SUMMARY AND CONCLUSIONS
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The objective of this investigation has been to examine the impact of pollution control upon business firms, particularly in those areas where the accountants have an interest and / or a responsibility and to report the findings along with appropriate recommendations.

It is difficult to define the scope of the study in precise terms because pollution control is not basically an accounting problem even though there are accounting implications. Technological, economic and legal matters involved in pollution control are dealt with only to the extent necessary to put the problem into a proper perspective. Thus, the scope of the study is somewhat broader : it also considers the related areas of environmental control.

The significance of the pollution problem is revealed through observing changes in the severity of the problem. Some forms of pollution are as old as civilization and even industrial pollution is not of recent origin. Pollution in small quantities is absorbed by the environment itself but the problems arise when the amount of pollution exceeds the capacity of the environment to absorb and recycle it. Even then, industrial pollution is tolerated as a price of progress. Pollution arising from industrial processes has given rise to what economists call external costs. These costs arise, for example, as air and water are utilized as repositories of industrial wastes. With the increase in the amount of pollution, the movement to clean up the environment put pressure upon business firms to internalize these
external costs by installing effective pollution control measures. This resulted in an increase in the firm's total production costs without a corresponding increase in the output. The present study analyses the effects of internalizing the external costs by undertaking pollution control programmes.

The methodology adopted for the present investigation consists of information available in the existing literature on pollution and an empirical study undertaken by the present investigator.

In chapter II, the general nature of the pollution problem is discussed to provide the background for subsequent chapters.

To formulate this background an historical development of the pollution problem is traced. Evidence is cited to substantiate a rather sudden emergence of concern for the environment during the 1960s, and some reasons were offered to explain the delay in environmental movement. After analysing the pollution problem, various proposals are advanced for solving the problem. These are back-to-nature movement, voluntary action by individuals and business enterprises, provisions for environmental services by government, government regulations, subsidies provided by government, tax incentives, economic incentives, etc. Some of the proposals are evaluated and they are found to have varying degrees of merit.
The strength of the environmental movement led to the adoption of national environmental legislations and agreements amongst different countries. But signs of progress in both domestic and international economic scenes are diminished when it is recognised that environmental goals are in conflict with other desirable national goals like industrial growth, agricultural production, control of inflation. Environmental movement also result in energy crisis.

An ecological background is provided by describing the various kinds of pollution with which the industries must be concerned. The nature, sources, control and treatment of different types of pollution are then discussed. A systematic method of approaching the environmental management problem, despite the distinctiveness of each problem, is worked out. Definition of the problem, identification and analysis of the possible courses of actions, preparation of plan, implementation of plan, evaluation of response and adjustment of actions are the stages in the environmental management process.

In chapter III, the economic aspect of pollution problem is discussed. The first part of this chapter is devoted to explaining a few economic concepts like marginalism, private and social cost, etc. related to pollution problem. An attempt is made to find out environmental costs of economic growth. Economic instruments like emission charges, user charges, marketable permits, deposit-refund system, etc, are designed to achieve environmental goal and their fields of application are also discussed. An attempt is made to estimate the benefits and costs
of pollution control measures. Assuming that the policy makers seek to maximise the net benefits from pollution control reduction attempts are made to choose the control techniques like pollution fee or pollution standard to achieve this goal. It is generally found that a pollution fee or a quantitative standard is a control instrument available to regulators. Freely transferable pollution rights and pollution taxes with two-part tariffs are cited as alternative approaches to the control problem.

The meaning of social responsibility in general and of corporate social responsibility in particular are clarified in the first part of the fourth chapter. The need for accounting for social responsibility arises out of an increased emphasis on corporate social responsibility and its wide acceptance by business leaders.

Any attempt to account for social responsibility reveals that its need is great but that the effective tools and techniques for achieving the same are extremely limited. An historical development to date reveals a wide variety of approaches and a lack of common technology - accounting for social responsibility being called by such names as social accounting, socio-economic accounting, macro socio-economic accounting, micro socio-economic accounting and so forth.

It is found that micro socio-economic accounting best serves the need to account for corporate social responsibility. The Socio-Economic Operating Statement and Social Audit
The later part of this chapter isolates the pollution problem from the broad area of social responsibility and presents it as a challenge to business firms in general and to industries in particular. Some authoritative views are summarized to give an indication of reactions to the challenge.

This study has been concentrated on pollution problems created by large corporations as industrial pollution is commonly associated with big business. Brief mention is made of the pollution woes of small businesses firms also to make it clear that pollution is not confined solely to big business. The present study is directed to the industrial aspects of pollution as they affect large business enterprises, with principal emphasis being laid upon the accounting implications.

In the fifth chapter, pollution problem is related to accounting. There are two reasons for accounting concern for the pollution problem. One reason is that the employers and the clients of accountants have pollution problems. The other reason, the more vital one, that of social responsibility on the part of the accountant, is discussed in the fifth chapter.

The contributions of accountants, accounting
firms and of the accounting organisations are examined to find out
the role of accounting in pollution control. The survey of the
current accounting literature reveals that the accountants are
seriously concerned with environmental matters, but adequate
solutions to all accounting aspects of the pollution problem have
not been found.

The sixth chapter presents the results of an
empirical study of Accounting for Pollution Control undertaken by
the present investigator. In this study, accounting is restricted
to 'accounting for profit - seeking business firms. 16 companies
in West Bengal are covered by this study.

Each of these companies was requested (i) to
complete a questionnaire, (ii) to send copies of its annual
reports, as well as (iii) any available printed or mimeographed
materials reflecting the company's approach to pollution control.
Replies were received from 16 companies but some replies did not
include all the three items requested.

In order to test the validity of the
questionnaire and to obtain an in-depth information, personal
interviews were conducted with executives of the companies.

The results of the study were organised under the
following four heads:

1. Environmental Policy.
2. Organisation for Pollution Control.
4. Analysis of Questionnaires.
The first three heads are covered by studying the annual reports, personal interviews and other printed materials supplied by participating companies. Major emphasis is placed on fourth head.

The analysis of questionnaires is presented under the following heads:

1. Capital Budgeting.
2. Plants Closed Due to Pollution Control Standards.
3. Research Works Regarding Pollution Control.
4. Accounting for Expenditures.
5. Recycling.
6. Tax Liability.
7. Approaches to Encourage Pollution Control Expenditures.
8. Reporting.

Under each heading, the relevant questionnaire results are presented both in absolute figures and percentage.

Conclusions based on the overall results of the study are organised within the following framework:

1. Organisation for Pollution Control.
2. Measurement and Economics of Pollution Control.
3. Accumulation of Pollution Control Data.
4. Internal Reporting of Pollution Control Data.
5. External Reporting of Pollution Control Data.
6. The Role of Public Accounting Firms in Pollution Control Matters.
1. **Organisation** for pollution control is necessary for a company with significant environmental problems. There should be a Director of Environmental Control who should be responsible for co-ordination of all pollution control activities. An Environmental Control Committee consisting of the Director of the committee and other high level company executives should formulate the policies to be implemented by the Director of the Environmental Control Committee. Environmental responsibilities should be delegated to operating divisions. It should be the responsibility of the Director to maintain close contact with those to whom major responsibilities are delegated. The Director should establish and maintain working relationships with the various regulatory bodies. The Director should take into account the public relations aspect of pollution control because the public is concerned about pollution.

2. **Indentification and measurement** of pollutants remain among the most persistent problems in environmental improvement. Pollutants like trace metals or chlorinated hydrocarbon insecticides must be measured in parts per billion, which means that extreme care is required in analysis as even a little contamination of analytical glassware, instruments or chemicals is likely to distort data. Several pollutants will act synergistically which means that the total effect being greater than the sum of individual pollutants acting independently. So identification of pollutant/pollutants may be insufficient to explain a disruption in the environment. Furthermore, the amount of a pollutant may differ immensely between two points at a short distance in an environment.

In brief, all precise numbers reported indicating amounts of a
pollutant in an environment should be viewed suspiciously until all aspects of collection and measurement are thoroughly understood.

Appearance of secondary pollutants is an important difficulty in measuring or predicting levels of pollution. Secondary pollutants mean products of a chemical reaction between a pollutant and constituents of the environment. When gasoline fumes and other exhaust gases of automobiles rise into the atmosphere and combine with nitrogen and oxygen under sunlight, the secondary pollutants like acids, ozone and other materials are formed. These cannot be measured by simply monitoring the original pollutants. Similarly, some pesticides are degraded in the soil as chemicals that are more toxic than the original.

Standards can be used as expressions of objectives for environmental quality. They identify goals we intend to achieve or maintain a check on a particular pollutant. Standards are misunderstood and frustrations are expressed by both the politicians and the public. They are attacked by industrialists and other potential polluters from one side and by the victims of pollution who will be challenging them on the other. This open debate about the quality of the environment has positive effects and under a democratic political system the process of setting a standard can be a vital stage in attaining environmental quality.

Current policies for abating most pollutants cannot be proved to have worked well because of inadequate monitoring of data. Due to inadequate monitoring facilities and a poorly designed civil penalty system, enforcement of pollution standards is extremely
poor. All studies of the cost of complying with current emission standards conclude that the present strategy for pollution abatement is far more costly than is necessary. The potential saving could easily amount to 30 percent of current control costs. The efficiency of pollution policy would improve by the use of pollution taxes rather than by use of standards. Transferable pollution rights are better than mandatory standards but are inferior to pollution taxes for most pollution problems. To continue progress toward a rational system of controlling pollution from industrial and utility sources, some changes should be made in the Environmental(Protection) Act. All new source performance standards should be abolished. New sources should not be treated differently from existing sources. The delayed compliance penalty should be set a fixed rate per excess unit of emission for each criteria of pollutant.

An improvement in monitoring techniques is needed particularly in random monitoring procedures for policing individual polluters. The criteria for setting primary ambient standards should be altered to allow the comparison of marginal compliance costs and marginal welfare benefits. It should be given less priority than improvement of emissions and air quality monitoring, abolition of new source performance standards, reformation of the delayed compliance penalty. Pollution control board should move aggressively for implementation of tradeable rights policies to the maximum extent permitted by the Environmental(Protection) Act.

3. To provide for the information for internal reporting to management and for external reporting to government and to stock holders, accumulation of pollution control data is necessary. it
is clear from the empirical study that these data are usually provided by using estimates, special summaries and analyses, etc. Establishment of a formal informations system for supplying the necessary information is desirable. This information usually relate to technical operating performance data. The company's accounting system should provide financial data relating to pollution control.

4. Regular internal reporting of pollution control data to management is desirable. This is useful to the management for (a) product costing, (b) decision-making and (c) control of expenditures relating to pollution.

Pollution control costs relating to the manufacturing processes should be treated as product costs. In order to determine inventory values and costs of goods sold, product costs must be known. In regard to decision-making, both capital budgeting and operating decisions are made. For making both types of decisions the management needs pollution control data. When decisions are made to spend funds, control procedures are needed to see that the funds are spent for the authorised purpose and the expected results are achieved. The accounting system should be designed for accumulation fo necessary information for control of expenditures relating to environment so as to make timely reports to the management. Here, incorporation of the principle of responsibility accounting is necessary with each executive receiving reports on costs controllable by him.

5. External reporting of pollution control data means reporting mainly to government and to stockholders. Reports to government
require technical performance data coming from sources other than the accounting records and also financial data. The data needed to prepare the financial statements should be provided by the accounting records. The statements need several types of environmentally related data to meet the test of full disclosure.

One type of data is the pollution control cost data for product costing purposes. These are needed for proper valuation of inventories on the balance sheet and for proper reflection of cost of goods sold on the income statement. Information about capital expenditures for pollution control are necessary to compute depreciation and for proper valuation of the assets on the balance sheet. Depreciation and other pollution control expenses should be shown on the income statement. To determine asset values and expenses it is important to distinguish between pollution control expenditures representing expenses for the current period and those representing assets which will benefit the future periods. The latter type of expenditure should be capitalized and be charged to expense in subsequent periods.

There should be adequate disclosure of liabilities arising from environmentally related activities. This disclosure should pose no problem in the case of actually incurred liabilities because the amounts of such liabilities usually are recorded in the books of accounts. Contingent liabilities relating to pollution matters are more troublesome to disclose. There is a genuine doubt in many cases regarding the uncertainty and/or the amount of possible liabilities arising from pollution incidents. The available information, at a minimum, should be disclosed in a note appended to the financial statements.
Description of any failure to comply with environmental standards is required by full disclosure. There should be disclosure of actual or potential penalties associated with such failure to comply with. The firm's ability to continue as a going concern may become risky due to the failure to comply with environmental standards.

The disclosure of all relevant pollution control information are required in a good external reporting.

6. Accountants' attitude seems to be influenced positively if their company is active in environmental disclosure and negatively if their company has no environmental policy. There is a suggestion that pre-training university education might be associated with environmental attitudes amongst accountants. Accountants are aware that environmental issues will affect their practice in future and view themselves as the appropriate individuals to innovate in this area. Despite this awareness of the accountants, there is an absence of environmental accounting. There is a low level of environmental accounting activity and accountants are not so involved in their companies' response to the environmental matters. They are involved in traditional accounting areas such as disclosure.

As the accountants undergo a relatively common training process, they respond in certain ways regardless of organisational setting. Accountants should have common personality traits that appear to differ little across organisational settings. A combination of training and personal dispositions may be enough to shape the accountant and thereby affect the accountant's ability to innovate in the future. The present education and training programmes
inadequately prepare accountants for the environment they will face within organisations. It has been identified that accountants as a whole, are ill-equipped to respond to new challenges. It does not mean that accountants are incapable of change, but their education and training make them ill-equipped to reflect upon and respond to challenges that lie outside the existing orthodoxy of current accounting techniques. It appears that the practising members in industry lack exhortation and guidance from the professional accountancy bodies. With regard to contingent environmental liabilities, a significant majority of accountants are not aware of the importance and implications of the environmental agenda for their practice and for the organisations for which they work. With regard to environmental agenda, accountants are not genuinely informed by professional guidance and are not sure as to how to develop accounting systems.

The role of public accounting firms in pollution control matters is closely associated with the requirements of the clients' facing pollution problems. Their services to the clients can be grouped into the following categories: (1) auditing (2) taxes and (3) management advisory services. To give adequate service to a client in any one of these categories requires knowledge of pollution control matters. Public accountants must acquire the required knowledge or forfeit the right to render certain services. It does not mean that public accountants must become experts in the area of pollution. Public accounting firms, can retain specialists in other disciplines to advise them on the more technical aspects of a pollution problem.

In auditing a client's financial statements, the duty of the
public accountant is to see that environmentally related matters are adequately disclosed. If they are not, then the auditor should be prepared to qualify his opinion or render an adverse opinion because the rights of third parties could be adversely affected. In the areas of taxes and management advisory services, the role of the public accountant is that of an advisor to management. So his ability to serve the client may be limited due to lack of knowledge about pollution matters. The public accountant should be able to recognise the particular pollution problem of his client and to assess its impact upon the company.

The fact that the intensity of the environmental movement has caused attention to be focused sharply on the matters that have been ignored in the recent past should be recognised in the concluding note relating to the accumulation, reporting and the auditing of pollution control data. New kinds of data are accumulated in a way that would allow separate disclosures. Pollution control costs are added with what previously had been total costs and need recognition as additions. The impact of pollution control costs upon the business firm deserve separate and special recognition, specially because there is no increase in the product produced. Occasionally, existing plants should be updated for inclusion of the best pollution control measures and the latest pollution control measures should be included in the basic design of new plants. Expenditures for pollution control capital equipments and for operating expenses should be accepted as normal, though they are non-productive in terms of output production.

The study has been conducted during an intermediate stage in the
development of pollution controls, a stage which is marked by increased concern for the environment. In an earlier stage, as very little attention was paid to this aspect, accountants had very little need to be concerned. But at the present stage and for the future, lack of concern is likely to be damaging. The impact of pollution control upon business firms has been identified, analyzed and documented. Now it is heartening to note that accountants have displayed concern for the environment and are contributing to attempts to terminate environmental deterioration.

More is needed, though, and it is time that accountants should assume a leading role and should work diligently to supply data appropriately presented and analyzed to businessmen, government officials and the general public to assist in more effectively resolving the pollution problem.