



RESEARCH ARTICLE

CAPITAL OUTPUT RATIO AND MARGINAL COST ANALYSIS OF HANDMADE PAPER UNITS OPERATING IN TAMIL NADU

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ABSTRACT

Detection the manufacturing of paper by hand is labor intensive, converts waste by recycling, uses non-wood materials, is eco-friendly; it seeks to promote the skills of local workers, generates employment and income, facilitates the participation of women in rural based industries and contributes to the social development as encompassed in the SHD framework. The sample consists of the following four units operating in TamilNadu. Handmade Paper Unit, Pidagam, Villupuram District, Handmade Paper Unit, Ponnavarayankottai, Pattukkottai, Tanjore District, Handmade Paper Unit, Shenbagaputhur, Erode District, Handmade Paper Unit, Veeragavapuram, Poonthmalli, Chennai. Output is the main key to economic development. Capital formation is the process that is interactive and cumulative, generating increase in income and there by facilitating raise in capital formation capital formation is investment that increases productive capacity. Financial capital takes many forms of real or physical capital like building machineries, inventories etc in primary, secondary and tertiary sectors of an economy. Where capital is scares and demands for it are numerous assignment of capital rationing. Therefore planners follow certain criteria for selection of activities for investment. It is nearly a truism that capital should be used where it yields most in the form of output. Thus capital output ratio becomes a valuable instrument of policy for allocation of capital. Capital-output ratio (COR) is the relationship between investment and resulting output over a period of time. Average COR is obtained when total stock of capital is divided by total output. Thus COR is a measure of capital required for producing one unit of output. Marginal or incremental COR is the additional capital required for one unit of additional output. Thus COR embodying the relationship between capital and output will enable us to allocate capital to those activities where in it yields more benefit, than in other activities.

Marginal cost is an addition to the total cost caused by producing one more unit of output.

Change in total cost

Marginal Cost - -----

Change in output

It is worth noting that marginal cost is independent of output. It is only the variable cost that varies with a variation in output in the short run. Therefore the marginal costs are in fact due to the changes in variable costs. The relationship between the marginal and the average cost is more a mathematical one than an economic one.

Key words: Manufacturing, SHD framework, COR.

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INTRODUCTION

Handmade paper refers to sheet of paper which has been manufactured by the use of minimum number of machines, and or less sophisticated. It is also true that more number of labours are employed to produce a quality of handmade paper and to give employment opportunities. Handmade paper is an engine of economic development in developing countries. The government realizing the importance of the industry, has given its moral support by the due recognition, financial and technical assistance.

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Statement of the Problem

The review of literature reveals that investigation into the status of the handmade paper industry has highlighted the role of the handmade paper industry in India's rural economy, the need to protect these industries, the scope of the handmade paper industry, the environmental impact of the industry, the role of various agricultural waste fibrous materials in the manufacture of handmade paper, technical means and the varieties of handmade paper for various uses. Though a number of studies are done on the performance of hand made paper units covering capital output ratio, sales, production and financial performance like operating cycle and working capital management etc. Not much more effort was taken to analyse capital output ratio and marginal cost analysis of

handmade paper units mainly it's a labour intensive industry and provides a lot of employment opportunity to rural educated youth. This study is proposed to cover this vacuum in handmade paper units operating in Tamilnadu.

The specific objectives of the study are: (i) To analyse the capital – output ratio and marginal cost of production of sample units.

Hypotheses

The handmade paper units have led to higher marginal costs and lack of control over costs and prices.

MATERIALS AND METHODS

The study covers all the handmade paper units operating in Tamilnadu, Tamilnadu Khadi and Village Industries Board, Chennai established around 25 handmade paper units in Tamilnadu since 1960. This has been reduced due to continuous losses and problem of sickness. As on 2002 – 2003, only four units are reported functioning and all the four units have been considered for the study. Thus the sample consists of the following four units operating in Tamilnadu. 1) Handmade Paper Unit, Pidagam, Villupuram District, 2) Handmade Paper Unit, Ponnaravankottai, Pattukkottai, Tanjore District, 3) Handmade Paper Unit, Shenbagaputhur, Erode District, 4) Handmade Paper Unit, Veeragavapuram, Poonthmalli, Chennai. The sample covered all the handmade paper units operating in TamilNadu with the certification of KVIC, Mumbai and TamilNadu KVIB, Chennai. The period covers the performance of the sample handmade paper units for a period of ten years from 1996-1997 to 2005-2006.

- Multiple regression analysis was used to determine the variables in controlling capital output ratio.
- Marginal cost analysis to find out the efficiency of the units in controlling costs and prices.

Scope and Limitation

The handmade paper units in Tamilnadu showed a poor performance over the years and the scope of the present work is to evaluate the “A Study on the Capital output ratio and marginal cost analysis of Handmade Paper Units Operating in Tamilnadu” in terms of economic parameters like production, sales, employment generation, labour productivity, working capital, per capita investment, per capita earnings and marginal cost etc. A larger sample consisting of private by owned handmade paper units operating in Tamilnadu could not be adopted due to resource constraints of the researcher.

Capital – Output ratio analysis

Output is the main key to economic development. Capital formation is the process that is interactive and cumulative, generating increase in income and there by facilitating raise in capital formation capital formation is investment that increases productive capacity. Financial capital takes many forms of real or physical capital like building machineries, inventories etc in primary, secondary and tertiary sectors of an economy. Where capital is scarce and demands for it are numerous assignment of capital rationing. Therefore planners follow certain criteria for selection of activities for investment. It is nearly a truism that capital should be used where it yields most in the form of

output. Thus capital output ratio becomes a valuable instrument of policy for allocation of capital. Capital-output ratio (COR) is the relationship between investment and resulting output over a period of time. Average COR is obtained when total stock of capital is divided by total output. Thus COR is a measure of capital required for producing one unit of output. Marginal or incremental COR is the additional capital required for one unit of additional output. Thus COR embodying the relationship between capital and output will enable us to allocate capital to those activities where in it yields more benefit, than in other activities. The size of the capital-output ratio in an economy depends not only on the amount of capital employed but also on a numbers of other factors such as the degree and nature of technological advance, the efficiency in handling new types of capital equipment, the pattern of demand, the relation of factor prices, the extent of the utilization of social and economic overheads and the impact of industrialization, educational and foreign trade on the economy.

Capital-output ratio also depends upon the rate of investment. The higher the rate of new investment, the higher is the capital-output ratio. A country which doubles its capital in ten years will have a higher output per unit of capital than a country which doubles it in twenty years. This is because new investment and new technology go together. The technology of the last ten years is embodied in half the capital in the first case, but only in perhaps a third of the capital in the second case. The concept of ex-factory value of production has certain limitations. It includes value of material, and inputs secured by the units under study from others, since the units under study made no contribution to the creation of the value of output will exaggerate the contribution of the units towards value creation. For measurement of real contribution of the industries in value, addition cost of material inputs has been subtracted from ex-factory value of output and gross value added by manufactures obtained. Subtraction of depreciation from gross value added by manufacturers has yielded net value added by manufactures (NVAM). Thus in addition to production and sales, NVAM is used as a measure of the economic conditions of the Handmade Paper units under study in respect of value addition. The concept of NVAM has been used for various purpose like estimates National Income, capital output ratio and productivity.

NVAM is the fund from which expenses like wages, salaries, and other cost of production one met and the residual is net profit. Thus NVAM has a bearing on employment. As a measure of value-addition it also indicates the span of operation or production cycle of the activity. Where span of production is long as in Handmade paper NVAM will be more as component of ex-factory value of output 20 percent or more. In such activities NVAM can sustain higher level of employment than in activities. Thus changes in NVAM as percentage of ex-factory value output will reflect. Khadi and Village Industries are known for its less capital intensity and high labour intensive methodologies. Handmade paper units at its name imply are expected to generate higher value addition per unit of capital employed because of its artistic and aesthetic value in it. The proposed work has examined the capital-output ratio of the study units with the following ratio analysis.

- Gross value added by manufacture (gvam) – Net sales+ closing stock – Purchase – opening stock.

- Net value added by manufacture (NVAM) – GVAM – Depreciation in the current year
- Capital – output ratio – NVAM / capital employed

Opening balance of the capital as reported in the balance sheet of the study unit.

The capital-output ratio will evaluate the efficiencies of the capital utilization in generating the value added by manufacture. It also speaks about the managerial effectiveness in making the unit and its assets for productive purposes. The COR measurement has yielded valuable guidelines to Khadi and Village Industries for improving their performance. Hence, the present study used capital-output ratio (COR) for analyzing the individual performances and inter-unit comparison of units. Higher capital-output ratio reflect the effective and better management of the capital employed and lower capital-output ratio reflect upon the inadequacies and other problems associated with poor capital utilization.

Handmade Paper Unit, Pidagam

Table 1. Handmade Paper Unit, Pidagam – Capital Output Ratio (Rs. in lakhs)

S.No (1)	Year (2)	Capital (3)	GVAM (4)	NVAM (5)	COR(5/3) (6)
1	1996-1997	3.60	3.22	2.89	0.80
2	1997-1998	7.13	5.14	4.18	0.59
3	1998-1999	6.94	4.39	3.64	0.52
4	1999-2000	13.92	1.26	0.93	0.07
5	2000-2001	11.69	2.83	2.44	0.21
6	2001-2002	3.01	3.90	3.55	1.18
7	2002-2003	5.83	2.12	1.74	0.30
8	2003-2004	5.77	7.22	6.86	1.19
9	2004-2005	13.39	10.45	9.63	0.72
10	2005-2006	21.10	15.41	14.56	0.69
	Mean	9.24	5.60	5.04	0.63

Source: Computed from the annual audited Reports of H.M.P Unit, Pidagam

The capital values showed fluctuating trends ranging from Rs. 3.01 lakhs to Rs. 21.10 lakhs in the span of 10 years. As and when the unit met with losses, it started to draw funds from its capital, resulting in fluctuations in the value of capital. The values of NVAM ranged from Rs. 0.93 lakhs to Rs. 14.56 lakhs, with an average of Rs. 5.04 lakhs. From the values of NVAM and respective capital values, two factors could be observed. In 1999-2000 a capital of Rs. 13.92 lakhs, has yielded NVAM of Rs. 0.93 lakhss. In 2005-06, when the capital increased to Rs. 21.10 lakhs the NVAM go up to Rs. 14.56 lakhs. Thus the unit met with high fluctuations in capital and NVAM affecting the capital-output ratios. The unit could not have sound capital planning system attempt to the markets. The product/output profile of this unit has to be modified so that high value added items could be produced to increase the NVAM. The capital-output ratio ranged from 0.07 to 1.19 with fluctuations. The unit could record capital-output ratio values exceeding 1.00 only in 2001-2002 and 2003-2004 only and in the remaining years the value were well below 1.00. The unit has enlarged capital in 2004-2005 and 2005-2006 has not made corresponding improvement in capital-output ratio values. Any investment plan should result in improved earnings through high NVAM values. When investment in plant and machinery is made it should be prioritized among the Departments. For instance, if investments in building, rag chopper and in beaters are made the expected improvement in production and quality will be limited and when the investments are made in cylinder mould, calendaring machine, cutting machine and scoring

machine it will directly improve the production value and the quality of the outputs. This will enhance the scope for higher NVAMs. In order to study the level of impact of capital (x₁) and NVAM (x₂) with the capital-output ratio (Y_p) a multiple regression model has been computed using Statistical Package for Social Studies (SPSS). For the handmade paper unit at Pidagam, the regression model was $y = - 0.952 - 8.871 x_1 + 0.109 x_2$ (significant at 1% level.)

From the regression model, when the capital (x₁) increased by Rs. One lakhs, the capital-output value decreased by 8.87 units. Because of wrong investment pattern and erosion of capital because of losses the unit could not improve capital-output ratio and had very high negative impact on capital. Therefore, capital investments and other assets maintained by the unit have to be based on priorities and also be selective. As per the regression model, the capital-output ratio (Y) has positive relationship with NVAM (x₂). When NVAM increase by 0.109 (significant at 1%). This indicated that the unit has scope to improve capital-output ratio through improving NVAM only and not on capital. To improve NVAM, the unit has to improve production, and generate more value addition and reduction input costs. Hence a package of measures on the above lines have to be ensured for recording better capital-output ratio values.

Handmade paper unit, ponnaravankottai

Table 2. Handmade Paper Unit, Ponnaravankottai – Capital Output Ratio (Rs. in lakhs)

S. No (1)	Year (2)	Capital (3)	GVAM (4)	NVAM (5)	COR(5/3) (6)
1	1996-1997	1.27	1.03	0.94	0.74
2	1997-1998	1.25	1.16	0.98	0.78
3	1998-1999	1.62	0.71	0.64	0.40
4	1999-2000	2.70	1.23	1.19	0.44
5	2000-2001	1.55	2.2	2.16	1.39
6	2001-2002	1.13	2.43	2.39	2.12
7	2002-2003	1.53	6.25	6.2	4.05
8	2003-2004	1.74	3.6	3.19	1.83
9	2004-2005	1.27	2.62	2.17	1.71
10	2005-2006	2.81	7.97	7.73	2.75
	Mean	1.69	2.93	2.76	1.63

Source: computed from the Annual Audited Reports of H.M.P Unit, Ponnaravankottai

The unit had very low capital base and the values ranged from Rs. 1.13 lakhs to Rs. 2.81 lakhs. The unit had recorded considerable additions to capital only in 1999-2000, and 2005-2006. In the remaining years, the capital values were within Rs. 2.00 lakhs. Due to meager internal generation of funds, the unit could not witness increasing capital base. The NVAM values of this unit ranged from Rs. 0.64 lakhs to Rs.7.97 lakhs with an average of Rs.2.76 lakhs. NVAM values showed very high fluctuation affecting the capita output ratio values. The capital-output ratio values ranged between 0.40 to 4.05 with an average of 1.63, because of obsolete technologies adopted in paper making the unit had recorded very low values of capital-output ratio. For instance, the unit used 4 dipping vats and one auto vats instead of cylinder mould. The dipping vats require more labours and auto vats require sufficient skills. The quality of the paper and boards produced out of dipping vats and cylinder moulds will have inferior quality affecting marketability of the products. The immediate requirement of the unit in respect of capital expenditure will be on establishing the cylinder mould instead of primitive methodologies using dipping vats and auto vats. The rate of production per 8 hours

in dipping vat will be around 100 sheets of board where as cylinder mould technology will produce around 300-400 boards. Considering the impact of capital (x_1) and NVAM (x_2) on the capital-output ratio values (y), through regression model the following inference were drawn.

The multiple regression model will be

$$Y = 0.641 - 0.856 x_1 + 0.517 x_2 \text{ (Significant at 1\% level)}$$

When capital increases by Rs. one lakhs, the capital output ratio values decreases by 0.856 units. Thus the unit experienced negative relationship with capital against capital-output ratios. Thus, the unit could not make capital expenditure productive enough to improve capital-output ratio and investments were made on non productive items like building works and repairs. The regression model has shown that the NVAM values had positive relationship with capital-output ratio. When NVAM increase by Rs.1 lakhs, the capital-output ratio values also increase by 0.517 units. Therefore the unit should concentrate on concerting the existing dipping vats and auto vats to cylinder mould for enhancing the addition and capital-output ratio values. It is worth mentioning that the handmade paper unit at Ponnaravayankottai is equipped with adequate quantity of soft water which is the essential ingredient to prepare quality paper and boards. Hence, modernization of the existing facilities will help to generate high capital-output ratio through high NVAM.

Handmade Paper unit, Senbagapudur

Table 3. Handmade Paper Unit Shenbagaputhur – Capital Output Ratio (Rs. in lakhs)

S. No (1)	Year (2)	Capital (3)	GVAM (4)	NVAM (5)	COR (5/3) (6)
1	1996-1997	4.71	1.04	0.93	0.20
2	1997-1998	4.65	1.52	1.32	0.28
3	1998-1999	4.76	3.02	2.83	0.59
4	1999-2000	5.99	6.87	6.47	1.08
5	2000-2001	6.74	5.65	5.25	0.78
6	2001-2002	7.11	3.01	2.72	0.38
7	2002-2003	7.44	1.7	1.00	0.13
8	2003-2004	7.54	1.3	0.98	0.13
9	2004-2005	7.63	1.67	1.27	0.17
10	2005-2006	7.92	1.33	1.18	0.15
	Mean	6.45	2.71	2.39	0.36

Source: Computed from the Annual Audited Reports of H.M.P Unit, Senbagaputhur.

The unit has recorded capital values ranging from Rs.4.65 lakhs to Rs.7.92 lakhs with gradual additions. The unit never shows decrease in the capital which may be considered a worthwhile feature. The NVAM values ranged from Rs.0.93 lakhs to 6.47 lakhs with an average of Rs.2.39 lakhs. The NVAM values showed vary high fluctuations with the peak occurred in 1999-2000 and the low enslaved occurring in 1996-1997. The variations in the NVAM could be attributed for shortage of water. The unit had bore wells for drawing water to the handmade paper production. These bore wells dried as and when the monsoon failed affecting the water supply, production and sales. Unless efforts are made to provide sufficient water for processing, the GVAM and NVAM are bound to suffer. The right alternative is to shift the plant to a nearby place where the river BhavaniSagar in flowing and provide adequate soft water for processing and generate the NVAM and employment. The capital-output ratio for the handmade paper unit ranged from 0.13 to 1.08 with an average

of 0.36. The unit witnessed continuous decline in the capital-output ratio values from 1999-2000 onwards due to the water problem. Because of the water problem the unit could not attempt for modernizing their dipping vat and auto vat facilities to cylinder mould paper formation technology. Thus due to low NVAM values the unit recorded capital-output ratio values around 0.15 in the last 4 years.

Fitting the capital values (x_1) and NVAM values (x_2) with capital-output ratio values (y), the regression model was,

$$Y = - 0.297 - 4.45 x_1 + 0.157 x_2 \text{ (significant at 1\% level)}$$

When capital values increased by Rs.1 lakhs the capital-output ratio values reduced by 4.40, indicating, that the capital has negative impact on capital-output ratio values. In respect of NVAM (x_2), when NVAM increase by Rs. 1.00 lakhs, the capital-output ratio values also increased by 0.157 units. The intensity of NVAM with respect to capital-output ratio is quite moderate in this unit suggesting, the unit has the scope to enlarge capital-output ratio when NVAM values are improved.

Handmade paper unit, Veeraragapuram

Table 4. Veeraragapuram Handmade Paper Unit – Capital Output Ratio (Rs. in lakhs)

S. No (1)	Year (2)	Capital (3)	GVAM (4)	NVAM (5)	COR (6)
1	1996-1997	6.66	2.45	2.32	0.35
2	1997-1998	9.40	2.85	2.68	0.29
3	1998-1999	10.67	4.95	4.78	0.45
4	1999-2000	6.45	4.3	4.20	0.65
5	2000-2001	3.80	1.8	1.72	0.45
6	2001-2002	3.23	1.26	1.17	0.36
7	2002-2003	2.10	1.4	1.32	0.63
8	2003-2004	2.39	2.08	2.10	0.84
9	2004-2005	2.93	4.66	4.59	1.57
10	2005-2006	5.29	8.87	8.81	1.67
	Mean	5.30	3.46	3.27	0.88

Source: Computed from the Annual Audited Reports of H.M.P Unit, Veeraragapuram.

Table 4.1.4 shows that the capital values ranged from Rs. 2.10 lakhs to Rs. 10.67 lakhs with an average of Rs. 5.30 lakhs. The unit has recorded additions to the capital in 1996-1997 from Rs. 6.66 lakhs to Rs. 10.67 lakhs in 1998-1999. This expenditure was made to build additional beaters and auto vats. This resulted in improvement in NVAM in 1996-1997 from Rs. 2.32 lakhs to Rs. 4.20 lakhs in 1999-2000. As they have gone form expending the beaters instead of cylinder mould technology, the unit could not improve NVAM and witnessed sudden fall in 2000-2001 and the declining trend continued up to 2003-2004. Only in 1998-1999, 1999-2000, 2004-2005 and 2005-2006, the unit could generate sufficient NVAM. The unit had shown fluctuating trends in the NVAM values from Rs. 1.17 lakhs to Rs. 8.81 lakhs. The spend in NVAM values in the last four years were mainly due to Government orders placed with this unit. This indicates that the unit can generate high values of NVAM but due to absence of adequate marketing facilities has affected the NVAM in the early periods. The capital-output ratio values ranged from 0.29 to 1.67 with an average of 0.88. The unit showed improvement in capital-output ratio only during the last two years of the study period. The unit has to explore adequate marketing, production and sales have been stabilized, it can think of modernizing the auto vats to cylinder mould technology for better capital-output ratio values.

Fitting the capital values (x_1) and NVAM values (x_2) with capital-output ratio values (y), the regression model was,

$$Y = 0.634 - 0.115 x_1 + 0.205 x_2 \text{ (significant at 1\% level)}$$

When capital values increased by Rs.1 lakhs the capital-output ratio values reduced by 0.115, indicating, that the capital has negative impact on capital-output ratio values. In respect of NVAM (x_2), when NVAM increase by Rs. 1.00 lakhs, the capital-output ratio values also increased by 0.205 units. The intensity of NVAM with respect to capital-output ratio is quite moderate in this unit suggesting, the unit has the scope to enlarge capital-output ratio when NVAM values are improved.

Multiple Regression Model

The result of the multiple regression analysis in respect of the capital-output Ratio is given below;

Multiple Regression Models in Respect of Capital Output Ratio

S. No	Name of the H.M.P Units	Multiple Regression models in respect of COR(Capital Output Ratio)
1.	Pidagam	$Y = 0.952 - 8.871 x_1^{xx} + 0.109 x_2^{xx}$
2	Ponnarayanakkottai	$Y = 0.641 - 0.856x_1^{xx} + 0.517 x_2^{xx}$
3	Shenbagaputhur	$Y = 0.297 - 4.405x_1^{xx} + 0.157 x_2^{xx}$
4	Veeraragavapuram	$Y = 0.634 - 0.115x_1^{xx} + 0.205 x_2^{xx}$

Source: Computed from the annual audited Reports of H.M.P Units by the researcher.

Y – Capital Output ratio

X_1 – Capital (Rs in lakhs) XX – Significant at 1% level

X_2 – NVAM (Rs in lakhs) X – Significant at 5% level

Table 5. Marginal Cost of H.M.P. Unit, Pidagam (Rs. in lakhs)

Sl. No (1)	Year (2)	Cost of Production (3)	No. Of Units Produced (4)	Average Cost $\frac{3}{4}$ (5)	Growth Rate % (6)	Marginal Cost (7)
1.	1996-1997	2.68	2.90	0.92	19.48	0.42
2.	1997-1998	5.14	5.19	0.99	7.61	0.14
3.	1998-1999	3.39	4.71	0.72	(-)27.27	(-) 0.54
4.	1999-2000	8.53	6.72	1.27	76.39	1.10
5.	2000-2001	14.85	12.29	1.21	(-) 4.72	(-) 0.12
6.	2001-2002	27.16	19.33	1.41	16.53	0.40
7.	2002-2003	25.06	16.48	1.52	7.80	0.22
8.	2003-2004	31.38	22.05	1.42	(-) 6.58	(-) 0.18
9.	2004-2005	43.69	29.09	1.50	5.63	0.16
10.	2005-2006	41.59	26.24	1.58	(-)10.78	(-) 0.30
	Average	20.35	14.45	1.41	6.46	0.88

Source: Computed from the Annual Audited reports of H.M.P. Unit, Pidagam

Handmade Paper Unit, Ponnarayanakkottai

Table 6. Marginal Cost of H.M.P. unit, Ponnarayanakkottai (Rs. in lakhs)

Sl. No (1)	Year (2)	Cost of Production (3)	No. Of Units Produced (4)	Average Cost $\frac{3}{4}$ (5)	Growth Rate % (6)	Marginal Cost (7)
1.	1996-1997	0.45	1.12	0.40	-	-
2.	1997-1998	1.39	2.00	0.70	75.00	0.60
3.	1998-1999	1.54	1.54	1.00	42.86	0.60
4.	1999-2000	3.20	3.35	0.96	(-) 4.00	(-) 0.08
5.	2000-2001	2.10	3.12	0.67	(-)30.21	(-) 0.58
6.	2001-2002	2.58	2.18	1.18	76.12	1.02
7.	2002-2003	2.71	2.00	1.36	15.25	0.36
8.	2003-2004	1.61	1.77	0.91	(-) 33.08	(-) 0.78
9.	2004-2005	2.09	0.83	2.52	176.92	4.18
10.	2005-2006	2.22	0.65	3.42	35.71	0.84
	Average	1.99	1.86	1.31	35.46	0.62

Source: Computed from the Annual Audited Reports of H.M.P. unit, Ponnarayanakkottai

It shows that, higher level of operations during the period under review. Even though the value of production declined gradually up to 1999-2000, thereafter the unit registered substantial progress. Yet total cost of production exceeded value of sales in during the period except 1996-1997, 1998-

1999 and 1999-2000 when the unit earned profit. Here too lack of control over cost is revealed by the trends in average cost. Substantial increase in value of production in 2001-2002 could not bring down average cost. Thus, despite increase in the value of production, the unit could not earn profit. The cost of production ranging from 2.68 to 43.69. In the year 1999-2000 the Growth rate was increased to 76.39., and the marginal cost was 1.10. The average value of marginal cost was 0.88. The above table reveals that the cost of production ranging from 0.45 to 2.71. The average value of cost of production was 1.99. The average cost was ranging from 0.4 to 3.42. In the year 2004-2005 the marginal cost was increased to 4.18 and the growth rate was 176.92. The average value of marginal cost was 0.62 and the Growth rate was 35.46. Analysis reveals that whereas movements of Average Cost and Marginal Cost confirm the theory those in value of sales and average cost are not according to the norm that average cost should fall with increase in sales and rise with fall in sales.

For instance, both quantity of sales and average cost increased in 1997-1998 and both decreased in 2000-2001. Cost of production can be found exceeding the value of production. In handmade paper unit the cost of production was ranging from 2.54 to 8.81. The average cost was ranging from 0.56 to

2.52. In the year 1996-1997 the cost of production was 8.81, and the average cost was 0.96 only in 1996-1997 and 1997-1998 the unit could generate sufficient cost of production. The highest growth rate was 113.54 in the year 1997-1998. The marginal cost in the year in the year 1997-1998 was 2.18. The average value of marginal cost was 1.65.

FINDINGS

Capital-output ratios indicate the effect of utilization of capital for generation of high value addition. In the present chapter the analysis of capital-output ratio yielded the following inferences. The handmade paper unit at Pidagam and the

Handmade Paper Unit, Shenbagaputhur

Table 7. Marginal Cost of H.M.P. Unit, Shenbagaputhur (Rs. in lakhs)

Sl. No (1)	Year (2)	Cost of Production (3)	No. Of Units Produced (4)	Average Cost $\frac{3}{4}$ (5)	Growth Rate % (6)	Marginal Cost (7)
1.	1996-1997	8.81	9.15	0.96	-	-
2.	1997-1998	7.88	3.85	2.05	113.54	2.18
3.	1998-1999	4.82	5.02	0.96	(-)53.17	(-) 2.18
4.	1999-2000	2.93	4.60	0.64	(-)33.33	(-) 0.64
5.	2000-2001	2.63	4.68	0.56	(-)12.50	(-) 0.16
6.	2001-2002	2.54	4.11	0.62	10.71	0.12
7.	2002-2003	2.65	2.89	0.92	48.39	0.60
8.	2003-2004	2.95	2.97	0.99	7.61	0.09
9.	2004-2005	2.86	2.40	1.19	20.20	0.25
10.	2005-2006	2.97	1.18	2.52	111.76	1.39
	Average	4.10	4.09	1.14	21.32	1.65

Source: Computed from the Annual Audited Reports of H.M.P. Unit, Shenbagaputhur.

Handmade Paper Unit, Veeraragavapuram

Table 8. Marginal Cost of H.M.P. Unit, Veeraragavapuram (Rs. in lakhs)

Sl. No (1)	Year (2)	Cost of Production (3)	No. Of Units Produced (4)	Average Cost $\frac{3}{4}$ (5)	Growth Rate % (6)	Marginal Cost (7)
1.	1996-1997	4.51	2.09	2.16	46.94	1.38
2.	1997-1998	5.16	2.14	2.41	11.57	0.50
3.	1998-1999	2.37	1.76	1.35	(-)43.98	(-) 2.12
4.	1999-2000	2.70	1.86	1.45	7.41	0.20
5.	2000-2001	2.40	1.37	1.75	20.69	0.60
6.	2001-2002	13.44	4.35	3.09	76.57	2.68
7.	2002-2003	14.00	2.42	5.79	87.39	5.40
8.	2003-2004	13.70	1.93	7.10	22.62	1.40
9.	2004-2005	24.74	4.91	5.04	(-) 29.01	(-) 6.93
10.	2005-2006	25.30	2.98	8.49	68.45	4.23
	Average	10.83	2.58	3.86	22.17	0.60

Source: Computed from the Annual Audited Reports of H.M.P. Unit, Veeraragavapuram

Usually average cost and total sales would move in opposite directions. Increased in sales could lead to decrease in average cost and vice-versa. Similarly marginal cost will be lower than average cost when the latter is declining. Again, when average cost moves up, it will be lower than marginal cost. The analysis reveals lack of control over cost of inputs and price of output. The lack of control over cost and price is well illustrated by the performance in 2001-2002 when a very low marginal cost failed to increase sales or yield profit. Again fixed costs influenced the total cost of production in 2002-2003 when total rose even when value of production declined. In Handmade Paper Unit, Veeraragavapuram (Table 8) the value of production fluctuated during the period of study. The cost of production and growth rate should be increased in the year 2001-2002, 2002-2003 and 2005-2006. In the year 1998-1999, 2004-2005 was the growth rate and marginal cost also declined. In case of average cost more fluctuating in the beginning after 2000-2001 the average cost was increased throughout the period of study. However, even doubling of the value of production in 2002-2003 could not produce surplus over cost due to lack of control over costs and prices. Marginal costs were, of course, below falling average costs and above raising average costs. This unit also could not make profit except in 1996-1997 and 2000-2001 because of the inability to maintain the costs.

handmade paper unit at Ponnaravayankottai met with losses and subsequently the capital bases have shown declining trends. The handmade paper unit at Ponnaravayankottai, the handmade paper unit at Shenbagaputhur and the handmade paper unit at Veeraragavapuram could not modernize their facility to cylinder mould technology which ultimately affected NVAM and capital-output values. The handmade paper unit at Veeraragavapuram has gone in for modernizing their beaters without prioritizing the area of modernization. This has affected their growth. The handmade paper unit at Sembagapudur could not enlarge production and NVAM due to want of soft water for production. Thus all the units have witnessed low to moderate capital-output ratio values and synergetic efforts are needed to improve their performance. A high level committee may be appointed by the Government of TamilNadu to ensure right modernization, identifying the areas for capital expenditure and to take measures for improving the production and sales. Otherwise the future of these units will be very difficult in the context of globalization and competition due to entry of new entrepreneurs. Summarizing the above, in the study units capital output ratio is not directly related to the technology adopted and it is also a function of the value added products and devitrified products. For (eg), the handmade paper unit, Ponnaravayankottai, has employed lower level of technology like dipping vats and auto vats yet it has

recorded maximum capital output ratio than the units which are equipped with cylinder mould technology namely, the handmade paper unit, Pidagam the handmade paper unit Ponnaravayankottai could record better values due to production of high value added items like paper covers, envelopes, shoe boxes, sweet boxes. Thus, the hypothesis stating that the capital output ratio is a function of technology has been disproved and it is a function of diversified products as far as the present study is concerned. Analysis reveals that whereas movements of Average Cost and Marginal Cost confirm the theory those in value of sales and average cost are not according to the norm that average cost should fall with increase in sales and rise with fall in sales. Usually average cost and total sales would move in opposite directions. Increased in sales could lead to decrease in average cost and vice-versa. Similarly marginal cost will be lower than average cost when the latter is declining. Again, when average cost moves up, it will be lower than marginal cost.

Conclusion

The manufacturing of paper made by hand is labour intensive, converts waste by recycling, using of non-wood materials, is eco-friendly. It seeks to promote the skills of local workers, generates employment and income, it facilitates the participation of women in rural based industries and contributes to the social development as encompassed in the SHD framework.

The study reveals that all the sample units, the labour productivity below the bench mark level. So this units put concentration on this aspect it will be beneficial not only to the units but also a society at large.

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