Trends in Capacity Utilization in Indian Manufacturing Sector in the Post Reform Period –A Case of Engineering Goods Industry

ASHEREF ILLIYAN
Associate Professor
Department of Economics, Jamia Millia Islamia (A Central University), New Delhi (India)

ABSTRACT

Capacity utilization is one of the most widely used measure to judge the performance of industrial sector. The Developing economies like India are facing the acute problem of capital shortage. Hence, proper utilization of capital is very imperative. Capacity utilization performs the dual role of not only indicating the use of scarce resources but also the state of existing demand in the economy. Excess capacity or underutilized capacity is bad for the economy and are detrimental for the sustainable growth of industry. The failure of an economy in making best use of scarce resources are also showcased by existence of excess capacity in any sectors. India adopted New Economic Policy in July 1991 which was a paradigm shift from the Nehru Mahalanobis model of development which emphasized dominance of public sector undertaking. Licensing requirement for expansion of capacity, quota and inward looking policy were the hallmark of such policy. The prime aims of new economic policy, interalia were to increase industrial efficiency through productivity and better capacity utilization. Hence, it is imperative to understand to what extent Economic Reforms have been successful in achieving faster growth of capacity utilizations. In this context, the present paper is an attempt to understand trends in capacity utilization in Indian Manufacturing sector *vis-a-vis* Engineering Industry in the post reform period (1991-2015). The paper applies methods such as annual average growth rate, Minimum Capital Output Ratio Method etc. for analysis. The major finding of the paper is that Capacity Utilization has witnessed a cyclical trend in the post- reform period. While the periods 1991-96 and 2002-2009 has witnessed higher and increasing capacity utilization rate in both Manufacturing and Engineering industry, 1996-2002 and 2009-15 has observed declining/ stagnating tendency in capacity utilization. The average capacity utilisation was found to be 71.79% in Engineering industry and 73.46% in Manufacturing sector. Efforts must be made for proper use of unutilized capacity so that Engineering and Manufacturing sector can be put on a sustainable growth path.

Key Words : Capacity utilization, Post reform period,Trends, Engineering goods industry, Manufacturing sector, Minimum capital output ratio method, India

INTRODUCTION

Performance of an industry can be judged by various measures such as productivity, profitability, capacity utilization, employment and export growth etc. Capacity utilization in short CU is one of the most widely used measures to judge the performance of industrial sector both actual and potential. "Capacity utilization is usually defined as the ratio of actual output to the output corresponding to (1) the minimum point on the short-run average total cost curve, and (2) the point of tangency between the long-run average total cost and short-run average total cost curves. In practice, however, capacity utilization is often measured as the ratio of actual to the maximum potential output consistent with a given capital stock" Nelson (1989). The Developing economies like India are facing acute problem of capital shortage. Hence, proper utilization of capital is very imperative. Capacity Utilization performs the dual role. Firstly, it not only indicates the use of scarce resources, secondly, it also

reflects state of existing demand in the economy. Excess capacity or underutilized capacity is bad for the economy and detrimental to the sustainable development of an industry. The failure of an economy in making best use of scarce resources are also showcased by existence of excess capacity in any sectors Ajith (1993).

India adopted New Economic Policy in July 1991 which was a paradigm shift from the Nehru Mahalanobis model of development which emphasized dominance of public sector undertaking. Licencing requirement for expansion of capacity, quota and inward looking policy were the hallmark of such policy. The new policy introduced new liberal framework and promoted private sector and outward orientation in Indian economy. The major part of this Structural Adjustment Policy (SAP) or New Economic Policy was industrial liberalization, financial sector liberalization, trade liberalization and so forth.

The prime aims of new economic policy, interalia, were to increase industrial efficiency through productivity and better capacity utilization., Hence, it is imperative to understand to what extent Economic Reforms have been successful in achieving faster growth of capacity utilizations. In this context, the present paper is an attempt to understand trends in capacity utilization in Indian Manufacturing sector *vis-a-vis* Engineering Industry in the post- reform period (1991-2015). Various studies have come out with slightly different views on the impact of economics reforms on capacity utilisation. Seth (1998) concludes that liberalization has improved rate of capacity utilization in Indian Manufacturing sector. Ganjan and Malhothra (2007) observes changes in economic environment alters short run decisions of the companies will have impact on observed capacity utilization. Azeez (2001, 2005) observe a cyclical trend in movement of capacity utilization over period and supply and demand have significant role in determining capacity utilization but the impact of economic reforms per se is not remarkable. Similarly Kumar and Arora (2009) observe that there is significant decline in capacity utilization levels during post-reform period.

A Snapshot of Review of Literature-Trends in Capacity Utilization in Pre Reform Period:

Following Seth (1998) and review of various studies on capacity utilisation on Indian Manufacturing sector we can observe 4 distinct phases in the movement of capacity utilisation for the period 1950-1990.

Phase 1-1950-65: The phase of higher growth rate of industrial output accompanied by higher and increased growth rate of capacity utilization (Budin and Paul, 1961, NCAER, 1966, Paul, 1974, Navar and Kanbur, 1976).

Phase 2- 1966-75: The phase of decline and stagnation in capacity utilization (Koti, 1967, Ragavachari, 1969, RBI, 1970, 1972, 1975, Paul, 1974, Ajith, 1993, Rao, 1995)

Phase 3-1976-84: The period of recovery (RBI, 1986, Srinivasan, 1992, Ajith, 1993)

Phase 4-1985-90: Period of acceleration (Ajith, 1993, Pohit and Satish, 1995).

A Snapshot of Review of Literature -Trends in Capacity Utilization in Post Reform Period:

The post reform trends in Capacity utilization can be broadly divided into 4 distinct phases

Phase 1- 1991-96: The phase of higher growth and capacity utilization (Uchikava, 2001,Ganjan and Malhotra, 2007).

Phase 2- 1996-2002: The deceleration /stagnation in growth rate and deceleration in capacity utilisation (Uchikava, 2001, Mulega and Weiss, 2006, Goldar and Ranganathan, 2008).

Phase 3- 2002-2008: Phase of higher growth rate and acceleration in capacity utilization (Goldar and Ranganathan, 2008, Saikia, 2012, Bhatia and Kaur, 2016).

Phase 4- 2009-2015: The deceleration /stagnation in growth rate and deceleration in capacity utilisation, (Illiyan, 2019, the present study, FICCI, 2019).

As far as methodology of these studies are concerned most of these studies have used conventional capacity utilisation measures such as Wharton Index, Minimum capital output ratio, Trend through peak methods and so forth. And a few studies have used translog cost function for measurement of capacity utilisation (Azeez, 2002, 2005, Hashim, 20003, Barik, 2007, Vishwanathan and Mukopadhyay, 1991, Suresh, 1991). A very few studies have used Leontif input output model (Burange, 1993).

There are demand pull and supply side factors identified by various studies for under utilisation of capacity such as shortage of raw materials, lack of demand, labour problems, Infrastructural bottlenecks such as power shortage and transport bottlenecks, obsolete machinery, variation in input prices (Koti, 1967, Paul, 1974, RBI, 1970, Goldar and Ranganathan, 1991, Srinivasan, 1992, Kumar, 1997, Dembla, 2000, Gangan and Malhotra, 2007, FICCI,

2019 etc.)

Objective of the study:

To analyze trends in capacity utilization in Indian manufacturing sector *Vis-a-vis* Engineering industry in the post reform period

METHODOLOGY

Secondary data has been used in this study. The data of value of output and capital are collected from Annual Survey industries (ASI) published by Central Statistical Organisation (CSO) under the Ministry of Statistics and Programme implementation, Government of India which is available from Economic Political Weekly Research Foundation (EPWRF). The output data is deflated by using WPI (Wholesale Price Index) of respective commodity and hence, the output data is real output. Capital data is deflated by Wholesale price index of Machinery and Machine tools. The price index data is obtained from Office of the Economic Advisor, Govt. of India. The period of study is from 1991 to 2015 (post-reform period).

The important measures of capacity utilization are: Wharton Index, RBI index, Minimum Capital output ratio, Measures based on machine hours, Survey methods, production function approach etc. Different measures of capacity suggest different conceptual base and different data requirement. Each measure of capacity utilization has its own limitations. The choice of appropriate measure depends on purpose of study and availability of data.

Following Ajith (1993) and Uchikawa (2001), the present study use minimum capital output ratio for measurement of capacity utilization which was proposed by National Conference Board of US.

Minimum capital output ratio method:

The National conference Board of US estimates capacity on the basis of capital output ratio. Under this method, on the basis of lowest capital-output ratio, a bench mark year is selected and capital output ratio is considered as capacity output. The capacity utilization rate is estimated as the ratio of actual output as the proportion of estimate of capacity *i.e.*

U= A/c x 100

where, A= real output/real value added

c = estimates of capacity

where c =C/ (C/A) minimum

C=Real capital stock

In other way this method can be calculated as follows:

" The first step in the method consists of calculating the ratio of output to capital for each year for different industries. *i.e.*,

$(Y/K)_1$, $(Y/K)_2$ …$(Y/K)_n$

where Y= industrial output at constant prices.

K= Capital stock at constant price.

n= Number of actual observation

Now to obtain index of capacity utilization we refer to the highest (peak) point of the output capital ratio $\{say[(Y/K)^*_t]\}$ which indicates the highest degree of capacity utilization. From the actual and potential (peak) output ratio we can work out index of capacity utilization corresponding to time point 't' as

$U_t = (Y/K)_t/(Y/K)^*_t$ x 100

where $(Y/K)_t$ is the actual output-capital ratio and $(Y/K)^*_t$ highest peak output capital ratio, both at time point 't'. It is clear that this type of index of utilization cannot exceed 100. If index reaches 100 it should be taken merely to indicate the highest degree of capacity utilization hitherto observed" Salim A Rahul (1999).

Annual average growth rate:

Annual average growth rate are estimated by the equation

$G_t = Y_t - Y_{t-1}/ Y_{t-1}$

where, Y_t, is the current year value and Y_{t-1} is the previous year value.

RESULTS AND DISCUSSION

This section presents the analysis of capacity utilization of Engineering Industry *vis-a-vis* Manufacturing Sector during Post Reform Periods.

The capacity utilization rate of Indian Engineering industry *vis- a-vis* manufacturing sector is depicted in Table 1.

The following observations can be made by the scrutiny of Table 1. A cyclical trend is witnessed in the movement of capacity utilization both in the case of Manufacturing sector and Engineering industry in the post reform period. The trends in capacity utilization in the post-reform period can be clearly divided into 4 distinct phases. Capacity utilization recorded a higher per cent of 74.80% for Engineering Industry in the first phase (1991-96) of post reform period. As compared to Engineering Industry Manufacturing sector has shown

Table 1 : Capacity Utilization Rate of Engineering *vis-a-vis* Manufacturing Sector- Post Reform Period

Period	Engineering	Aggregate Manufacturing
Post-Reform – stage 1 level 1 (1991 – 1996)	74.80	70.06
Post-Reform – stage 1 level 2 (1996 – 2002)	63.48	63.89
Post-Reform – stage 1 (1991 – 2002)	68.62	66.97
Post-Reform – stage 2 level 1(2002-2009)	84.89	85.98
Post-Reform – stage 2 level 2 (2009-2015)	62.34	73.97
Post-Reform – stage 2 (2002-2015)	74.48	79.96
Post-Reform-overall (1991 – 2015)	71.79	73.46

Source: Computed by the Author from ASI data

Table 2 : Real Output Growth of Engineering Industry *vis-a-vis* Manufacturing Sector- Post Reform Period

Period	Engineering	Aggregate Manufacturing
Post- Reform – stage 1 level 1 (1991 – 1996)	11.14	9.04
Post- Reform – stage 1 level 2 (1996 – 2002)	1.70	3.58
Post- Reform – stage 1 (1991 – 2002)	5.99	6.06
Post- Reform – stage 2 level 1(2002-2009)	15.76	13.77
Post- Reform – stage 2 level 2 (2009-2015)	8.32	8.70
Post- Reform – stage 2 (2002-2015)	12.33	11.43
Post- Reform-overall (1991 – 2015)	9.42	8.97

Source: Computed by the Author from ASI data

Table 3 : Real Fixed Capital Growth of Engineering vis-a-vis Aggregate Manufacturing Sector-Post Reform Period

Period	Engineering	Aggregate Manufacturing
Post-Reform– stage 1 level 1 (1991 – 1996)	9.87	9.80
Post-Reform– stage 1 level 2 (1996 – 2002)	4.74	1.39
Post-Reform– stage 1 (1991 – 2002)	8.45	6.08
Post-Reform– stage 2 level 1 (2002-2009)	12.79	9.94
Post-Reform– stage 2 level 2 (2009-2015)	13.46	12.96
Post-Reform– stage 2 (2002-2015)	13.10	11.34
Post-Reform- overall (1991 – 2015)	10.97	8.93

Source: Computed by the Author from ASI data

slightly lower performance in capacity utilization in the post reform period in the initial period (Phase 1). It recorded 70.06% of capacity utilization in the first phase. More liberal policy environment in the early 1990s , better investment climate and better demand condition might have helped to achieve higher capacity utilization percentage in both Engineering and Manufacturing sector in this phase. During early liberalization there were lot of flux in the activities of the companies and they keep some capacity as reserve capacity to overcome potential threat from their competitors. Therefore,, modern theory of cost also confirms the idea of a reserve capacity. And hence the shape of cost curves will not be U shaped rather L shaped. This explains why capacity utilization is not in very high percentage in first phase.

However, contrary to the expectation, capacity utilization rate in Engineering industry declined to 63.48% during second phase (1996-2002). Similarly capacity utilization in Manufacturing sector declined to 63.89% during the same period.

One may wonder why capacity utilization rate has decelerated in the second half of 1990s (Phase-2:1996-2002). Many studies including one by Uchikava (2001) had pointed out that there was an investment boom in 1990s and demand did not increase in consummate with increase in investment leading to under utilization of capacity particularly during second half of 1990s. Goldar and Ranganathan (2008) noted that the capacity utilization level declined between 1995 and 2001 while it increased during the period 2001 and 2004.

The analysis of fixed investment and real output growth (Table 2 and 3) in the post-reform period also

confirms faster growth of investment in first half of 1990s and deceleration output growth in the second half of 1990s which led to decline in capacity utilization rate in second half 1990s.

The main reasons for stagnating trend in output and demand and hence capacity utilization were: Tight Monetary Policy by RBI since 1996-97, south East Asian Crisis, Un stable Central Government, and host of other factors.

When we go beyond 1990s and analyze capacity utilization rates in 2000s we can see encouraging pictures in both Engineering Industry and Manufacturing sector. While Engineering goods industry has recorded highest capacity utilization rate of 84.89% during third phase (2002-2009), Manufacturing sector has recorded highest capacity utilization rate of 85.98% during third phase (2002-2009).

The acceleration in capacity utilization during third phase was caused by faster GDP growth, better investment climate, faster growth of export, higher growth of FDI inflow etc. which led to better demand and higher capacity utilization. This period was considered to be golden period as far as Indian economic development is concerned.

After stellar performance in capacity utilization during 2002-2009, capacity utilization started decelerating in the 4th phase (2009-2015). Capacity utilization rate in Engineering industry has declined to 62.34% during 2009-15. Whereas capacity utilization rate in Manufacturing sector has declined to 73.97% during the same period.

The deceleration in capacity utilization during 2009-2015 was mainly caused by demand decline due to Global financial crisis, Chinese slowdown, Euro zone crisis etc.

The average capacity utilization in the post-reform period has been 71.79% and 73.46% in Engineering Industry and Manufacturing Sector, respectively. The FICCI report (2019) also report capacity utilization in manufacturing sector stagnate around 72% in 2018-19.

Conclusion:

The Capacity utilization in Indian manufacturing sector and Engineering Industry has witnessed a clear cyclical trend in the post-reform period. Our findings are in line with the findings of Uchikava (2001), Azzez, (2005), Goldar and Ranganathan (2008), Bhatia and Kaur (2016) etc. The average capacity utilization in the post-reform period has been 71.79% and 73.46% in Engineering Industry and Manufacturing Sector,

respectively. The FICCI report 2019 also report capacity utilization stagnate around 72% in 2018-19. The phase 1 and 3 (1991-96 and 2002-2009) has recorded highest capacity utilization rate. The worst phases of declining/decelerating tendency of Capacity utilization rate has been during 2nd and 4th (1996-2002 and 2009-2015). There are both domestic and global and demand and supply factors behind a cyclical trend in capacity utilization during post-reform period.

As capital is a scares commodity in India, efforts must be made for proper use of approved capacity so that Engineering and Manufacturing sector can be put on a sustainable growth path. Efficient and scientific management, Research and Development, Dynamic plant design, better infrastructure, availability of raw materials and inputs such as power, coal, iron ore, steel, transport, spare parts and components etc., better labour relations, modernization of plant and machinery, better marketing, boosting of demand through better employment, faster growth of Agriculture, Industry and service sectors, more exports and higher inflow of Foreign Direct Investment etc. can be adopted for faster growth of capacity utilization in Indian Engineering Goods Industry in particular and Manufacturing Sector in general.

Appendix:
Engineering Industry -Definition:

As per ISIC Rev 3.1 of UN (2004) which is same as National Industrial Classification of India 2004, Engineering Goods Industry constitutes the following items:

1) Manufacture of Basic Metals (27)

2) Manufacture of Fabricated Metal Products, except Machinery and Equipment (28)

3) Manufacture of Machinery and Equipment n.e.c. (29)

4) Manufacture of Office, Accounting and Computing Machinery (30)

5) Manufacture of Electrical Machinery and Apparatus n.e.c. (31)

6) Manufacture of Radio, Television and Communication Equipment and Apparatus (32)

7) Manufacture of Medical, Precision and Optical Instruments, Watches and Clocks (33)

8) Manufacture of Motor Vehicles, Trailers and Semi-Trailers (34)

9) Manufacture of other Transport Equipment (35)

Figures in parenthesis shows NIC Classfication

2004.

Manufacturing Sector-Definition:

Engineering industry is a constituent of manufacturing sector constituting more than 1/3 of share of output, employment, investment and export of manufacturing sector. Besides Engineering Goods industry manufacturing sector consists of Food products industry, Chemical, industry, Rubber industry and so forth.

Acknowledgment:

This paper has been pulled out from the Ph.D. thesis entitled "An Economics Analysis of Performance of Engineering Goods Industry in India (1973-2015)" submitted to Jamia Millia Islamia University, New Delhi-110025.

REFERENCES

Ajith, D. (1993). Capacity Utilisation in Indian Industries, Reserve Bank of India Occasional Papers, Vol. **14**, No.1, March.

Azeez, Abdul Erumban (2001). Utilization of optimal capacity in Indian manufacturing, 1974-96. *Applied Economic Letters*, Vol. **8**, September, pp623-28.

Azeez, Abdul Erumban (2005). Economic Reforms and industrial Performance: An Analysis of Capacity Utilization in Indian Manufacturing. *Indian J. Economics & Business*, **4**(2) : 305–223 (An earlier version is available as Working paper 334, Centre for Development Studies, Trivandrum, June, 2002, and Proceedings of the ERC/METU VI International Conference in Economics, Ankara, Turkey, September 2002)

Barik, Kaustava (2007). Capacity Utilization in Indian Paper industry. Working Paper, School of Social Science, Indira Gandhi National Open University.

Berndt, E.R. and Morrison, C. (1981). Capacity utilization: Underlying economic theory and an alternative approach. *American Economic Review*, **71** (22) : 48-52.

Betancourt, R.R. and Clague, C.K. (1970). An Economic Analysis Capital Utilisation. *Southern Economic J.*, **42** : 69-78.

Bhagawati Jagatish, N. and Desai, Padma (1971). India: Planning for Industrialization, Oxford University Press, London , New York, Bombai

Bhatia, Aparna and Kaur, Baljinder 2016). Capacity Utilization in India - A Case Study Of Basic Goods Industry. *Internat. J. Engg. Technol. Sci. & Res. IJETSR* ISSN 2394 – 3386,

Volume **3**, Issue 11, November.

Bhatia, Aparna and Kaur, Baljender (2016). Trend of Capacity Utilisation in Indian Manufacturing Sector. *Gian Jyoti E J.*, **6** (2) April June 2016.

Bhatia, Aparna and Kaur, Baljinder (2017). Capacity Utilization of Capital Goods Industry in India: An Empirical Evaluation. *Pacific Business Review Internat.,* **10** (4), October 2017.

Budin, M. and Paul, S. (1961). The Utilization of Indian Industrial Capacity (1949-1959). *Indian Economic J.*, **19** (1).

Burange, L. (1993). Implications of Full Capacity Utilization of Manufacturing Sector in Indian Economy. *Artha Vijñâna*, No 35.

Burange, L.G. (1992). Trends in Capacity Utilization in Indian Manufacturing Sector (1951-1986). *J. Indian School Political Economy*, **4**, (5) : 445-455.

Deb Arnab, K. (2014). Economic Reforms, Capacity Utilization and Productivity Growth in Indian Manufacturing, *Global Business Review*, **15** (4).

Dembla, Priyanka (2000). Production in the Indian Manufacturing Sector: A Panel Data Analysis. *Indian Economic Review*, New Series, **35** (1) : 41-65.

Economic Survey (2015). Ministry of Finance and Company Affairs, Government of India, pp 136

Economic Survey (2001-02). Ministry of Finance and Company Affairs, Government of India.

FICCI (2019). Capacity Utilisation Stagnant in Indian Manufacturirng" available at www.businesstoday.in/latest.

Ganjan, Shailendra and Malhotra, D. (2007). Measures of Capacity Utilization and its Determinants : A Study of Indian Manufacturing. *J. Appl. Econ.*, **39** (6) : 765-777.

Goldar, Bishwanath and Renganathan, V.S. (1991). Capacity Utilisation in Indian Industries. *Indian Economic J.*, **39**(2): 82-92.

Goldar, Biswanath and Renganathan, V.S. (2008). Import penetration and capacity utilization in Indian industries, Working paper series no.E/293/2008., Institute of Economic Growth, New Delhi.

Goldar, Bishwanath (2003). Import Liberalization and Productivity Growth in Indian Manufacturing Industries in the 1990s", The Developing Economies, 12/2003.

Gujarati, Damodar (2004). Basic Econometrics, MacgrawHill, New Delhi.

Klein, L.R. (1960). Some Theoretical issues in the Measurement

of Capacity. *Econometrica*, **28** (2) : 272–286.

Koti, Ragunath (1967). Capacity Utilization and Factors Affecting it in Certain Indian Industries 1966-67, Gokale Institute of Economics and Politics Mimeograph series no 2.

Koti, Raghunath (1967). Utilization of Industrial Capacity in India (1967-68). Gokhale Institute of Politics and Economics. Mimeograph series no 9.

Kumar, Mohan P.S. (1997). Inter differences in Capacity Utilization. *Vikalpa*, Vol. **22**, No.1, Jan-March.

Morrison, C.J. (1985). On the Economic Interpretation and measurement of optimal capacity. *Review of Economic Studies,* **LII** : 295 – 310.

Mulega, G. and Weiss, J. (1996). Trade Reform and Manufacturing Performance in Malawi 1970-91. *World Development*, **24** (7): 1267-78.

Nanda Mohan, V. (1992). The Concept of Capacity Utilization. *Anvesk,* June-Dec, Vol 22 , No 1 & 2.

Navar, N.P and Kanbur, N.G (1976). Measurement of Capacity Utilization in Indian Manufacturing industries. *Indian J. Economics*, **57** (225) : 221-239.

Nelson Randy, A. (1989). On the Measurement of Capacity Utilization. *J. Industrial Economics,* **37**(3):273-86. DOI: ,10.2307/2098615.

Paul, S. (1974). Industrial Performance and Government Controls in J.C. Sandesara (Ed). *The Indian Economy: Performance and Prospects*, University of Bombay, Bombay.

Pohit, Sanjib and Ragavandhra, Satish (1995). Trends in Capacity Utilization in Indian Industries: A Disaggragated Approach. *Indian Economic J.*, **43** (2).

Rao Subha, S.V. (1995). A Note on Potential Production Index and Capacity Utilization in Industries, Margin, *NCAER J.* **13** (2).

Saikia, Hemanta (2012). Capacity Utilization in Small Scale Industries of India: Some Empirical Evidences From Underdeveloped Industrial Structure, No.**1**, Vol.1, Summer 2012.

Salim A. Rahul (1999). Capacity realisation and Productive Growth in a Developing Country-has Economic Reforms had Impact', Ashghat publication, USA, Singapore, Sydney, Adershoo.

Seth Vijay, K. (1998). Economic Reforms and Capacity Utilization of Indin Industry. *Productivity*, **39**, No. 3, October-December, 1998.

Srinivasan, P.V. (1992). Determinants of Capacity Utilization in Indian Industries. *J. Quantitative Economics*, **8** (1) : 139-156.

Srinivasan, P.V. (1992). Excess capacities in Indian industries: Supply or Demand Determined?. *Economic & Political Weekly*, **27**(45) : 2437–2441.

Springer (2018). Eurasian Economic Perspectives, Springer Science and Business Media LLC.

Subha Rao, S.V. (1995). A Note on Potential Production Index and Capacity Utilization in Industries, *Margin*, (*NCAER J.*), **13** (2).

Suresh, Padma. M. (1991). Economic Measure of Capacity Utilization in Some Selected Industries in India: 1960-61 to 1982-83" M. Phil Dissertation, Department of Economics, Delhi School of Economics.

Uchikawa, S. (2001). Investment Boom and Underutilisation of Capacity in the 1990s". *Economic & Political Weekly*, **36**(34) : 3247-325, DOI: ,10.2307/4411027

Vishvanathan, U. and Mukhopadhyay, H. (1991). On the Measurement of Capacity Utilization: The Case for the Cement industry in India, Paper Presented at the Annual Conference of the Econometric Society, New Jalpaiguri, pp. 29-31 Oct.

www.dyuthi.cusat.ac.in

www.ejbe.org

****