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Sponsored jointly by the Economic Commission for Latin America, the Centre for Industrial Development of the United Nations and the Bureau of Technical Assistance Operations, with the co-operation of the Executive Groups of the Brazilian Industry (GEIA, GEIMAPE, GEIMET, GEIN), of the confederação Nacional da Industria and of the Federação das Industrias do Estado de São Paulo

São Paulo, Brazil, 4 to 15 March 1963

PROJECT APPRAISAL

Prepared by

International Bank for Reconstruction and Development

ST\BOLIA\GOIN\TT\J.S.
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ORIGINATOR: MORTON

SUMMARY OF INDUSTRIAL PROGRAMMING

Specified by the Government of the Commonwealth of Australia
to Latin America to carry out industrial development
programme of the United Nations Economic Commission
for Latin America to the Government of Brazil
with the co-operation of the Brazilian Government
of the Brazilian Ministry (MINT, SEMIAP)
to the countries mentioned above
in the following order:

1. The following table shows the
percentage of progress made

INDUSTRIAL PROGRAMME

percentage of

Implementation Plan for Reconstruction and Development

PROJECT APPRAISAL

Prepared for the Seminar on Industrial Programming

by

Industry Division Staff

International Bank for Reconstruction and Development

1962

EMERGENCY

Emergency Information to contact six cell phones

75

State mobile number

Emergency and non-emergency numbers

911

INTRODUCTION

In sixteen years of operations, the International Bank for Reconstruction and Development has loaned slightly more than \$6.5 billion equivalent to its members. Of this amount, nearly \$900 million equivalent have been for direct loans to expand existing industries or to establish new manufacturing and mining industries.

As a matter of policy, Bank loans for industrial projects are made to private borrowers on conventional terms, at the going interest rate (at present $5\frac{1}{2}\%$) for periods usually not exceeding 15 years. Government may, in some cases, have a share of the company, but the control of the operations must be left in the hands of the private investors.

A detailed appraisal of a project is an important part of the Bank's procedure in dealing with loan applications. Similarly, project appraisal or evaluation should be an important part in general planning and programming for industrial development.

Proper programming with a view to the achievement of economic objectives is, in most cases, a necessity for the process of rational economic development. Many cases can be cited where careful planning has resulted in significant and balanced growth of the economy. Cases can also be cited where lack of planning has permitted relative stagnation or distorted and uneconomic development. There is little doubt of the need for overall planning, although detailed programming of some sectors often presents problems. The industrial sector is, perhaps, of all the sectors of an economy, the most difficult to plan, especially where private enterprise is important.

INTRODUCTION

1

Now comes the question, what is the best way to do this? There are many ways to approach this problem, but I believe that the most effective way is to use a combination of both traditional and modern methods. The traditional method involves using a combination of physical and chemical processes to remove the organic material from the soil. This can be done by plowing, tilling, or by using a tractor. The modern method involves using a combination of biological and chemical processes to remove the organic material from the soil. This can be done by using a tractor, a tractor with a tiller, or a tractor with a harrow. Both methods have their own advantages and disadvantages, and it is up to the farmer to decide which method is best for his/her farm.

CONCLUSION

In conclusion, the best way to remove organic material from the soil is to use a combination of both traditional and modern methods. The traditional method involves using a combination of physical and chemical processes to remove the organic material from the soil. The modern method involves using a combination of biological and chemical processes to remove the organic material from the soil. Both methods have their own advantages and disadvantages, and it is up to the farmer to decide which method is best for his/her farm.

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One of the most beneficial aspects of planning in the industrial sector, in many cases, is the creation of an environment by the establishment of policies that take into account special labour or raw materials situations, tariff policies, credit facilities, etc., which will stimulate industrial development and growth. At the same time, there is a danger that specific and detailed programming and target setting for industries may overlook opportunities for productive investment that an entrepreneur with a special skill may see. Also, there is a further danger that a programme or target may be used in such rigid terms, it may become an obstacle standing in the way of new, more economic investment opportunities as they arise.

This paper does not attempt to deal with industrial planning or programming in the broad sense. Instead, it is confined to a description of the techniques of project appraisal, the information required to permit an appraisal and the factors which are considered in any appraisal made by the Bank in the hope that such information will be of use by those engaged in planning for industrial development.

GENERAL APPROACH TO APPRAISAL

Our experience has taught us never to take anything for granted, and that we must be sceptical in appraising projects. Many times even the basic statistical data must be questioned in order to determine the magnitude of error. All too often sophisticated techniques of mathematical analyses are applied to highly questionable data. While the results appear to be very precise they can in fact contain margins of error which could unduly influence the apparent feasibility of a project.

We have also found that each project must be considered on its own merits, that industry averages cannot safely be applied to individual projects, other than serving as a preliminary guide, and that formulas cannot be rigidly applied in such matters as the debt/equity ratio, current ratio, or other financial indicators.

In appraising a project, we in the Bank do not take the relatively narrow viewpoint of a conventional creditor. We do expect to be repaid on time of course, but equally important we are interested in the execution of the project and in its successful operation to the maximum benefit of the economy it is intended to serve. We therefore do not confine our scrutiny to the project itself, but are interested in all the circumstances surrounding it, the whole economic complex of which the project will form a part. In practice, this means that we investigate six different aspects of the project, namely: the economic aspect, the technical aspect, the managerial aspect, the organizational aspect, the commercial aspect, and the financial aspect. In particular cases there may be other aspects, such as legal, political, international, etc. which may also require careful consideration.

THE ECONOMIC ASPECT OF PROJECT APPRAISAL

Relative Priorities of Different Types of Projects

Before we can consider the merits of a particular project, our economists must first study the whole economy of the country involved and form conclusions about the relative priorities for development of different sectors of economic activity. In many countries in which we work, it is evident that the highest priority should be given to what is called the infrastructure of the economy, and the development of the basic services such as transportation and power; agricultural activities of course rank high in almost every country. Once these sectors have been developed to a certain extent, light industry may become important and, when light industry has reached a certain level of development it may provide a basis for heavy industry.

Once it has been established that a project is of a type that has a high priority, the question which the economist asks is this — What is the need for the goods and services this particular project is designed to produce? This question must be answered from a broad point of view. One has to investigate not only the potential demand for the goods and services in question, its direct contribution to economic development, but also the indirect benefits that may be expected from it.

Market Studies

In order to answer the narrow question of the needs for goods and services of the particular project, a study of the market is required, the magnitude of which may vary widely. If one is looking at a brick factory for example, it is obvious that the cost of transportation limits the market area so that no extensive market survey is needed. But in the case of drugs, cameras

or transistor radios, where transportation costs are low in relation to the value of the product, one may have to make a much wider market study. Or if, for instance, the project is for the exploitation of a deposit of iron ore, it may be necessary to look at the whole world market, to form a judgment about the present and prospective future relation of demand to supply and so to come to a conclusion about the probable future price trends.

The market study may not be confined to one commodity. For example, in considering the demand for copper one has to take into account the prospect of competition with other materials such as aluminium and plastics which may be substituted for copper for certain uses.

Subsidy and Protection

Another aspect of the economic appraisal of projects is the question of subsidy or protection. In principle, it is likely a misdirection of investments and a waste of scarce capital resources to create an industry which can only be profitable if it is protected by a large import duty or by a quantitative restriction of imports. This is not to say, of course, that a certain amount of protection may not be justified in particular cases. Many of you are no doubt familiar with the classical "infant industry" argument, which makes the case for the protection of an industry in its earlier stages, if there is a true prospect of the industry being able to stand on its own feet without protection when it is well established and within a reasonably short period. But in principle, the moment it is found that an existing or proposed industry needs a high degree of protection to operate profitably, there is a *prima facie* case that this industry may not be the right choice, from an economic point of view, for the investment of scarce capital.

... a good first step in getting out of your own difficulties to friends, who you ,invariably "extraordinarily" appreciate and now tell them the whole story on the way to ,another raftree and at the same time to get them along and help out the rescue, do it now.

Fig. 10. Tropidophorus

Relative Scarcity of Factors of Production

There is another aspect that the economist has to take into account — the relative scarcity of the factors of production. It may be, for instance, that in certain countries population has grown or is growing at a faster rate than the opportunities for productive work. Labour in consequence is cheap. Very often in the same countries capital is scarce and its price high. In these circumstances, the creation of an industry which is labour intensive, which will provide many new jobs, has an economic advantage, other things being equal, over the investment of the same amount of money in an industry which is capital intensive, and which provides far fewer opportunities for new jobs.

This does not imply however an excuse to "make work" in an industry which by nature is capital intensive. There are examples where in continuous processes labour has been used to replace materials handling equipment. In some cases this has disrupted the continuous and orderly operation of the process, making the cost of the final product more expensive than if the so called cheap labour had not been used.

It is not only labour that can be unemployed. Natural resources may also be idle, and in this case it is generally economically advantageous to create an industry that puts these idle resources to use rather than one which depends on imported raw materials, with all the uncertainties that are involved in such dependency.

Indirect Benefits

As mentioned earlier, the project has to be looked at in all its relations to other economic activities. This means that indirect benefits to be expected from the project have to be taken into account. The

prohibited to protest. So without any kind
of intervention or any opposition in their times soldiers are allowed
to do whatever they want to do in the interests of the state. So
therefore, if we allow such military rule, then there will be no
opposition. Now, opposition to such administration is not against the
interests of the state. Because administration is not just about the welfare of the
country but also about the welfare of the people. So if we allow
such administration then it will be difficult to oppose it. So
it was not self-interests of the
people that caused such an act.

So, when we talk about the welfare of the people, we have to take
into account the welfare of the people and the welfare of the country.
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establishment of a particular project may give opportunities which did not before exist for the creation of related enterprises, perhaps supplying components, raw materials, perhaps for further processing of its products. The obverse of this is the question whether the project can be successfully carried out only on the condition that other developments which are not directly a part of the project are also carried out (for instance, the establishment or expansion of a steel industry is practical only if adequate arrangements are assured to supply the necessary raw materials and if there are adequate facilities to transport the raw materials and the finished products).

Effects on Balance of Payments

It is necessary to take into account the effect which the project is expected to have on the balance of payments -- either by way of generating exports or by way of substituting for imports. In forming an opinion on this question it is necessary to consider the need to import on a continuing basis raw materials, fuel, spare parts, and the repayment of foreign debt.

The Timing of Projects

The last point concerning the economic aspects of project appraisal concerns the question of timing. For example, it may be quite true that looking into the future, one may see that a certain scale of a project will be justified by the market demand in fifteen or twenty years time, but the investment of scarce capital will seldom be justified in a project when some of that capital will not be productive for many years to come. It would not matter if capital were so plentiful that it would earn practically nothing if put to other uses. But in almost all under-developed countries the investment

needs are so great that it is essential that the scarce capital available is invested in projects which can, in as short a time as possible, make a reasonable return on the investment so that funds may be generated for investment in other high priority projects.

THE TECHNICAL ASPECT OF PROJECT APPRAISAL

Scale of Operations

The first technical consideration to be studied is whether the proposed scale of operations is justified. There are certain industries which can work economically only at a certain minimum scale and to establish such an industry on a more restricted scale is a misdirection of scarce capital. The minimum scale varies greatly of course between different industries and between different countries. Usually it is the most capital intensive industries in which the minimum economic scale is large. But the proposed scale of a project must be looked at not only from the point of view of technical efficiency and of reducing costs of production, it must also be related to the prospective demand for its product. And here again the question comes up, how far ahead should we plan, how far ahead can we afford to build?

Operational Techniques

An investigation must be made into the proposed methods and processes to be used. In a type of activity in which rapid technological progress is being made and new and improved processes and equipment are being developed, one has to be careful to take account of possible technological obsolescence. In Europe and the United States today for example, no company will invest in a plant for certain types of chemical manufacture

unless there is a reasonable prospect that the total investment of the plant can be returned within two to five years. This of course is an extreme case in an industry in which technological improvement is occurring very rapidly. But even in the older established industries one cannot be sure that new developments will not change the industry almost over night. As an example, one has only to look at the developments in the steel industry during the last few years. Blast furnace techniques, long considered unimprovable, have changed radically in a short time so that output of a given furnace can be nearly doubled with relatively minor investments.

Plant Layout and Location

The layout of a project may be very important, especially from the point of view of possible future expansion. Otherwise, when the time comes for expansion efficiency may be reduced due to bottlenecks in the flow of production from one process to another, and the whole problem of internal transportation may throttle expansion beyond a certain point. This is an example where it may be very profitable to spend more money now in order to save at a later stage. If in the future more land will be needed to expand the factory it may be better to buy it now and leave enough room in planning the layout of the buildings in order that additional units may be added later.

Account must be taken of the relation of the proposed location to the sources of the raw materials and other factors of production, and to the markets to be served by the project. The sources of power, of fuel, of skilled and unskilled labour all have to be considered in this connection. There may be advantages in locating near a large city, where public utilities are

available, and housing for workers presents no problem. But in some projects, the economics of the case demand that the project be set up close to the sources of raw materials, and then it may be necessary to include in the project the whole cost of building a town, with all the housing, schools and utilities involved.

There is an additional factor which has to be taken into account. Sometimes an outside authority will have to build the road or railway branch leading to the project, or a transmission line bringing power to the site, and one has to be sure that arrangements have been made for these works, and that the progress of this kind of work is coordinated with the needs of the project.

Need for Consultants

The investigation of the proposed arrangements for carrying out the engineering of the project is an important part of the technical appraisal. Are the sponsors of the project themselves capable of doing their own engineering work or will they need help, for instance, from an engineering consultant? One may often find that a factory maintains a very competent engineering department which is fully capable of understanding and solving the problems of production and maintenance, but which is not qualified to carry out all the engineering tasks required for the design and construction of the proposed expansion of the factory. The amount of work consultants may be needed for varies greatly from project to project. It may run from the design of the plant, the preparation of specifications and invitations to bid, the analysis of bids and the recommendation of which bidder the contract should be awarded to, the inspection of equipment purchased, arrangements for shipping and insuring imported equipment, the

supervision of construction and installation, as well as to the initial control of operations of the completed project. Consultants cost money but their services frequently save many times their cost.

Construction Schedule

The timing of construction must be realistically planned. This involves the careful scrutiny for all the different main physical elements of the project, of a construction schedule which takes all the necessary steps into consideration, from the engineering design work to the installation and testing of equipment, taking into account the effect of seasonal or other unusual variations in working conditions.

Cost Estimates for Construction and Operation

Parallel to the construction schedule there must be a budget in which the estimated cost is calculated for all the different phases of construction and for all the main physical elements of the project. The investigation of the construction and operational cost estimates must start with an examination of the assumptions on which the cost estimates have been based. The cost estimate must include adequate allowances for physical contingencies and for likely increases in the general level of costs during the construction period. It may be necessary to include the cost of interest on borrowed funds during the construction period. In addition, an adequate allowance must be made for the initial working capital requirements. It is necessary to check carefully that all costs associated with the project are included and it is well to remember very few projects proceed according to schedule. In reviewing cost estimates one has always to be on the pessimistic side and to provide something to take care of the delays and accidents and changes in design and unfavourable movement of prices.

It is useful of course to compare the estimated costs with the actual costs of other similar projects, and if there are any major discrepancies to find out their cause. The costs of operation need to be investigated for different levels of production. Many sponsors expect that they will be able to produce at capacity from the moment the plan starts up. This is seldom if ever true and adequate allowances must be included for the start-up expenses and the training of the labour crews.

THE MANAGERIAL ASPECTS OF PROJECT APPRAISAL

The appraisal of management presents peculiar difficulties. Of course, where a project is to be carried out by an existing organization much can be learned about the quality of management from a study of what has happened in the past. But it often happens that a management with a good past record may be inadequate to handle a greatly expanded operation. In particular proper delegation of authority is sometimes difficult to obtain, and this may be due not only to unwillingness to delegate from the top but also due to lack of executive ability on a second level.

The shortage of management experience and ability is one of the main difficulties standing in the way of economic development in many countries. It is in some cases compounded by an unwillingness to employ foreigners in positions of management responsibility. One solution to this problem may be the partnership between local investors and an existing foreign organization. Another possibility is to have professional managing agents provide centralized management services for a number of different organizations.

There are, however, cases in which these solutions may not be practical, and in which the only reasonable assurance of adequate management is to import it. It may be possible to arrange for a management contract with a foreign organization, or it may be practical to employ individuals from abroad. One of the objectives of such arrangements should be that the foreigners train local people to take their places as soon as practicable.

One difficulty frequently met with is the limited concept of the role of management in some countries, where it is not understood that management is more than simply keeping a plant running. In general, the appraisal of management is "an art and not a science," and the investigator has to rely on his personal judgment, based upon his own experience of men and affairs. One word of caution is in place here: any project which depends for its success on a one-man management is a risky affair, and one should try to find a way to minimize that risk.

THE ORGANIZATIONAL ASPECTS OF PROJECT APPRAISAL

This side of the appraisal of a project falls naturally into two phases, the organization required to bring a project to the operating stage and the organization required thereafter. The type of problem which has to be investigated here is the extent to which responsibility and authority should be centralized or delegated. This, of course, is intimately related to the scale of operations, and to their geographical extension.

One of the most important aspects of organization is the question of adequate internal controls. In order for management to be able to function efficiently, an organization must be able to provide without delay

intelligently presented information which is constantly checking performance against expectations and so bringing to light problems as they arise. It is, of course, equally important that an organization should be able to put the decisions of management into practice without undue delay.

Another aspect of organization is the importance of good budget controls and the system of controlling inventories. These in turn are closely connected with the system of controlling and scheduling production, which in its turn must be dovetailed into a regular schedule of routine and preventive maintenance. The necessity for preventive maintenance cannot be stressed too strongly because in our experience its importance is not properly appreciated in many of the developing countries.

A final point on the organization aspect is the question of training. Arrangements must be satisfactory for training at all levels in the organization, from apprentices to management candidates, in making plans for a project. The training aspect is of the utmost importance where a new industry is to be established in a country in which there is little or no previous experience in the field. It is of little use to build a plant if one cannot be assured that the necessary skilled personnel will be available to operate it when the physical plant is completed.

THE COMMERCIAL ASPECTS OF PROJECT APPRAISAL

By the commercial aspects of appraisal is meant the investigation of the arrangements for buying the materials needed to construct the project and the arrangements for obtaining the raw materials, power and labour for the operation of the project, and for marketing its product.

In the construction phase, the main objective is to see that the proposed arrangements will ensure that the best value is obtained for the

money spent. This will normally mean that the arrangements should provide effective competition between potential suppliers and contractors. The best way to ensure this is usually through international competitive bidding. It is, of course, true that there are exceptions to this. For example, it may be most economic to standardize on the basis of existing equipment in order to reduce both the investment in spare parts and the cost of maintenance. Sometimes competition between suppliers may not be appropriate, as in the case of manufacturing under licence. It is necessary to investigate whether those responsible for the project have the necessary knowledge and experience to come to the best decisions about the way in which the available money is to be spent. In many cases, they need outside help for this purpose which can be provided by consultants.

The investigation at the operating stage involves the proposed arrangements for obtaining raw materials, power, etc. and for marketing products of the project. Among other things, this will involve investigation of the terms of purchase and sale, which will have an important bearing on the amount of working capital required.

THE FINANCIAL ASPECTS OF PROJECT APPRAISAL

All of the information gathered under the previous headings is focussed toward the financial aspects of the project. This side of the investigation normally falls into two parts: that concerned with the amount of money required to bring the project into operation and with the sources from which this money is to be obtained, and that concerned with the operating costs and revenue and the prospective liquidity in the operating phase. In order to explain this approach fully, the main outline of the following paragraphs assumes a project which is to be carried out by an organization already engaged in operations, and earning revenue.

Taking first the construction period, the first question is: How much money will be needed? The total financial requirements will include some or all of the following items:

- , (a) The cost of goods and services required for the project, including engineering expenses;
- (b) Allowances for escalation and contingencies;
- (c) The cost of other capital investments to be made during the same period;
- (d) Interest during construction;
- (e) Repayment of existing debt during the construction period;
- (f) Working capital.

Many projects get into difficulty because inadequate working capital has been provided. The estimation of working capital requirements has to be based on reasonable assumptions concerning the amount of stocks, raw materials, spare parts, goods in process, finished inventories, etc.; the terms on which raw materials are purchased and products are sold, which will indicate the amount of receivables to be financed; and the amount of funds necessary to take care of swings in payments and receipts, taking into account any seasonal variations in production or sales.

The sources from which it is planned to meet the financial requirements will normally include funds (depreciation and undistributed earnings) generated from operations. They may also include the proceeds of the sale of share capital, and part of the funds will normally be provided by borrowing at long-term, short-term, or both.

$\text{H}_2^{\text{O}} = \text{H}_2 + \text{O}$ (2) $\Delta H_f^\circ = -242 \text{ kJ mol}^{-1}$ $\Delta S_f^\circ = 188 \text{ J mol}^{-1} \text{ K}^{-1}$

(1)

The next step in the financial analysis is to prepare projections of three kinds:

- (a) An earnings estimate during the construction period to determine the amount of self-generated funds which can be applied to the project;
- (b) A cash flow estimate (a statement of estimated receipts and expenditures, from which it can be seen whether funds will be available at the right time to meet the expected requirement); and
- (c) Balance sheets which show the financial situation of the organization.

These projections then have to be carried on into the operating period to show the likely financial results of the operation. In these forecasts account must be taken of the time required to overcome initial operating difficulties and the rate at which the market may be able to absorb production. Corresponding calculations will have to be made of the growth in the amount of working capital required.

With these forecasts in hand, the investigators have to form various judgments. They must be satisfied that there will be no shortage of funds during the construction period, and that the financial situation at the end of the period will meet the requirements of sound financial principles. A judgment has to be made whether the expected revenue during the operating period represents a reasonable return on the capital invested, whether there is an adequate margin in the funds generated by operations to meet fixed financial obligations, and in many cases whether revenue will

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betwixx lu k-kompli u kien t-tuġġid minn-hu (d)

be adequate to establish reserves needed for sound operation and, in particular, reserves for further expansion.

In light of these judgments the investigators should be able to say whether the proposed financing plan is sound, or whether some change is necessary. They should, in addition, be able to formulate the conditions on which money should be made available for the project. The object of these conditions will, among other things, be to ensure that subsequent action on the part of the management will not jeopardize the soundness of the financial situation and prospects. This may involve placing limitations on freedom to incur future debt, to distribute cash dividends, etc. It may also be necessary to make arrangements for security, and for the provision of additional funds in case they are needed.

CONCLUSION

From the foregoing, it may appear that a Bank appraisal is a formidable ordeal. However, we do not feel that we are being unduly severe in our appraisal — certainly no more severe than good management should be in examining its own project. We are interested in providing financial assistance for sound projects, but we are not interested in providing finance beyond that necessary to accomplish the sound aims of a project.

Most developing countries need so many things to assist development — roads, schools, power, housing, etc. — that usually their legitimate needs are in excess of their financial means. By careful project planning and project control, it is often possible to save considerable money on specific projects which will then release funds for other essential investment needs.

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January 2000 by

Author's Edition

and it's now available in a new edition. I hope you'll enjoy reading
it again.

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