JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

An Analysis of Cost and Productivity of select Co-Operative Sugar Mills in Tamil Nadu

[1]**Mrs.M.Umamageswari, M.Com.,M.Phil.,PGDCA.**
Research scholar in Commerce Dept.(P.T),
Trinity College for Women, Namakkal. Tamil Nadu State.

[2]**Dr.J.Uma Maheswari, M.Com.,M.Phil., Ph.D.**
Principal, Salem Kongunaadu College of Arts and Science College,
Mamangam, Salem, Tamil Nadu State.

ABSTRACT

Research Issue: Productivity is the relationship between output and inputs used in the process. Cost based productivity is the ratio between output cost and inputs cost. Material Cost, overhead cost and conversion cost productivities are measured and analyzed with the total cost of sugar production. This article focuses on cost based productivities of 13 select co-operative sugar mills in Tamil Nadu for 13 years from 2006 to 2018. Goal is to reduce the total cost by improving the productivities.

Research Findings: 13 select co-operative sugar mills have been collectively taken together for analysis. Every firm has to improve its productivity for its survival and prosperity. Result of the AUTO REGRESSIVE DISTRIBUTED LAG (ARDL) model shows that there is long run and short run relationship between the Material Cost productivity, Overhead cost productivity, conversion cost productivity and Total cost. The null hypothesis there is no co-integration between total cost and elements of productivities has been rejected. The study also proves that there is short run relationship between the variables through Co-efficient diagnostic Wald test. It also indicates that material cost, overhead cost productivity and conversion cost productivities are jointly affecting the total cost. It evidences that the total cost of sugar production is significantly associated with cane cost of productivity and overhead cost productivity and conversion cost productivity.

Key words: Productivity, Cost Productivity, Co-integration

INTRODUCTION

Sugar industry in India being an agro based industry; it provides direct and indirect employment to people living in rural areas and promotes other allied industrial activities like poultry, fisheries, banking, insurance, etc. Besides this, sugar industry has been facing various challenges and constraints due to low productivity and profitability due to increase in cost of production and Controlled selling price and high Interest Costs.Hence, it is worth to study the productivity and total cost of sugar mills to bring out a valuable solution for the problems and also to improve the sugar mill's performances.

STATEMENT OF THE PROBLEM

The most influencing cost in sugar production is sugar cane cost as it is based on monsoon and very often high price variations. Sugar mills in India are facing major problems such as high production cost of sugar due to underutilization of capacity, high cost of sugar cane due to competition from gur and khandsari production, low recovery rate of sugar cane , short crushing season, low milling efficiency, old machineries, high interest costs and no control over the quantity and quality of sugar cane, Statutory Minimum Price (SMP) fixed by Government for sugar cane and levy sugar allotment due to the Government for Public Distribution System(PDS) and low economic size of sugar crushing per day in India (2500 tonnes crushing per day) when compared with other countries (Thailand 10,000 tonnes per day). [1] Therefore it is very much beneficial to investigate association between total cost and material cost productivity, conversion cost productivity and overhead cost productivity. The result of the study may be useful to tune the productivity for improving the cost and to bring out a proper viable solutions for the problems to a great extent. In this paper as a 13 select co-operative sugar mills data have collectively taken for 13 years to bring out a common solution to the problems related to total cost and cost productivity.

[1] Venkateswara Rao,"problems of sugar Industry " Volume 3,issue 1 ,jan 2014

OBJECTIVES OF THE STUDY

Based on the issues stated above, the following objectives are framed:

1. To measure the cost productivities such as material cost productivity, overhead cost productivity and conversion cost productivity.
2. To analyse the relationship between Total cost of sugar production and Material cost productivity, overhead cost productivity and conversion cost productivity.
3. To offer suggestions for the improvement of performances.

RESEARCH METHODOLOGY

The methodology proposed in the study is to analyze the impact of material cost productivity, overhead cost productivity and conversion cost productivity on total cost of sugar production. ARDL has been employed to analyze the relationships among variables. The study also examined the significant long run and short run relations among the variables. The findings from the study are collected to render few suggestions for the improvement of total cost and also cost productivities.

- **Period of Data**

Data related to the study of 13 select co-operative sugar mills in Tamil Nadu have been taken from Annual reports for the 13 years from 2005-2006 to 2017-2018.

- **Frame work of Analysis**

After the collection of secondary data of 13 select sugar mills ARDL model tools to investigate co integration relationship with Total cost and each element of cost productivity.

- **Selection of co-operative sugar mills**

Co-operative sugar mills having complete data of 13 years have been taken for analysis of sugarmills.

REVIEW OF LITERATURE

The reports, books and articles have been studied to find out the findings of the earlier research outcome. Most of the papers are on sugar production, productivity and profitability. In this paper, Material cost productivity, overhead cost productivity and conversion cost productivity are associated with the dependent variable Total Cost causing such production and productivity. Generally, we measure physical productivity as Output per Input. Here, cost based productivities are calculated as total cost of sugar production per each element of cost. In this way the research gap is fulfilled by analyzing both the total cost and each element of cost productivity.

Desai (2001) in his article, "Sugar Industry in India" has made a comparative statement of sugar production and price of sugar in India and the whole world. He also suggested the utilization of co-products of sugar.

Reddy and Naidu (2013) in their research paper studied the productivity trends of 12 Indian cement companies for the period from 2000 to 2009. The labour, capital productivity, capital intensity, labour, capital productivity indices and capital intensity indices have been calculated to determine the efficiency of an individual factor input.

Shinde, Dilip P. (2016) made a study on growth and productivity of co-operative sugar factory in Maharashtra and revealed that adequate facilities and other complimentary inputs are the key factors of utilization of production capacity. He explained that there is a need of coordinated and concerted effort for appreciation and consolidation of the needs of consumers.

CONCEPT OF COST PRODUCTIVITY

Productivity means the ability to produce output from the given input. Output means the quantity of products produced and the inputs are the various resources used in the production. The resources used may be land, building, equipment, machinery, materials, labour etc. Productivity can be calculated as the ratio of the volume of output to the volume of inputs. However, the cost productivities are arrived based on the general formula Cost of Output/Cost of Each element of Input.

Material (Cane-Crushing) cost productivity=Total Cost of Sugar Production/Material Cost of production.

Overhead cost productivity=Total Cost of Sugar Production/Overhead Cost of production

Conversion cost productivity=Total Cost of Sugar Production/Conversion Cost of production.

Above productivity ratios are used to reduce the cost of production per unit through more economical uses of resources. Reduction in costs helps to improve the profits of a business. The gains of higher productivity can be passed on to consumers in the form of lower prices and/or better quality of products and also shared with employees. Due to higher productivity, a firm can survive and grow better.

Table No.1 Total Cost and Cost Productivities of 13 sugar mills

No.	SUGAR MILL	TOTAL COST -Rs.in Lacs	Material Cost Productivity	Overhead cost Productivity	Conversion Cost Productivity
1	AMBUR	4,454.37	1.77	2.82	19.11
2	AMARAVATHI	4,406.66	1.69	3.25	15.67
3	SALEM	8,855.64	1.40	5.00	22.40
4	KALLAKURICHI-I	10,659.65	1.52	3.82	19.08
5	DHARMAPURI	5,988.12	1.61	3.69	17.06
6	TIRUPATTUR	4,970.74	1.72	2.86	23.67
7	VELLORE	5,883.62	1.67	3.50	14.60
8	CHENGALRAYAN	8,738.50	1.67	3.62	14.73
9	TIRUTTANI	6,979.85	1.78	2.93	19.44
10	MRK	7,455.79	1.46	4.01	19.40
11	CHEYYAR	7,638.44	1.34	4.99	23.82
12	S.SIVA	7,525.74	1.45	4.13	24.45
13	KALLAKURICHI-II	**9,672.30**	1.28	6.97	17.30
	Average	**7171.49**	**1.57**	**3.97**	**19.29**
	Std.Deviation	**1981.24**	**0.17**	**1.15**	**3.43**
	C.V	**28%**	**11%**	**29%**	**18%**

Source: Computed

Interpretation:

The averages of Total cost of sugar production and cost productivities of 13 sugar mill indicates that they are different with each other. The Co-efficient of variation shows that material cost productivity is more stable than other productivities and total cost. Ambur Sugar mills Material cost productivity is 1.77 ,that is total cost per material Rs.1 ,the total cost is Rs.1.77. Similarly, the Overhead cost productivity 2.82 ,that is total cost per overhead is Rs.2.82 and Total cost per conversion cost is ₹19.11.

HYPOTHESES

In carrying out the analysis and bring out the pattern of relationship, the following hypothesis have been tested with suitable statistical tools:

1. Null Hypothesis: Total Cost, Material Cost productivity, Overhead cost productivity, Conversion Cost Productivity has unit root.(Non-stationary)
2. Null Hypothesis: There is no co-integration relationship between Total cost_lac,and Material cost productivity, Overhead Cost productivity and Conversion cost productivity:
3. Null Hypothesis : There is no Short run relationship between Total cost_lac and Material cost productivity, Overhead Cost productivity and Conversion cost productivity
4. Null Hypothesis : There is no Serial Correlation
5. Null Hypothesis : There is no Heteroscedasticity

AUTO REGRESSIVE DISTRIBUTED LAG (ARDL):

It has two components Auto Regressive Model and Distribution Lag Model. It is used to examine the short run and long run relationship among the variables. First step is to examine the stationarity of the variable using ADF UNIT ROOT Test.The following tables' shows step by step the results of the ARDL process:

1)Stationarity of variables: The variables must be stationary to conduct ARDL analysis. For this purpose ADF unit root test is employed**:**

Null Hypothesis: Total Cost_Lac, Material Cost productivity, Overhead cost productivity, Conversion Cost Productivity has unit root. (Non-stationary)

Table No.2 Augmented Dickey Fuller : Unit Root Test

Variables	Level		First Difference		Order of Integration
	Statistic	Probability	Statistic	Probability	
TotCost-Lac	**-0.1739**	**0.6220**	**-4.0675**	**0.0001**	**I(1)**
Mc_prod	**-0.9145**	**0.3187**	**-5.7373**	**0.0000**	**I(1)**
Ohc_prod	**-0.0321**	**0.6707**	**-12.4240**	**0.0000**	**I(1)**
Convc_Prod	**-1.2207**	**0.2033**	**-5.5505**	**0.0000**	**I(1)**

Source: Computed

Where, TotCost_Lac =Total cost of sugar production,Mc-Prod=Material(cane crushed)cost productivity;ohc_prod=Overhead Cost Productivity;Convc_prod=Conversion Cost productivity.

Inference: As the P –value is less 0.05 at first difference, the variables are stationary.

2)Long run relationship

After checking the stationarity of the variables, the optimal lags of the variables be added in the equation to make as ARDL.In this analysis Total cost of sugar production is taken as dependent variable and material cost productivity, overhead cost productivity and conversion cost productivity are taken as independent variables. The ARDL (4, 0, 3, 4) with Akaike info criterion (AIC) with maximum 4 lags has been taken as the model for further processing.

Table No.3 ADRL-Co-integration results

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
TOTCOST_LAC(-1)	0.758987	0.077410	9.804828	0.0000
TOTCOST_LAC(-2)	-0.259851	0.097678	-2.660282	0.0087
TOTCOST_LAC(-3)	0.069642	0.095331	0.730528	0.4662
TOTCOST_LAC(-4)	0.160590	0.077474	2.072814	0.0399
MC_PROD	**-2248.970**	**905.6488**	**-2.483270**	**0.0141**
OHC_PROD	**-418.4348**	**218.9380**	**-1.911202**	**0.0579**
OHC_PROD(-1)	76.37586	183.5258	0.416159	0.6779
OHC_PROD(-2)	-208.9579	191.8327	-1.089271	0.2778
OHC_PROD(-3)	**431.2156**	**172.3240**	**2.502353**	**0.0134**
CONVC_PROD	-9.749618	28.98552	-0.336362	0.7371
CONVC_PROD(-1)	-10.03863	29.90467	-0.335688	0.7376
CONVC_PROD(-2)	**-60.58964**	**29.56612**	**-2.049293**	**0.0422**
CONVC_PROD(-3)	52.18695	29.46199	1.771331	0.0785
CONVC_PROD(-4)	42.24127	26.78430	1.577090	0.1169
C	5721.290	2261.196	2.530206	0.0124
R-squared	0.588150	Mean dependent var		7232.342
Adjusted R-squared	0.549711	S.D. dependent var		2892.644
S.E. of regression	1941.068	Akaike info criterion		18.06637
Sum squared resid	5.65E+08	Schwarz criterion		18.34873
Log likelihood	-1475.476	Hannan-Quinn criter.		18.18099
F-statistic	15.30074	Durbin-Watson stat		1.933914
Prob(F-statistic)	0.000000			

*Note: p-values and any subsequent tests do not account for model Selection.

Source: Computed

The fitted ARDL model involving the explanatory variables is given below:

TOTCOST_LAC = 0.758987*TOTCOST_LAC(-1) - 0.259851*TOTCOST_LAC(-2) + 0.069642*TOTCOST_LAC(-3) + 0.160590*TOTCOST_LAC(-4) - 2248.970*MC_PROD - 418.4348*OHC_PROD + 76.37586*OHC_PROD(-1) - 208.9579*OHC_PROD(-2) + 431.2156*OHC_PROD(-3) - 9.749618*CONVC_PROD - 10.03863*CONVC_PROD(-1) - 60.58964*CONVC_PROD(-2) + 52.18695*CONVC_PROD(-3) + 42.24127*CONVC_PROD(-4) + 5721.290

Inference

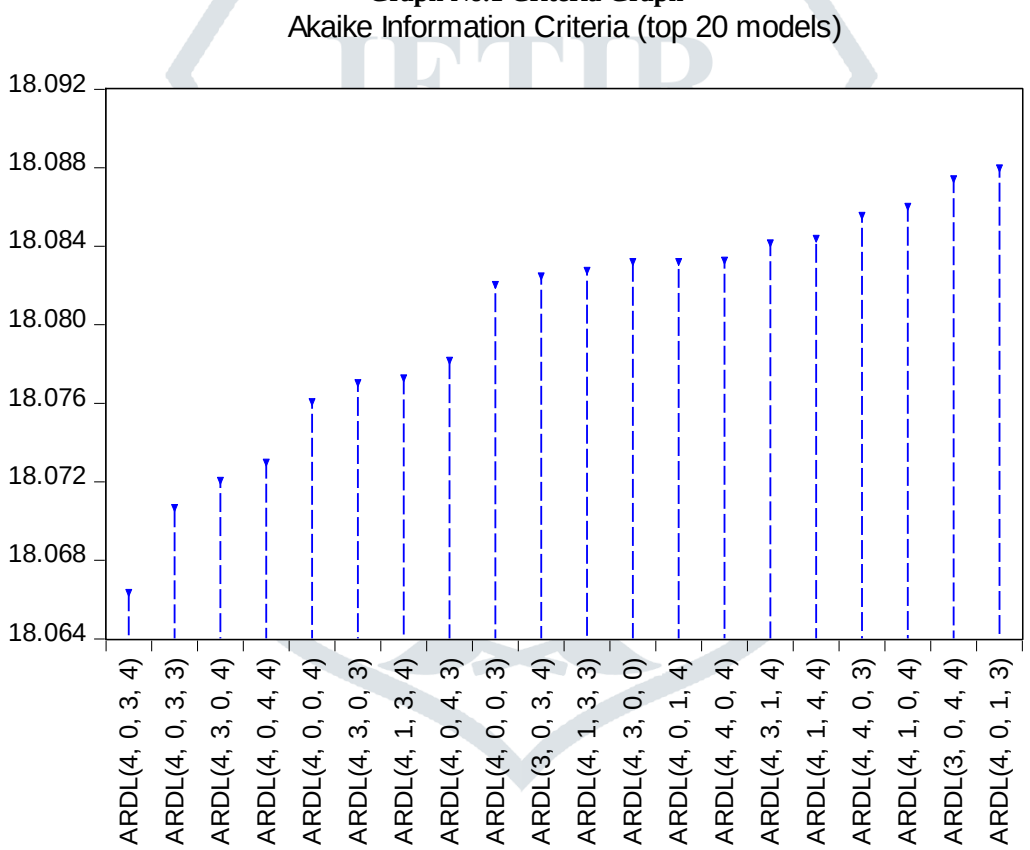
As the P value of F-statistic is "0.0000" which is below 0.05 ,the null hypothesis is rejected. That is there is long run relationship between the variables. The model also states that there is significant relationship with Total Cost(lags1,2,4),Material cost productivity(level) ,Overhead cost Productivity(Lag 3),and Conversion cost productivity(lag 3).The high impact factors are cane crushed costs productivity and overhead cost productivity. The R-Squared statistic indicates that the model as fitted explains 58.82 percent of the variability in total Cost. As the Durbin-Watson statistic is 1.94 which is around 2 ,there is no serial correlation.

The Autoregressive Distributed Lag ARDL model is a co integration technique. In this model variables are studied at stationary I (0) or integrated in the order of I (1) to catch the short-run and long-run impact of independent variables.

3)**Criteria Graph of Lag Selection:**

It is interested to find the suitable lag selection for the ARDL.For this purpose criteria graph is prepared. The appropriate lag lays at which the Akaike Infomration Criteria (AIC) is the least. In this case ARDL (4,0,3,4) Gets selected.

Graph No.1 Criteria Graph



4)F Bound Test :

F bound Test is used to find the co-integration /Long Run Relationship. As the F statistics 5.721578 is above the Upper Bound I(1)=3.2,then the **long run relationship** exists.

Null Hypothesis: **There is no co-integration between Totcost_lac, and Mc_prod,Ohc_prod ,and Convc_prod** .

Table No.4 F Bound Test :

Period of Study	K(lag length)	F Test Statistics	95% Lower Bound	95% Upper Bound	Remarks
2006-2018	3	4.242202	2.79	3.67	Null Hypothesis rejected. That is there is co-integration.

Source : Computed

Inference :

As the F statistics 4.242202 is above the Upper Bound I(1)=3.67,there is the **long run relationship** between the variables.

5)**Short Term estimation results-Error Correction Method :**

ECM is used to determine the existence of short run relationship and also the speed of adjustment to equilibrium.

Null **Hypothesis : There is no Short run relationship between the variables**

Table No.5 Error Correction Method(ECM)

Period of Study	Regressor	Co-efficient	T-Statistics	Probability	Remarks
2006-2018	Ecm(-1)	-0.270632	-4.66544	0.0000	Null Hypothesis Rejected

Source : Computed

Inference

The guide line for determining the short run relationship is that the ECT should be negative and its P value should be less than 0.05. As the P value is less than 0.05 ,the Null hypothesis is rejected That is, there is short run relationship among the Variables. The co-efficient of Error Correction Term (ECT) shows that the speed of adjustment towards long run equilibrium is at 27.06 percent.

6)Wald test

It is a co-efficient Diagnostic test used to check the short run casual effects. The Wald test computes a test statistic based on the unrestricted regression. The Wald statistic measures how close the unrestricted estimates come to satisfying the restrictions under the null hypothesis. The restrictions should be expressed as equations involving the estimated coefficients and constants. The coefficients should be referred to as C(1), C(2), and so on, unless you have used a different coefficient vector in estimation.

Null Hypothesis :C(5)=0;That is co-efficient of Material cost productivity is equal to zero
Null Hypothesis :C(6)=0;That is co-efficient of Overhead cost productivity is equal to zero
Null Hypothesis :C(10)=0;That is co-efficient of Conversion cost productivity is equal to zero
Null Hypothesis :C(5)=0,C(6)=0;That is co-efficients of Material and Overhead cost productivity are equal to zero.

Table No.6.Wald test Statistics

No.	Variable	Chi-square -Value	P-Value	Remarks
1)	C(5)=Material Cost Productivity	6.166627	0.0130	Reject Ho
2)	C(9)=Overhead Cost Productivity	6..261771	0.0123	Reject Ho
3)	C(12)=Conversion Cost Productivity	4.199600	0.0404	Reject Ho
4)	C(5,9,12)Joint Material, Overhead and Conversion Cost	18.11802	0.0004	Reject Ho

Source : Computed

Inference

As the P value is less than 0.05 in material cost productivity, overhead cost productivity ,conversion cost productivity and Joint effect of material, overhead and conversion cost productivities, the null hypothesis is rejected. Their co-officients are not equal to zero, which means that there are making significant short run impact on total cost of sugar production.

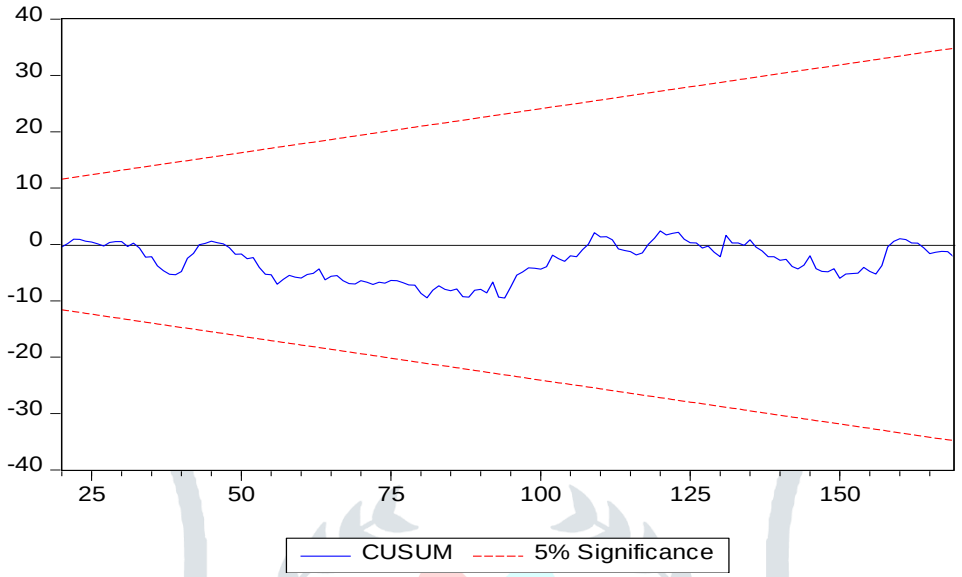
7)**Diagnostic test**

Three types of tests residuary test has carried out to check the Auto correlation and Heteroscedasticity of the variables. Besides this, Stability Diagnostic: CUSUM test is also carried out.The CUSUM test (Brown, Durbin, and Evans, 1975) is based on the cumulative sum of the recursive residuals. This option plots the cumulative sum together with the 5% critical lines. The test shows that parameter is stable as the cumulative sum appears within the area between the two critical lines. The following table shows the results of the three tests:

Table No7.. Diagnostic tests

No.	TEST	Test Statistic	Value	P-values	Remarks
1)	LM TEST	F Test Statistics	0.578857	0.5618	No Auto or serial correlation
		Observed R- squared	1.280677	0.5271	
2)	Heteroscedasticity Test	Observed R- squared	34.72180	0.0016	No Heteroscedasticity
3)	Cusum Stability Test	Cumulative sum line		Appears with in the two critical lines	Stability satisfied

Graph No.2 :Cusum test



Inference

The appearance of plots of CUSUM between 5% critical bounds proves that the parameters are stable. The model is structurally stable.

Test of Heteroscedasticity: This test is employed to determine whether the residuals are having Heteroscedasticity or not.

Null Hypothesis : There is no Heteroscedasticity.

Inference

Breusch-Pagan-Godfrey proves that the residuals obtained from the ARDL model are free from Heteroscedasticity. The observed R-Squared is 34.72180 and its corresponding P-value is 0.0016.As the p-value is less than 0.05 the null hypothesis is rejected.

FINDINGS:

The result of ARDL model shows the relationship between Total cost of sugar production and material cost productivity, Overhead head cost productivity and Conversion cost productivity: The findings of the study are given below:

1. The Co-efficient of variation shows that material cost productivity is more stable than other productivities and total cost. There is significant long run association between Total cost of sugar production and cane crushed cost productivity, overhead cost productivity and conversion cost productivity. .
2. The ADF test shows that the variables are stationary at one period lag.
3. The ARDL(4, 0, 3, 4) with Akaike info criterion (AIC)with maximum 4 lags has is appropriate for finding the significant association between the variables. The result of the study shows that There is significant long run relationship between the variables. The model also states that there is significant relationship with Total Cost(lags1,2,4),Material cost productivity(level) ,Overhead cost Productivity(Lag 3),and Conversion cost productivity(lag 2).The high impact factors are Material (cane crushed) cost productivity and overhead cost productivity
4. The F bound test also confirms that there is co-integration(Long run) relationship between Total cost and Material cost productivities, Overhead productivities, and Conversion cost productivities.
5. Error Correction Model also confirms that there is short run relationship between the variables. The co-efficient of Error Correction Term (ECT) shows that the speed of adjustment towards long run equilibrium is at 27.06 percent.
6. Wald test shows that material cost productivity, overhead cost productivity and Joint effect of material& overhead cost productivities are having significant short run impact on total cost.However,the conversion cost productivity is not significant at all. That is conversion cost productivity is not any significant impact on total cost in the short run.
7. LM TEST shows that there is no Auto or Serial Correlation among the variables.
8. Heteroscedasticity Test shows that the residuals are not having Heteroscedasticity.

SUGGESTIONS

The frame work of measuring the cost productivities and finding the relationships with total cost of production are made employing statistical tools. The finding of the study collected and presented. Based on the findings the following suggestions may be considered:

1. The productivity of sugar mills depends on sugar cane crushed and output processed. The cane crushed depends on capacity utilization and recovery rate. There is significant relationship between total cost and material cost. Cost of material can be reduced by the use of hybrid high yielding sugarcane can be used to enhance the productivity and to reduce the cost of operation.
2. The sugar total cost of production has both long run and short run relationship with material cost productivity, overhead cost productivity and conversion cost productivities. The Total Cost of Sugar production is also impacted by the joint influence of all these three cost productivities. Since 1 unit increase in material cost productivity would decrease the total cost by 2248.97 units which is the high impact factor among all other cost productivities, it advisable to necessary steps to improve material cost productivity by increasing the yield, reducing the waste and increasing the scale of operations.
3. Similarly improving the overhead cost productivity and also conversion cost productivity would decrease the total cost of sugar production. Lean manufacturing may reduce the waste and would increase the output at optimal cost. Operation of the sugar mill at its optimal capacity and utilization of assets effectively would reduce the total cost.
4. Adoption of Total Cost Management (TCM) strategy towards the material management and cost management would decrease the cost. In the material field, optimal material cost is possible by the use of high yielding sugar canes and the decrease in supply chain cost. Tracing of overhead cost by the sung of Activity Based Costing (ABC) would reduce the overhead cost and also non-value added overhead cost would be removed. Conversion cost is the cost other than material and overheads. These include power and fuel cost, water and chemicals and consumables etc. A Design of Experiment (DOE) may be conducted to traced the related costs .This would reduce both the financial and non-financial cost. Thus by improving productivity, total cost gets reduced which would ultimately increase the profitability.

CONCLUSION

The study obviously, indicates the cost productivities to be improved so as to reduce the total cost. Among the cost productivities the high impact factor is the material cost productivity, the improvement of which would reduce the total cost to a greater extent. Similarly, the other conversion cost and overhead cost productivites.The weightage of co-efficient shows its significant impact on total cost. The major cost factor affecting the total cost is material cost. Use of Lean manufacturing, adoption of TCM and ABC would reduce the total cost. Besides this financial cost such as high interest cost should also be traced and effectively reduced by effective use of working capital and better financial management. All these all round efforts would reduce the total cost and ultimately increase the profitability. A permanent reduction in cost and continuous improvement of cost would reduce the total cost. Since, the possibility of improving the sales revenue is impossible due to controlled sugar supply price by the Government, the only way is to reduce the cost within the doors of the company.Conqer cost to improve profitability is the mantra for the survival of any concern.

REFERENCES

1. Deb, A. K. & Ray, S. C. (2014). Total Factor Productivity Growth in Indian Manufacturing: ABiennial Malmquist Analysis of Inter-State Data.Indian Economic Review, 49(1), 1-25
2. Gupta, C. B. (1989). Production, Productivity and Cost-Effectiveness, Sultan Chand & Sons, New Delhi.
3. Reddy, M. S. & Naidu, V. B. (2013). Partial Productivity Trends of Selected Indian Cement Companies, Indian Journal of Research, 2(7), 39-41. ISSN - 2250-1991.
4. Meenu Maheshwari & Priya Taparia," Productivity Measurement Using Productivity Accounting Model: A Case Study Of Refineries Sector Companies Included In Nifty 50" july,2020, The Management Accountant-p.103-111
5. James C.Van Horne (1993): Financial management and Policy, prentice-Hall of India, New Delhi, Ninth Edition. (P 780-787).
6. Peter MacKay(2003)"Real Flexibility and ***Financial Structure:*** An Empirical Analysis Southern Methodist University, Financial studies Vol.16(4),pp. 1131-1133
7. Cyrus.A.Ramezani ,Luc Soenen, and Alan Jung, "Growth, Corporate Profitability ,and Value Creation",Financial Analyst ,Vol.58,issue 6.november /December -2002
8. Rui Huang & Guiying Liu(2009)-Study on the Enterprise Sustainable Growth and the Leverage Mechanism-International Journal of Business and management –Vol.4,No.3-March-2009.pp.200-205.
9. Abdul Raheman and Mohamed Nasr," Working Capital Management And Profitability – Case Of Pakistani Firms" International Review of Business Research Papers Vol.3 No.1. March 2007, Pp.279 - 300
10. Viswanathan, Secretary General, Sugar manufacturers' Association, "Emerging Trends& Challenges In Indian Sugar Industry "Indian Sugar review, August-2012.
11. Business line, "Sugar demand remains weak as prices firm up", October 30,2017.
12. Business line," Infrastructure boost to reduce supply-demand mismatch in Sugar industry", September 29, 2017.
13. Singh S.P,"Technical Change and Productivity Growth in the Indian Sugar Industry"procedia Economics and Finance,2016,-p.131-139
14. Gunawan1, Tajuddin Bantacut2, Muhammad Romli2 and Erliza Noor2," Production and productivity improvement through efficiency sugar mill",International Journal of Advanced Research(IJAR) December, 2017. P.1931-1941

Websites

- www.jstor.org/stable/24583404
- www.tncsf.com
- www.researchgate.net
- www.informativejournal.com
- www.sugarindustry.com