODUCTION AND ECONOMETRICS ANALYSIS OF MICRO, SMALL AND MEDIUM ENTERPRISES (MSMES) IN INDIA

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Abstract

Micro, Small and Medium Enterprises (MSMEs) have performed a completely import function in the socio-economic improvement of India during the past few years. It has notably contributed to the overall growth in phrases of the Gross Domestic Product (GDP), employment generation and production. This region is a labour-in-depth and creates mammoth employment possibilities in India. The overall performance of MSME has an instantaneous effect on the boom of the overall economic system of India. This paper carefully analysis the boom of the Indian MSME region and uses techniques are Charnes, Cooper and Rhodes (CCR) Model, Cob-Douglas Production Function from 1973-74 to 2020-21. It indicates the present employment, production and GDP situation of MSMEs in India.

Key words: Employment, GDP, Production

Introduction

Micro, Small and Medium Enterprises (MSMEs) are an important dynamic factor for the growth of the Indian economy. It significantly contribute to domestic production, export production, low investment requirements, new technology-oriented enterprises, and operational flexibility – MSMEs reduce unbalanced income distribution among people and provide employment opportunities to rural and urban people. The MSME sector is an important pillar of Indian economy as it provides greatly to growth of the Indian economy with a vast network of around 633.88 lakh units, creating employment of about 1109.89 lakh and manufacturing more than 6000 products. This sector contributing about 45 percent manufacturing output and about 40 percent of exports, directly and indirectly with contributes 8 percent GDP of the country. Many large-scale industries depend on MSME sector, boosting the large-scale industry. Better planning and proper implementation are the growth of MSME and the entrepreneur's success. The government has required to provide facilities, flow of credit from financial institutions/ banks, support for new technology up-gradation and modernisation, integrated infrastructural facilities, communication facilities, modern testing facilities, quality measurement, modern management

practices, entrepreneurship development and skill up gradation through suitable training facilities, Domestic as well as international Market facilities, etc.

Review of Literature

Hasan and Ahmed (2019) exhibit '*The Role of Micro Enterprises in Employment and Income Generation: A Case Study of Timergara City Dir (L) Pakistan*'. The use of statistical and econometric gear is primarily based on a questionnaire timetable, and the accrued data have been analysed. The objective a try is made to evaluate the position of micro corporations creating employment opportunities and earnings generation opportunities in Timergara District Dir Lower, KPK Pakistan. They carried out a sampling method known as stratified random sampling method used (Model: Yi = α + β1 Monthly sale + β2 Life + ei)**.** After all, they found the observation difficult that there are a few advantageous increases in the price of micro-enterprises in Timergara City. Regarding employment creation, the results of model, Monthly variable sales and variable Enterprise lifestyles are effectively associated with the corporation's employment level.

Bhaskaran (2017) performed *"The Performance of Micro, Small and Medium Enterprises in North Eastern States of India"*. His study based on secondary data. The examination's objectives are the Physical and Financial overall performance of Khadi and Village Industries. The statistics were analysed using Correlation Analysis, Regression Analysis and Data Envelopment Analysis (DEA) of Charnes-Coop-Rhodes (CCR) model, DMU model. The statistical result suggests Assam, and Sikkim were given a rating of 1 and rank 1. Meghalaya has 77% green and 3% inefficient. The overall performance of KVI in the kingdom of Arunachal Pradesh, Sikkim true and Manipur wishes development.

Arzum et.al (2016) analyses "*Measuring the Efficiency of Turkish SMEs: A Data Envelopment Analysis Approach*". They used secondary sources of facts. The study's objective is to address problems of monetary resource of the MSMEs in presenting credit sturdy fairness shape aren't able to make use of their resources correctly or now not. They adopt era CCR and BCC models out of the DEA model for analysis the statistics. The result observed average performance values of the corporations are on the stages around 60% for every year, and it seen that changes arise even though they're every year. It is concluded that the SMEs have essential importance in phrases of the economic system of the country, survival within the market for the firms and adoption to the competitive environment of Turkish.

Dixit and Pandey (2011) carried out a co-integration analysis to study the causal courting among SMEs output, exports, employment, the number of SMEs and their fixed investment and India's GDP, and general exports for 1973-74 to 2006-07. They look at the high-quality causality between SMEs output and India's GDP.

Statement of the Problem

Analysis of the performance on MSMEs has received different responses from different economists in different studies, right from parameters like number of units, production, employment and GDP will help to understand its role in the economic development of the country. The limited literature review point out that small-scale industry development is dynamic and a

comprehensive one-time study is not possible, which explores the causal relationship among the variables that help in judging the performance of the small-scale industries for all times.

Objective of the Study

1. To study the current status of MSME in India
2. To analyse the performance of MSME in terms of contribution to GDP

Research Methodology

The present research paper prepared on analytical in nature, exclusively compiled on the secondary sources of data. The study period covering from 1973-74 to 2020-21. Methodology constitutes the different steps that are generally adopted by studying in a research problem along with the logic behind them. Appropriate mathematical and statistical tools are used for analysing the data. The techniques are Charnes, Cooper and Rhodes (CCR) Model, Cob-Douglas Production Function are adopted.

Hypothesis of the Study

On the basis of objectives, the following hypotheses are formulated for analysis and discussion to arrive at some definite conclusions. Hypothesis on the econometric and production analysis of MSME in terms of employment, production and GDP in the country (One sample T-test)

- **H_1** There is no statistical significant relationship between employment and GDP.
- **H_2** There is no statistical significant relationship between production and GDP.

Sources of Data

In this present paper most of the information based on secondary in nature. The secondary data retrieved from MSME Annual Report, publication of Ministry of Small Scale Industries, various publication of MSME report, journal dealing with the subject, subject related books, RBI Bulletin and web sites.

Current status of MSME in India

As per the report of Micro, Small and Medium Enterprises, total number of enterprises are 633.88 lakh units in 2020-21. Out of which 12,201,448 units are registered and 51,183,552 units are unregistered. In rural area 324.88 lakh units and urban area 309.00 lakh units are functioning the current year. In 2021-22 period recorded micro enterprises 630.52 lakh units, small sector 3.31 lakh units and medium enterprises only 0.05 lakh units are running. Total employment 1109.89 lakh, followed by micro enterprises 1076.19 lakh, small sector 61.75 lakh and medium enterprises 1.75 lakh employees are working. MSMEs total production recorded Rs. 72,235.15 crore in 2020-21 and it increased to Rs. 85,932.97 crore in 2021-22 which is 18.96 percent increased against previous year. MSMEs total sales noticed Rs. 95,741.36 crore in 2020-21 and it went up to Rs. 1,13,078.21 crore in 2021.22 which is 18.11 percent growth against previous year.

Performance of MSME in terms of contribution to GDP

Charnes, Cooper and Rhodes (CCR) MODEL

The first Data Envelopment Analysis (DEA) model developed by Charnes, Cooper and Rhodes (1978) under the assumption of a Constant Returns to Scale production technology, i.e. when an increase in the production resources results in a proportional increase in the output.

The Model Explained

Considering j = 1, 2, 3, .m Decision Making Units (DMUs) using

x_i

| i = 1, 2, 3, ., n inputs to produce

y_r

| r = 1, 2, 3, ., outputs and prices (multipliers)

v_i

And

u_r

Associated with those inputs and outputs, we can also formalize the efficiency expression in (1) as the ratio of weighted outputs to weighted inputs:

$$Efficiency = \frac{\sum_{r=1}^{s} u_r y_{jr}}{\sum_{i=1}^{n} v_i x_{ji}} \quad \textbf{(2)}$$

In Charnes et al. (1978) DEA methodology the multipliers, and a measure for the technical efficiency for a specific DMU can be estimated by solving the fractional programming problem

$$max \frac{\sum_{r=1}^{s} u_r y_{or}}{\sum_{i=1}^{n} v_i x_{oi}} | \sum_{r=1}^{s} u_r y_{jr} - \sum_{i=1}^{n} v_i x_{ji} \leq 0 \quad \textbf{(3)}$$

For all j, r and i, and strict positive v_i and u_r. This problem is denominated the CCR constant return to scale input-oriented model, which by duality is equivalent to solving the following linear programming.

$$min(\theta) | \sum_{j=1}^{m} z_j x_{ji} \leq \theta x_{oi}; \sum_{j=1}^{m} z_j y_{jr} \geq y_{or}; \sum_{j=1}^{m} z_j = 1; z_j \geq 0 \quad \textbf{(4)}$$

Similarly, the model adapted for the definition of input and output slacks:

$$min(\theta - \sum_{r=1}^{s} s_r^+ + \sum_{i=1}^{n} s_i^-) | \sum_{j=1}^{m} z_j x_{ji} + s_i^- = \theta x_{oi}; \sum_{j=1}^{m} z_j y_{jr} - s_r^+ = y_{or}; z_j, s_i^-, s_r^+ \geq 0$$

(5)

For all j, r and i. As a result, we have an efficiency score θ which varies from 0 to 1 designating the efficiency for each decision making unit. We can obtain the marginal contribution of each input and output in the multiplier model of (3), the peers of efficiency and respective weights in the primal (or envelopment) form of (4), and also the potential for improvements and slacks.

$$N_{ij} = \frac{X_{ij}}{\sum_{J=1}^{n} X_{ij}^2}$$

m

$$gk = \min_{i=1} \left(\sum v_i x_{ik} \right)$$

subject to

$$\sum_{r-1}^{s} U_r y_{rk} + \sum_{i=1}^{m} v_i x_{ik} \geq 0 \text{ For } i=1,.....n$$

$$\sum_{r=1}^{s} U_r y_{rk} = 1$$

$Ur \geq 0$, r = 1,.....s

$V_1 > 0$, i = 1,.....,m

n = number of alternatives / DMU

m = number of input criteria

s = maximum of output criteria.

XikYrk denote the value of ith input criterion and rth output criterion for Yth alternative.

Ur and Vi are the non-negative variable weights to be determined by the solution of the maximization problem.

[X, g1] = linprog (F, A .b. Acq, beq, lb, Ub)

Table 1 Output of Production and GDP of MSME units

Sl. No.	Year	INPUT	OUTPUT	OUTPUT	gk	hk	Sl. No.	Year	INPUT	OUTPUT	OUTPUT	gk	hk
		Employment	Production	GDP					Employment	Production	GDP		
1	1973-74	39.7	7200	4.6	1.604149	0.623384	25	1997-98	213.2	54721	4.8	3.04841	0.32804
2	1974-75	40.4	9200	5.2	1.400705	0.713926	26	1998-99	220.6	48045	6.5	3.347803	0.298703
3	1975-76	45.9	11000	9	1	1	27	1999-00	229.1	36376	6.1	4.186396	0.238869
4	1976-77	49.8	12400	6.2	1.400546	0.714007	28	2000-01	238.7	26129	4.4	6.060786	0.164995
5	1977-78	54	14300	7.5	1.272337	0.785956	29	2001-02	249.3	28227	5.79	5.327012	0.187723
6	1978-79	63.8	15800	5.5	1.799087	0.555837	30	2002-03	260.2	31485	5.92	5.204751	0.192132
7	1979-80	67	21600	5.2	1.719369	0.581609	31	2003-04	271.42	36454	5.79	5.071664	0.197174
8	1980-81	71	28100	7.2	1.352913	0.739146	32	2004-05	282.57	32979	5.84	5.553159	0.180078
9	1981-82	75	32600	6	1.463946	0.683085	33	2005-06	294.91	28784	5.83	6.219353	0.160788
10	1982-83	79	35000	5.1	1.595982	0.626574	34	2006-07	805.23	13514	7.2	19.84831	0.050382
11	1983-84	84.2	41600	7.7	1.284443	0.778548	35	2007-08	842.23	14351	8	18.911963	0.052877
12	1984-85	90	50500	4.3	1.397746	0.715437	36	2008-09	881.14	15243	8.72	18.27483	0.05472
13	1985-86	96	61200	4.5	1.243706	0.804048	37	2009-10	822.19	16194	7.49	18.708621	0.053451
14	1986-87	101.4	72300	4.3	1.12688	0.887406	38	2010-11	965.69	17215	7.42	21.703984	0.046074

15	1987-88	107	87300	3.8	1	1	39	2011-12	1012.59	18343	7.28	22.582062	0.044283
16	1988-89	113	85640	10.5	1	1	40	2012-13	1061.4	24024	7.04	21.886893	0.045689
17	1989-90	119.6	82230	6.7	1.144626	0.873648	41	2013-14	1114.29	26109	6.27	23.688774	0.042214
18	1990-91	158.3	78802	5.6	1.59643	0.626397	42	2014-15	1171.32	27569	6.11	24.620714	0.040616
19	1991-92	166.9	80615	5.3	1.6536	0.604741	43	2015-16	1109.89	27868	29.48	7.38214	0.135462
20	1992-93	174.8	84413	5.1	1.662341	0.601561	44	2016-17	1109.89	41110	29.25	7.22812	0.138349
21	1993-94	182.6	98796	5.9	1.484698	0.673537	45	2017-18	1109.89	48081	29.75	6.881126	0.145325
22	1994-95	191.4	81215	7.3	1.840234	0.543409	46	2018-19	1109.89	58218	30.27	6.463928	0.154705
23	1995-96	197.9	72771	7.3	2.103191	0.475468	47	2019-20	1109.89	67667	29.7	6.26764	0.15955
24	1996-97	205.9	53781	7.8	2.712413	0.368675	48	2020-21	1109.89	78686	29	6.058063	0.165069

Table 2 Output of GDP and Employment of MSME units

Sl. No.	Year	INPUT	OUTPUT	OUTPUT	gk	hk	Sl. No.	Year	INPUT	OUTPUT	OUTPUT	gk	hk
		Production	GDP	Employment					Production	GDP	Employment		
1	1973-74	7200	4.6	39.7	1.655756	0.603954	25	1997-98	54721	4.8	213.2	11.065646	0.09037
2	1974-75	9200	5.2	40.4	1.87157	0.534311	26	1998-99	48045	6.5	220.6	7.819096	0.127892
3	1975-76	11000	9	45.9	1.292921	0.773443	27	1999-00	36376	6.1	229.1	6.308219	0.158523
4	1976-77	12400	6.2	49.8	2.115688	0.472659	28	2000-01	26129	4.4	238.7	5.147658	0.194263
5	1977-78	14300	7.5	54	2.016956	0.495797	29	2001-02	28227	5.79	249.3	4.811738	0.207825
6	1978-79	15800	5.5	63.8	3.038898	0.329067	30	2002-03	31485	5.92	260.2	5.191668	0.192616
7	1979-80	21600	5.2	67	4.394122	0.227577	31	2003-04	36454	5.79	271.42	5.933441	0.168536
8	1980-81	28100	7.2	71	4.128531	0.242217	32	2004-05	32979	5.84	282.57	5.228647	0.191254
9	1981-82	32600	6	75	5.74762	0.173985	33	2005-06	28784	5.83	294.91	4.457474	0.224342
10	1982-83	35000	5.1	79	7.259715	0.137746	34	2006-07	13514	7.2	805.23	1	1
11	1983-84	41600	7.7	84.2	5.715106	0.174975	35	2007-08	14351	8	842.23	1	1

12	1984-85	50500	4.3	90	12.423518	0.080492	36	2008-09	15243	8.72	881.14	1.004169	0.995849
13	1985-86	61200	4.5	96	14.38668	0.069509	37	2009-10	16194	7.49	822.19	1.168201	0.856017
14	1986-87	72300	4.3	101.4	17.786542	0.056222	38	2010-11	17215	7.42	965.69	1.062198	0.941444
15	1987-88	87300	3.8	107	24.302577	0.041148	39	2011-12	18343	7.28	1012.59	1.079376	0.926461
16	1988-89	85640	10.5	113	8.627978	0.115902	40	2012-13	24024	7.04	1061.4	1.348659	0.741477
17	1989-90	82230	6.7	119.6	12.983063	0.077023	41	2013-14	26109	6.27	1114.29	1.396137	0.716262
18	1990-91	78802	5.6	158.3	14.885756	0.067178	42	2014-15	27569	6.11	1171.32	1.402431	0.713048
19	1991-92	80615	5.3	166.9	16.090208	0.06215	43	2015-16	27868	29.48	1109.89	1	1
20	1992-93	84413	5.1	174.8	17.508979	0.057114	44	2016-17	41110	29.25	1109.89	1.480949	0.675243
21	1993-94	98796	5.9	182.6	17.713689	0.056454	45	2017-18	48081	29.75	1109.89	1.709654	0.584914
22	1994-95	81215	7.3	191.4	11.768878	0.08497	46	2018-19	58218	30.27	1109.89	2.034541	0.491511
23	1995-96	72771	7.3	197.9	10.545257	0.094829	47	2019-20	67667	29.7	1109.89	2.410139	0.414914
24	1996-97	53781	7.8	205.9	7.293835	0.137102	48	2020-21	78686	29	1109.89	2.846714	0.351282

Source: Data formulation from MSME Annual Report

Table 1 expressed CCR Model analysis of MSME's Employment, Production and GDP from the period 1973-74 to 2020-21. We have taken the employment as input and production and GDP as output. The calculated efficiency and inefficiency values belonging to the MSME companies are seen in this table according to years. It could be said that the enterprises whose efficiency value has been calculated as 1 are efficient and those calculated below are not efficient. Table reveals that the years 1973-74 and 1974-75 the hk value is below1. In 1975-76 hk value is 1 which shows efficient. Again, period from 1976-77 to 1986-87 provides inefficient value. Further, period 1987-88 and 1988-89 hk value comes 1 which is efficient. After that, period from 1989-90 to 2020-21 found inefficient value. It can be concluded that most of the years the inefficient output.

Table 2 depicts the CCR model analysis of MSME period from 1973-74 to 2020-21. The variable are production as input variable and GDP and Employment as output variables. It can be seen period from 1973-74 to 2005-06 inefficient which provides hk value below 1. In 2006-07 and

2007-08 output value of hk shows 1 which is efficient according to the CCR Model. Further period from 2008-09 to 2014-15 value of hk below 1 which are inefficient. Again, the year 2015-16 hk value stood at 1 which is efficient for MSME. After that, from 2016-17 to 2020-21 noticed inefficient output. Now, output of the 48 years only 3 years shows efficient output according to the CCR Model.

Table 3 reveals that CCR Model analysis of MSME period from 1973-74 to 2020-21. Two variables are taken employment and GDP whereas employment is input variable and GDP is output variable. The 48 years calculated values it shows that 1975-76 hk value is 1 which is efficient. Further period from 1976-77 to 2020-21 the value of hk found inefficient.

Table 4 empirically predicts the CCR Model analysis of MSME units and taken employment as input variable and production as output variable. As per the rule of CCR Model consider to have minimum input value which is beneficial criteria. The hk value sum of 1 is the efficient and below 1 is inefficient. Out of 48 years, in 1987-88 period hk value got 1which is efficient and consider. Other years are shows hk value below 1 which is inefficient.

Table 3 Employment and GDP of MSME units

Sl. No.	Year	INPUT	OUTPUT	gk	hk	Sl. No.	Year	INPUT	OUTPUT	gk	hk
		Employment	GDP					Employment	GDP		
1	1973-74	39.7	4.6	1.692242	0.590932	25	1997-98	213.2	4.8	8.709151	0.114822
2	1974-75	40.4	5.2	1.523379	0.656436	26	1998-99	220.6	6.5	6.654601	0.150272
3	1975-76	45.9	9	1	1	27	1999-00	229.1	6.1	7.364192	0.135792
4	1976-77	49.8	6.2	1.574953	0.63494	28	2000-01	238.7	4.4	10.637255	0.094009
5	1977-78	54	7.5	1.411765	0.708333	29	2001-02	249.3	5.79	8.442548	0.118448
6	1978-79	63.8	5.5	2.27451	0.439655	30	2002-03	260.2	5.92	8.618177	0.116034
7	1979-80	67	5.2	2.526395	0.395821	31	2003-04	271.42	5.79	9.191642	0.108794
8	1980-81	71	7.2	1.933551	0.517183	32	2004-05	282.57	5.84	9.487309	0.105404
9	1981-82	75	6	2.45098	0.408	33	2005-06	294.91	5.83	9.918609	0.100821
10	1982-83	79	5.1	3.037294	0.32924	34	2006-07	805.23	7.2	21.928923	0.045602
11	1983-84	84.2	7.7	2.14413	0.46639	35	2007-08	842.23	8	20.642893	0.048443
12	1984-85	90	4.3	4.103967	0.243667	36	2008-09	881.14	8.72	19.813367	0.050471
13	1985-86	96	4.5	4.183007	0.239062	37	2009-10	822.19	7.49	21.523863	0.04646
14	1986-87	101.4	4.3	4.623803	0.216272	38	2010-11	965.69	7.42	25.519001	0.039186
15	1987-88	107	3.8	5.521156	0.181121	39	2011-12	1012.59	7.28	27.272949	0.036666
16	1988-89	113	10.5	2.110178	0.473894	40	2012-13	1061.4	7.04	29.562167	0.033827
17	1989-90	119.6	6.7	3.500146	0.285702	41	2013-14	1114.29	6.27	34.84661	0.028697

18	1990-91	158.3	5.6	5.542717	0.180417	42	2014-15	1171.32	6.11	37.589296	0.026603
19	1991-92	166.9	5.3	6.174621	0.161953	43	2015-16	1109.89	29.48	7.38214	0.135462
20	1992-93	174.8	5.1	6.720492	0.148799	44	2016-17	1109.89	29.25	7.440188	0.134405
21	1993-94	182.6	5.9	6.068461	0.164786	45	2017-18	1109.89	29.75	7.315143	0.136703
22	1994-95	191.4	7.3	5.141015	0.194514	46	2018-19	1109.89	30.27	7.189478	0.139092
23	1995-96	197.9	7.3	5.315606	0.188125	47	2019-20	1109.89	29.7	7.327458	0.136473
24	1996-97	205.9	7.8	5.175968	0.193201	48	2020-21	1109.89	29	7.504328	0.133256

Source: Data formulation from MSME Annual Report

Table 4 Employment and Production of MSME units

Sl. No.	Year	INPUT	OUTPUT	gk	hk	Sl. No.	Year	INPUT	OUTPUT	gk	hk
		Employment	Production					Employment	Production		
1	1973-74	39.7	7200	4.498715	0.222286	25	1997-98	213.2	54721	3.178803	0.314584
2	1974-75	40.4	9200	3.582812	0.27911	26	1998-99	220.6	48045	3.746173	0.266939
3	1975-76	45.9	11000	3.404477	0.293731	27	1999-00	229.1	36376	5.13855	0.194607
4	1976-77	49.8	12400	3.276711	0.305184	28	2000-01	238.7	26129	7.453497	0.134165
5	1977-78	54	14300	3.080975	0.324573	29	2001-02	249.3	28227	7.205897	0.138775
6	1978-79	63.8	15800	3.294534	0.303533	30	2002-03	260.2	31485	6.742703	0.148308
7	1979-80	67	21600	2.530763	0.395138	31	2003-04	271.42	36454	6.074732	0.164616
8	1980-81	71	28100	2.061496	0.485085	32	2004-05	282.57	32979	6.990674	0.143048
9	1981-82	75	32600	1.877043	0.532753	33	2005-06	294.91	28784	8.359279	0.119628
10	1982-83	79	35000	1.841575	0.543013	34	2006-07	805.23	13514	48.614576	0.02057
11	1983-84	84.2	41600	1.651388	0.605551	35	2007-08	842.23	14351	47.882742	0.020884
12	1984-85	90	50500	1.454058	0.687731	36	2008-09	881.14	15243	47.163381	0.021203
13	1985-86	96	61200	1.279824	0.781357	37	2009-10	822.19	16194	41.423666	0.024141
14	1986-87	101.4	72300	1.144274	0.873916	38	2010-11	965.69	17215	45.76792	0.021849
15	1987-88	107	87300	1	1	39	2011-12	1012.59	18343	45.039518	0.022203
16	1988-89	113	85640	1.076545	0.928897	40	2012-13	1061.4	24024	36.046594	0.027742
17	1989-90	119.6	82230	1.186674	0.842692	41	2013-14	1114.29	26109	34.820777	0.028718
18	1990-91	158.3	78802	1.638982	0.610135	42	2014-15	1171.32	27569	34.664506	0.028848
19	1991-92	166.9	80615	1.689161	0.59201	43	2015-16	1109.89	27868	32.494107	0.030775

20	1992-93	174.8	84413	1.689517	0.591885	44	2016-17	1109.89	41110	22.027384	0.045398
21	1993-94	182.6	98796	1.507967	0.663144	45	2017-18	1109.89	48081	18.833755	0.053096
22	1994-95	191.4	81215	1.922809	0.520072	46	2018-19	1109.89	58218	15.554395	0.064291
23	1995-96	197.9	72771	2.218799	0.450694	47	2019-20	1109.89	67667	13.382384	0.074725
24	1996-97	205.9	53781	3.123618	0.320142	48	2020-21	1109.89	78686	11.508347	0.086893

Source: Data formulation from MSME Annual Report

Table 5 Employment and GDP of MSME units

Sl. No.	Year	INPUT	OUTPUT	gk	hk	Sl. No.	Year	INPUT	OUTPUT	gk	hk
		Employment	GDP					Employment	GDP		
1	1973-74	7200	4.6	1.655756	0.603954	25	1997-98	54721	4.8	12.059643	0.082921
2	1974-75	9200	5.2	1.87157	0.534311	26	1998-99	48045	6.5	7.819096	0.127892
3	1975-76	11000	9	1.292921	0.773443	27	1999-00	36376	6.1	6.308219	0.158523
4	1976-77	12400	6.2	2.115688	0.472659	28	2000-01	26129	4.4	6.281911	0.159187
5	1977-78	14300	7.5	2.016956	0.495797	29	2001-02	28227	5.79	5.157127	0.193906
6	1978-79	15800	5.5	3.038898	0.329067	30	2002-03	31485	5.92	5.626051	0.177745
7	1979-80	21600	5.2	4.394122	0.227577	31	2003-04	36454	5.79	6.660216	0.150145
8	1980-81	28100	7.2	4.128531	0.242217	32	2004-05	32979	5.84	5.97374	0.167399
9	1981-82	32600	6	5.74762	0.173985	33	2005-06	28784	5.83	5.222811	0.191468
10	1982-83	35000	5.1	7.259715	0.137746	34	2006-07	13514	7.2	1.985515	0.503648
11	1983-84	41600	7.7	5.715106	0.174975	35	2007-08	14351	8	1.89764	0.52697
12	1984-85	50500	4.3	12.423518	0.080492	36	2008-09	15243	8.72	1.849165	0.540785
13	1985-86	61200	4.5	14.38668	0.069509	37	2009-10	16194	7.49	2.287147	0.437226
14	1986-87	72300	4.3	17.786542	0.056222	38	2010-11	17215	7.42	2.454284	0.407451
15	1987-88	87300	3.8	24.302577	0.041148	39	2011-12	18343	7.28	2.665389	0.37518
16	1988-89	85640	10.5	8.627978	0.115902	40	2012-13	24024	7.04	3.609893	0.277017
17	1989-90	82230	6.7	12.983063	0.077023	41	2013-14	26109	6.27	4.404984	0.227016
18	1990-91	78802	5.6	14.885756	0.067178	42	2014-15	27569	6.11	4.77311	0.209507
19	1991-92	80615	5.3	16.090208	0.06215	43	2015-16	27868	29.48	1	1
20	1992-93	84413	5.1	17.508979	0.057114	44	2016-17	41110	29.25	1.486768	0.6726
21	1993-94	98796	5.9	17.713689	0.056454	45	2017-18	48081	29.75	1.709654	0.584914

22	1994-95	81215	7.3	11.768878	0.08497	46	2018-19	58218	30.27	2.034541	0.491511
23	1995-96	72771	7.3	10.545257	0.094829	47	2019-20	67667	29.7	2.410139	0.414914
24	1996-97	53781	7.8	7.293835	0.137102	48	2020-21	78686	29	2.870259	0.348401

Source: Data formulation from MSME Annual Report

Table 6 Production and Employment of MSME units

Sl. No.	Year	INPUT	OUTPUT	gk	hk	Sl. No.	Year	INPUT	OUTPUT	gk	hk
		Production	Employment					Production	Employment		
1	1973-74	7200	39.7	10.80632	0.092538	25	1997-98	54721	213.2	15.29336	0.065388
2	1974-75	9200	40.4	13.56883	0.073698	26	1998-99	48045	220.6	12.97713	0.077059
3	1975-76	11000	45.9	14.2796	0.07003	27	1999-00	36376	229.1	9.460757	0.1057
4	1976-77	12400	49.8	14.8364	0.067402	28	2000-01	26129	238.7	6.522385	0.153318
5	1977-78	14300	54	15.77896	0.063376	29	2001-02	28227	249.3	6.746499	0.148225
6	1978-79	15800	63.8	14.75613	0.067768	30	2002-03	31485	260.2	7.209953	0.138697
7	1979-80	21600	67	19.20945	0.052058	31	2003-04	36454	271.42	8.002752	0.124957
8	1980-81	28100	71	23.58218	0.042405	32	2004-05	32979	282.57	6.954205	0.143798
9	1981-82	32600	75	25.89956	0.038611	33	2005-06	28784	294.91	5.815642	0.17195
10	1982-83	35000	79	26.39836	0.037881	34	2006-07	13514	805.23	1	1
11	1983-84	41600	84.2	29.43861	0.033969	35	2007-08	14351	842.23	1.015284	0.984946
12	1984-85	50500	90	33.43374	0.02991	36	2008-09	15243	881.14	1.03077	0.970149
13	1985-86	61200	96	37.98536	0.026326	37	2009-10	16194	822.19	1.173594	0.852083
14	1986-87	72300	101.4	42.48507	0.023538	38	2010-11	17215	965.69	1.062198	0.941444
15	1987-88	7300	107	8.61458	0.02057	39	2011-12	18343	1012.59	1.079376	0.926461
16	1988-89	85640	113	45.15795	0.022144	40	2012-13	24024	1061.4	1.348659	0.741477
17	1989-90	82230	119.6	40.96709	0.02441	41	2013-14	26109	1114.29	1.396137	0.716262
18	1990-91	78802	158.3	29.66145	0.033714	42	2014-15	27569	1171.32	1.402431	0.713048
19	1991-92	80615	166.9	28.78032	0.034746	43	2015-16	27868	1109.89	1.496104	0.668403
20	1992-93	84413	174.8	28.77425	0.034753	44	2016-17	41110	1109.89	2.207006	0.453102
21	1993-94	98796	182.6	32.23849	0.031019	45	2017-18	48081	1109.89	2.581247	0.38741
22	1994-95	81215	191.4	25.2831	0.039552	46	2018-19	58218	1109.89	3.125456	0.319953
23	1995-96	72771	197.9	21.91031	0.045641	47	2019-20	67667	1109.89	3.632729	0.275275

24	1996-97	53781	205.9	15.56355	0.064253	48	2020-21	78686	1109.89	4.224288	0.236726

Table 5 presents the CCR Model analysis of MSME units from 1973-74 to 2020-21 with taken production as input variable and GDP as output variable. Out of total 48 year of study only the year of 2015-16 hk value found 1 which is efficient and acceptable. Except this year, other years are inefficient value.

Table 6 manifested CCR model analysis of MSME units period from 1973-74 to 2020-21. The production and employment taken as input and output variables. The calculated 48 years values of MSME shows that 2006-07 hk value is 1 which is positive and efficient for MSME sector. Except this year other years are got hk value below 1 which is inefficient and not considered for MSME sector.

Cob-Douglas Production Function

In economics and econometrics, the Cobb-Douglas production function is a particular functional form of the production, which is used to represent the technological relationship between the amounts of two inputs (particularly physical capital and labour) and the amount of output that is produced by inputs.

$Q=AL\beta 1K\beta 2$

Q= Production Quantity.

A= Total factor Productivity.

L = Employment (Input).

K = Production (Input)

β1and β2 are the output elasticities of production and employment, respectively. These values are constants determined by available technology.

Estimation model: $\ln (Q) = \ln (A) + \beta 1 * \ln (L) + \beta 2 * \ln (K)$.

$\ln (Q) = Y$, $\ln (A) = \beta 0$, $\ln (L) = X1$, $\ln(K) = X2$.

Here $\beta 1 + \beta 2 < 1$ means returns to scale are decreasing, that a percentage increase in production K and employment L produce a smaller percentage increase in output Y.

Table 7 Cobb-Douglas Production Function

SUMMARY OUTPUT	
Multiple R	0.21
R Square	0.05
Adjusted R Square	0.00
Standard Error	0.69
Observations	48.00

ANOVA					
	df	SS	MS	F	Significance F
Regression	2.00	1.03	0.51	1.07	0.35
Residual	45.00	21.58	0.48		
Total	47.00	22.61			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	10.28	0.51	20.28	0.00	9.26	11.30
LN(L)	-0.06	0.12	-0.49	0.62	-0.29	0.18
LN(K)	0.25	0.18	1.39	0.17	-0.11	0.61
LN(A)		10.28				
"=EXP()	A	30.00				

Above table 7 Cobb-Douglas production function indicates β1 and β2 are the output elasticity of production and employment. These values are constants determined by available technology. The summary output shows Multiple R is 0.21, R square is 0.05, Adjusted R Square value 0.00 and Standard Error is 0.69. The Anova test result noticed Regression Sum of Square value 1.03, Mean Square is 0.51, Frequency is 1.07 and Significance F value 0.35. The result is employment LN(L) coefficient -0.06 and production LN(K) value 0.25. The factor productivity LN(A) is 10.28 and the EXP(A) value comes 30.00 which is greater than β1+β2 means return to scale are decreasing, that percentage increase production (K) and Employment (L). So the result shows smaller percentage increasing in output Y.

Table 8 Descriptive Statistics

Descriptive Statistics				
		EMPLOYMENT	PRODUCTION	GDP
N (Statistic)		48	48	48
Range(Statistic)		1131	91596	29
Minimum(Statistic)		40	7200	1
Maximum(Statistic)		1171	98796	30
Mean	(Statistic)	420.21	42411.56	8.83
	(Std. Error)	60.807	3779.957	1.172
Std. Deviation(Statistic)		421.283	26188.310	8.117
Skewness	(Statistic)	.835	.553	2.087
	(Std. Error)	.343	.343	.343
Kurtosis	(Statistic)	-1.137	-.997	3.010
	(Std. Error)	.674	.674	.674
Source-Computed by the author				

Above table 8 shows descriptive statistics of MSME sector. The employment range statistics of employment seen 1131, production is 91596 and GDP is 29. The mean statistics of employment and production remarked 420.21 and 42411.56 whereas Mean Std. Error of employment and production noticed 60.807 and 3779.957. The employment and production Std. Deviation (Statistics) comes 421.283 and 26188.310. Employment Skewness Statistics and Std. Error is .835 and .343 whereas production Skewness Statistics and Std. Error is .553 and .343. The

Kurtosis Statistics and Std. Error of employment shows -1.137 and .647 and the production is -.997 and .674. From the analysis point out MSME sector has smoothly running.

HYPOTHESIS

The test statistics for a One Sample t Test is denoted t, which is calculated using the following formula:

$$t = \frac{\bar{x} - \mu}{\frac{s}{\sqrt{n}}}$$

T = The number of sample standard deviations (s) the sample mean (x) is away from the mean.
μ = The test value – the proposed constant for the mean.

$\bar{x}$ = Sample mean.
n= Sample size (i.e. number of observations).

$s/\sqrt{n}$ = Estimated standard error of the mean.

The calculated *t* value is then compared to the critical *t* value from the *t* distribution table with degrees of freedom *df* = *n*-1 and chosen confidence level. If the calculated *t* value > critical *t* value, then we reject the null hypothesis.

Table 9 **HYPOTHESIS TEST**

One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
Employment (Lakh)	48	420.21	421.283	60.807
Production (crore)	48	42411.56	26188.310	3779.957
GDP (%)	48	9.15	7.890	1.139

One-Sample Test						
	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Employment	6.911	47	.000	420.208	297.88	542.54
Production	11.220	47	.000	42411.563	34807.27	50015.86
GDP	7.540	47	.000	8.833	6.48	11.19

Table 9 expressed hypothesis of one-sample test. Employment t value 6.911, Mean Difference value 420.208 and Sig. (2-tailed) test is .000 which is less than 0.05 percent level of significance and it can accepted. The production t value is 11.220, Mean Difference comes 42411.563 and Sig. (2-tailed) test shows .000 which is less than 0.05 percent level of significance.

GDP's t value is 7.540; Mean Difference is 8.833 and Sig. (2-tailed) test stood at .000 which is less than 0.05 percent level of significance. It is clear that employment, production and GDP are positive impact and accepted for MSME sector.

Conclusion

Micro, Small and Medium Enterprises have played a major role in the Indian economy. It noted that, production and sales of MSME sector increased 18.96 percent and 18.11 percent respectively. GDP growth from 4.6 percent to 29 percent. Cob-Douglas production function indicates multiple R is 0.20, R Square is 0.05, adjusted R Square value is 0.00 which is positive signal for MSME sector. The above result shows employment LN(L) coefficient value -0.06 and production LN(K) value 0.25. The productive LN(A) is 10.28 and EXP(A) value comes 30.00 which is greater than $\beta 1+\beta 2$ means return scale are decreasing, that percentage increase production (K) and employment (L). So, the result point out smaller percentage increase in output Y and smoothly running the MSME units. MSME sector provide employment opportunities among the people and change their leaving standard as well as change the standard of society. So, the MSME is an important pillar of the growth of Indian economy.

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