INDUSTRIAL WATER POLLUTION AND COST ABATEMENT:AN EMPRICAL STUDY IN BANGALORE

Dr. S. Shyamala Devi

Government First Grade College Channapatna

INTRODUCTION

Industrialactivities are accompanied by deterioration of environment quality and pollution. In order to restore the quality of environment the burden of cost is to be incurred by stakeholders such as the industries, Government and individual consumers who enjoy these goods. The magnitude of these costs is of great significance. The pollution abatement in industries depends on the strategy adopted by the Nation. In India, Regulatory or Command and Control method is the strategy adopted. The Central Pollution Control Board (CPCB) and State Pollution Control Board (SPCB) enforce this strategy by setting pollution standards and enacting legislations from time to time to govern industrial pollution. Presently the consent is issued to industries to operate only if it has installed plant and machinery for pollutions abatement at the inception stage. This compels polluting firms to invest on pollution abatement. This the concept of pollution control cost emerges at the inception of the unit itself.

Objective:

This paper addresses two major issues, first, it discusses about the magnitude of pollution control costs in terms of total investment, total costs, turnover and profits of firms. Would such a control cost be burden for the firms? Second, what are the cost differentials among the various industrial firms and how do they vary across various categories of industries? These issues help us to understand the economic impact of pollution control on the firms.

Analysis:

Profile of the Selected Industrial Units for the Study:

The Table 1.1 presents the profile of units in different categories in Bangalore Urban Distract as on 1997, which have installed Effluent Treatment Plants (ETPs) and are operating. The sample units in different category of industries selected for our study are General Engineering 57

units constituting 57 percent. The next major industries taken as sample are food products constituting nine per cent from the total sample. We have also covered pharmaceuticals eight per cent, Distillery and Breweries even per cent and also seven per cent from the textile industries. The remaining units which we have covered, constitute about 12 percent of the sample. As there are about 120 general engineering industries the sample seems to be high from this sector.

Table 1.1: Profile of the Sample Units in Bangalore Urban District as on 1997

Category	Total Units	Percentage to the total	Sample Size (rounded off)
General Engineering	120	57.1	57
Food Products	18	8.6	9
Pharmaceuticals	16	7.6	8
Distillery &Breweries	15	7.1	7
Textiles	14	6.7	7
Steel	6	2.9	3
Chemicals	5	2.4	2
Organic and Petrochemicals	4	1.9	2
Tanneries	3	1.4	1
Paper & allied Products	2	1.0	1
Dairy	2	1.0	1
Rubber&Rubber Products	1	1.0	1
Edible oil	1	0.5	0
Paints and Dye	1	0.5	1
Insecticide & Pesticide	1	0.5	0
Total	210	100.0	100

Source: Computed from 'National Inventory of Industries', Published by Central Pollution Control Board, 1997.

Note: This doesn't include miscellaneous industries constituting about 162 units.

The measures undertaken towards pollution control need to be mentioned here. Of the 32 units having separate pollution control cells we found that only 14 units actually operating and running the effluent treatment plant (Activated Sludge Process) during the author's field visits, while others (supposed to be in operation) were not actually operating during the visit. The

remaining industries did claim that they treated the effluents to the standards of the SPCB. It was also reported that the managements demanded subsidy from the government to recover the abatement cost since, they have spent enormous amount on pollution control.

All the fifteen categories of industries, wiz, General Engineering, Food Products, Pharmaceuticals, Distillery & Breweries, Textiles, Steel, Chemicals, organic and Petrochemicals, Tanneries, Pulp and paper, Dairy, Rubber & Rubber Products, Edible Oil, Paints and Dye, and Insecticide and Pesticide are one way or the other cause air and water pollution in Bangalore Urban district.

Results:

During the field survey, it was observed that about 32 units have separate environmental protection or effluent treatment cells, The concerned units represent from General Engineering, Food products, Pharmaceuticals, Distillery and Breweries Textiles, Steel, Chemicals Organic and Petrochemicals. The strength of the staff involved in pollution control is about four to five persons on an average per unit. They include two technically qualified staff and two to three unskilled labourers. Many of the other units, constituting about 68 percent did not have separate cells as such for environment protection, but personnel entrusted with pollution control managed it as an additional assignment along with their other routine jobs. In such cases, the labour costs were apportioned on the basis of time reported to be spent on pollution control while estimating pollution control costs.

For working out Pollution Control Cost (PCC), both the capital costs and operation and maintenance costs were taken in to account. The capital cost comprises cost of construction of ETP including equipment, electrification and land cost. The operation and maintenance cost, which is called recurring of running expenditure, includes chemical power, labour, repair and fuel used in effluents treatment process.

The method used the analyse the cost here is, by taking both total capital (only fixed capital) or investment and annualised costs, The annualised costs, both in respect of pollution abatement and total costs are estimated by taking linear deprecation at 10 per cent assuming that the machinery would last at least for about 10 years, plus the interest rate of 12 per cent and the annual maintenance cost. The maintenance and pertaining costs of pollution control are actual are reported, and cover apart from labour costs, chemicals and fuel. The investment in (fixed capital) pollution abatement is then compared with total investment, similarly annual pollution abatement

cost is compared with the total investment, similarly annual pollution abatement cost is compared with the total annualised cost of production, annual turnover and profit level and corresponding proportions of pollution abatement costs are derived.

We have not made any attempt to derive cost functions based on cross section data, since the different types of industries produce different products and cannot be assumed to have a unique cost function common to all.

Cost Analysis:

The 100 sample units, which are presented in Table 1.1, are medium and large-scale industries only. We have not taken small-scale industrial units, because many of the units run under losses and it will not be possible for us the estimate the PCC as proportion of profits. Moreover, it is difficult for the small-scale industrial units to have ETP's independently. Most of them have common ETP's.

We have used the data for more than one year, so that some idea of the stability or otherwise of cost ratios could be obtained. Moreover, since the number of industrial units for which we could obtain information, itself was only limited (being only 100 units), we could compensate for this to some extent by a greater number of observations obtained through pooling together three years (1998-99, 1999-2000 and 2000-01).

Regarding the relation between the size of the firm and pollution control costs, on the basis of this limited number of case studies at least, we cannot make a string inference about the size of units as conferring an advantage in pollution abatement costs, particularly since they belong to different industries. It is expected, however that generally medium firms have relatively higher costs due to certain disadvantages in this respect, such as adequate space not being available for water effluents treatment and high overhead in the form of salaries of pollution treatment staff, which cannot be spread over a large turnover as in the case of a large-scale units.

We would like to see whether the level of pollution control costs could be considered as burdensome to the firms as to affect their profitability. We shall, therefore, first study the level of these costs in terms of total investment and turnover. Table 1.2 presents pollution control costs in terms of two indicators. Both the indicators show that for most of the observations, taken by pooling all the three years together, the proportion of pollution control costs are low and not high. There is no doubt that there are some observations with high values, which affect the simple

average values but they are not normal cases. The frequency distribution is actually skewed towards lower values of indicators.

Table1.2: Cost of Pollution Control (PC) in Relation to Total Investment and Turnover for Selected Industries (Rs. In Lakhs)

Category	Fixed Investment on plant & Machinery per unit(A)	Fixed investment on plant& machinery per unit for pollution control(B)	% of(B)to (A)	Annual cost on the plant and machinery(C)	Annual cost on pollution control(D)	%of (D) to (C)
General Engineering	363.11	5.81	1.60	885.54	0.75	0.09
Food products	587.56	8.67	1.48	1997.56	0.67	0.03
Pharmaceutical	585.38	16.56	2.83	1463.50	2.06	0.14
Distillery&Breweries	931.86	52.14	5.60	3261.43	3.57	0.11
Textiles	434.86	7.57	1.74	1869.86	2.57	0.14
Steel	4205.00	79.33	1.89	5298.33	9.67	0.18
Chemicals	345.00	10.00	2.90	483.00	0.85	0.18
Organic&Petrochemicals	451.50	8.50	1.88	587.00	0.83	0.14
Tanneries	350.00	7.50	2.14	1505.00	3.30	0.22
Paper&alliedProducts	325.00	8.70	2.68	812.00	1.05	0.13
Dairy	415.00	5.50	1.33	1411.00	0.70	0.05
Rubber&Rubber products	366.00	3.50	1.04	782.00	0.62	0.08
Paints&Dye	190.00	3.25	1.71	418.00	0.67	0.16
Average	775.51	17.67	2.28	1598.02	2.10	0.13

Source:Computed from field data.

It is inferred from the from this table that the costs are quite low in terms of the two indicators, being as low as 2.28 percent and 0.13 per cent on a n average respectively on the fixed investment on pollution control equipment and the total annual turnover.

The median value of each cost indicator showed that investment in pollution control was as low as 2.28 per cent of total investment and a mere 0.13 per cent of annual turnover.

These median values in the modal quartile could be a more realistic indicator of the central tendency than the simple average. They show that the pollution control is not so burdensome in terms of costs, and they cannot therefore exercise a decisive influence on the profit levels and output.

This is confirmed by the relative independence of profit levels from the Pollution Control Costs. Quite a few observations in Table 1.3 show that in case of some industries the PCC has made a dent and in some other cases it is very much negligible. For example, in case of steel industries the cost of pollution control seems to be very high constituting about Rs. 10 lakhs. Therefore, out of the total profit it constitutes about 16 per cent, which is a considerable loss to the factory. In case they do not go for pollution control they gain about Rs. 10 lakhs per year. The other industries, which have serious implication on the profit, are Tanneries, Distillery & Breweries and Textiles. In all these industries the PCC constitutes more than five per cent and therefore, they lose considerable money due to the PCC. Onn an average, each unit loses about Rs. Two lakhs due to the PCC constituting about 4.81 per cent of the total profit of the industries.

Table1.3: Percentage of Fixed Costs, Annual Cost on Pollution and Average Profit with PCC in sample units (Rs. In Lakhs)

Category	% of Fixed cost on plant & Machinery for PC equipment to the total machinery in the factory(per unit)	Annual cost on pollution control (Rs. In lakhs)	% ofPCC to the total annual cost in the unit	Average profit without PCC(inlakhs)	Average profit with PCC(in lakhs)	%of PCC to the total profit
General Engineering	1.60	0.75	0.09	54.26	55.01	1.36
Food products	1.48	0.67	0.03	48.24	48.91	1.37
Pharmaceutical	2.83	2.06	0.14	56.12	58.18	3.54
Distillery&Breweries	5.60	3.57	0.11	62.18	65.75	5.43
Textiles	1.74	2.57	0.14	45.68	48.25	5.33
Steel	1.89	9.67	0.18	52.36	62.03	15.59
Chemicals	2.90	0.85	0.18	49.56	50.41	1.69
Organic &Petrochemicals	1.88	0.83	0.14	51.26	52.09	1.59
Tanneries	2.14	3.30	0.22	49.82	53.12	6.21
Paper&alliedProducts	2.68	1.05	0.13	26.37	27.42	3.83
Dairy	1.33	0.70	0.05	32.46	33.16	2.11
Rubber&Rubber products	1.04	0.62	0.08	31.26	31.88	1.94
Paints&Dye	1.71	0.67	0.16	24.28	24.95	2.69
Average	2.28	2.10	0.13	41.70	43.65	4.81

Source:Computed from field data.

The pollution control costs are a proportion of profits are on the lower side. The cases where losses were made are excluded and we have observations pooled form 3 years, where the pollution control costs range from a mere 1.36 per cent of profits (General Engineering) to 15.59 per cent (in case of Steel industries). This would also support our earlier contention that for the majority of the cases, pollution control costs cut profits only marginally even in a static and short

run setting. In the case of some old firms, however, it need not be so marginal. But as a necessity, they will have to overcome this difficulty and even try to turn into an advantage by converting the pollutants into economic goods. Among the firms studied by us, however, we could not find such cases.

Conclusions:

The Pollution Control Costs in term of total investment and turn over show that for most of the observation, are low and not high. The frequency distribution is actually skewed towards lower values of indicators. The costs are quite low in terms of the two indicators, being as low as 2.28 per cent and 0.13 per cent on an average respectively on the fixed investment on pollution control equipment and the total annual turnover. The pollution control costs as a proportion of profits are on the lower side. On an average, each unit loses about Rs. 2 lakhs due to the PCC constituting about 4.81 per cent of the total profit of the industries. Thus, this shows that the pollution control is not so burdensome in terms of costs, and they cannot therefore exercise a decisive influence on the profit levels and output.

References:

1. CPCB(1997):National Inventory of Industries, New Delhi.