



Capacity Utilization in SMEs of India – a Study of Chemical Industry

Kirti AREKAR^{*}, Shaila SRIVASTAVA^{**}

ARTICLE INFO

Article history:
Accepted February 2016
Available online April 2016
JEL Classification
L60, L65

Keywords:
Capacity utilization, Small scale industry, Technical Problem, Financial problem

ABSTRACT

There is a large scale capacity underutilization in SMEs in India. The chemical industry has been the worst sufferer owing to multifaceted problems in this segment. This study was undertaken to explore the reasons for under capacity utilization amongst small-scale chemical industries in India. The main objectives of this research paper are to identify the favorable and unfavorable factors affecting the production capacity utilization and to identify the relationship between all the factors of managerial problems i.e. technical and financial with actual utilization of production capacities of industries under survey. The data was collected through primary source. Self-administrative questionnaires were prepared based on four different scale of measurement viz. nominal, ordinal, interval and ratio were used. The data have been analyzed with the help of statistical techniques such as one sample test and two independent sample tests. The targeted sample population was small-scale chemical industries from Mumbai and suburb region. The effect of various factors of the key managerial problems viz. technical and financial over production capacity utilization was studied. The practical implications of the outcome of the present study would be useful for the industry segment as well as for policy makers.

© 2016 EAI. All rights reserved.

1. Introduction

The chemical industry is an indispensable and integral constituent of the growing Indian Industry. It is one of the most diversified of all industrial sectors covering thousands of commercial products. This Industry occupies a pivotal position in meeting basic needs and improving quality of life. The industry is the main stay of industrial and agricultural development of the country and provides building blocks for several downstream industries, such as textiles, papers, paints, soaps, detergents, pharmaceuticals, varnish etc.

There are three key segments of chemical industry – Basic Chemicals, Specialty chemicals and Agro chemicals. Basic chemicals include organic and inorganic chemicals, petrochemicals and other chemicals e.g. Polymers, synthetic rubber, paints & varnishes, etc. Specialty chemicals are low volume but high value products prepared from basic chemicals. Agro chemicals are the chemicals meant for protecting crops. The chemical and petrochemical sector in India presently constitutes 14% of the domestic industrial activity. According to National Accounts Statistics 2013, brought out by the Central Statistics Office (CSO), chemical and chemical products sector (industry division 24 of NIC2004) accounted for 2.06% of the GDP (at 2004-05 prices) in 2011-12, compared to 2.18% in 2010-11. The share of this sector in the GDP for manufacturing sector at 2004-05 prices was 13.1% during 2011-12. The size of the Indian Chemical industry in terms of value of output in the year 2011-12 was 5,99,148 cores. The average Indices of Industrial Production (IIP) for the Chemical and Chemical products (division 24: NIC2004) for the year 2012-13 stand at 127.3, which is 3.8% higher as compared to the previous year (Mo C&F, 2013).

The Indian chemical industry comprises both small and large scale units. The fiscal concessions granted to SSI sector in mid-eighties led to establishment of large numbers medium and small enterprises (SME). This sector is a significant employment generator. Over the last five years the Indian chemical industry has seen significant changes in terms of increase in capacity additions, investments in R & D. However, despite increase in its competence, the tapped potential is still far below than desired. The Indian government has increased its focus towards domestic manufacturing with the intent of increasing the share of manufacturing in GDP from 16% to 25% by 2022 (GoI, 2011). The average capacity utilization in chemical sector during the 1st & 2nd quarter of the year 2013-14 was 77-78 % (FICCI, 2013).

^{*}, ^{**} K.J. Somaiya Institute of Management Studies & Research, Mumbai, India. E-mail addresses: kirtiarekar@somaiya.edu (Arekar K.), shaila@somaiya.edu (Srivastava S.).

2. Literature review

The average capacity utilization in chemical sector during the 1st and 2nd quarter of the year 2013-14 was 77 and 78 % (FICCI, 2013). Currently, the capacity utilization in this sector is higher than last year. Average Capacity Utilization during 3rd and 4th quarter of the year 2013-14 stands 79% and 80 % (FICCI, 2014).

Table 1. Current average capacity utilization levels

Sector	Average Capacity Utilization (%) in Q-4 2012-13	Average Capacity Utilization (%) in Q-1 2013-14	Average Capacity Utilization (%) in Q-2 2013-14
Auto	73	72	60
Capital Goods	68	70	70
Cement	77	75	73
Chemicals	74.5	77	78
Textiles	81	80	78
Electronics & Electricals	58	56	60
Food Products	80	75	86
Leather & Footwear	73	82	71

Source: Ficci Quarterly Survey on Indian Manufacturing Sector (November 2013)

Table 1 lists the average capacity utilization in various industry sectors in the year 2012-13 (Q4) and year 2013-14 (Q1 & Q2). Referring to chemical sector, the capacity utilization has barely exceeded 80% due to various constraints. It is observed that while the large industries are able to overcome these constraints the worst sufferers are the SMEs. High prices of raw materials- fuels and energy, lack of domestic demand and uncertainty of economic environment are significantly impacting the growth of chemical sector. Inadequate export demand and competition faced from imports are other major constraints faced by chemical sector, and more so by the SMEs.

Very few studies are done on the capacity utilization in small and medium industries. Data available have been collected from small scale industrial Centre, Government agencies for small scale industries and some of the industrial associations such as confederation of Indian Industries (CII), FICCI. Although underutilization of capacity may be considered as one of the major problems. The capacity utilization rate provides the value of production capacity which is actually being utilized over a specified period, and by providing the output in percentages, it can provide a clearer idea of the total utilization of resources and how company can improve its efficiency without affecting cost of production.

A firm's **productive capacity** is the total level of output or production that it could produce in a given time period. **Capacity utilization** is the percentage of the firm's total possible production capacity that is actually being used.

$$\text{Capacity utilization (\%)} = \frac{\text{Actual output per month (or per annum)}}{\text{Maximum possible output per month (or per annum)}} \times 100$$

Although capacity utilization rate is important for several business decisions, it is still not enough to provide with the actual feedback necessary for economic and market conditions at a given period. A decrease in the capacity utilization rate percentage indicates an economic slowdown, whereas increase shows economic expansion. 100% capacity utilization is theoretically not possible; the maximum capacity utilization rate that can be expected is in the region of 90-95% owing to various managerial challenges.

Table 2. Capacity utilization (%) of selected major chemicals (GROUPWISE) and performance of total chemicals (DURING 2005-06 TO 2012-13)

(Fig. in 000' MT)

GROUP	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	CARG (%) (12-13/05-06)
Capacity Utilization (%) of Selected Major Chemicals (GroupWise)									
1. Alkali Chemicals	83	75	73	73	73	78	79	78	
2. Inorganic Chemicals	73	80	85	72	77	70	70	65	
3. Organic Chemicals	83	77	75	61	58	61	60	63	
4. Pesticides(Tech.)	68	73	77	79	72	62	64	63	
5. Dyes & Dyestuffs	63	70	79	67	79	78	69	68	
Total Major Chemicals(1to5)									

GROUP	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	CARG (%) (12-13/05-06)
Capacity	9532	10156	10620	10659	10981	11205	11451	11380	2.56
Production	7788	7656	7880	7493	7710	8259	8461	8402	1.09
Capacity Utilization(%)	82	75	74	70	70	74	74	74	
Imports	1542	1446	1922	2378	2651	2514	3162	3820	13.84
Exports	617	581	626	599	1187	1268	1317	1087	8.43

Source: Chemicals and Petrochemicals Statistics at a Glance: 2013 (www.chemicals.gov.in)

Table 2 clearly indicates capacity underutilization in chemical sector in general. Most of the small scale units have not been able to achieve capacity utilization above 80%, as revealed by different surveys. There are various limitations faced by SMEs in achieving higher capacity utilization. The first and foremost among them is availability of raw materials at competitive price. While the large enterprises are able to get the raw material at a very competitive price and longer credit on the strength of their volume of usage and availability of finance, the same facility is not available to smaller organizations. Availability of finance is also a factor because of their poor credit worthiness bank shy away in giving loans or credits. SMEs do not have access to latest technology. Availability of skilled labor and managerial problems are the other factors which limits their effective capacity utilization and consequently the growth of the organization. High fragmentation of manufacturing units, and limitation in capacity in the SSI sector put them in disadvantageous position while tapping export opportunities with large volume. Another area that poses challenge for the SMEs is the lack of coordinated marketing, branding and distribution development. The low levels of technology and R&D investments hamper the way for new product and technology development, leading to lower levels of capacity utilization.

3. Objective of the study

As discussed above, there is a large scale capacity underutilization in SMEs in India. The chemical industry has been the worst sufferer owing to multifaceted problems in this segment. This study was undertaken to explore the reasons for under capacity utilization amongst small-scale chemical industries in India.

The specific objectives of this research paper are:

- To identify the favorable and unfavorable factors affecting the production capacity utilization.
- To identify the relationship between all the factors of managerial problems i.e. technical and financial with actual utilization of production capacities of industries under survey.

4. Research methodology

Descriptive and inferential research was conducted with the help of structured questionnaire. Questions were framed using likert scale (four point). The Survey sampled is basically customer touch point owners. The data is collected from the small scale chemical industries located in Mumbai and suburb area. This study on capacity utilization has been carried out with special emphasis on Paints and Allied industry taking them as typical case since most of these industries are in small scale sector. Sample units randomly selected for collecting data. To conduct survey the structured questionnaire had been sent to 50 SMEs, although only 27 responded, which comprised final sample. Finally, data collected on 27 units are tabulated and analyzed. The data have been analyzed with the help of statistical techniques such as one sample test and two independent sample tests.

An exploratory study also was conducted. For that the information and data was collected through secondary sources like periodicals, reports, government publications, publications of industrial association, research organization etc.

Data Analysis & Findings

Objective 1 - Identify the favorable and unfavorable factors affecting the production capacity utilization in chemical industry.

a) Technical problems (TP) -

H_0 : Average perception of all the factors affecting the production capacity utilization due to technical problem is not different from 2.5 i.e. neutral perceptions.

($H_0: \mu=2.5$)

H_1 : Average perception of all the factors affecting the production capacity utilization due to technical problem is different from 2.5 i.e. neutral perceptions.

($H_1 : \mu \neq 2.5$)

One Sample Statistics:

Table 3. One-Sample Test

Factors	Test Value = 2.5					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
TP_Frequently_Breakdown_of_Machinery	6.152	26	.000	1.056	.70	1.41
TP_Lack_of_Technical_Knowledge	1.181	26	.248	.241	-.18	.66
TP_Lack_of_Maintenance	3.135	26	.004	.611	.21	1.01
TP_Service_facilities	1.575	25	.128	.346	-.11	.80
TP_Unable_to_cope_with_latest_development	.736	26	.468	.167	-.30	.63
TP_Power_cut	2.704	26	.012	.500	.12	.88
TP_Water_shortage	2.848	26	.008	.537	.15	.92
TP_Raw_material_shortage	.406	26	.688	.093	-.38	.56
TP_Any_other	-1.234	19	.232	-.350	-.94	.24

From the above table, it is observed that for the factors i.e. lack of technical knowledge, service facility, unable to cope with latest development, any other factors and raw material shortage $p > \alpha$ (0.025) so null hypothesis accepted and alternative rejected. So we can conclude the above factors are neither relevant nor irrelevant for the respondents. And, for the factors i.e. Frequently breakdown of machinery, lack of maintenance, power cut and water shortage $p < \alpha$ (0.025) so null hypothesis rejected and alternative accepted. So, further to identify which factor relevant/irrelevant we will use one sample statistics.

Table 4. One-Sample Statistics

Factors	N	Mean	Decision
TP_Frequently_Breakdown_of_Machinery	27	3.56	Relevant
TP_Lack_of_Maintenance	27	3.11	Relevant
TP_Power_cut	27	3.00	Relevant
TP_Water_shortage	27	3.04	Relevant

From the above table, it is observed that the frequently breakdown of machinery, lack of maintenance, power cut and water shortage are very relevant factors of technical problems faced by the chemical industries in India.

b) Financial problems (FP) -

H_0 : Average perception of all the factors affecting the production capacity utilization due to financial problem is not different from 2.5 i.e. neutral perceptions.

($H_0 : \mu = 2.5$)

H_1 : Average perception of all the factors affecting the production capacity utilization due to financial problem is different from 2.5 i.e. neutral perceptions.

($H_1 : \mu \neq 2.5$)

One Sample Statistics:

Table 5: One-Sample Test

Factors	Test Value = 2.5					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
FP_Shortage_of_working_capital	6.535	26	.000	1.611	1.10	2.12
FP_Difficulty_in_obtaining_loans	2.350	26	.027	.648	.08	1.22
FP_Cannot_repay_loans	-.079	26	.938	-.019	-.50	.46
FP_High_interest_rate	.601	26	.553	.167	-.40	.74
FP_Collection_of_bills	2.808	26	.009	.648	.17	1.12
FP_Price_fixation_for_product	2.969	26	.006	.537	.17	.91
FP_Accounting_billing	.987	26	.333	.167	-.18	.51
FP_Any_other	-3.804	20	.001	-.738	-1.14	-.33

From the above table, it is observed that for the factors i.e. inadequate financial assistance / Difficulty in obtaining loans, Cannot repay loans, High interest rates on loan and Accounting /Billing $p > \alpha$ (0.025) so null hypothesis accepted and alternative rejected. So we can conclude the above factors are neither relevant nor irrelevant for the respondents. And, for the factors i.e. Shortage of working capital, Collection of bills, Price fixation for product/ service and other factor $p < \alpha$ (0.025) so null hypothesis rejected and alternative accepted. So, further to identify which factor relevant/irrelevant we will use one sample statistics.

Table 6. One-Sample Statistics

	N	Mean	Decisions
FP_Shortage_of_working_capital	27	4.11	Relevant
FP_Collection_of_bills	27	3.15	Relevant
FP_Price_fixation_for_product	27	3.04	Relevant
FP_Any_other	21	1.76	Irrelevant

From the above table, it is observed that the Shortage of working capital, Collection of bills and Price fixation are very relevant factors of financial problems faced by the chemical industries in India. And, remaining other factors is irrelevant.

c) Labor Problems (LP) -

H_0 : Average perception of all the factors affecting the production capacity utilization due to Labor problem is not different from 2.5 i.e. neutral perceptions.

$$(H_0 : \mu = 2.5)$$

H_1 : Average perception of all the factors affecting the production capacity utilization due to Labor problem is different from 2.5 i.e. neutral perceptions.

$$(H_1 : \mu \neq 2.5)$$

One Sample Statistics:

Table 7. One-Sample Test

Factors	Test Value = 2.5					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
LP_Unrest	.309	26	.760	.056	-.31	.42
LP_Absenteeism	2.533	26	.018	.426	.08	.77
LP_Labour_turnover	2.116	26	.044	.352	.01	.69
LP_Any_other	-1.272	20	.218	-.262	-.69	.17

From the above table, it is observed that for the factors i.e. Unrest, labor turnover and any other are $p > \alpha$ (0.025) so null hypothesis accepted and alternative rejected. So we can conclude the above factors are neither relevant nor irrelevant for the respondents. And, for the factors i.e. Absenteeism $p < \alpha$ (0.025) so null hypothesis rejected and alternative accepted. So, further to identify which factor relevant/irrelevant we will use one sample statistics.

Table 8. One-Sample Statistics

	N	Mean	Decision
LP_Absenteeism	27	2.93	Relevant

From the above table, it is observed that the Absenteeism is very relevant factors of Labor problems faced by the chemical industries in India.

d) Marketing Problems (MP) -

H_0 : Average perception of all the factors affecting the production capacity utilization due to Marketing Problems problem is not different from 2.5 i.e. neutral perceptions.

($H_0 : \mu = 2.5$)

H_1 : Average perception of all the factors affecting the production capacity utilization due to Marketing Problems problem is different from 2.5 i.e. neutral perceptions.

($H_1 : \mu \neq 2.5$)

One Sample Statistics:

Table 9. One-Sample Test

Factors	Test Value = 2.5					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
MP_Lack_of_adequete_demand	6.132	26	.000	1.500	1.00	2.00
MP_Stiff_competition	15.774	26	.000	1.944	1.69	2.20
MP_Availability_of_cheaper_substitut e	9.360	26	.000	1.574	1.23	1.92
MP_Distribution_problem	4.750	26	.000	1.056	.60	1.51
MP_Unable_to_advertise	3.924	26	.001	.944	.45	1.44
MP_Any_other	.000	21	1.000	.000	-.49	.49

From the above table, it is observed that for the factors i.e. any other $p > \alpha$ (0.025) so null hypothesis accepted and alternative rejected. So we can conclude the above factors are neither relevant nor irrelevant for the respondents. And, for the factors i.e. lack of adequate demand, stiff competition, availability of cheaper substitute, distribution problem and unable to advertise $p < \alpha$ (0.025) so null hypothesis rejected and alternative accepted. So, further to identify which factor relevant/irrelevant we will use one sample statistics.

Table 10. One-Sample Statistics

Factors	N	Mean	Decision
MP_Lack_of_adequate_demand	27	4.00	Relevant
MP_Stiff_competition	27	4.44	Relevant
MP_Availability_of_cheaper_substitute	27	4.07	Relevant
MP_Distribution_problem	27	3.56	Relevant
MP_Unable_to_advertise	27	3.44	Relevant

From the above table, it is observed that the Lack of adequate demand, stiff competition, availability of cheaper substitute, distribution problem and unable to advertise are very relevant factors of Marketing Problems faced by the chemical industries in India.

e) Legal Problems (LegalProb) -

H_0 : Average perception of all the factors affecting the production capacity utilization due to Legal Problems problem is not different from 2.5 i.e. neutral perceptions.

($H_0 : \mu = 2.5$)

H_1 : Average perception of all the factors affecting the production capacity utilization due to Legal Problems problem is different from 2.5 i.e. neutral perceptions.

($H_1 : \mu \neq 2.5$)

One Sample Statistics:

Table 11. One-Sample Test

Factors	Test Value = 2.5					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
LegalProb_Industrial_policy_restrictions	1.066	26	.296	.204	-.19	.60
LegalProb_Tax_policy	.542	26	.593	.093	-.26	.44
LegalProb_Tax_authorities_harassment	.698	26	.491	.167	-.32	.66
LegalProb_Any_other	-4.738	17	.000	-.722	-1.04	-.40

From the above table, it is observed that for the factors i.e. industrial policy restrictions, tax policy and tax authorities harassment $p > \alpha$ (0.025) so null hypothesis accepted and alternative rejected. So we can conclude the above factors are neither relevant nor irrelevant for the respondents. And, for the factors i.e. any others $p < \alpha$ (0.025) so null hypothesis rejected and alternative accepted.

Objective 2 - To identify the relationship between all the factors of managerial problems i.e. technical and financial with actual utilization of production capacities of industries

Relationship between technical and financial problems with actual initial utilization of production capacities of industries -

H_0 : Actual initial utilization is independent of technical and financial problems faced by the chemical industries

H_1 : Actual initial utilization is dependent of technical and **financial** problems faced by the chemical industries

Table 12. ANOVA

Factors		Sum of Squares	df	Mean Square	F	Sig.
Technical Problems	Between Groups	.060	2	.030	.070	.933
	Within Groups	7.250	17	.426		
	Total	7.309	19			
Financial Problems	Between Groups	.576	2	.288	.410	.669
	Within Groups	12.630	18	.702		
	Total	13.205	20			

From the above table it is observed that $p > \alpha$ (0.05), so we accept null hypothesis. So, we can say that actual initial utilization is independent of technical and financial problems faced by the chemical industries, so we can conclude that at initial utilization process there is no impact of technical and financial problems faced by the chemical industries.

Relationship between technical and financial problems with actual current utilization of production capacities of industries -

H_0 : Current utilization is independent of technical and financial problems faced by the chemical industries

H_1 : Current utilization is dependent of technical and financial problems faced by the chemical industries

Table 13. ANOVA

Factors		Sum of Squares	df	Mean Square	F	Sig.
Technical Problems	Between Groups	.686	3	.229	.552	.654
	Within Groups	6.624	16	.414		
	Total	7.309	19			
Financial Problems	Between Groups	3.293	3	1.098	1.882	.171
	Within Groups	9.912	17	.583		
	Total	13.205	20			

From the above table it is observed that $p > \alpha$ (0.05), so we accept null hypothesis. So, we can say that actual currently utilization is independent of technical and financial problems faced by the chemical industries, so we can conclude that at currently utilization process there is no impact of technical and financial problems faced by the chemical industries.

So, finally we can conclude that there is no impact of technical and financial problems on initial and current utilization process in chemical industries in India.

5. Conclusions

The first objective of the study was to identify the favorable and unfavorable factors affecting the production capacity utilization in chemical industry. From the data analysis it is observed that the frequent breakdown of machinery, lack of maintenance, power cut and water shortage are very relevant factors of technical problems faced by the chemical industries in India. The shortage of working capital, collection of bills and price fixation are very relevant factors of financial problems faced by the chemical industries in India whereas the absenteeism and labor turnover are very relevant factors of Labor problems. In case of marketing problems, it is observed that the lack of adequate demand, stiff competition, availability of cheaper substitute, distribution problem and unable to advertise are very relevant factors.

The second objective of the study was to identify the relationship between all the factors of managerial problems i.e. technical and financial with actual utilization of production capacities of industries. It is observed that on initial as well as current capacity utilization process there is no impact of technical and financial problems faced by the chemical industries on their actual utilization of production capacities. Thus different managerial challenges may become hurdle in full capacity utilization by SMEs.

Technology up gradation is required essentially for improving efficiency. The entrepreneurs must focus on specializing in their areas of expertise in line with the global trend. Likewise, the industry must focus on improving its product and production processes by investing in technology development and

building R&D capabilities. Such a step will enable the industry to not only build its expertise in a chosen field but also will lead to cut down in production costs, thus making it more competitive.

References

1. *A Brief Report on Chemical & Petrochemical industry in India, October 2013*, Corporate Catalyst India (CCI), WWW.cci.in.
2. *Annual Report 2012-13*, Ministry of Chemicals & Fertilizers Department of Chemicals & Petrochemicals, Government of India, New Delhi, [http://chemicals.nic.in/AR_2012-2013_\(1-94\).pdf](http://chemicals.nic.in/AR_2012-2013_(1-94).pdf)
3. *Chemicals & Petrochemical Statistics At A Glance: 2013*, Government Of India, Ministry Of Chemicals & Fertilizers, Department of Chemicals & Petrochemicals New Delhi) retrieved on 8/12/14 from website
4. (<http://chemicals.nic.in/Chemicals%20&%20Petrochemicals%20Statistics%20At%20A%20Glance%20%202013.pdf>)
5. *FICCI Quarterly Survey on Indian Manufacturing Sector, 2013.*
6. *FICCI Quarterly Survey on Indian Manufacturing Sector, 2014.*
7. *Chemicals & Petrochemical Statistics At A Glance: 2013*, Government of India, Ministry of Chemicals & Fertilizers Department of Chemicals & Petrochemicals, New Delhi, <http://www.chemicals.gov.in>
8. *Emerging India: Sustainable Growth of the Chemical Sector*, 2012, Handbook on Indian Chemical and Petrochemical Industry, Tata Strategic Management Group, The Federation of Indian Chambers of Commerce and Industry (FICCI)
9. *India Chem Report 2013*
10. *India Chem report 2012*
11. *IBEF report on Chemicals, 2013*
12. *National manufacturing policy, 2011, Government of India*
13. *Planning commission document on five year plan, 2012-17, for Indian Chemical industry*