OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

FAIR USE POLICY

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

RESTRICTED

18084

DP/ID/SER.A/1316
6 February 1990
ORIGINAL: ENGLISH

INSTITUTION BUILDING FOR INDUSTRIAL PROMOTION

DP/PNG/86/002

PAPUA NEW GUINEA

Technical report: Guidelines for the performance of industrial feasibility studies in Papua New Guinea*

Prepared for the Government of Papua New Guinea
by the United Nations Industrial Development Organization,
acting as executing agency for the United Nations Development Programme

Based on the work of A.H.L.M. Philipsen,
associate expert in preparation and evaluation
of industrial projects

Backstopping officer: R. Mueller,
Industrial Planning Branch

United Nations Industrial Development Organization
Vienna

---

* This document has not been edited.

V.90 81269

EXPLANATORY NOTES:

November 1989:
1 Kina = 1.15 U.S.$;
1 Kina = 100 toea.

Abbreviations:

BEP	= break-even point;
CIF	= costs insurance freight;
c.o.t.	= coefficient of turnover;
IRR	= internal rate of return;
K	= Kina;
m.d.c.	= minimum days of coverage;
NNVA	= net national value added;
NPV	= net present value;
NPVR	= net present value ratio;
p.a.	= per annum;
P.N.G.	= Papua New Guinea;
PV	= present value;
PVI	= present value of investment;
UNIDO	= United Nations Industrial Development Organization.

In this paper one will find several words that are in *italics*, underlined or ***both***. On the words that are in italics, one will find further information in the glossary, while the words that are underlined are key words in the text.

ABSTRACT

This report, titled "Guide-lines for the performance of Industrial Feasibility Studies in Papua New Guinea", has been prepared in the frame of the project "Institution Building for Industrial Promotion", reference DP/PNG/86/002.

The aim of the project is to assist the strengthening of the industrial promotion activities of the Papua New Guinean Department of Trade and Industry. The improvement in performance of feasibility studies plays an important role in strengthening the industrial promotion activities, particularly related to the planning of investments. The "Guide-lines for the performance of Industrial Feasibility Studies in Papua New Guinea" are to give the reader the basic information needed and to link this information to two computer programmes, COMFAR and PROPSPIN, both created by UNIDO in order to facilitate the evaluation of investment projects.

The objective of this report was not to elaborate a user's manual for the computer programs, but to facilitate the work in the field of feasibility studies in P.N.G.. The report also contains some basic information regarding the situation in Papua New Guinea in July 1989, that could be of help during the performance of feasibility studies. It should be noted by the reader that this information needs to be updated regularly, in order to be of any value.

These Guide-lines have been elaborated by the Associate Expert in Preparation and Evaluation of Industrial Projects, Twan Philipsen, in close cooperation with the P.N.G. Department of Trade and Industry as well as the UNIDO team of the project DP/PNG/86/002.

TABLE OF CONTENTS:

1. INTRODUCTION TO DATA COLLECTION

All feasibility studies start with the compilation of data. Their quality is decisive for the quality of the feasibility study as a whole. For that reason it is very important to make sure that the data sources are reliable. The more reliable they are, the less uncertain will the conclusion of the report be.

For the performance of a feasibility study all kinds of information are needed. Information on quality and prices of the raw materials as well as information on the demand for the products of the plant that will be examined. It will be obvious that all this information is not available from one source. National statistical offices are always good sources for general national economic information like import and export figures, wage rates, tax receipts etc.. Information on export markets can be gathered at foreign Trade Councils and data on raw materials can be found by questioning the suppliers. It will be clear that there is no general rule of how to obtain information. This will differ from occasion to occasion. Sometimes the data that are being looked for are hidden in other information so that one will have to analyse this information in order to get what is wanted. This is often the case when market trends are being analysed.

In fact there is only one rule in data collection and that is that it is being learned while collecting. During this collection one will always meet new people and institutions and therefore new data resources for the future. That is why it is of major importance to keep the addresses one has used during the past projects.

It is prudent to split the data on costs into local and foreign parts. When this is being done from the start, it will help later on in case one wants to calculate the effects on the balance of foreign exchange. It is also essential to calculate the costs annually during the production period of the plant. In that case it will be easier to assign the costs to the respective years of production.

2. INTRODUCTION TO PROPSPIN AND COMFAR

At the moment UNIDO has developed two computer programmes that can act as an aid while performing a feasibility study. These two programmes, COMFAR and PROPSPIN, differ considerably in user friendliness and complexity. While COMFAR assumes a very thorough knowledge of economic terms and performs a very detailed study of the project, on financial as well as on economic scale, PROPSPIN assumes a fairly basic knowledge of economics and gives some basic output. Another difference between the two programmes is that COMFAR is a programme on its own,while PROPSPIN is a Lotus 1-2-3 spreadsheet. So, in order to be able to use PROPSPIN, one has to be able to run Lotus 1-2-3. The next paragraphs will try to give some more information on the pros and cons of both programmes. For detailed information is referred to their manuals.

PROPSPIN: As has been stated before, PROPSPIN is a Lotus 1-2-3 spreadsheet. That means that one has to start running the Lotus programme before one can start working in PROPSPIN. A basic course in Lotus 1-2-3 is therefore needed, before somebody is able to use PROPSPIN. In fact PROPSPIN consists of several spreadsheets that can be linked together. The names of these spreadsheets are: PROPDATA.WKX, DATENTRY.WKX and PROPSPIN.WKX. The DATENTRY.WKX file provides the possibility to print out some data entry sheets that enable one to collec all the information in the right form, before starting to work on the computer. After the computer has been switched on, exactly the same sheets will appear on the screen in the PROPDATA.WKX spreadsheet, so that the data can be copied from the sheets into the computer. After this, all information can be transferred into the calculation spreadsheet, PROPSPIN.WKX, in order to be calculated. A simple press of the key then enables one to print out the following tables (The first word of three letters is the code for the table, being used in the programme):

- inv = investment (1a)
- fin = financial structure (1b)
- deb = debt service (1c)
- dep = depreciation (1d)
- sal = sales analysis (2a)
- mat = materials analysis (2b)
- lab = labour and labour costs (2c)
- uti = utilities (2d)
- oth = other overheads (2d)

- inc = income statement (3)
- cas/cas2 = cashflow (4)
- bal = balance sheet (5)
- rat = ratio analysis (6)
- val = value added analysis (7)
- for = foreign exchange analysis (8)
- sum = executive summary.

PROPSPIN is in fact quite self explanatory and for people with some knowledge of Lotus 1-2-3 and economic definitions, it will not be too difficult to use the spreadsheet. Since PROPSPIN is not as detailed as COMFAR, and easier to understand, it is more suitable for small-scale projects than COMFAR. One of the shortcomings of the programme is the fact that it does not offer a package of ready-to-use graphs, like COMFAR.

COMFAR: This programme is really a programme on its own, the basic skills of it have to be mastered thoroughly, before it can be used safely. Since the programme is not as self explanatory as PROPSPIN, and because it is much more detailed, especially concerning the calculation of annual *production costs*, a thorough knowledge of economic theories is required as well. Concerning the construction of the programme, paragraph 1.4 of COMFAR User's Guide and Reference Manual, page 8, is quoted:

> " COMFAR is not limited to providing forecasts of the relevant financial characteristics required as criteria for the evaluation of the investments under investigation, that is, cashflow, income and balance sheet. It also includes such features as distinction between local and foreign currencies, separate planning of foreign and local cashflows during the construction phase of a project, automatic computation of a financing scheme, break-even analysis and evaluation of the contribution of each product to the financial and economic results of multi-product projects.
>
> Another strength of the programme is its capability to build-up projects by varying project data, which allows alternatives to be analysed and evaluated and project sensitivity to parameter variation (risk analysis) to be determined.
>
> Although the UNIDO Manual[1], on which COMFAR has been based, is chiefly concerned with project preparation, the need for wider application of cashflow analysis in project evaluation prompted the introduction of simple and discounting methods applied in financial and economic evaluation. The format suggested for this

[1] "Manual for the preparation of industrial Feasibility Studies", UNIDO, Vienna, 1986.

purpose by the UNIDO Manual allows a stage-by-stage analysis of the various financial project components, with the sets of figures generated for each component gradually converging to the totals. In this manner, each chapter of the UNIDO Manual contains several pro-forma schedules suitable for data collection.

These schedules were designed to serve also as the basis for the entry of financial and economic data into COMFAR. The programme processes these input data, using, in principle, the rules described in the UNIDO Manual, with only a few amendments and extensions.

COMFAR was designed to operate in a dialogue mode and guide the user step-by-step through the following three phases:

Phase 1: data entry = entering of input data
Phase 2: calculation = computation of results
Phase 3: reporting = printing of schedules

During the data entry phase, COMFAR ensures that all basic data required for subsequent computations are saved on an external data file or on a hard disk. This file can be updated or modified and used again for computation of alternatives and for sensitivity analysis.

The programme checks data entered, rejecting wrong answers: warnings are issued against incorrect inputs, whereas in the case of a fatal error it may even stop operation and send a prompting message, thus protecting the work against unintentional change or loss of data.

During the calculation phase, COMFAR computes the results, processing into result tables the project data taken from the input data file.

During the reporting phase, COMFAR reads data from the result tables and reproduces the following schedules conforming to the UNIDO Manual arranged in tabular and graphical form:

- initial investment costs
- current investment costs
- production costs
- net working capital
- sources of finance
- cashflow
- net income statement
- projected balance sheet."

The major advantages of COMFAR over PROPSPIN are the facts that it offers an extensive package of graphs and that it enables the analyst to perform a detailed economic cost-benefit analysis. Both these aspects come in very handy while performing feasibility studies on large scale projects. For small scale projects though, these advantages do not outweigh the complexity of the programme and it is advised to use PROPSPIN instead. Another advantage of PROPSPIN is the fact that anybody with some knowledge of Lotus 1-2-3 can customize the programme.

3. DATA DESCRIPTION

3.1 Introduction

In this chapter a structure is suggested which can be used to sort out the input data. It is useful to store information in groups from the beginning, because it will facilitate retrieval of the data, especially in large projects, and will clarify the interaction between the variables. The structure that is being proposed is based on the structure of the computer programme COMFAR. Using the structure proposed, will facilitate the input of the data into the computer when applying COMFAR. The items between brackets refer to the heading under which the data have to be entered when applying PROPSPIN, the LOTUS 1-2-3 spreadsheet.

Seven key groups to sort out the data have been identified. These groups are the following:

- Initial fixed investment;
- Current fixed investment;
- Production and sales;
- Annual production costs;
- Working capital requirements;
- Sources of finance;
- Income tax and cashflow.

These groups will be clarified on the next pages, as will be the major items they comprise.

3.2 Initial fixed investment

The data that are being stored in this key group concern the costs of building the plant and getting it ready for production. These costs are all made before the actual start of production, during the construction period. The items of this group are the following:

COMFAR:Land (PROPSPIN:Land): With respect to the purchase of land several characteristics of the site have to be checked. Not only the financial but also the physical qualities of the land are of major importance. When choosing land from several alternatives the decision has to be based on divers criteria. Of the physical criteria, these are the most important:

-Geographical position: province, town;
-Quality of infrastructure available: roads, airports, connections of utilities, wharf etc.;
-Public policy concerning the site;
-Availability of manpower, raw materials and other input;
-Housing requirements;
-Social and health facilities available;
-Environmental issues like pollution.

With respect to the financial criteria the investment cost of the land and the legal expenses and commissions that are involved in acquiring the land have to be reckoned with. It has to be kept in mind that land is a very important issue in most investment projects in Papua New Guinea and that leasing of land is sometimes the only option to obtain the land that is required. In this case the costs of leasing have to be included in the annual production costs under administration non-labour costs.

C:Site preparation and development (P:Site preparation AND Infrastructure): In most cases the site available is not ready to be used for the purpose it has been bought or rented for. There might appear some additional costs e.g. to prepare the soil for building upon or to fence the property in order to safeguard security. Another possibility is that the site has to be connected with the utility systems or the major road systems. In these cases additional costs will be involved. These costs form part of the costs for site preparation and development.

C:Structures and civil engineering (P:Buildings): In order to estimate the costs of buildings and outdoor works the requirements have to be examined first. During this examination the buildings for storage, manufacturing and administration must be assessed. In some cases additional civil works might be needed like buildings to accommodate extra power generation or to store effluents temporarily. All the costs involved in these items and for the vegetation and the construction of roads on the site, form part of the costs for structure and civil engineering.

C:Incorporated fixed assets (P:Design & Engineering AND Research & Development AND Technology): This item contains all the data that concern the acquisition of technology. In some kinds of industry a certain kind of technology has to be bought, often accompanied by machinery. For this technology royalties have to be paid. Other costs that could be involved are legal fees, costs for the acquisition of licenses, the costs of acquiring goodwill (brand names, trade marks etc.) and the like. Because these *assets* are intangible, they are called incorporated fixed assets. The annual payments form part of the production costs but if there is an up-front payment involved, this forms part of the initial investment costs.

C:Plant, machinery and equipment (P:Plant Mach & Equipment): As was the case with the structures and civil engineering, the requirements have to be examined in order to estimate the costs involved. In some branches of industry only one kind of machinery exists so that the choice is not difficult. In most cases though, one can choose out of several possibilities, each with certain advantages and disadvantages. In that case the alternatives have to be compared and it is not very wise to base that comparison on financial data only.
The most popular distinction that is made between the different types of technology is whether it is capital or labour intensive. Due to the fact that the labour costs in P.N.G. are rather high compared to other countries in similar circumstances, the tendency is to choose more capital intensive technologies than those countries. If this choice is made too often, social problems might arise from a macro-economic point of view, like unemployment. On the other hand capital intensive

technology will often strengthen the position on the world market because of the level of production costs. It is a policy choice that has to be made.

Although financial aspects are not the only criteria that have to be taken into account during the choice of equipment, they certainly form a very important part of it. Examples of financial costs involved are the investment, transport (CIF: freight and insurance) and installation costs. The transport costs in Papua New Guinea tend to be very high so the cost factor of transporting the equipment from the point of entry in P.N.G. to the actual spot should not be underestimated. Other criteria that have to be taken into account are for example the manpower requirements of the machinery, the maintenance requirements, the expected life-span, the availability and costs of spare parts and the energy requirements. One aspect that is often underestimated is the risk of becoming too dependent on the supplier of the machinery. If every time the machine breaks down the plant has to stop producing for several weeks because of lack of know-how or spare parts needed for repairs, one might wonder whether one has made the right choice of technology, even if it was a lot cheaper.

Even if the choice between the different kinds of technology available has been made, there is another problem has to be solved, is the project going to use new or used equipment? For some machinery that is widely used, it might be possible to find some second-hand machinery at a low cost, which is still suitable for the planned project. As is the case with most used items, it has to be found out whether the costs of maintenance of used machinery are not exceeding the budget. These costs can be very high and it would not be the first time a project goes bankrupt because of the high costs involved in maintaining and repairing the machinery.

All together it is clear that being familiar with the type of technology that is being researched is essential, in order to be able to make a good judgment. This is often the most difficult part of the feasibility study anyway. In most cases the help of an expert is needed and it is not always possible to find one. That is why in very specialized industries the help of a consultant is needed although this might be an expensive way to solve the problem.Care has to be taken in order to get an independent opinion because sometimes a consultant happens to be a salesman as well.

C:Auxiliary and service equipment (P:Transport equipment AND Service Facilities): The data needed regarding the choice of the most convenient set of auxiliary and service equipment, are much the same as those needed on the last item. The main difference between "Plant, machinery and equipment" and "Auxiliary and service equipment" is that the last item contains all information on those parts of the total equipment that are not directly involved in the production process. Examples of that kind of equipment are trucks, generators and office equipment like typewriters and furniture.

C:Pre-production expenditures (P:Preproduction capital Exp.): Before a plant comes into actual operation, a lot of things have to happen beside the acquiring of the essential physical assets. In the first place the staff often has to be trained for the job and the equipment tested. Furthermore there will be costs involved in several consultancy services like the performance of feasibility studies and market surveys. Another part of this item form the costs that are involved in several consultancy services like the performance of feasibility studies and market surveys. A third part of this item form the costs that are involved in the start-up of the plant. In some kinds of industry it is impossible just to start manufacturing the product, due to starting procedures of the machinery or difficulties in adjusting them. Finally, the expenditures that are involved in the acquisition of capital have to be mentioned. In order to issue shares, one has to publish promotion material like brochures. Additionally, one has to pay interest on loans if drawn down during the construction period already. If this is the case, one has to place the costs involved under this item.

3.3 Current fixed investment

The data referring to current fixed investment have much in common with the data concerning initial fixed investment. The only difference is that initial fixed investment becomes current fixed investment where the expenditure involved will take place during the production period, instead of during the construction period. The reason a distinction has been made between these two kinds of fixed investment is that initial fixed investment has to be financed, at least partly, out of equity or loans while the current fixed investment often can be financed out of reserves. The descriptions of the items that form part of the current fixed investment, are exactly the same as those for the items of initial fixed investment.

The costs that are involved in the current fixed investment often refer to replacements of old equipment or expansion of the plant capacity. If for example a plant needs a truck for its transport, the acquisition of the first truck will take place during the construction and start-up period and the costs will therefore be part of the item "Auxiliary and service equipment" of the group "Initial fixed investment". After five years this truck will be worn out and needs to be replaced. The costs of this replacement will also fall under "Auxiliary and service equipment" but now of the group "Current fixed investment".

In case the manager of this same plant decides after five years that the plant needs an additional truck for its transport needs, then the additional costs for the acquisition of this truck will also form part of "Auxiliary and service equipment" of "Current fixed investment" although this truck is not a replacement of another truck. The reason for this is, as has been explained before, that this investment is being made during the production period of the total project.

3.4 Production and sales

In order to be able to calculate the costs that are involved in the total production programme, as will be described in the next section, the total production volume, and therefore sales volume, has to be determined. In other words, how many items is the customer willing to buy? This part of a feasibility study is considered to be one of the most difficult ones. The work involves a great deal of uncertainty because it is impossible to predict the exact sales volume during a certain period of time, unless one is working on a contract basis. Market studies are unavoidable and in most cases this means a great deal of statistical analysis. The market size has to be determined very carefully, the local as well as the export market. The future growth rate of both these markets has to be determined as well. It has to be kept in mind that a production unit almost never starts at full production capacity but often needs a start-up period of several years.

Factors that can influence the market size in a negative way are the introduction of a substitute for the product or a major technical innovation of a competing production process. Although it often is very difficult to predict such events, the risk of such a thing happening during the sales forecast has to be assessed, since it can have a major impact on the viability of the project.

During the assessment of the market size, a fair estimate of what a suitable market price would be in order to get a fair share of the market, will be determined. In case one is aiming at import substitution, it often is rather easy to assess the market and therefore the sales price, although one has to take care not to take the sales price for granted since this price can contain a considerable mark-up for the distributors. In case the aim is the export market though, it is much more difficult to get this information. One of the reasons for this is that the competition in general is much tougher and several tax regulations and trade regulations have to be dealt with. In case one is going to deal with an export market, a very useful way to collect information is by contacting the trade commissions of the countries involved. Most of these commissions will supply information on quality standards, tax regulations, import restrictions and addresses of potential customers, information invaluable at this stage of the project.

After a suitable sales price has been identified, and the boundaries for calculating the production costs per item have thus been established, the profitability of the project can be estimated. In case the estimated production costs are higher than the sales price identified, it has to be determined what cost item causes the trouble. In the next section

the calculation of production costs will be discussed. However, it has to be kept in mind that the sales price that has been determined, will not be received for all products. It is not unlikely that the producer will run into non paying customers, so called bad debts, while marketing techniques sometimes force the producer to offer volume discounts to his customers in order to obtain a larger market share[2]. These factors decrease the average sales revenue per unit sold and therefore have to be reckoned with while estimating the total sales revenue and establishing the sales price.

[2]For more information on marketing in general: "Principles of marketing", Third Edition, Philip Kotler, Prentice-Hall, New Jersey, 1986.

3.5 Annual production costs

The annual production costs contain all costs that are directly involved in the production process (raw materials, utilities, energy and direct labour) as well as other costs that have an indirect relation to this process, such as costs involved in maintenance and repair, factory overheads, administration and marketing. All these items will be elaborated on the next pages. In order to facilitate the construction of financing and the assessment of the impact of the project on the total economy, it is very wise to split all the costs into local and foreign costs, labour and non-labour costs and variable and non-*variable costs*. The items between brackets again refer to the PROPSPIN programme. Suitable *depreciation* rates should be obtained where needed because the annual depreciation also forms part of the annual production costs.

C:Raw materials (P:Raw materials): This includes all physical inputs that are incorporated in the product, packaging included. With relation to the choice of the right kind of raw material, not only the financial criteria have to be taken into account but physical criteria as well, which is quite obvious. For data collection on this subject it is necessary to consult an expert quite often. It is usually very difficult for an outsider to analyse the quality and future size of the supply. Another thing that has to be kept in mind is the frequency of delivery. If the raw material is very difficult to obtain and not easy to store or only at a high expense, an alternative has to be found. The frequency of delivery is also very important in relation to the calculation of working capital. Of course the prices of the raw materials are very important as well. In general the costs of raw materials form the major part of the total production costs, together with the costs of labour.

C:Utilities (P:Electricity AND Water): All plants and projects need utilities like water, electricity and/or sewerage. The costs that have to be met in order to obtain these services fall under this item. The costs of utilities form part of the factory overheads. While estimating the requirements for utilities in the future, the quality of the system that is being used, has to be kept in mind. In some cases the system will not be able to handle a peak load, for example when the machinery has to be activated at the beginning of the day. This could mean some additional services are needed and therefore extra charges have to be paid in order to improve the supply and to eliminate the bottle-necks in the system. As

long as these costs do not form part of fixed investment costs, recurring fees for improvements for example, they will fall under costs for utilities.

C:Energy (P:Liquid fuels AND Diesel AND Wood): In COMFAR this term is used to describe all energy sources except electricity, that is being supplied by the utility systems. That leaves costs for petrol for the cars, diesel for generators and boats, wood for stoves and gas cylinders for welding for example. Although this description might be quite misleading it is being maintained because it is being used in the COMFAR programme. Care just has to be taken not to put costs under "Utilities" as well as under this item.

C:Direct labour (P:Unskilled AND Semi-skilled AND Skilled & technical): This item contains all the information concerning labour that is directly involved in the production process. So, for example in a wood carving plant, it would include the wood carvers and the people who finish the product, but not the sales people and the administrative staff. The first thing one has to know is the number of employees that are involved in the production process and their wage level. While estimating the wage levels, the government policy has to be taken into consideration. To be more detailed, skilled, semi-skilled and unskilled employees as well as local and foreign personnel can be distinguished. Another aspect to be found out is how many working hours there will be in a working year per employee. In general it is being assumed that a year has about 250 working days as a basis for calculating the costs for the direct labour per annum. Furthermore it is useful to find out what the organization of the labour force will be like. It will provide a better view on the structure of the plant. A list of wage rates in Papua New Guinea can be found in the Annexes.

C:Maintenance (P:Annual Maint & Insur. rate): With respect to maintenance the costs that will be involved in maintenance and repair have to be forecasted. These costs do not include the contractual repair and maintenance costs. Only the costs that are made by the employees involved in repairing and maintaining vehicles, machinery, and buildings have to be included. These costs have to be forecasted by

estimating the requirements of all assets. All costs that are involved in maintenance, except the expenditures for the acquiring of spare parts, have to be included in this item.

C:Spare parts (P:Annual Maint & Insur. rate): This item has often been underestimated. It is of major importance to make sure that spare parts will always be available. Firstly the requirements of the plant have to be assessed and secondly it has to be found out how long it will take to obtain the spare parts needed. In case they come from abroad, it can take quite a while. Out of this information it can be calculated what the stock of spares has to be. The smaller the stock needed, the better of course.

C:Administration, labour and non-labour costs (P:Clerical/admin AND Management AND Other overheads): In some kinds of industry the expenditures involved in administration are so large that it is more useful to put them in a separate item than incorporating them in the factory overhead costs. In administration costs labour costs, like wages and salaries, as well as non-labour costs, such as expenditures for office supplies, communications, rents, insurances (property) and taxes (property), are included. In PROPSPIN the non-labour costs will be put under "Other Overheads".

C:Marketing, labour and non-labour costs (P:Clerical/admin AND Management AND Other overheads): As is the case with respect to costs of administration, marketing costs can be so extensive that it is worthwhile to create a separate item for it. Marketing costs include labour and non-labour costs as well. In this case the non-labour costs include expenditures made for promotional purposes, such as travels, advertisements, posters and exhibitions. The costs involved will be greatly affected by the fact whether the project produces for a local or a foreign market. Another circumstance to reckon with is whether there is a market existing already or a new one has to be created. Again, in PROPSPIN the non-labour costs will be put under "Other Overheads".

C:(Other) Factory overheads (P:Other overheads): This item contains all the information on the overhead costs, not included elsewhere. This includes for example costs made for packaging and

storage, wages and salaries of employees not directly involved in the production process, expenditures caused by effluent disposal and costs of contractual repair and maintenance. All these expenses have to be made in order to keep the plant going. Frequently, overhead costs are computed as a percentage surcharge on total manpower and material input. This procedure is often not adequate. The best way to proceed is therefore to try to estimate the costs in a more direct way. This will decrease the risk of mistakes and unrealistic estimates.

3.6 Working capital requirements

One of the factors that often have been underestimated during the performance of feasibility studies, is the calculation of the working capital required. During the calculation of the initial investment outlay, most people will not forget to include the costs for buildings, machinery, transport equipment and other capital assets. The costs involved in obtaining these items are easy to predict because all these assets carry a price tag. Some people however, forget that a project in general has to cover some additional expenses before the first income is generated. For example, during the first stage of the project raw materials have to be bought in order to produce the first series of products and wages will have to be paid during this period as well. The capital used to cover these expenses is called the net working capital. The amount of working capital is being estimated by using the number of days that each item has to be covered, also called the minimum days of coverage (m.d.c.). In case of raw materials and spare parts these m.d.c. are based on the number of days it would take to receive the next order of these products, if it was placed on the day the last order has been received. In order to cover some unexpected delays as well it is prudent to add some days as a safety margin. In case of work in progress the m.d.c. are based on the actual time it takes to produce the product out of the raw materials whereas the m.d.c. for finished products are more difficult to estimate since it depends on how fast the products can be sold after the production has been finished. It should not be forgotten that the value of work in progress and finished products is to be based on *factory costs* and not on production costs or sales value (for a detailed break-up, see the glossary). In case of the finished products a contingency has to be included also, in order to cover the administrative costs of storage.

Finally the m.d.c. of accounts payable and accounts receivable simply depend on the terms of credit. If, for example, a tax credit is granted, this should be included in the calculation of the working capital. In Papua New Guinea there is a kind of tax credit since companies pay their income tax in three equal instalments at the end of the first three quarters of the year following the year of income.

In general, accounts receivable should also contain a contingency to cover administrative, sales and distribution costs that have been made for the sales. As soon as the respective m.d.c.'s have been estimated, the working capital requirements can be calculated, using the annual production costs. The total working capital then is the sum

of the individual items[3]. If the project is able to obtain an overdraft from the bank this will affect the calculation of the working capital needed as well, since eventual shortages can be covered by this overdraft, thus enabling the management to work with less working capital.

However, one part of the working capital has not been covered yet, the amount of cash-in-hand the management requires. This is a subjective matter, but the easiest way to estimate this sum is to take a certain percentage of the total annual production costs. Five percent is a good rule of thumb. In case the producer can obtain a bank overdraft this will affect the amount of cash-in-hand needed since its function of being a cushion of funds for emergencies can then be taken over by this overdraft, thus decreasing the amount of working capital needed.

In case it is difficult to estimate proper m.d.c.'s these rules of thumb can be used:

Cash in-hand:	15 days;
Local raw material:	30 days;
Imported raw material:	100 days;
Spare parts:	180 days;
Work in progress:	15 days at factory costs;
Finished products:	15 days at factory costs plus administrative overheads;
Accounts receivable:	60 days at factory costs plus administrative, sales and distribution costs;
Accounts payable:	30 days for raw materials and utilities.

These figures differ slightly from the default values in the PROPSPIN programme which can be found on page 4 of the data entry sheet[4].

In order to clarify the principles of working capital, let us have a look at this example:

> Strawberry Pty. Ltd. wants to start the production of hand made straw baskets and is calculating what amount of working capital would be needed in order to safeguard a continuous production. For the production of these baskets only two inputs are

[3]For further information on this calculation we refer to page 195 of "Manual for the preparation of Industrial Feasibility Studies", UNIDO, Vienna, 1986, Schedule 10-3/2.
4 PROPSPIN uses a different technique to value the working capital items. For more information we refer to the manual.

needed, labour and the raw material, straw. It is assumed that the straw will be bought daily and that the wages will be paid daily as well. All products will be sold the working day after the actual day of production. The working week consists of five days.

It is calculated that every day K 200 of straw will be used while the daily labour costs are K 100. Since the products of the first day will not be sold before the second day, Strawberry Pty. Ltd. will have to raise the capital to cover the costs involved in manufacturing the first day's production volume, the so called work in progress. These costs are K 200 for the straw and K 100 for the labour, K 300 in total. So the total working capital would be K 300 in this case. The straw and labour for the second day will be paid out of the sales revenue of the products of the first production day.

However, further study reveals that it will be impossible for Strawberry Pty. Ltd. to buy the straw on a daily basis since the straw can only be supplied on a weekly basis. That means that the company has to buy enough raw material to continue production until the next delivery, one week. This also means that every time a delivery comes in, the company has to put enough raw materials in stock for 4 days plus the raw material for the day of work in progress. An increase in the working capital in order to cover these additional costs will be needed. The additional amount of capital involved is 4 (days) times K 200 (costs of raw material per day) makes K 800. That brings the total working capital to K 300 + K 800 = K 1100. Remember that the company has to save K 1000 out of the sales revenue during the week, in order to pay the next delivery. So the working capital is constantly being invested, either in raw materials in stock or in cash, saved to pay for the next delivery.

A market study reveals that the baskets will not be sold immediately but that it will take about three days on the average. This means that the company will always be keeping the finished products of three days of production in stock and that they have to cover the value of this stock as well, since the costs for these products have not been recovered yet. The value of this stock at factory costs is 3 (days) times (K 100 + K 200) makes K 900. This brings the working capital to K 1100 plus K 900 makes K 2000.

The market study also states that the competitive position of Strawberry Pty. Ltd. would be strengthened in case they supplied their customers a credit of one week. The result of such a credit (accounts receivable) is that the company will have to wait an

additional seven days before the costs of production will be recovered. This means that the working capital has to be increased by 5 (days) times (K 100 + K 200) makes K 1500, in order to cover these costs before they can be recovered from the sales revenue. The total working capital now is K 2000 plus K 1500 makes K 3500.

The manager of Strawberry Pty. Ltd. succeeds in getting a supplier's credit of one week from the supplier from the straw. As a result Strawberry Pty. Ltd. does not have to pay for the raw materials until one week after the delivery. So the period between the payment for the raw material and the sales of the product will be decreased. That again means that the working capital can be decreased by the value of these accounts payable, in this case 5 (days) times K 200 (daily costs of raw material) makes K 1000. This would bring the working capital on K 3500 minus K 1000 makes K 2500.

In summary, the working capital has been built up as follows:

1	Work in progress (1 day)	K 300
2	Raw materials (4 days)	K 800
3	Finished products (3 days)	K 900
4	Accounts receivable (7 days = 5 work.days)	K 1500
5	Accounts payable (7 days = 5 work.days)	-K 1000
	TOTAL	K 2500

It has to be kept in mind that the working capital will be a cash inflow at the end of the project because at that time no more provision for the acquiring of *current assets* needs to be made.

3.7 Sources of finance

This section will look at a few ways to raise funds for an investment project. The perfect balance between equity and debt has to be found in order to satisfy the shareholder as well as the creditor. A few ratios that can be used to determine the right construction, will be suggested and clarified in chapter 6.

Long-term loans: The source of finance is a very important prerequisite for any feasibility study. Before a feasibility study is undertaken, the financial possibilities of the investor should be studied. The general financing pattern for industrial projects is that the initial investment outlay is being covered by equity and long-term loans to varying extents and that working capital requirements are being met by additional short- and medium-term loans from national banking resources. However, in order to be able to secure loans, the investor has to offer the bank certain securities, usually a certain percentage of the initial investment has to be paid out of investor's capital in the form of equity. The rest of the investment can then be paid out of long-term debt. The debt/equity ratio depends on the risk involved in the project, but in general the ratio 60/40 is being applied in Papua New Guinea. This ratio can be improved for the investor if he can offer some kind of guarantee, like the Government Guarantee Scheme that covers long term loans up to K 100,000.

The investor will have to make sure that a balance is struck between long-term debt and equity. If he issues lots of shares, the income per share will decrease whereas a high proportion of loan finance will increase the interest to be paid, and therefore the profit will be decreased. So the ideal balance must be assessed carefully.

Equity: Equity can be raised by two types of shares: ordinary and preference shares. Preference shares usually carry a dividend at least partly independent from profit, with a limited voting right. They can be cumulative or non-cumulative in terms of dividends and can be redeemable or non-redeemable, with the redemption period varying between 5 and 15 years. Dividends on ordinary shares with full voting rights depend on the profits of the project. In order to assess a cash-flow table, it is necessary to estimate the dividend payment as a percentage of the total equity. This percentage has to compete with the commercial interest rate in order to attract investors. Since there is no stock market in Papua New Guinea at the moment the valuation of equity will not be discussed in further detail.

Grants: Another source of funds, apart from equity and loans, is the possibility of acquiring grants or subsidies from government institutions or other funds.. In most cases this means that the project has to meet certain requirements. If this is the case, care has to be taken that these requirements do not endanger the viability of the project. For example, it is possible that such grants are linked with certain market restrictions for the local market of the supplier of the grant. In that case the future of the project could be endangered by a decrease in the potential sales volume.

Short-term financing: There are several other means of financing the project. In the paragraph on working capital requirements it has already been shown that supplier's credit is a way of financing, since this will decrease the working capital needed. Another way of short-term financing mentioned there, was the bank overdraft. If the financial situation in general is sound, the bank can allow the company to withdraw more money than actually is in the account. The charges for this right are quite high compared to other means of short-term financing, but it adds some extra flexibility to the financial management since capital is constantly available and can immediately be repaid in case of profit earnings. If one wants to use this provision, certain arrangements have to be made with the bank involved, concerning the maximum overdraft and the maximum pay back period.

3.8 Income tax

Most projects that are making a profit will have to pay income tax to the National Government. The rate of this income tax depends on several factors. The most important one is whether the company is locally or foreign owned. In case the firm is locally owned the current tax rate in Papua New Guinea (1989) is 30%, except for firms engaged in mining and petroleum operations, they have to pay 35% of their gross profit. For foreign owned companies there is only one tax rate of 48%. A foreign owned company has been defined as a company of which 26% or more of the shares is owned by non-P.N.G. nationals.

On dividends there is a dividend withholding tax imposed of 17% (1989) so that the effective tax rate for nationally owned companies is:

$$30 + ((100 - 30) \times .17) = 41.9\% \text{ or}$$

$$35 + ((100 - 35) \times .17) = 46.05\%.$$

No further tax is imposed on the profit of non-resident companies remitted out of the country. At this moment opportunities for investment incentives like tax holidays, *carry forward of losses*, tax credit etcetera, are rather limited in Papua New Guinea, although tax does not have to be paid until the end of the first three quarters of the following year, in equal instalments. In case this situation might change, the consequences of these incentives have to be kept in mind during the performance of feasibility studies. At this moment (July 1989) the incentive scheme is being reviewed by a working committee, so changes in this scheme might be due.

Before the income tax that has to be paid can be assessed, the *depreciation method* and allowance applicable has to be studied carefully (for some information on depreciation structures, see the glossary). In some cases it is possible to get an increased depreciation up to 100%. These specific income tax incentives were valid in 1989[5]:

> **Flexible Depreciation for Manufacturers:** Industrial plant, not previously used in Papua New Guinea, is eligible for increased depreciation up to 100% of cost. The tax-payer can elect the amount to be claimed in any year, but not so as to create

[5]This information has been derived from Coopers and Lybrand's annual "Tax facts and figures", ed. 1989.

a loss. To qualify, the plant must have a life exceeding five years and be used by the tax-payer or any other person (e.g. a lessee) in a manufacturing process. Expenditure on buildings housing such plant or for storing raw materials or finished products also qualifies.

100% Initial Depreciation for Agriculture and Fishing Industries: Expenditure on new plant or articles acquired after 4th March 1986 and used in agricultural production or commercial fishing activities now qualifies for a 100% initial depreciation deduction. Boats or ships exceeding 7 meters in length are specifically excluded, together with ancillary equipment fitted to such vessels. Previously the plant or articles had to be purchased by a tax-payer.

Double Deduction for Export Market Development Costs: Expenditure on export market development for goods manufactured in Papua New Guinea qualifies for a double deduction. The double deduction is not absorbed by any exempt export sales income. The types of expenditure to qualify include overseas publicity and advertising, market research, tender preparation, samples, trade fair expenses, overseas sales office expenses, and certain travel costs. The tax saving resulting from the allowance of the deduction may not exceed 75% of the expenditure actually incurred.

Export Incentives for Manufacturers: Tax-payers who commenced exporting certain qualifying goods manufactured by them in Papua New Guinea on or after 1st September 1984 are entitled to an income tax exemption of 100% of the net export income for the first 4 years of income. For the following 3 years the excess of export sales over average export sales of the previous three years is exempt. Varying levels of exemption apply where exports commenced prior to 1st September 1984. The goods which qualify for the exemption include:

Artifacts;	Beverages;	Biscuits;
Canned, loined and	Canned fruit and	Cigarettes;
smoked fish;	vegetables;	Clothing and manufactured
Plywood;	Fibreglass products;	textiles;
Flexible packaging	Foam products;	Jewellery;
material;	Livestock feeds;	Matches;
Processed and canned	Rubber products;	Wooden furniture
meat;	Shipbuilding and repair;	components and doors.
Soap;	Wood-pulp;	Activated carbon;
Ceramics;	Chopsticks;	Cement and

Confectionary;	Dairy products;	concrete products;
Dry cell batteries;	Electrical appliances;	Essential oils/oleoresins;
Fabricated steel;	Fishing nets;	Flour;
Founded and manuf.	Glass products;	Hand tools;
metal products;	Industrial and	Motor vehicles;
Paint;	medical gases;	Plastic products;
Processed ginger;	Refined petroleum;	Treated and processed
Sawn timber;		crocodile skins;

In addition the exemption applies to new manufactured products approved by the Taxation Office.

Wage Subsidy for Manufacturers: Companies manufacturing new products may receive a subsidy payment for up to 5 years based on a percentage of the relevant minimum wage for each full time employee who is an automatic citizen. The subsidy, itself taxable, is a reducing percentage of the relevant statutory minimum wage, as follows:

First year of subsidy	40%
Second year of subsidy	30%
Third year of subsidy	20%
Fourth year of subsidy	15%
Fifth year of subsidy	10%

To qualify, the company must obtain a New Product Manufacturing Certificate from the Chief Collector of Taxes. The subsidy is not available for products which receive tariff protection, or quota protection without import parity pricing.

Initial Year Accelerated Depreciation: An initial year accelerated depreciation is available on the capital cost of certain new assets, converting existing oil-fired plant to non oil-fired plant, or in improving the efficiency of fuel-using plant.

Rural Development Incentive: Qualifying new businesses started in certain specified under-developed areas will be exempt from income tax on their net income from carrying out a rural development industry for 10 years after the year of commencement of business. Losses arising from these newly exempt activities will be deductible against taxable income from other activities. Businesses involved in exploitation of non-renewable resources (mainly mining and petroleum companies)

are specifically excluded from the exemption and anti-avoidance measures are being introduced to ensure that the incentive is not abused.

These are just a few examples of the set of incentives. New developments should be closely monitored by contacting the institutions responsible, like the Department of Finance and Planning and the Taxation Office, or by studying the publications of accounting offices in the country, like Coopers & Lybrand.

In case the Income Tax law does not provide any clues regarding what rates of depreciation to use, some rules of thumb are given here (It has to be kept in mind that income tax depreciation is based on the declining balance principle):

Land:	0% p.a.;
Site preparation:	2% p.a.;
Design & engineering:	10% p.a.;
Buildings:	5% p.a.;
Service facilities:	5% p.a.;
Transport equipment:	25% p.a.;
Plant Mach. & Equipment:	10% p.a.;
Infrastructure:	3% p.a.;
Pre-production capital expenditures:	25% p.a.;
Contingencies:	5% p.a.;
Research & development:	20% p.a.;
Technology:	20% p.a..

These rates are also the default values being used in the PROPSPIN-spreadsheet.

4. REQUIRED FINANCIAL STATEMENTS

To estimate the financial requirements of a new or expanding enterprise either a "projected-balance sheet" or a "cash-flow forecast" is used in addition to the net-income statement. The balance sheet method of determining future needs of funds is built around a forecast of the size of the key balance sheet items at a selected future date. The date selected is an important factor, and should be at a time of normal operation. Cautious forecasters would prepare a second balance sheet of a different future date, when for some reason (e.g. diminishing sales, delayed accounts receivable, increased costs of production), the enterprise might be in financial difficulties. A comparison of the two balance sheets would show where to allow for "cushions" of funds.

The cash-flow method is in many ways a "budgeting" method, and is more comprehensive than the balance sheet method as a way of forecasting the amount and timing of funds needed. The theory of the cash-flow forecast is based on the anticipated receipt of cash at a certain time and the predicted outflow of cash at other times. As the cash-flow statement deals only with cash transactions, non-cash items, such as depreciation, bad debt write-offs, intangibles and others will not appear on it.

In case of expansion projects, financial statements should be provided for the past 3-5 years in addition to the projected pro formas. The next paragraphs will give a brief introduction to the cash-flow table, balance sheet and net-income statement.

4.1 Cash-flow table for financial planning

It is not sufficient only to find sources of finance; the timing of inflow of funds (from financial resources and sales revenue) must also be synchronized with the outflow of investment expenditures, production costs and other expenditures. If this is not done, significant losses of revenue, in terms of interest (as a result of idle funds) or delays in project implementation (as a result of financial bottle-necks) may ensue.

It is, therefore, necessary to prepare a cash-flow table showing the inflow and outflow of finance. Such a cash-flow table is of utmost importance in the investment phase of the project, when it should be drawn up at least once a month. At the pre-investment stage, however, an annual cash-flow table is usually sufficient.

Just as the planning of capital financing aims to ensure that capital is available to finance investment expenditure and that investment inflow and outflow are

synchronized, financial planning for the operation period must ensure that cash inflow from sales revenue will be adequate to cover production costs and all financial commitments, such as debt service charges (both interest and principal), taxes, and payments of projected dividends. This aspect is particularly significant in the early years of operation, when output is usually considerably below capacity, while the burden of debt service is usually the highest. This is the case, for example, with supplier credits, which usually have to be repaid over 5-8 years in equal instalments of principal plus interest.

On the next page is an example of the cash-flow table as it appears in the PROPSPIN programme (cas2).

As can be seen in the example, PROPSPIN only gives a cash-flow table for the total project period. COMFAR, however, will supply a cash-flow table for the production period as well as for the construction period. This is useful in complex projects, where the in- and outflow of foreign exchange needs to be monitored closely. The cash-flow table is closely linked to the projected balance sheet since the cash-flow cumulative cash balance, which should never become negative, is eventually transferred to the cash balance of the projected balance sheet. In the example, the cash balance grows significantly, as do the reserves.

Since capital is frequently scarce, it is the general tendency of inexperienced promoters to perform pre-investment studies with the investment outlays and financial resources maintained as low as possible. A project analyst should resist the temptation of pleasing the sponsors of the study by such low figures. Bad financial planning in pre-investment studies will slow down the progress of the project either while obtaining clearance by financial institutions or at an even more crucial stage of project implementation and can therefore lead to the project's failure. In order to shed more light into the financial structure of investment proposals, in every pre-investment study alternative modes of financing must be considered and provided for and an attempt made to develop contingency plans. Cash-flow tables for financial planning proposals should therefore indicate the amounts and timing of finance needed and should be produced for all alternatives in order to facilitate the final choice of financing.

PROPSPIN - CASHFLOW

	1	2	3	4	5	6	7	8	9	10
Total SALES	0	0	0	0	0	0	0	0	0	0
Equity	0									
Loans	0									
Total Cash Inflow	0	0	0	0	0	0	0	0	0	0
Total assets	0	0	0	0	0	0	0	0	0	0
Operating costs	0	0	0	0	0	0	0	0	0	0
Cost of finance	0	0	0	0	0	0	0	0	0	0
Repayment	0	0	0	0	0	0	0	0	0	0
Corporate tax	0	0	0	0	0	0	0	0	0	0
Dividends paid	0	0	0	0	0	0	0	0	0	0
Total Cash Outflow	0	0	0	0	0	0	0	0	0	0
Cash Surplus	0	0	0	0	0	0	0	0	0	0
Cum. Cash Balance	0	0	0	0	0	0	0	0	0	0
Net Cash Flow	0	0	0	0	0	0	0	0	0	0
Cum. Net Cashflow	0	0	0	0	0	0	0	0	0	0

4.2 Net income statement

This statement is used to compute the net income or deficit of the project by periods for the entire duration of the project. It differs from the cash-flow statement inasmuch as it follows the accrued concept: revenues are associated with the costs that were needed to achieve the revenues during the period under consideration.

The net-income statement also serves as a link with the projected-balance sheet, with the accumulated losses/reserves derived from the net-income statement and inserted in the projected-balance sheet. In a lot of cases, the net income statement serves as a subsidiary table for the computation of corporate tax. That means that depreciation has to be used during the construction of this table. On the next page is an example of an net-income statement, produced by PROPSPIN (inc).

PROPSPIN - NET INCOME STATEMENT

Item Period >>>	1	2	3	4	5	6	7	8	9	10
Total SALES	0	0	0	0	0	0	0	0	0	0
Less: OPERATING COSTS										
Materials	0	0	0	0	0	0	0	0	0	0
Direct Labour	0	0	0	0	0	0	0	0	0	0
Utilities	0	0	0	0	0	0	0	0	0	0
Deprec & Amort	0	0	0	0	0	0	0	0	0	0
Other Overheads	0	0	0	0	0	0	0	0	0	0
Admin & Marketing	0	0	0	0	0	0	0	0	0	0
Managment & Tech	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
Operating Profit	0	0	0	0	0	0	0	0	0	0
Less: Interest Expense	0	0	0	0	0	0	0	0	0	0
Profit before Tax	0	0	0	0	0	0	0	0	0	0
Income Tax Expense	0	0	0	0	0	0	0	0	0	0
Net Profit	0	0	0	0	0	0	0	0	0	0
Less: Dividends	0	0	0	0	0	0	0	0	0	0
Undistributed profit	0	0	0	0	0	0	0	0	0	0

4.3 Projected-balance sheet

This method consists of the forecasting of key balance-sheet items, such as cash balance and other current assets (viz. raw materials, accounts receivable, work-in-progress and finished products), and fixed assets, as well as equity and loan capital and *current liabilities* that are required for the smooth performance of the enterprise. The projected-balance sheet gives the total financial picture at certain intervals during the life of the project.

It is essential to understand the difference between the balance sheet of a sole proprietor, and that of a partnership or a corporation, most common being a limited company. The balance sheet of a sole proprietor will give a very incomplete picture as it shows only the assets employed in the business, and not the proprietor's private assets (with which he guarantees the business); again, only those *liabilities* that arise directly out of it are shown. The profit-and-loss statement will be more useful, as it will show the scale of operations and the annual results. The balance sheet of a partnership or firm, if properly drawn up, will show all the assets and liabilities of a business. A creditor of the firm has recourse to the means of all the partners, while the balance sheet of a limited company will show its complete position. All assets and liabilities are clearly and unequivocally stated.

In summary, a limited company produces the most exact, a partnership the most conservative and a sole proprietorship the least complete or reliable of balance-sheets. The rate of turnover is a measure of the marketing capabilities of management. It is computed by the following equation:

$$\text{Rate of turnover} = \frac{\text{Cost of goods manufactured during the year}}{\text{Value of average stock}}$$

All other things being equal, the faster the stock turnover, the better for the finances of the company.

Over-trading, which is often found in developing countries, is caused by trying to maintain a scale of operations with insufficient cash resources. The effects of over-trading can be disastrous and can even lead to complete failure. Over-trading can be caused by inflation and rising prices, increased stocks, heavy taxation, depletion of working capital or over-expansion. The cure for over-trading is naturally in finding sources of additional cash, reducing operations and reducing stocks.

Over-trading can be detected in balance sheets from the following indicators:

-The number of creditors is growing faster than the number of debtors;
-Without an increase in turnover, the total amount of loans increases, the creditor accounts increase or the stocks and work-in-progress increase;
-Receivables decrease;
-Above all, there is a reduction of liquid resources and a failure to raise fresh cash by borrowing, as one pledgeable asset after another is mortgaged.

PROPSPIN - BALANCE SHEET

Period	Work cap (Days)	1	2	3	4	5	6	7	8	9	10
ASSETS											
Current Assets											
Cash		0	0	0	0	0	0	0	0	0	0
Accounts Rcvbl	30	0	0	0	0	0	0	0	0	0	0
Inventory											
Raw Material	60	0	0	0	0	0	0	0	0	0	0
In-Process	15	0	0	0	0	0	0	0	0	0	0
Finished Goods	15	0	0	0	0	0	0	0	0	0	0
Spares	180	0	0	0	0	0	0	0	0	0	0
Subtotal		0	0	0	0	0	0	0	0	0	0
Securities		0	0	0	0	0	0	0	0	0	0
Current Assets		0	0	0	0	0	0	0	0	0	0
Fixed Assets											
Cost		0	0	0	0	0	0	0	0	0	0
Less											
Accum Dep/Amort		0	0	0	0	0	0	0	0	0	0
Net		0	0	0	0	0	0	0	0	0	0
TOTAL ASSETS		0	0	0	0	0	0	0	0	0	0
LIABILITIES											
Current Liabilities											
Accounts Payable	30	0	0	0	0	0	0	0	0	0	0
Loans											
Short-term		0	0	0	0	0	0	0	0	0	0
Long-term		0	0	0	0	0	0	0	0	0	0
Bonds/Debentures		0	0	0	0	0	0	0	0	0	0
Suppliers' Credit		0	0	0	0	0	0	0	0	0	0
Export Credit		0	0	0	0	0	0	0	0	0	0
Total Loans		0	0	0	0	0	0	0	0	0	0
Equity		0	0	0	0	0	0	0	0	0	0
Undistributed Profit		0	0	0	0	0	0	0	0	0	0
TOTAL LIABILITIES		0	0	0	0	0	0	0	0	0	0
NET WORKING CAPITAL		0	0	0	0	0	0	0	0	0	0

5. FINANCIAL AND ECONOMIC EVALUATION

In this chapter three methods of financial and economic evaluation will be explained. One of them, the pay-back period, is a simple method of financial evaluation. The other two are *discounting* methods, the net present value and the internal rate of return[6]. The pay-back period gives a rough estimate of the viability of the project, although it is not very reliable because it does not take into account any *time preference*, a problem that is being solved by using a discounting method. In many cases the internal rate of return is considered to be the most important parameter of a specific project.

5.1 Pay-back period

This pay-back period is not the period referring to the pay-back of loans. In this case it refers to the period of time that it takes the project to pay back the initial investment outlay, out of the profits earned by the project. In this case "profit" is being defined as net profit after taxation, adding financial costs (interests) and depreciation. This is an example of how a pay-back period is being calculated:

In order to apply for a loan from the bank, Jumbo Ltd. wants to know how long it will take them to earn back the investment outlay, out of the profits made by the project. It is being calculated that the initial investment cost will be K 10,000 and that the net profit, interests and depreciation will develop as follows:

	Year 1	Year 2	Year 3	Year 4	Year 5
Net profit	-2,800	3,000	3,500	3,500	4,000
Interests	1,000	750	500	250	0
Depreciation	1,000	1,000	1,000	1,000	1,000
"Profit"	- 800	4,750	5,000	4,750	5,000

In order to calculate the pay-back period, one now has to look at which stage the cumulative "profit" equals the initial investment outlay, K 10,000:

"Profit"	- 800	4,750	5,000	4,750	5,000
Cum."Profit"	- 800	3,950	8,950	13,700	18,700

[6]These methods are explained in more detail in "Manual for the preparation of Industrial Feasibility Studies", UNIDO, Vienna, 1986, Page 175-180.

One can see that the cumulative "Profit" passes the K 10,000 mark during the fourth year of production. One can therefore say that the pay-back period of the project is 4 years. The same result can be obtained using the cumulative net cash-flow.

There are two ways to calculate the pay-back period: one is the method described above, either including or excluding the eventual construction period. The other one excludes the value of land and net working capital from the initial investment costs. The reason for this is that it is assumed that these costs can be fully recovered at the end of the project's lifetime. If it is assumed that investment costs in the example contain an allowance of K 2,000 for land and working capital, the pay-back period will be determined by the moment in time the cumulative "profit" passes the (10,000 - 2,000) = K 8,000 mark. The table shows that that will be during the third year. So, in this case the pay-back period will be decreased to three years because of the smaller amount of investment capital to be recovered. In this case one can also decide to include or exclude the construction period. It should be noted that the PROPSPIN-spreadsheet uses the first method, including the construction period. COMFAR does not give the pay-back period at all.

A single project may be accepted if the pay-back period is smaller than, or equal to an acceptable time period; this period is usually derived from past experience with similar projects. The major merit of the pay-back period as a project selection criterion is its easy calculation. It is particularly useful for risk analysis, which is relevant in branches of industry that face rapid technological obsolescence. The main shortcoming of this method is that it does not consider what will happen once the project has paid for itself and that it over-emphasizes quick financial returns. Furthermore, this method does not measure the profitability of the project proposal but it is mainly concerned with its liquidity. In summary, this method is not a reliable criterion for project selection, but it can be an useful supplementary tool in some cases.

5.2 Net present value

One of the major shortcomings of the simple methods of financial evaluation is that they do not make any distinction between a certain profit being made today and the same profit being made in the future. It is quite obvious that a financial manager prefers to earn K 1,000 in Year 1 over earning the same amount of money in Year 10. This assumption forms the base of the discounting methods of financial evaluation. Using a *discount rate*, these methods try to value profits being earned in the future in "today's money", in order to be able to compare different scenarios for the project. This value is called the present value. The starting point for this valuation is in general the point in time the implementation of the project is supposed to start.

The sum of all present values of a project is called the net present value (NPV). The formula for the calculation of the NPV is as follows:

$$NPV = X_0 + \frac{X_1}{(1+k)^1} + \frac{X_2}{(1+k)^2} + ... + \frac{X_n}{(1+k)^n} \qquad (1)$$

where X_x is the net cash flow in year x, while k is the discount rate, valued between 0 and 1 (so a discount rate of 15% becomes k = 0.15). The discount rate being used is usually closely related to the expected prevailing interest rate for long-term loans. The reason for this is that in case the project is only just viable, using the interest rate as the discount rate, the management might as well put the investment capital in the bank, using that interest rate to earn a less risky return. In general the discount rate will have to be several percentage points higher than the current commercial interest rate in order to attract investors because of the extra risk involved in investing in the project.

In case the NPV is positive, the project is considered to be viable. This example will illustrate the use of this formula:

> Henzo Pty. Ltd. wants to expand and has developed two alternatives for this project. In order to make a decision what project to choose, the net present value of both projects is being calculated. The total investment for both projects is estimated to be K 5,000. The current interest rate is 15% so the management decides that the discount rate to be used will be 18%. The calculated net cash flows and their present value for the two alternatives, using a discount rate of 18%, are as follows:

	Year 0	Year 1	Year 2	Year 3	Year 4
Alt. 1	- 5,000	3,000	2,500	1,500	1,000
Pres. value	- 5,000	1,796	913	516	2,543
Alt. 2	- 5,000	1,000	1,500	2,500	3,000
Pres. value	- 5,000	848	1,077	1,522	1,547

If one now calculates the net present value by adding up the respective present values, he finds these results:

Alternative 1: K 768
Alternative 2: - K 6

So, on the basis of the NPV calculated, alternative 1 is considered viable, while alternative 2 is not considered viable.

So, although the initial investment outlay and the total non-discounted profits are equal for both projects, alternative 1 is being preferred over alternative 2 due to the time preference of the management.

The discounting period should be equal to the life of the project. In order to assess the lifetime of the project one can relate this to the lifetime of the fixed assets. For instance, the useful life of equipment is generally between 10 and 15 years. Factory buildings of solid material will usually last 30 or 40 years, vehicles 4 or 5 years etcetera. The practical solution is to take the life of the essential part of the fixed assets, although a discounting period of longer than ten years is not advisable due to the level of uncertainty. Obviously, in a factory this is the basic equipment. The value of fixed assets that last longer, buildings for example, must be valued at their salvage value at the end of the discounting period. This is also true for the values of land and working capital, which remain almost constant during the lifetime of the project. Assets with a shorter lifetime should be replaced.

It should be noted that during the calculation of the net present value, the depreciation is not taken into account since this does not involve any cash movement. However, repayments of credits are considered, since they are cash outflows. In addition to this it should also be noted that there are two versions of the net present value in use. One includes interest payments and repayments of loans as cash outflows, and is called the net present value with outside financing and is interesting for the investor who wants to

know the return on his equity. The version that does not include these cash outflows in the total cash flow, is called the net present value without outside financing and is being used by the banker in order to assess the capability of the project to repay the loans.

If one of several project alternatives has to be chosen, the project with the largest NPV should be chosen, as can be seen in our example. This needs some refinement though, since the NPV is only an indicator of the positive net cash flows. In cases where there are two or more alternatives, it is advisable to know how much investment there is needed to generate these positive NPV's. The ratio of the NPV and the present value of the investment (PVI) required, is called the net present value ratio (NPVR), and yields a discounted rate of return; this should be used for comparing alternative projects. The formula is as follows:

$$NPVR = \frac{NPV}{PVI} \qquad (2)$$

Given alternative projects, the one with the highest NPVR should be chosen. When only one project is being considered a positive decision should only be made if the NPVR is greater than or equal to zero. When comparing alternatives, care should be taken to use the same discounting period or rate of discount for all projects. In our example the NPVR for alternative 1 was $\frac{768}{5000} = 0.1536$ while the NPVR for alternative 2 was negative: $\frac{-6}{5000} = -0.0012$.

In summary, the NPV has great advantages as a selective method compared with the pay-back period, since it takes account of the entire life of the project and of the timing of the cash flows. The NPV can be considered as a calculated investment rate which the profit rate of the project should at least reach. The shortcomings of the NPV are the difficulty in selecting the appropriate discount rate and the fact that the NPV does not show the exact profitability rate of the project. For this reason the NPV is not always understood by businessmen, used to think in terms of a rate of return on capital. Therefore it is advised to use the internal rate of return instead.

5.3 Internal rate of return

The internal rate of return (IRR) is closely related to the net present value since the internal rate of return is the discount rate at which the present value of the cash outflows of a project is equal to the present value of the cash inflows. In other words, it is the discount rate at which the net present value is zero. Since there is no formula to calculate the IRR, one has to calculate the NPV using several discount rates, until one has found the one that gives an NPV of zero.

The normal way to proceed is to start with an estimated discount rate. If the NPV, using this discount rate, is positive, a higher discount rate should be tried. If the NPV is negative, a lower discount rate should be tried. If the sign of the NPV changes, using the next discount rate, the IRR must be somewhere between these two rates. If one has obtained a positive and a negative NPV which are both close to zero, a relatively precise and less time consuming way to arrive at the IRR is to use this formula:

$$IRR = I_1 + \frac{PV\,(I_2 - I_1)}{PV + NV} \qquad (3)$$

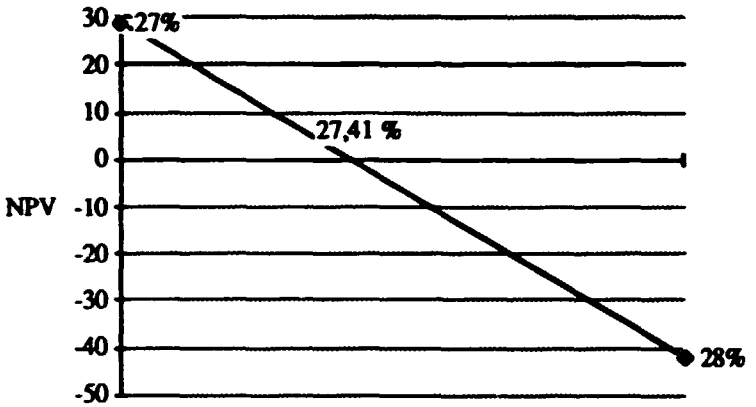
where PV is the positive NPV at the low discount rate I_1 and NV the negative NPV at the high discount rate I_2. The numerical values of NV and PV are both positive. It should be noted that I_1 and I_2 should not differ by more than 1 or 2 per cent. The difference should not be too big since the discount rate and the NPV are not related linearly. If this theory is applied to the example of the previous paragraph, one finds the following:

> Henzo Pty. Ltd. wants to know the exact profitability of alternative 1 and therefore the financial manager of the company tries to assess the internal rate of return by using several discount rates to calculate the NPV. Since the NPV at 18% was still positive, the IRR has to be higher than 18%. After trying a few discount rates these two tables of cumulative present values are found for the discount rates 27% and 28%:
>
> | | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 |
> |---|---|---|---|---|---|
> | 27% | - 5,000 | -2,638 | -1,088 | - 356 | 29 |
> | 28% | - 5,000 | -2,656 | -1,130 | - 415 | - 42 |
>
> This indicates that the internal rate of return lies somewhere between 27% and 28%.

Using the formula gives:

$$IRR = 27 + \frac{29 \times (28 - 27)}{29 + 42}$$

Thus the internal rate of return for alternative 1 would be 27.41%. Instead of using the formula, it is also possible to determine the IRR graphically, using the NPV's at 27% and 28%:



The result of this graph is exactly the same as the result of using the formula.

Some people have difficulties to grasp the concept of the internal rate of return. Why is it related to the commercial interest rate for long term loans and of what amount of money is it the rate of return? These are the most common questions asked. In order to try to get an answer to these questions one has to take a look at the viewpoints of a potential investor, who has a certain amount of private capital to invest. In case he is thinking of spending the money on investing it in a project, there is always an alternative, namely putting it into a regular savings account. Since the investor in general prefers the highest yield on his capital, the return of the project has to be higher than the return of the savings account. In other words, the interest rate of the project has to be higher than the interest rate of the savings account, also because the risks involved in investing in the project are much higher than the risks involved in putting his money into the bank. This interest rate of the project is equal to the internal rate of return and has to be higher than the *hurdle rate*. In fact the IRR is equal to the interest rate a regular savings account should have, in order to generate the same profile of cash outflows (in time and size) out of the same profile of cash inflows, as the project does.

Returning to the example, one can see that a savings account needs to offer an interest rate of 27.41% in order to enable the investor to take out K 3,000 after one year, K

2,500 after two years, K 1,500 after three years and K 1,000 after four years, after an initial input of K 5,000. This is the same profile of cash inflows and cash outflows the project offers. As long as the actual interest rates on a savings account are lower than 27.41%, it is more profitable for an investor to invest in the project, than putting his money in a regular savings account, although it is much riskier as well.

As was the case with the net present value, there are different kinds of the internal rate of return. The two major ones are the internal rate of return with outside financing and the internal rate of return without outside financing. The first rate of return includes costs of outside financing (interest and repayments) in the cash outflows, while the second internal rate of return does not. So, the internal rate of return with outside financing gives the rate of return on the equity capital, while the one with outside financing gives the rate of return on the total investment outlay. The IRR without outside financing is in general used by bankers and other creditors, in order to assess the capability of the project to repay its debts. The IRR with outside financing is being used by the investor to see what his profit is after paying debts and tax. While COMFAR will give both IRR's, the one with outside financing being called IRRE, PROPSPIN only calculates the IRR without outside financing.

One of the major disadvantages of the IRR, that should be kept in mind while determining one, is the fact there can be several IRR's, if after the investment period there are more negative cashflows and that in case of pre payments, there might be no IRR at all. For example:

The projected cashflows of two projects look like this:

	Year 1	Year 2	Year 3
Cashflow Project A	-36	85	-50
Cashflow Project B	50	-100	75

Project A is calculated to have both 10% AND 25% as possible IRR's and it is impossible to determine which IRR to use. For project B, no IRR will be found since the NPV is always positive.

So in these cases one will have to rely on other methods of financial evaluation, since the method of IRR will not give any clues.

The method of the internal rate of return can also be used to perform some kind of risk analysis. By changing one or more key variables and watching the change in the internal rate of return, one can get a fair idea about the sensitivity of the project to that particular variable. If the change is a large one, one has to study the likelihood of this change in the key variable(s) to happen.

5.4 Break-even point

Break-even analysis determines the break-even point (BEP), the point at which sales revenues equal production costs. The break-even point can also be defined in terms of physical units produced, or of the level of capacity utilization at which sales revenues and production costs match each other.

Prior to calculating the break-even point, the following assumptions should be observed:

- Production costs are a function of production volume;
- The sales volume is equal to the production volume;
- Fixed *operating costs* are equal for all production volumes;
- Variable production costs vary in proportion to the production volume;
- The unit sales price is equal for all production volumes;
- Data from a normal year of production should be taken;
- The level of unit sales price, variable and fixed operating costs remain constant;
- The product mix should remain constant.

The break-even calculation in the PROPSPIN spreadsheet is based on these assumptions. Since almost no project fits in the framework described above, the break-even calculation should only be used as an supplementary tool.

There are two methods to determine the BEP, an algebraic and a graphical one. Both methods will be discussed in this paragraph:

Algebraic determination of the break even point

When expressing the break-even point in physical units produced, the basic assumption can be put into the following equations (annual data):

- Sales value = production costs (I)
- Sales value = (sales volume) x (unit sales price) (II)
- Production costs = (*fixed costs*) + (variable unit costs) x (sales volume) (III)

Writing x for production (sales) volume (at BEP), y for sales value (= production costs), f for fixed costs, p for unit sales price, and v for variable unit costs, the following algebraic expressions are derived:

Equation for sales	$y = p \times x$	(IIa)
Equation for production costs	$y = v \times x + f$	(IIIa)
Thus,	$p \times x = v \times x + f$	(Ia)
and	$x = \frac{f}{p - v}$	(IV)

In these equations, the break-even point is determined by the relationship between fixed costs and the difference of the unit sales price and variable unit costs. Several practical conclusions can thus emerge from the break-even analysis:

- A high break-even point is inconvenient since it renders a firm vulnerable to changes in the level of sales.
- The higher the fixed costs, the higher the break-even point.
- The larger the difference between unit sales price and variable operating costs, the lower the break-even point.

This example will illustrate the calculation of the BEP:

> Velo Ltd. is selling 10,000 bicycles per year at K 250 a piece. The fixed costs of production are about K 500,000 per year while the variable costs of production are estimated at K 150 per bicycle. The management now wants to know what the BEP is for this plant. Using formula 4 one finds the following:
>
> $f = 500{,}000$
> $p = 250$
> $v = 150$
>
> Thus,
>
> $$x = \frac{500000}{250 - 150} = 5000$$
>
> So one can conclude that the BEP of this plant lies at a production level of 5000 bicycles per year or, in other words, 50% of the production.

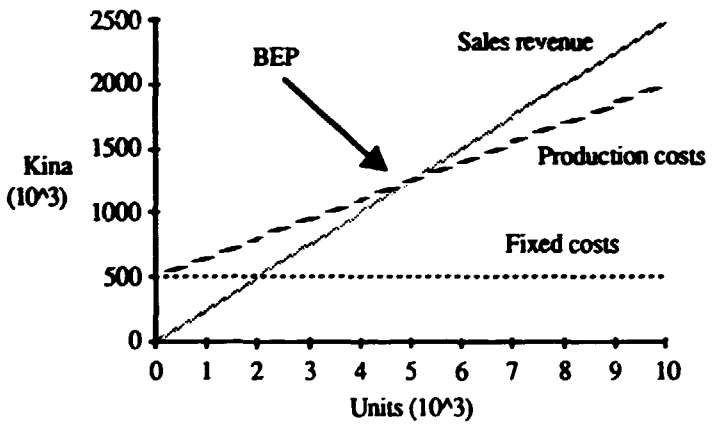
Since the BEP is quite easy to determine, it lends itself easily to sensitivity analysis, in order to determine the impact of a change in the project outlay.

Graphical determination of the break-even point

Graphically the break-even point can be determined on the basis of the two equations:

Sales revenue	$y = p \times x$
Production costs	$y = v \times x + f$

The intersection of the lines is the break-even point, which in this case is defined in terms of units of production. Knowing the rated capacity of the project, it is fairly easy to determine the rate of capacity utilization at the break-even point. If the data out of the previous example are used this result will be found:



The result, 5,000 units, is the same as the result of the algebraic determination of the break-even point.

6. RATIOS FOR FINANCIAL ANALYSIS

In financial analysis it is usual to refer to several well-known ratios. These are derived from data on the project-balance sheet, the net-income statement and the cash-flow table for financial planning. The ratios discussed below are those that are most frequently used. Other ratios may be applied as well. Whichever choice is made by the project evaluator, he should not apply them mechanically, but rather consider them as tools for assessing the prevailing financial situation.

Long-term debt-equity ratio

The long-term debt-equity ratio is an indicator of the financial risk that a new project faces, and compares borrowed and owned funds. Financial prudence sets certain norms for this ratio. In a number of projects of large or medium size, an ideal equity-debt ratio of 50:50 tends to be adopted, but this is by no means a standard pattern. A feasibility study should define the appropriate financing arrangement, taking the availability of resources and the nature of the requirements of funds fully into account. The current policy of banks in Papua New Guinea forces most projects to adopt a debt-equity ratio of approximately 60:40 in most cases.

The debt-equity ratio is also a measure of investor leverage. The smaller the equity capital, the higher the income per unit share. Equity owners therefore favour high debt-equity ratios since such ratios give leverage to equity capital, and allow equity owners to control projects even with a small amount of capital. Investment banks ask for a sound debt-equity ratio, since the largest portion of equity capital is always tied in land, buildings and equipment, which can be liquidated only with difficulty or only at a loss in case of bankruptcy of the project. Banks therefore frequently refuse to finance a project with loans greater than the amount the promoter is prepared to invest, thus limiting the loan to 50% of the required investment outlay.

Current ratio

The current ratio is a liquidity measure computed by dividing current assets by current liabilities. This ratio is a very rough indicator of a company's ability to meet current liabilities. It is so rough that, for example, even a "satisfactory" ratio would be misleading as far as the liquidity situation is concerned, if the inventory could not, for example, be sold for cash. To guard against this, the "quick ratio" is frequently used in addition to the current ratio. The quick ratio is computed by dividing cash plus

marketable securities and discounted receivables by current liabilities. The ratio thus eliminates inventory and prepaid expenses from current assets. In view of the danger of possible misinterpretations, the following ranges of "satisfactory" values can only be offered with great reservation:

Current ratio	2.0 - 1.2
Quick ratio	1.2 - 1.0

7. VALUE ADDED ANALYSIS

Value added is the basic criterion for the overall effects of a project on the economy. It represents in a most general way the difference between the output value and the value of inputs purchased from other units. It is particularly useful for project analysts, government officers for example, who want to assess the effect of the project on the national economy. Private investors are in general not very interested in this kind of analysis.

The evaluation of an investment project is based on net value added. Net value added generated by a project equals value of output, minus value of current material inputs and services purchased from outside the project, minus total investment outlays:

$$NVA = O - (MI + I) \qquad (4)$$

where

NVA	=	expected net value added generated by a project;
O	=	expected value of the output of a project which is usually the sales revenue;
MI	=	expected value of current material inputs and services purchased from outside the project required to obtain the above output;
I	=	total investment.

It may be noted that the material inputs of a project include all current materials and services (raw materials, energy, fuel, transport, maintenance etc.) purchased from outside the project.

The net value added comprises two major components: wages and salaries, W, and social surplus, SS:

$$NVA = W + SS \qquad (5)$$

Wages and salaries express the level of employment and the average wages of the people employed. The social surplus expresses the earning capacity of a project. It comprises indirect taxes, interest, dividends, insurance and reinsurance charges, rent, royalities, and undistributed profit that is being used by the firm for expansion funds, reserve funds, social welfare funds etc.

Net value added can be measured for any single year or for the entire life of the project.

Net value added for a single year:

$$NVA = O - (MI + D) \text{ (for that year)} \quad (6)$$

where

D = annual depreciation.

The net domestic value added produced by a project consists of two parts:

(a) Net national value added: that part that is produced and distributed in a country;
(b) Repatriated net value added: that part that is produced by a project but repatriated abroad (wages, interest, net profits, dividends, rents, royalties, insurance and reinsurance, or any other foreign payments not included in material inputs).

Investment projects are evaluated in terms of net national value added (NNVA). This value added is the most important index of the contribution of a project to the national economy. All repatriation payments are to be excluded. The formula for finding the net national value added would therefore be as follows:

$$NNVA = O - (MI + I + RP) \quad (7)$$

where RP is equal to all repatriated payments in respect of this project such as royalties, insurance, rents, interest and net profits of foreign capital as well as wages of expatriate labour. Under the present circumstances this analysis is very worthwhile for projects in Papua New Guinea, due to the exceptional high costs of expat labour.

On page 53 is the value added analysis table as it appears in the PROPSPIN programme. Note that in the last line of this sheet the absolute efficiency test is being mentioned. This test shows whether the net value added estimated for a single year also yields some surplus over the wages for that year. This is done by using the following formula:

$$E = 0 - (MI + D) > W \quad (8)$$

where

E	=	absolute efficiency test of the project in terms of value added surplus over the wages on the basis of data for a normal year;
O	=	expected value of normal annual output (usually annual sales revenue);
MI	=	expected value of normal annual current material inputs and services purchased from outside the project;
D	=	expected depreciation of fixed capital in a normal year;
W	=	expected wages in a normal year.

As can be easily seen, this formula is based on net domestic value added. As a matter of fact this test checks whether the project, being formulated, shows a social surplus. PROPSPIN calculates the present value of the annual NNVA's and wage totals of the project's lifetime and gives the result.

If the PV(NNVA) is higher than the PV(Wages), it means that the project yields a social surplus. A more detailed analysis of the project may now be undertaken with some confidence. Even if there is no such surplus, it may not be necessary to abandon the project at this stage, but how to improve it may be considered.

PROPSPIN - VALUE ADDED ANALYSIS

Item Period >>>	1	2	3	4	5	6	7	8	9	10
VALUE OF OUTPUT	0	0	0	0	0	0	0	0	0	0
Domestic	0	0	0	0	0	0	0	0	0	0
Exports	0	0	0	0	0	0	0	0	0	0
Residual Value										
VALUE OF MATERIAL INPUT	0	0	0	0	0	0	0	0	0	0
Investments:	0	0	0	0	0	0	0	0	0	0
Imported	0	0	0	0	0	0	0	0	0	0
Domestic	0	0	0	0	0	0	0	0	0	0
Current Material Input:	0	0	0	0	0	0	0	0	0	0
Imported	0	0	0	0	0	0	0	0	0	0
Domestic	0	0	0	0	0	0	0	0	0	0
Utilities	0	0	0	0	0	0	0	0	0	0
NET DOMESTIC VALUE ADDED	0	0	0	0	0	0	0	0	0	0
REPATRIATED PAYMENTS	0	0	0	0	0	0	0	0	0	0
Wages	0	0	0	0	0	0	0	0	0	0
Profits (dividends)	0	0	0	0	0	0	0	0	0	0
Interest	0	0	0	0	0	0	0	0	0	0
NET NATIONAL VALUE ADDED	0	0	0	0	0	0	0	0	0	0
Wages	0	0	0	0	0	0	0	0	0	0
Social Surplus (percent)	0	0	0	0	0	0	0	0	0	0
Discount factor at: 0	0	0	0	0	0	0	0	0	0	0
Discounted NET NATIONAL VALUE ADDED	0	0	0	0	0	0	0	0	0	0
Discounted Wages	0	0	0	0	0	0	0	0	0	0
Discounted Social Surplus	0	0	0	0	0	0	0	0	0	0

ABSOLUTE EFFICIENCY TEST	PV (NNVA)		PV (Wages)
	0	=	0

ANNEX A:

Glossary[7]

ASSETS:

An entity possessing market or exchange value, and forming part of the wealth or property of the owner. In economics an important distinction is made between "real" assets, which are tangible resources like plant, buildings and land yielding services in production or directly to consumers; and financial assets (which include money, bonds and equities) which are claims or titles to receive income, or to receive value from others.

CARRY FORWARD OF LOSSES:

The possibility to subtract losses made today, from profit made in the future, in order to decrease the income tax payable in the year the profit is being made. In most cases where this is possible, there is a maximum time span over which the tax-payer can carry forward his losses

CURRENT ASSETS:

There are three main components of current assets. The first is stocks, including finished goods, work-in-progress, and raw materials.The valuation of stocks is a difficult and sometimes contentious matter. The second item is accounts receivable or short-term debtors. The main problem under this heading concerns the estimation of bad debts. The third element is cash and short-term investments. The size of current assets, particularly in relation to other financial indicators in the form of financial ratios, is a main indicator of the liquidity of the company.

CURRENT LIABILITIES:

A statement of a company's debts which have to be settled within the subsequent year. It is the measure of a company's total short-term debt. The debts may be for goods purchased, or for services received. They include credit obligations and interest payments. Their amount, especially in relation to other financial indicators, give a picture of the liquidity position of a company.

---

[7]Based on "MacMillan Dictionary of Modern Economics", editor D.W. Pearce, MacMillan Press Ltd., London, 1981.

DEPRECIATION:

The reduction in the value of assets, generally arising from wear and tear. The consumption of capital is recognized as a cost of production and an allowance for this is made before net profit is arrived at. Conventional accounting seeks to allocate the decline in value of the asset over its projected economical life. Annual provisions are conventionally calculated by one of two methods. The first is the 'straight-line method' where the cost of the asset minus the residual disposal value is divided by the number of years of its expected life to give the annual figure. The second is the 'declining balance method' where the figure employed is a constant proportion of the value of the asset and so an annually declining amount. Generally historic values of capital have been employed.

Depreciation is generally permitted as an allowance against profits for corporation tax purposes, but the allowances have to be calculated according to rules set down by tax authorities and these need not correspond to the depreciation charged by a firm in its accounts.

DEPRECIATION METHOD:

Because depreciation charges are deductible as an expense, they affect the amount of tax to be paid. The greater these charges, the lower the tax, all other things remaining constant. There are three methods for depreciating a capital asset: straight-line, declining-balance, and sum-of-the-years'-digits methods. The last two are forms of accelerated depreciation.

To illustrate the first two methods of depreciation, consider first straight-line depreciation. If an asset, costing K15,000, has to be depreciated over five years, annual depreciation charges using straight-line depreciation would be K15,000/5, or K3,000. The declining-balance method of depreciation must specify some multiple. Let us assume initially that the multiple is 2. With the declining-balance method, depreciation charges in any year then are

$$2(BV/n)$$

where BV is the undepreciated book value at the start of the year, and n is the depreciable life of the asset. For a K15,000 asset, with a 5-year life, depreciation charges in the first year would be

$$2(K15,000/5) = K6,000$$

Depreciation charges in the second year are based upon an undepreciated book value of K9,000; one arrives at K 9,000 by subtracting the first year's depreciation charges, K6,000, from the asset's original book value. Depreciation charges in the second year would therefore be

$$2(K9,000/5) = K3,600$$

In the third year they would be

$$2(K5,400/5) = K2,160$$

and so on.

DISCOUNTING:

The process of applying a rate of interest to a capital sum. It is widely employed to find the equivalent value today of sums receivable or payable in the future. Thus if the rate of interest or discount rate is 10 per cent and if the sum of K 110 is receivable in one year's time, its present value is K 100. Discounting is the reverse of compounding and the formula for executing it on any sum, Si is:

$$\frac{Si}{(1 + r)^i}$$

where r refers to the rate of discount.

DISCOUNT RATE:

The rate at which future benefits and costs are discounted because of time preference or because of the existence of a positive rate of interest. Thus, if K 100 accrues each year to an individual, the K 100 in year 1 is worth less than K 100 in the present. This is because the individual prefers his benefit rather now than in the future, or because K 100 now can be invested at the rate of interest, r, to become K 100 x (1 + r) in 1 year's time. Hence the individual values K 100 now and K 100 x (1 + r) in 1 year's time the same. It follows that he also values K 100/(1 + r) now and K 100 in one year the same (dividing both sides of the previous option by (1 + r)). The sum:

$$K\ 100 + \frac{K\ 100}{(1 + r)}$$

is called the net present value and r is the discount rate.

FACTORY COSTS:

See Production costs.

FIXED COSTS:

For a firm the short run is defined as the period of time over which some factors of production can not be varied. The latter are known as fixed factors and the costs associated with them as fixed costs. Fixed cost does not therefore vary with output. An example would be the cost of a factory which, in the short run, can not be expanded to meet increased demand. Only labour and perhaps other inputs can be varied - these are the variable costs.

HURDLE RATE:

The hurdle rate is the minimum rate of return the investor expects from an investment project. If the predicted rate of return of a specific project is lower, the investor will not be willing to invest his money in the project. The height of the hurdle rate is a personal decision of the investor and is often related to the current interest rate on long-term loans.

LIABILITIES:

Any claims, actual or potential, on an individual or institution. The term usually refers to financial liabilities of which the commonest form is a debt of any kind.

OPERATING COSTS:

See Production costs.

PRODUCTION COSTS:

The relationship between factory costs, operating costs and production costs is as follows: (see next page)

Raw materials +
Labour +
Utilities +
Repair +
Maintenance +
Factory overheads

Factory costs +
Administrative
overhead costs +
Sales costs +
Distribution costs

Operating costs +
Financial costs +
Depreciation

Total Production costs

TIME PREFERENCE:

Individuals with a positive rate of time preference value units of current consumption or income more highly than those accruing in the future. For this reason in investment appraisal the stream of future costs and benefits is discounted to a present value so that projects with different time profiles of costs and benefits can be compared.

VARIABLE COSTS:

Costs which vary with the level of output (e.g. labour costs). In the short run some costs will be fixed and some variable. In the long run, all costs will be variable.

ANNEX B:

Wages in Papua New Guinea (March 1989)[8]

	Level one centre Alotau, Arawa, Goroka, Kavieng, Kieta, Lae, Madang, Mount Hagen, Popondetta, Port Moresby, Rabaul, Wewak.	Level two centre Bulolo, Bwagaoia, Daru, Kainantu, Kerema, Lorengau, Samarai, Vanimo, Wau, Mendi, Kimbe, Kundiawa, Wabag.
Classifications	Weekly rates	Weekly rates
Youth under 22 Years of Age	K26.95	K22.75
General Labourers and Married Youth	K53.91	K45.90
Class 1	K57.22	K48.92
Class 2	K60.96	K52.77
Class 3	K65.76	K57.65
Class 4	K71.52	K71.52
Class 5 Qualified Tradesman Class (B1 & B2)	K77.28	K77.28
Class 6 Qualified Tradesman Class (A)	K83.06	K83.06

Rural national minimum wage is K20.11 per week.

[8]Source: Department of Labour and Employment.

REFERENCE LITERATURE:

(Available in DTI library or UPNG library/bookshop)

1) Manual for the Preparation of Industrial Feasibility Studies, United Nations Industrial Development Organization, Vienna, 1986, Sales No. E.78.II.B.5.

2) Fundamentals of Financial Management, Sixth Edition, James C. Van Horne, Prentice-Hall, New Jersey, 1986, ISBN 0-13-339615-0.

3) MacMillan Dictionary of Modern Economics, Third Edition, David W. Pearce, The MacMillan Press Ltd., London and Basingstoke, 1986, ISBN 0-333-41748-8.

4) COMFAR User's Guide and Reference Manual, United Nations Industrial Development Organization, Vienna, 1987.

5) PROPSPIN, UNIDO's Project Profile Screening and Pre-Appraisal Information System, United Nations Industrial Development Organization, Vienna, 1988.

6) Tax facts and figures 1989, Coopers & Lybrand, Papua New Guinea, 1989.

7) Principles of marketing, Third Edition, Philip Kotler, Prentice-Hall, New Jersey, 1986, ISBN 0-13-701830-4.

8) Manual for Evaluation of Industrial Projects, United Nations Industrial Development Organization, Vienna, 1986, Sales No. E.80.II.B.2.