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FOR REVISION

A Proposal

to

American Industry and Government

to Establish a

NATIONAL ENVIRONMENTAL INDEX PROGRAM

Prepared by

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Introduction

The National Environmental Index Program is premised on the fact that any complex industrialized society needs to consider the effects of its technological extentions upon the natural environment and its interrelating ecology.

It is evident by the concern for the environment now prevalant in the board rooms, press, government, universities, and the public mind that corporate and governmental policymakers have failed to factor the ecological ramifications of their financial and industrial activities. We are facing a real crisis in our environment as witnessed by the increasing levels of pollution to our food chain, water supplies, air, and health, caused by the end- and by-products of our industrial society.

It is generally agreed that careless planning and lack of foresight are the factors that led to this environmental crisis. Planning at any level depends upon information. Timely and relevant information has always been the key factor behind any decision that requires action, whether for investment planning, product marketing, government programs, or information required to plan and direct activities so that they will not contribute to further detrimental effects upon the environment.

Information and knowhow is urgently needed if we are to roll back the damage already done to our natural environment and at the same time not inhibit a reasonable expansion of our industrial

society and assure normal employment levels in the process. This is the challenge we face; all we need is the information that will provide the means to correct the environmental imbalance while maintaining our standard of living.

The National Environmental Index Program is an information system designed for industrial, financial, and governmental policymakers that will provide the information needed to monitor and plan for the environmental effects of industrial activities. With this specific, broad, and detailed information at ready access, planning can be accomplished in both how to avoid detrimental environmental side effects to any industrial enterprise and to remove the detrimental effects of programs and enterprises already in existence. The system will provide displays of information useful to every level of policymaking, from production-line supervisor to all levels of management and government.

The program interrelates the knowhow of industry, government, and the natural and social sciences, through the use of existing computer hardware facilities, into an integrated software information system relating all industrial activities to the environmental context.

The program is national in scope and a working partnership between private industry and government.

Cutline of the Environmental Index

The idea of using indexes to provide information is not new. Any index is composed of essentially two factors; one a constant and the other a variable that is relative to that constant. Concepts of relative humidity, the consumer price index, the wholesale price index, rate of unemployment, and the disposal index now being used by the packaging industry, are all examples of current index scales in daily use.

Indexes have a base usually expressed in terms of a number that relates activity applicable to the base in terms of another number expressing magnitude, either positive or negative. The consumer price index, for example, is an arbitrary assignment of consumer-goods prices at a given moment that becomes the constant or factor from which consumer prices can be measured as a rate of increase or decrease at a later moment. An example of a relatively new index is the disposal index now used by the packaging industry. This index considers the rate of deterioration of packaging materials in the environment after their use. Paper decomposes to an organic state faster than metal cans, which in turn decompose faster than plastic containers. By knowing these rates of decomposition, the packaging industry can assign index values for various types of packaging and determine which are best suited to have the least detrimental effect on the environment.

For example, if the disposal index of packaging materials has

an index scale of zero (0) to ten (10) with 0 representing material with instant decomposition characteristics, and 10 representing materials that for all practical purposes do not decompose at all, then the disposal index for paper (contingent on the medium in which decomposition takes place) might be 2, that of metal 5, glass 7, and plastics 9. Thus, the index numbers can be used as a guide to the most efficient packaging. The disposal index can also be factored to take into account the ease by which packaging materials can be recycled. Thus if plastics, glass, and metal containers can be 90% recycled, it is conceivable that the disposal index for these materials might be lower than that of paper materials in the overall environmental context.

The environmental index is a composite of indexes like the disposal index that translates the available knowledge about the effects of environmental and human changes caused by the technological extension of our industrial society into an easy to use information system that will provide the specific and general displays of data required for short- and long-term planning by business and government. The system relates all measurable technical and commercial activity to the parameters of a balanced natural ecology.

Description of the Environmental Index

The environmental index is designed to serve the lowest common denominator of commercial, industrial, and technological activity. For practical discussion, consider the corporation as the activity base. The index for a given business is derived from that business entity's component operations and the index factors obtained there. Figures (1) and (2), on Pages 22 and 23, serve as reference diagrams for the ensuing discussion.

In the case of typical corporation A illustrated, assume that we are dealing with a manufacturing corporation that uses raw natural materials and whose final products involve some type of packaging. Figure (1) represents the contributing factors that lead to the assignment of an overall environmental index for that company. The company's EI, in the example, is itself composed of four major components which are themselves indexes factored to the environmental context.

The nature of the indexing process itself is basically a systems analysis approach that mathematically factors the many variables against what is determined to be a known constant and produces a product represented by a number. If, for example, the total reserves of a given natural resource could be represented by the number 100, and this resource is consumed at the rate of 10 units per given time period, then the index of consumption would be represented as 10. It could then be shown for planning purposes that when ten periods of time have elapsed the resource would be depleted.

In the case of raw materials, if we know the rate that this company uses the resource, we can index resource consumption versus known reserves of this resource remaining in the natural environment. If the resource were timber, clearly the index would indicate the critical level beyond which demand for the resource would outstrip supply and would indicate to management the need to find a substitute material. The index of resource use against available supplies might show the critical point to be well below the factor of simple supply and demand, due, in the case of timber, to the fact that timber in tall growth represents an ecology upon which other forms of life and the land itself depend.

There are only limited reserves of natural resources and management will need specific information on its own and other rates of consumption for this resource to make timely long-range plans to diversify product lines and resources as the case may prove.

A company's presence and operations have profound influences upon its locale in terms of what it consumes and produces, the nature of the production and the immediate and long-term effects on the local and remote environmental quality, and the numbers and types of local personnel and businesses that economically depend on the company's presence. These are, for the most part, influences and effects already known by diverse disciplines of physical and social sciences. What is required is to reduce and adapt this data to a mathematical index format within the total environmental and ecological context. Managers will be able to measure these effects and influences not in fragmented and unwieldy reports, but in an instantaneous display of indexes from which identifiable and immediate problems can be given priority attention.

Consider the products produced by this company. Assume, for example, that they are electrical appliances that require some form of packaging. Electrical products require power to operate them. Based on the company's production it can easily be determined what the additional power requirements of the product's marketing area must be to support the products being produced. It can also be determined what the reserves of power are at any given moment. With available power reserves as a constant, the additional demand due to the company's production can be expressed as a mathematical function of known reserves. This would be expressed as an index and would be one of many for the company's operations. Added to this would be the disposal indexes of the product's packaging and the disposal index of the product itself. The disposal index for a product with a short working life would be higher than one with a long working life due to less units required either to produce or dispose of. Less units with higher prices eases the demand on resource use, packaging, transportation, and upon the actual and potential detrimental environmental effects.

Alien and inorganic wastes of the company's manufacturing operations entering the air, waters, and land can be indexed knowing what the conditions of these environments are in the natural state and measuring the alien factors (pollutants) from a qualitative and quantitative standpoint. With the natural environment and its constituent elements expressed as a numerical constant; a measure of additional or alien constituent elements can be numerically expressed or indexed. If a company had no manufacturing waste products enter-

ing the natural environment, as in the case of a company that only assembles products, then its indexes with respect to these air, water, and land indexes would be the same as for the natural environments' numerical constant that uses zero (0) as its reference point. So the indexes in this case would show 0. If a company were contributing pollutants to the natural environment, the extent would be known quantitatively and qualitatively by index values that express higher values than the constant. Management could read these indexes and determine where, and in what manner processes have to be changed to reduce the levels of pollution its operations produce.

Companies with toxic manufacturing processes that affect the health and productivity of its labor force will know the extent that these processes contribute to poor physical or psychological health by indices of human health and well-being. With parameters set by the social sciences, constants of optimum health and well-being can be applied to the company's labor force and its turnover can be measured as its operations deviate from these norms. In the long run, a labor force functioning under conditions of physical and social pollution is not in the interests of productivity and profit. The indexes will display problem areas and allow for long-range corrective planning if required.

The environmental index for the company as a whole is composed of these various sub-indexes that in the discussion focused on only the broad categories of raw material input, product output, waste material, and human and social well-being. All of these categories cause de facto environmental effects both in a physical and social

sense, and taken together with proper assignment of each's effect, constitute the gross environmental index of the company expressed as a single index number. With a condition of no detrimental effects to the environment and ecology expressed as 0, all the component indexes can be expressed as an aggregate function of this zero condition.

For example, if for simplification we determine zero (0) to be a condition of no detrimental effects on the environment, and ten (10) to be conditions of maximum detrimental effect, it might be shown that in terms of natural resource use that this company has an index of 3. That is, the company is using resources at a rate that will deplete them by a factor of 3. This is better than depleting them by a factor of 3.2 or 5.6 or 10; but it is not as good as by a factor of 2.96 or 1, or .85. Similarly for the indexes of product output. If they are determined to be 2 on a scale of 0 to 10, it would be better than 2.3 or 4.3, but not as good as 1 or 1.7. Manufacturing wastes indexes might be an aggregate of 6 based on 0 to 10. Personnel and sociological indexes might be .76. Taking these indexes of 3, 2, 6, and .76, and knowing the relative gross effects of any given index quantitatively upon the environment (one may be more significant in causing absolute and immediate detrimental effects than others), we can average and factor them out to one overall index for the total effects and presence of the corporation upon its environment. Thus, the factored average of the illustrated indexes 2, 3, 6, and .76 might be set at 3.7. So the environmental index of typical corporation A is 3.7.

Now management can analyze its operations from the gross effect and determine which of its component operations needs any changes to lower that particular index if found unacceptably high, and in so doing lower the company's overall index of which the particular index is a component factor. Also, management can now look at other companies of a similar type that have been similarly indexed, and at a glance determine how it compares on the aggregate and component levels. Company A with an environmental index of 3.7 might be more efficient than a similar company with an index of 4.2 in the environmental context. The information is now at hand to respective managements to see the reason why, by looking at component indexes of their companies. Planning can now be made for specific corrective measures. The difference might be a case of a more favorable disposal index of one company over another. In any event the reasons for environmental index differences can be easily determined by analysis of the component indexes.

Once individual companies have developed their environmental indexes, these can be compared and analyzed on any level that planning requires. Industry indexes can be derived from its many component companies and an environmental index derived for the whole industry. Companies can be compared with related and non-related companies and so with industries. The environmental index of given industries and companies might differ because of diverse geographical or other local variables; but in all cases the reasons for the deviations of similar companies and industries can be specifically determined from their respective component indexes. High-level and long-range planning can be made to determine the best ways to shift resources,

people, or products to contribute to an overall lowering of the indexes and stabilize detrimental environmental effects.

For government planning the aggregate indexes of all corporate entities within specific geographical or political regions can be factored together to produce the regions' overall environmental index. A National Environmental Index can be factored from the component indexes of the whole country. This figure would be as significant as the present concept of Gross National Product. Whereas in the case of GNP the target is for increases, in the case of the National Environmental Index the managing target will be for decreases.

The entire concept of the environmental index assumes that we have the knowledge to determine environmental and ecological norms, express these in terms of base numbers and apply variations to these norms in terms of numbers having relationship to this base and deriving an index value from the base and the variables. Much research is already being done to determine these environmental norms and the technical skill and facilities are available to assimilate the products of this research, and factor the data obtained to an instantly usable form that will give a range of display from minutiae to the broadest ranges possible.

To be timely the program will have a built-in means of updating, assimilating, and reporting new and revised data as established index parameters expand with increased knowledge.

Implementing and Managing the Environmental Index

The environmental index as a program must be national in scope and depends upon the full cooperation and participation of all industrial enterprises. The program must be financed, and it will be costly.

The most workable means of insuring participation in a program of this scope is a working partnership between private industry and government. Uniform standards of indexing will have to be developed to apply impartially to diverse enterprises. The program itself must exist from a constant base of uniform standards and consistent and objective management. Since it is essentially an information system, a central data and standards facility must be established whose only function is information collection and not policy determination. The Environmental Protection Agency of the federal government appears a likely choice.

Participation in the program could be assured by either of two mechanisms: voluntary participation or federal legislation. Legislation seems the only practical means of achieving timely participation. This could take several forms. Legislation could require that any business entity doing business with the government as a prime or sub-contractor submit an environmental index before contracts could be let. This would insure participation of most, but not all of the major enterprises of the country. Internal Revenue Service, in cooperation with the program, could require an environmental index as an integral part of a business tax return. This would insure 100% participation of all business activities. Initially, practical consider-

ations of this latter requirement might have exemption categories for small businesses that are single proprietorships or those that deal in intangible services.

Once participation and the standards and criteria of the index are established, an effective and impartial means of administering the program needs to be developed. This, too, could take many forms, the best of which will be determined in the developmental phases and will be contingent on the manner upon which the financing of the program is established.

The actual establishment of an index or indexes will be left to a research survey team who could be a private organization using the federally developed standards or a team of the government itself using the standard. At the time of actual survey of a company's operations, suitable checks need to exist to assure an objective and impartial survey that adheres to the standards and models upon which the survey is based. The survey team, directed by a project manager, works in close cooperation with representatives of the company being surveyed to resolve and mediate conflicts. Only upon a joint signature would the results of the survey and the derived environmental index be officially validated under the program. The survey team would then move to another company, leaving behind a means of monitoring, updating, and reporting changes to the index derived.

Of crucial importance is the initial setting of index parameters and the weighing factors of the unknowns. This massive chore will necessitate a fully motivated and conscientious effort combining the expertise of industry, finance, universities, natural and social

scientists, government, and the technical and administrative know-how to translate this cooperation to a usable information system.

Of importance, also is the fact that the program, no matter how administered, is only an information system with no authority to dictate policy or corrective measures to any industry or company displaying a high environmental index. The program is designed only to provide an information system that will provide overall and local identification of what is wrong as far as the environment and ecology is concerned. It is not for punitive measures against those found to be "high polluters." The problems of environmental pollution are not easily resolved and to discriminate arbitrarily against a company because its index of air pollution is high without considering the employment-labor index and the "social pollution" that would result if that company were forced out of operation might prove correcting one evil by creating another.

Participation in, and managing of the program must remain on the information level with corrective measures left to the private and governmental partnership in its many forms. Private enterprise has a long-run vested interest in correcting its own problems -- pollution and environmental upset are to no one's profit.

Full financial cost estimates for the program can be determined only by a development study as with the setting of index parameters and the mechanics of administration. Whether these costs are to be borne entirely by the private realm, entirely by government, by matching private and public funds, or by indirect tax-free special environmental investment and savings bonds earmarked for the program will only be determined in time. The idea of creating a special bond of large and small denomination with a tax-free, interest-bearing yield similar to the current yield of the various securities

now in existence seems an attractive means of financing. It could capture the public's imagination, especially if they were earmarked only for environmental problems.

Time Frame for Developing the Index

It is now 1971. Given full support, the program will need one to three years to set parameters, initiate the necessary legislation and financing, and organize the apparatus to administer the program at all levels. It will then be 1974. With full support continued, it could take another three to five years to index the country to arrive at the first overall display of what the environmental crisis actually represents to the quality of our industrial and social life in broad and detailed data. By then it will be almost 1980. Only with the information at hand can corrective action occur. Only then will the extent of the problem be known. Corrective planning might take another ten to twenty years before some balance is restored and a reasonable hope for a balanced ecology can be achieved within which a technically and industrially organized society can exist.

Political, Financial and Social Considerations of
the Environmental Index

Policymaking for environmental questions in the federal government is shared by the executive and legislative branches. Although various regulating apparatus exist within both branches, their efforts are fragmented at this time. Responsibility for environmental questions are presently duplicated between the executive departments and independent agencies. The executive reorganization plan currently proposed would seem to further strengthen executive jurisdiction over environmental affairs, but it is not known at this time to what extent this will be so. The establishment of the Environmental Protection Agency seems a positive step toward centralizing environmental problems on the executive level, but in the Congress there is not a central committee of either house that has exclusive jurisdiction over environmental affairs. Jurisdiction is shared by various committees on a fragmented basis. Machinery in the Congress is totally inadequate at the present time to consider environmental questions at the overall level required to plan and direct the massive corrective programs needed to check environmental decay.

A program of this scope, which depends upon federal legislation, will need the full cooperation of government bodies with centralized jurisdiction and the authority to act. The burden lies with the Congress to establish in both houses or jointly, a super-committee with the task to inform itself and consider environmental questions on the scope that can initiate programs and corrective measures on

a total and coordinated national basis. Nothing less will do. A program of this sort must stay out of partisan politics if it is to succeed. It is not a program to be imposed by government, but a program springing from private industry that depends upon the facilities of government to make it function. To develop and implement the program in the time frame previously set forth will depend upon close liaison and counsel from many present areas of governmental expertise in both the executive and legislative branches. The program as conceived is far too important to get bogged down by special-interest factions from any quarter.

When approved, developed and implemented, the Environmental Index Program has a built-in capacity to stimulate business activity, create employment, develop new products and approaches, stimulate and focus currently fragmented research activities, and create a general public focal point for improving environmental quality.

The program can easily assimilate the diverse technical and scientific talent now increasingly being displaced from the aerospace, aviation, and related industries. This large pool of educated, scientific talent represents precisely the knowhow, and innovation, needed to plan, administer, and develop the workings of the program. Personnel with established credentials for objective and analytical competence, combined with administrative ability will be needed by the thousands to direct the complicated index surveys of companies. A phased reorientation program for displaced technical talent will have available the manpower needed to implement the program at the

working level at the required time. This problem of displaced technical talent is the present concern of the President's Advisory Council on Management Improvement from which cooperation could reasonably be expected.

Thus, the mechanisms of locating the necessary personnel are already at hand. Full implementation of the program will directly generate hundreds of thousands of jobs that will compose the survey and monitoring teams. Nor should the possibility be discounted of using the newly created ACTION force that combines the Peace Corps and VISTA as a possible source of manpower for the program.

University research laboratories and facilities that formerly depended largely on defense research contracts and are now suffering cutbacks would be given a new life under the program since these institutions are in an ideal position to contribute to the program's many parameters. The program generates a new environmental orientation that will profoundly affect academic and scientific disciplines whose present structures only need redirecting to contribute to a coordinated environmental academic program that will make available new and innovative manpower to attack environmental decay.

The program can serve as a constructive alternative to disenchanting youth and hard-core unemployed both in terms of offering hope that something is seriously being done to address environmental problems and directly by making them part of the program by offering jobs. Almost anybody could be trained to do most of the field work under the guidance of project officials.

It is difficult to consider all the ramifications of the program. Certainly the volume of business directly generated by the

program will be enormous. In addition to generating a whole new service industry supported by computer software and related administrative and technical support, the research nature of the program will certainly achieve major breakthroughs to new approaches and product lines saleable to an environmentally conscious country. Air monitoring devices to measure air pollutants could become as common on outside window sills as the thermometer is now. The potential for spin off in such a program is unlimited.

In a final analysis the program represents a management tool whereby American industry can shift its thinking and approaches and reconcile itself to its natural environment. Business activity and profits are not necessarily tied to ever-expanding products and consumption of durable goods.

Economies can and do expand simply by the confidence engendered by productive human activity. Money and credit are merely the logical extensions of this confidence and activity. What the system will most likely reveal in the 1980's is that the American concept of business is valid, and can shift its gears to reduce its adverse environmental effects by shifting whole segments of its industrial activity from durable goods and products to intangible information services supporting the industrial infrastructure that must remain if we are to retain the beneficial parts of our technological society.

As a long-range management and financial planning tool, the program will provide the means to make the necessary transitions in a phased and socially stable manner.

Action Required to Start the Program

The first step toward implementing the program is to start a one man year level of effort preliminary development study, contained within a non-profit, tax-exempt shell, that will serve as a nucleus for expanded program development. The initial task of this first effort will be to determine the parameters of the program, the current state of the art of these parameters, and who are the leading people and institutions working in these parameters. Secondly, any first effort will obtain additional support for the program, establish lines of communication with the program's parameters and seek to define the specifics and mechanics of the program's structure. Thirdly, the first effort will define the extent of further development study and will seek to distribute the costs for further development on as wide a base as possible so as not to unduly burden financial support sources. The development study will seek to establish actual computer programs of selected environmental index parameters, the basic approach to be taken in parameter definition with regard to the software vehicle, the best legislative proposals for the program's private-public interface and the projected required level of effort for further development or actual implementation of the program.

The National Environmental Index Program is without precedent in its attempt to provide the vehicle whereby a technologically extended society can coexist with the ecology of the natural world.

DERIVING THE CORPORATE ENVIRONMENTAL INDEX (EI)

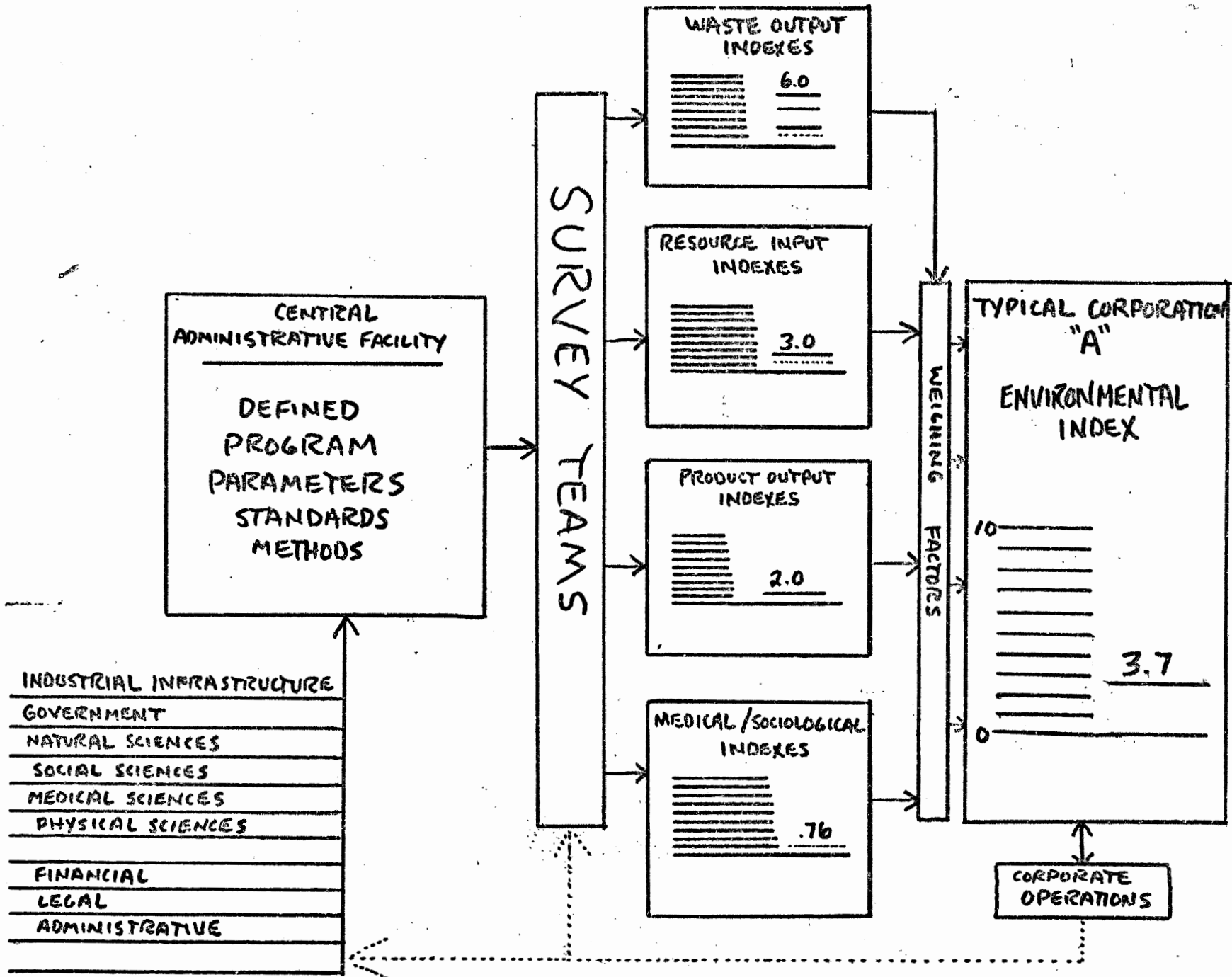


FIGURE (1)

Figure (2)

