Establishing pulp and paper mills

FAO FORESTRY PAPER

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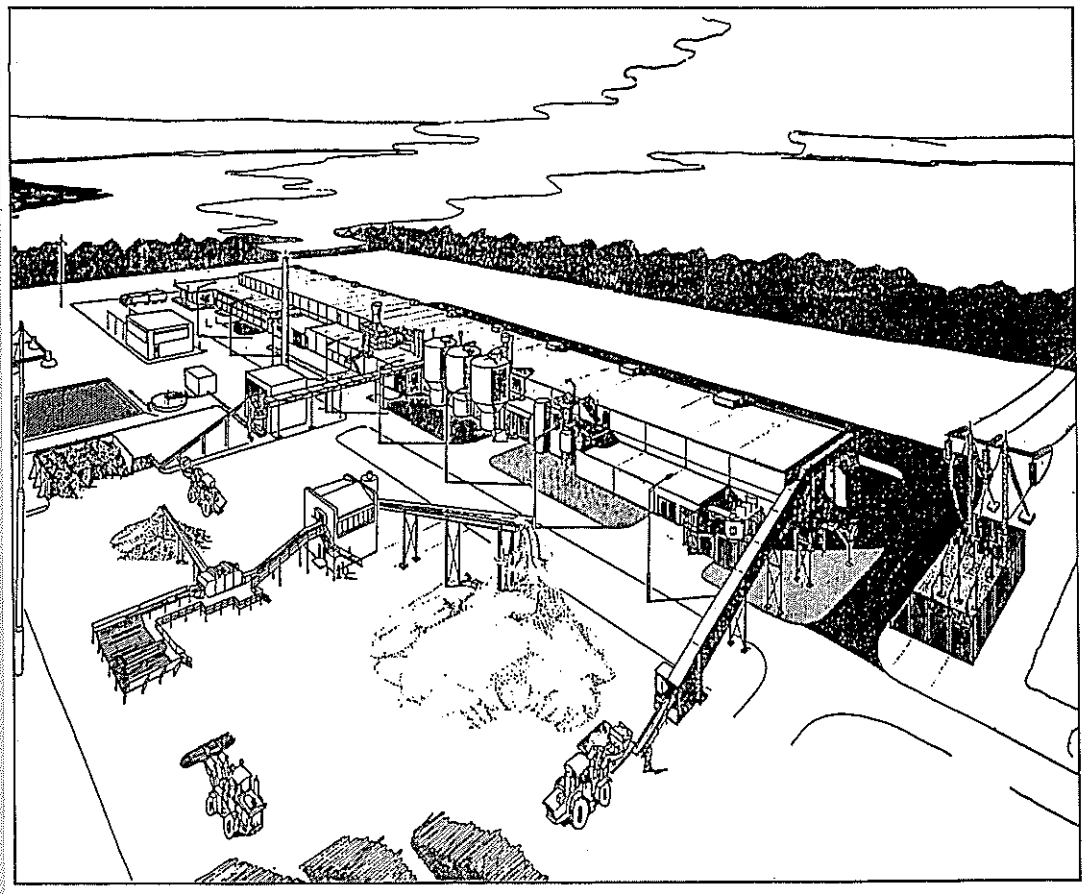
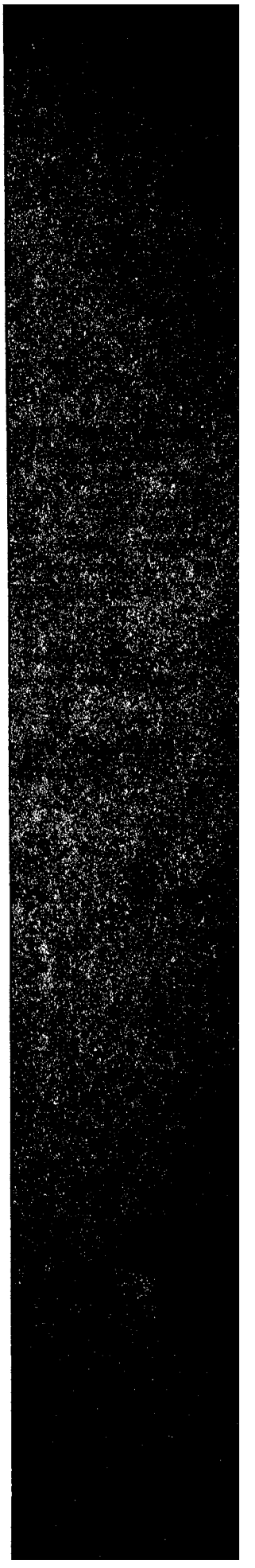


FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Establishing pulp and paper mills

A guide for developing countries



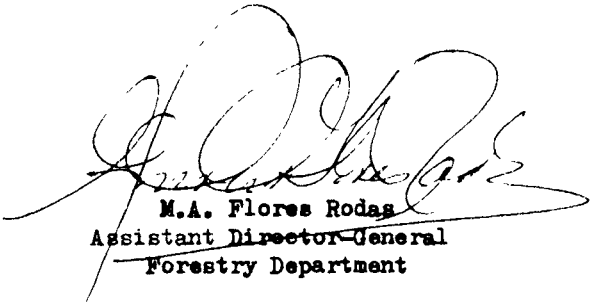
M-38
ISBN 92-5-101423-X

FOREWORD

During the twenty-second to twenty-fourth sessions of the FAO Advisory Committee on Pulp and Paper in 1981 to 1983, the committee included on its agenda a discussion item which related to the establishment of pulp and paper mills in developing countries. Originally the emphasis was on the essential phases which were required for the establishment of such industries but later on items were included which also covered special features for the installation of such plants in developing countries. During the sessions, papers were presented by various invited authors, following which the members of the committee discussed the subjects introduced. They were assisted in this by other participants representing the pulp and paper industry, invited by the members.

The present volume consists of two parts. Part I presents all the papers introducing the subject to the meetings whereas Part II provides a report on the discussions held by the committee on the same subjects.

The contributions made during the presentations and discussions by the members and participants in the three sessions of the committee are gratefully acknowledged.



M.A. Flores Rodas
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PART I

INTRODUCTORY PAPERS

WHY DO DEVELOPING COUNTRIES GO INTO THE PULP AND PAPER INDUSTRY

by

Pedro M. Picornell[1/]

INTRODUCTION

In spite of some very formidable problems and well-known pitfalls relevant to establishing a pulp and paper industry, many a developing country has gone or is thinking of going into pulp and paper making. Such major problems as very heavy capital requirements, high energy requirements, questionable sources of raw materials, lack of technology and trained manpower, competition from countries with a long established pulp and paper industry, questionable profitability, etc., seem not to daunt developing countries into joining the seemingly prestigious group of pulp and paper manufacturing countries, because this industry is one of the indications of development.

LEVEL OF DEVELOPMENT AND PAPER CONSUMPTION

The per caput consumption of paper and paper products is one of the indeces of the stage of development of a country. In countries of Africa and Asia, we talk of per caput consumption of below ten kilograms a year, while in 1979 Japan had a per caput consumption of 151 kg, Canada 215 kg, and the United States 289 kg.

Literacy is one of the most important factors in development; literacy means education, and education means paper - books, notebooks and writing pads. Education and literacy serve to increase the demand for paper products - a literate population wants to be kept informed - more newspapers, magazines and books; and, as literacy grows, the literate population demands more and more newspapers, magazines, educational material and books.

Development means the establishment of new industries to take over from the traditional subsistence agriculture and new industries means new ways of packaging and this means more paper and board. Development means improved sanitation and improved sanitation also results in an increased consumption of paper. It also means more letters, memoranda, receipts, pamphlets, more government and more government means more paper. The per caput consumption of paper of a country is indeed a good index of its stage of development.

SUPPLY AND DEMAND CYCLES

A developing country initially gets its supply of paper from a developed country. The paper industry, as we observe, is cyclical in nature and in times of plenty, developing countries become the dumping ground for paper products from developed countries. Paper is plentiful and cheap, and this situation encourages a further increase in demand. Then comes the time of shortage and the supply of paper to developing countries is the first one to be cut, and paper becomes unavailable at any price. The effect of these periodic shortages of paper in developing countries is very serious, particularly to the print media which many times have to curtail circulation and reduce pages because of lack of paper.

1/ Executive Vice-President (Planning), Paper Industries Corporation of the Philippines (PICOP), Philippines.

FOREIGN EXCHANGE CONSIDERATION

Another serious problem caused by the growing demand of paper because of development is its effect on the foreign exchange resources of the country. Except for a very limited number of developing countries generating sufficient foreign exchange for all their requirements mostly from oil resources, most of these are always short of foreign exchange, which usually has to be allocated on the basis of a system of priorities. As the demand for paper grows, so does the need of foreign exchange for its importation, and as it does, so do problems of allocating foreign exchange. These can be very serious and can be the cause of grave abuses.

EMPLOYMENT

Most developing countries also have large labour surpluses, and the establishment of any industry that will help employ idle labour is always welcome. That this may have resulted in the establishment of very uneconomic industries in some cases is also true. A discussion of this aspect of the subject is beyond the scope of this paper.

FIRST STEPS TOWARD ESTABLISHMENT OF A PAPER INDUSTRY

Consequently, it may be said that developing countries started looking into establishing their own pulp and paper industries because of economic and political needs to assure themselves of a steady supply of this vital commodity and, at the same time, to conserve scarce foreign exchange. As the demand grows, a developing country starts looking around for possible local raw materials to use for the manufacture of pulp and paper, and most developing countries with an agricultural economy have some in the form of agricultural waste. Others have forest resources and, with the recent developments in technology, tropical woods, which are usually short fibred, can now be used for this purpose.

Then come the consultants, local and foreign. Some of the local consultants are local visionaries looking for ways to further develop their countries, while others see a business opportunity. Some foreign consultants are invited by the developing countries, others come as representatives of foreign governments or international institutions extending aid programmes. Others come by themselves looking for business opportunities.

The feasibility reports follow, many done with uncertain data and insufficient local knowledge, resulting in sometimes agonizing decisions to be made on the basis of their findings. Have all significant factors been considered? What are the uncertainties involved? These, of course, presuppose that an honest effort is being made to evaluate the project. Many are the cases in which, through ignorance, and at times knowingly, the figures presented to not correspond to reality.

COMPETITIVENESS

In cases where the project does not look economically feasible, the weight to be given to other factors, mostly social in nature, is always a problem. If the products of such projects are not competitive with those from developed countries and there are many reasons why many times it is difficult for these to be so, local products may have to be protected with tariff barriers. What is a 'reasonable' tariff to give local products protection? How much extra should the people in developing countries pay to have local production and to promote local employment? How long should such protection last? Here you have equally valid answers to both sides of the question. Should inefficient local mills, producing lower quality products, be tolerated for the luxury of having a domestic pulp and paper industry? On the other hand, developed countries have been known time and again in times of surplus supply to dump their products on developing countries at prices way below what they charge in their own countries, just to keep their mills going or even kill emerging competition. There is no single answer to these questions and each project has to be considered on a case by case basis.

ENSURING SUPPLY

In some cases, the apparent prestige of having an industry such as pulp and paper comes into play in a developing country. Its propaganda value at times outweighs many other considerations. When the cyclical paper shortages come, is the country ready to reduce the pages of its daily newspaper? Will educators approve of having school children share books or having class-room activities reduced due to lack of paper? Will industry be content to see their goods damaged or delayed due to lack of packaging? Will Government be happy if it cannot disseminate information to its constituents because of a shortage of paper? Who will be responsible if such things happen? The general feeling is that a local industry can prevent these from happening. On the other hand, how much are we prepared to pay for this?

CONCLUDING REMARKS

I cannot generalize on the success or failure of pulp and paper mills built in developing countries. This again has to be on a case-to-case basis. Some mills have been resounding economic successes. Others have not been economically successful, but have satisfied the need to have a steady domestic supply of paper, to conserve scarce foreign exchange and to create employment and support development. Others have been resounding failures. Particularly during recent years when, because of the energy crisis, developing countries with no domestic oil resources have seen their foreign exchange resources squeezed to the limit to take care of their energy requirements. Many of these mills have proven their worth even if it cannot be said that these were economic successes. A study of the performance of the pulp and paper industry in developing countries, stressing the reasons for successes and failures, may be an interesting subject for someone to undertake so that others may profit from the experience gained to date.

IDENTIFICATION OF CONCEPT AND FEASIBILITY STUDIES

by

A. Dara Sekban[1/]

INTRODUCTION

In the identification and conceptual assessment leading to the possible establishment of a forest products industry, there are certain basic and inviolable criteria that must be evaluated in the consideration of such projects.

These criteria are empirical. At the outset, I would like to outline these in condensed form and then elaborate on it further.

I. Adequate raw material availability
   - (a) Suitable quality
   - (b) Suitable quantity
   - (c) Suitable accessibility
   - (d) Suitable economics of supply
   - (e) Constant availability over life cycle of mill

II. Adequate finished product market
   - (a) Internally (locally)
   - (b) Externally (export)
   - (c) Acceptable market logistics
     1. Competition
     2. Transport
     3. Duties
     4. Costing factors

III. Adequate site conditions
   - (a) Raw material transport
   - (b) Process water
   - (c) Effluent disposal
   - (d) Transport of finished product
   - (e) Labour and housing availability
   - (f) Expansion facilities

IV. Adequate production cost structure
   - (a) Indigenous raw materials
   - (b) Imported raw materials, chemicals, etc.
   - (c) Energy
   - (d) Labour and other variable costs

V. Adequate capital cost estimate
   - (a) Plant cost
   - (b) Infrastructure cost
   - (c) Financing costs during construction and start-up
   - (d) Working capital including training

1/ Beloit Corporation, U.S.A.

VI. Adequate financing structure

(a) Debt/equity ratio and availability
(b) Net cash flow for debt servicing
(c) Sensitivity analysis, viz.
    1. Market price fluctuations and cyclicity
    2. Raw material cost fluctuations
(d) Return on investment

CONSTRAINTS IN ESTABLISHMENT OF PAPER MILLS

A superficial assessment of the need for pulp and paper mill projects in developing countries would show that it is high time for everybody to start promoting and implementing all kinds of mills. The developing countries possess more than one half of the forest land, but produce only one-twentieth of the pulp. The emphasis on increasing literacy and industrialization so as to close the gap between the less developed countries and the western world, coupled with the daily increase of millions of people, would statistically justify building several mills each month. That such a paradoxical situation has existed for decades and has not ameliorated, can be attributed to certain characteristics of the pulp and paper industry. In 1974, Dr. Boerma, Director-General of FAO, arranged a meeting between representatives of IBRD, UNDP and FAO in Rome to work out a programme for resolving this disparity. The considerable expertise and dedication of the various UN/IBRD bodies has been useful in identifying the problems and helpful in getting certain projects started in the right direction. However, it is my belief that this situation in the foreseeable future cannot improve basically due to economic reasons; namely, high capital costs, high interest rates and low product sales prices.

I believe all those present here are very familiar with those constraints and it is a matter of vital interest to the pulp and paper industry of every country but, unfortunately, some of the developing countries tend to discount or disparage the key factor - a realistic economic appraisal. For example, there is a tendency by some 'spot' purchasing countries to blame the large producers of pulp and paper of overcharging during shortages, but they do not mention how much below the going price they paid when supplies were tight. This in itself makes it very difficult to project what the selling price is going to be during the pay-back period. Today, we see integrated projects costing eight hundred thousand dollars per daily ton. Assuming a ten-year loan, ten percent interest, 300 working days and no equity, the cost of servicing the loan would average US$ 400 per ton. It is difficult to see the most patriotic investor get excited about an export pulp mill whose photographs and description look as complicated to him as the space shuttle when he can invest his money in land and buildings with a good return and appreciation or just loan it at 50 percent per annum. My apologies for deviating from my topic and if I sound facetious, but I did want to stress the importance of economic viability.

The concept for establishing a pulp and/or paper mill arises from local or regional market conditions. In developing countries, the market for cultural grades usually precedes industrial grades, the former generally requires more skill. It is also not easy to determine what the market demands are and will be, because in some cases import restrictions or statistics on the groupings of various papers and board grades can be misleading. The major problem is to reconcile the relatively small consumptions with having an economic size mill. The tendency here is to increase the range of grades at the expense of quality and efficiency. The presence of a fibrous raw material is the other important factor. It is unfortunate that the vast forest reserves of developing countries are basically composed of mixed tropical hardwoods which, as yet, cannot be utilized to compete with homogeneous hardwoods or softwoods forest reserves.

PRELIMINARY STUDIES

In any event, the promoter, whether government entity or private investor, needs a feasibility study. I feel that a preliminary feasibility study should first be made rather than a full-scale study. Such a preliminary study's cost would be in the tens of thousands rather than the hundreds of thousands for a full-scale 'bankable' study.

Having determined the product desired, the promoter should hire the services of an independent consultant to work together with his local experts. In relatively quick order, they should be able to determine whether the project is technically feasible; i.e., availability of fibrous raw material, water, power, fuel, effluent disposal, etc. One must shy away from the tendency that one can get away with inferior quality due to import restrictions especially since there is a psychological tendency by the consumer that imported products are superior to those manufactured locally.

The next important step is the size of the mill vis-à-vis the marketing area and penetration possibilities. With the basic parameters established, an 'order of magnitude' capital cost and operating cost would be estimated. One of the most important figures would be the selling price projections. I have seen a project which looked highly profitable only because that country's high inflation rate was used as the basis of projection.

With these figures in hand, I believe it is best to get a financial man rather than a pulp and paper expert to prepare a profit-and-loss statement, cash flow charts, sensitivity analysis and a projected balance sheet. The promoter can then determine whether it is of interest to the equity partners, the government entities and lending institutions. This, of course, is not a bankable report and no financial institution will make any binding commitment, but guidelines can be obtained such as whether a take or pay marketing partner and/or an experienced operating partner is needed or what kind of guarantees the export credit organizations may require. During this period, the promoter will obtain a better feel of the project from the feedbacks and reactions of potential suppliers, partners, financiers, customers, local government entities, etc.

FEASIBILITY STUDY

After completing the preliminary study, together with its modifications both technically and economically, a full feasibility study would be prepared if the project still looks attractive. Such a study could be along the following lines covering the criteria mentioned at the outset.

The resume should be relatively short and to the point, highlighting where the project is located and the broad characteristics of the project, including its priority in the national development plan. A description of the principles involved and the background of those involved in preparing the study. The proposed plan and timing for obtention of the raw material, construction, training, operation and whether it will be done in one or more phases. I would like to point out that there is not enough consideration given to implementing projects in several phases such as a paper mill first and then a pulp mill or some sawmills or other wood processing units. The marketing prospects with an indication of prospects for increased production. The total cost of the mill with the foreign and local costs and the return on investment. Foreign exchange earnings and savings should be mentioned and there really should be no difference between earnings and savings even though some governments have regulations giving preference to earnings.

An introduction would elaborate on the resume by elaborating or including the selection of the mill site, topography, socio-economic status, the fundamental assumptions and the general economic background including political stability. The last point is of special importance to foreign investors such as the nationalization of pulp and paper companies as has happened even in Western Europe.

A description of the process and mill including all ancillaries such as power generation, recovery, effluent treatment, water treatment, electrolytic plant, maintenance shop, etc., would follow. If the study is to be used for obtaining bids from suppliers, the detailed specifications would obviate the necessity of going into detail.

The next chapter would be on marketing. This should cover present and future demands, existing and projected pulp and/or paper sources, importation costs including freight and tariffs and demand growth projections. Any arrangements or agreements on marketing could be included here.

Production materials would follow covering in detail source and cost of fibrous raw materials, caustic and chlorine, imported pulp, waste paper, china clay, starch, rosin, alum, fuel oil, electricity, water, maintenance materials including machine clothing and spares. The fibrous raw material being the major factor, the forestry or agricultural residue would have to be very clearly detailed. For example, in the case of bagasse, the cost of fuel oil is critical and there is a project where the price is US$ 12 a ton for government-owned enterprises and US$ 220 for private or mixed public and private companies. Since about a ton of fuel oil is needed to produce one ton of bagasse pulp, this would mean a difference of about US$ 200 per ton of product.

The operation of the mill covering method, data and production plan would develop the consumption of the various raw materials outlined in the previous chapter. Any tests or sources of information on yields, as well as pulping characteristics, can be given at this point. Manpower requirements including staffing, rates of pay, organization charts, schedule of employees, training and accommodation can be in this section or as a separate chapter.

Based on the assumptions and information given, the manufacturing costs would be calculated. Capital cost requirements with reference to its basis of calculation should include escalation, contingencies, interest during construction and all other expenditures such as housing, power lines, roads, piling, training, etc.

The preliminary study is often helpful in showing financing institutions whether the pay-out period envisaged needs to be extended or not and, therefore, an indication of the anticipated interest rates, terms and grace period would be known. The proposed method of foreign and local financing, together with the equity covering the capital requirements and the timing of the receipts and expenditures, would follow.

A financial analysis of the project should be made over a period of at least as long as the credit terms. At the start, I emphasized the need to be realistic as well as the difficulties of certain assumptions (sales prices); but, certainly, it must be as precise and detailed as possible not only for the investor's benefit, but also to make the study 'bankable'.

One could elaborate more on what a feasibility study should or should not include, but I feel the outline given above covers the main points. Notwithstanding what has been mentioned above, I cannot help but conclude that some crystal ball gazing will be required with the world's present economic and political situation.

FINANCING OF PULP AND PAPER PROJECTS

by

D. von Stauffenberg[1/]

CHARACTERISTICS OF THE INDUSTRY

Let me begin by mentioning some of the outstanding characteristics of pulp and paper projects. I am not doing this because I think that you need to be told what these projects look like - everyone of you no doubt knows infinitely more about them than I do - but rather because they determine in many ways the design of the financing package.

Much of the work of project financing consists of tailoring a financial structure to suit the special needs of a project. The word 'tailoring' can be used quite literally in this particular context. Just like a tailor, our needs to pay close attention to shape, size, in short to the characteristics of the project to which one 'fits' a financial suit. Pulp and paper projects happen to have quite pronounced characteristics, with the result that financial packages which are, so to speak, taken off the rack usually just will not fit.

Capital Intensity

What are those characteristics? Well, the first, and most outstanding one is their capital intensity. By that I do not only mean that they require large sums of money, even though that is true enough. As a rule of thumb, it seems to be accepted that under most conditions the minimum size for a plant producing, say, writing paper is at least 30 000 tons per year. By the same token a ton of annual capacity requires an investment of between US$ 2 000-3 000. This means that even a minimum sized plant will certainly not cost less than US$ 60 million and it is more likely to run closer to US$ 100 million.

Small, relatively simple mills are now being offered which look as if they would be economical if the conditions are right. IFC has just financed one of them, but these are the exceptions which prove the rule that pulp and paper projects tend to be highly capital intensive.

Capital intensity, apart from referring to the sheer size of an investment, also refers to the fact that annual sales are usually much smaller than the investment. In other words, every dollar invested in a paper mill will, as a rule of thumb, generate only about 40 cents in annual revenue. In that sense of the term, even an ice-cream vendor, whose plant consists of a US$ 200 push-cart, is in a capital intensive business if he does not sell more than US$ 100 worth of ice-cream cones per year. A capital intensive plant does not necessarily have to be big. Rather, in a capital intensive business the fixed charges - interest expenses and depreciation - constitute an important part of operating costs.

What does that mean in practice? It means that high capacity utilization becomes extraordinarily important. The reason is obvious. The fixed charges on a US$ 100 million plant can easily reach US$ 15 million per year. That works out to US$ 500 per ton if the plant runs at full capacity of 30 000 tons; if it achieves only 50 percent capacity utilisation, then the fixed charges double to US$ 1 000 per ton.

1/ International Finance Corporation.

Forgive me for treating you with mathematics which, admittedly, are at primary school level. But its simplicity notwithstanding, this is one of the fundamental rules of the industry which determines much of its behaviour and it is crucial to have understood it before one attempts to finance a paper plant. The highly cyclical nature of the pulp and paper industry, the tendency to keep a plant running even if it is at a loss, can be traced back to this basic aspect of capital intensity.

Things would have to get very bad indeed before it is worth shutting down a pulp and paper mill: to stop production saves variable costs, but fixed charges keep on accumulating whether the plant runs or not. As a result, when demand drops, producers will cut prices in an attempt to maintain sales, rather than stopping production.

A temptation to which project sponsors in developing countries are subjected to is to choose the most sophisticated technology which is available. The less experienced the sponsor, the more susceptible he appears to be to that temptation. If he resists at all, it is usually because he cannot afford to pay the price. But the cost of such an advanced plant is actually less of a problem than the difficulty of operating it. If service and spare parts are continents away, a project sponsor is better off with simple technology which is within his capacity to operate and maintain. The price of a sophisticated plant is under those circumstances prohibitive not so much in terms of capital cost than in terms of down-time.

Long Implementation Time

Another characteristic, which is closely related to the size of paper projects, is the long time it takes to build them. If everything goes well - and it rarely does - you can assume that it will take about three years to build a new paper mill. On top of that, at least another three years are needed to work out the bugs of a new plant, to get the staff fully familiar with it and to run it at capacity. In other words, you can count yourself lucky if no more than six years pass from the moment the investment decision is taken until a new plant operates at full capacity. Eight years still would not be bad and ten years is not unheard of.

To sum up, the characteristics which determine the financial structure of pulp and paper projects:

- They are usually very large. In most cases, their minimum size is somewhere between US$ 60 and 100 million.

- The revenues they generate are small if compared to the investment needed to build them. Fixed charges account for a substantial part of operating costs.

- They take inordinately long - at least six years and often longer - to implement.

FINANCING

In terms of project financing, this means two things. First, pulp and paper projects require a large equity base and, second, debt has to be as long term as possible.

Equity

In our experience, raising equity tends to present the more difficult problems. Obviously, it is not easy to attract investors to a project which will not show profits for another six years or more. The problem is compounded in developing countries because capital markets are usually far too small to absorb investments of the required size. Following the rule of thumb I have just mentioned according to which the smallest economically sized paper project requires investments of somewhere between US$ 60 and 100 million, their equity needs are about US$ 24-40 million. You will have noticed that I assume that roughly 40 percent of project costs have to be financed by equity. There is nothing magic about that figure - it does vary somewhat in practice - but in our experience it does not vary very much.

The importance of a sufficiently large equity base for the success of a project cannot be overemphasized. Projects quite commonly do not allow for enough equity in their initial financial plan. Sponsors often engage in wishful thinking in this area. Project cost estimates tend to be optimistic and, even more frequently, the time it takes to construct a plant and run it up to full capacity is underestimated. If it were, for example, possible to reach full capacity production after only a year or so, internal cash generation would, of course, be much larger, equity could then be smaller and the project could afford to repay its loans in a shorter period. Only this usually is not possible, and a project sponsor who has indulged in optimism of this kind frequently finds himself in the unenviable position of running out of funds. To return to the metaphor of the tailored suit: his financing plan does not fit.

The penalty for running out of funds can be severe. Work stops or slows down which in turn increases costs further. A veritable vicious circle can develop. By the time the sponsors have finally raised additional money, the project cost has gone up and a new financing gap has appeared. So the sponsors look for more money, work stops again, etc. We have seen projects which have gone through repeated cycles of this type.

Moreover, funds tend to be most difficult to obtain when they are needed most. All of you are familiar with the saying that banks will be happy to lend to you if you do not need their money. Well, they will be considerably less eager to lend to an 80 percent completed project which has just run out of money. If funds can be obtained at all under these conditions, they will be obtained at a high price. And, with his back to the wall, so to speak, the borrower is in no position to do much about it.

While talking about the need for realism in cost estimates, I would like to mention that the kind of figure which emerges from a feasibility study is in most cases something quite different from the cost estimate on which the financing plan is built. One is an engineering estimate. It is used to control project implementation and it therefore tends to be low. The financial plan, on the other hand, includes all contingencies and reserves precisely because the consequences of running out of funds are so serious. In some cases, we deliberately overfinance projects - allow for more money than the project is said to cost - to make sure there will be enough funds.

It is therefore extremely important that anyone undertaking a project of this kind be realistic, and realism begins with an adequate level of equity. What represents an adequate level depends on the terms at which you manage to borrow. If your loans are very long term - say 15 years or so - and if they carry a grace period which not only lasts until the project is completed but until it has reached capacity production, then you might be able to afford to cover less than 40 percent of project cost with equity. But in our experience, such cases are rare indeed. More frequently, loans carry too short a term, with the result that more than 40 percent is needed as equity.

Quasi-Equity

The difficulties associated with raising enough equity have led to a number of hybrid forms of financing which combine features of equity with those of loans. Closest to straight equity are preferred shares. But these are not common in developing countries.

More frequent is some form of quasi-equity. A subordinated loan, for example, which is convertible into equity, can be attractive for both the sponsors of a project and for the lender. For the sponsor, a subordinated loan is very close to an outright equity contribution since it increases the borrowing capacity of his company much as an equity investment does. The higher risk for the lender, on the other hand, is compensated by the conversion feature. If the project is a success, he converts his loan into equity and earns a much higher return than he would have if he had held only a loan.

There are many forms quasi-equity can take and I will not go into them, but let me just say that, if you are faced with the problem of financing a new pulp and paper project, do not overlook the possibilities offered by this form of financing. Hybrids between loan and equity have in many cases made it possible to finance projects which would not have gone ahead otherwise.

Export Credits

Unlikely as this may sound, raising loans tends to be the simpler part of assembling a financing package. The main reason is that the countries producing capital equipment are engaged in a strong competition for export markets. They are, therefore, prepared to extend export credits which by today's standards are extraordinarily favourable. There have been efforts, during recent economic summit meetings, to curb this competition. I do not know what the latest results are, but the mere fact that export credits have repeatedly been on the agenda at such meetings demonstrates how important they are.

Literally billions of tax dollars - or pounds or yens or marks - are spent every year by governments of capital goods producing countries to subsidize export credits. What is a problem for these governments is an opportunity for the pulp and paper industry. With export credits being available at well below commercial rate and at long terms, any project sponsor today would be well advised to make export financing the heart of his financial plan.

Apart from their long repayments terms, export credits have one other characteristic which makes them especially attractive for pulp and paper projects: their interest rates are mostly fixed. Floating interest rates introduce an element of risk which projects in the pulp and paper industry, where financial charges are high in any event, are particularly ill equipped to bear. In today's environment, it is practically impossible to avoid floating interest rates entirely - banks simply will not lend at fixed rates - but floating rate loans can at least be held to a minimum.

Having advocated the use of export credits, let me point out some of their drawbacks of which anyone who intends to finance a major project should be aware. Export credits have a strong cost advantage, but they also tend to narrow down competition among equipment suppliers. The result can be higher equipment costs which offset at least part of that advantage.

There are various ways of encouraging competition, even if export credits are used. One is to rely as much as possible on buyers' credits (i.e., credits extended by the export financing agency directly to the project) rather than on suppliers' credits. Another consists of obtaining commitments for export credits from as many equipment producing countries as possible, and then to use only those from countries to which equipment contracts have been awarded. But there are practical limits on how far a project sponsor can go in this direction and, no matter what measures are taken, export credits will tend to weaken competition.

Another point worth keeping in mind is related to the nature of Export Credit Agencies. Their objective is to promote export sales. They will, therefore, not provide the kind of advice and assistance a project can obtain from institutions specializing in development finance. Export credit agencies would, for instance, not become deeply involved in determining the viability of a project, nor will they take it upon themselves to devise a financial plan. For these reasons, it is quite common that one of the smaller lenders acts as lead bank for a project while export credit agencies, which have provided the bulk of the financing, take a more passive role.

Other Loans

Export credit will never cover all of a project's borrowing needs. Additional loans will have to be obtained from commercial banks and from institutions specializing in project finance. Given that loans for pulp and paper projects must necessarily carry long payment terms, the choice of sources is not excessively wide. Basically there are two other types of lenders for such projects in developing countries: International Development Banks and private commercial banks. Let me begin with the former.

International financing agencies such as the World Bank - which is by far the largest of them - regional development banks or the International Finance Corporation, for which I work, have the advantage that they specialize in project financing. They are, therefore, used to dealing with greenfield projects with little to offer by way of collateral or operating experience and - and this is a particularly important point here - their loans usually carry fixed interest rates.

As part of their way of operating, they assure themselves through careful analysis that a project is viable. This can mean considerable free technical advice for the sponsor. They also tend to play an active role in designing a financial package for the project and in putting the various parts of that package into place. In effect they become the financial adviser to the project.

The other side of that same coin is that these institutions need time to perform their role. Analysis of a large complex project is not a short process and development banks, therefore, do not move with the agility of commercial banks.

The services of international financing agencies are best used if they are involved in a project as early as possible. In this way, they carry out their analysis as the project evolves and they are able to give their advice while it can still be built into the project without major upheavals. By the same token, to present a financing request to these agencies while the project is already well along is the least effective way of using them. At this stage their project experience will no longer do the sponsors much good - all basic decisions have presumably been taken by then - and the time required for project analysis may lead to delays.

Project financing has not been one of the traditional fields of commercial bank activity. But a significant development of the last decade has been that commercial banks have become increasingly willing to support projects in developing countries. By now, it is no longer uncommon to see commercial banks extending eight or ten-year loans. They have thus entered a stage where they must be considered seriously as financing sources for pulp and paper projects.

The International Finance Corporation, IFC for short, occupies a position somewhere between the other international development agencies and commercial banks. On the one hand, IFC is clearly a project financing institution with all that entails in terms of project analysis, advice and involvement in designing a financing package. In fact, it belongs to the World Bank group. On the other hand, IFC is committed to mobilizing funds from commercial banks and to act as a kind of channel through which commercial funds reach projects in developing countries.

IFC will finance up to 25 percent of the cost of a project with its own funds. These can take the form of equity investments or quasi-equity, but usually the bulk of them are long-term loans. Moreover, for large projects such as those in your industry, we mobilize long-term loans from banks.

Technically, the entire package, consisting of IFC and bank loans, forms a single loan and the borrower signs only one loan agreement with IFC. We administer the package and we handle all matters with the participating banks. The loan conditions of the various parts of this package are, however, different. The funds provided directly by IFC carry our usual lending rate - presently 16½ - 17 percent on dollars - which is fixed for the life of the loan.1/ Moreover, the term of our funds usually is longer - say, with a grace period extending 2-3 years from project completion and repayment over another 6-8 years. The part provided by the banks is lent at their usual rate. Mostly we are talking here about Eurodollars with variable interest set at a specified margin above Prime or Libor. In designing these packages, we make sure that they fit the requirements of the project - that their grace or repayment periods are not too short - and we help the borrower to obtain the most favourable conditions from the participating commercial banks.

CONCLUSION

You are, of course, well aware that I have simplified the problems involved in financing pulp and paper projects. The reality is much more intricate. I have, for instance, not at all dealt with the complex topic of guarantees - either collateral offered by the borrower, or performance guarantees by the equipment supplier, or completion agreements (so-called

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1/ IFC loans can be prepaid at any time without penalty.

project funds agreements) between the sponsors and the lenders. Another host of complications is introduced by the fact that a financial plan is really nothing else than the translation of the reality of the project - of its technical, human, marketing and other aspects - into financial terms. Although we express ourselves in the abstract terms of money, we are really dealing with the entire project in all its complexity. I am fully aware of these complications - we grapple with them daily - but dealing with them all would far exceed the scope of this presentation.

But I would, of course, be glad to talk to you individually about the more detailed aspects of project financing.

Let me conclude by once again highlighting the salient features - those which tend to cause most difficulties - in financing projects in your industry.

First, there is the sheer size of pulp and paper projects. Do not engage in wishful thinking about their cost! The result will be that you run out of financing before the project is completed and the cost of that, in turn, can be very high.

Second, be realistic about the time it takes to build a plant and to run it to capacity and design your project financing accordingly.

Third, do not under-capitalize your project. Allow for enough equity.

Finally, export financing offers extraordinary bargains, particularly at this time of record interest rates. Use them to the fullest.

CONTRACTING, PLANT CONSTRUCTION AND TRAINING

Relating to Pulp and Paper Facility Establishment in Underdeveloped Countries

by

Frank Peterson[1/]

INTRODUCTION

Following a decision to proceed with the physical establishment of a pulp and paper facility, the implementation thereto becomes the most critical phase of the establishment.

It is assumed that the decision to proceed is based upon in-depth feasibility and viability studies attesting to the economic and technical substance of the proposal, coupled with area assessments of items as adequate capital formation and financing to provide for both the capital costs, working capital and auxiliary costs of interest during construction and pre-production expenses, etc.; corroborated availability of raw materials; adequate site selection; critical marketing analysis for both internal and export sales of the product; and last, but not least, an adequate and supportive series of financial formulae attesting to the capability of the facility to generate the cash to service the capital structure with attendant production costs and market interpreted forecasts of selling price.

The foregoing reports are usually prepared, as we all know, by reputable specialists in the field of pulp and paper who have established prior histories in determining and identifying technical and economic viability. Without such an assessment, implementation should not and axiomatically cannot proceed.

Following the decision to proceed, several constants must be established prior to the initiation of contractural arrangements for the supply of materials and equipment and construction.

DETAILED ENGINEERING OF THE FACILITY

The basic predication of this function is to provide the detailed design and related engineering data based on which contracts can be let for the construction of the facility.

At the same time as detailed engineering is proceeding, detailed specifications are prepared for items of equipment, machinery and materials to be used and the bidding process for the supply of this material and equipment takes place. The engineering also serves as a corroborative function of study cost estimates provided in the feasibility or viability studies.

The engineering function is perhaps the most important phase of activity since the data thus produced will freeze the configuration of the facility wherein after errors of design are most difficult to obliterate during construction.

Selection of engineering specialists can accomplish a myriad of activities by the engineering firm ranging from process consultants and design specialists through operational and production expertises.

There are times when the design engineer might also be the manager of construction, or alternatively, there are certain firms who do both engineering and construction and a combined contract can be worked with such firms.

1/ President, Beloit International Corporation, U.S.A.

When a single firm is assigned engineering and construction of the facility, many times accelerated schedules of construction can be achieved since the firm doing both the engineering and construction is familiar with its own data base and can proceed with certain areas of implementation without waiting for full detailed drawings as the case might be if an independent engineering firm is doing the design work and an independent construction firm doing the building.

System checks, on the other hand, separate contracts for engineering and construction providing for a check of systems and balances of both firms.

There are pros and cons to both formats.

CONTRACTING

We, so far, have established that either combined or separate engineering and construction contracts can be let. The most imperative ingredient in the composition of the project implementation is the project management structure which is necessary to ensure the proper fiscal and technical control procedures are instituted and monitored. The project manager and his structure must provide a check-point to the independent engineer and constructor with overriding authority to direct the activities of the contractor and the engineer and the project manager should be responsible to the ownership structure of the facility for this function.

The contractor constructor is responsible for the total construction, erection and completion of the facility in conformation with the engineering criteria established; however, the project manager has the major responsibility to ensure all work is in conformity to all criteria established - technical, material, equipment, financial budgetary control, etc.

One of the greatest problems in the construction phase of such a capital intense facility is proper periodic monitoring - particularly in an underdeveloped area - and total strict cost budgetary control. There are very sophisticated systems based on data processing criteria that are used for this purpose. Outside of date of completion guarantees for a facility, capital cost overruns are the greatest evil involved. Unless properly monitored and properly controlled, can have a disastrous effect not only on the completion of the project, but for financial planning on which the project has been based. Case after case has been illustrated where overruns of as much as 50 percent of original estimated capital costs have taken place.

Proper estimating and proper project management control should dominate this type of a problem; indeed, most important to the success of such a project.

CONTRACTURAL CRITERIA

The proper selection of a construction contractor is also a very important selective phase of project implementation. If an off-shore contractor is used, great care should be taken that he has a familiarity with local conditions of both labour and material sources, together with the work ethics and habits of the local area. If such a contractor does not have this experience, but does have a background in the construction of the facility in question, it is a good idea to consider affiliation with a local construction firm. Selection of all construction contractors, of course, is based on a thorough study of reputation, past experience habits; histories of bringing projects in on-time schedules and within the cost framework established by the estimates.

IMPLEMENTATION TASK FORCE

The owners of the facility should ensure at the outset that an implementation task force is set up. The task force should be, of course, revolved about the selection of the project manager. Surrounding the project manager should be a capable support staff of process engineers, staff engineers with a broad knowledge of the vast technical disciplines involved. This support staff in effect, under the direction of the project management,

becomes the monitoring force to ensure that engineering and design and construction criteria adhere to the conceptive baselines established in the engineering area and feasibility and viability study. As part of the production management group, it is vitally important that a capable construction accountant and his staff be employed so that responsible fiscal controls and monitoring of budgetary requirements are consistently involved.

TRAINING

It is of particular importance if the facility is in an underdeveloped area of the world that does not offer the indigenous skills to the operation of the facility that a thorough training programme be structured. There are several ways to handle this, but the most classical one is an association with an existing pulp and paper facility to provide these services.

The training format can take on the following:

(a) During the construction phase, selecting a nucleus group as supervisory and semi-supervisory personnel to take to a production facility in another country that specializes in the type of product to be made.

(b) This nucleus group is trained in all operations and procedural and technical areas; will serve as the base plant personnel supply and return to the completed facility.

(c) The training company selected will provide supervisory personnel on-site when the facility is ready to start up to work with the nucleus group trained and to foster the training of others to be engaged at the start-up.

(d) During construction phases, operation training manuals must be prepared and this assignment should be given to the project management group or the engineer of record in the design phase. These manuals are most important and should be highly detailed in nature and be linguistically understandable in the area of the facility.

(e) Equipment supplies contracted with during the purchase negotiations should provide training specialists familiar with the configuration of their equipment to be on-site during erection and start-up.

(f) Primary experienced supervisory personnel, particularly in areas of material handling, chemical preparation, chemical recovery, steam and power, stock preparation and paper making should be engaged for a period of twelve to twenty-four months as employees of the facility to supplement the training personnel heretofore described.

Much could be said and much could be written on the theories and practices of the subject reviewed herein. Perhaps the most overriding concept to bear in mind is the utilization and selection of experience and, this is repeated, significant experience of all disciplines involved - be it engineering, construction, training or marketing - and bring this experience to bear. The combination of experience in developing facilities of this type, together with successful production effort, project management monitoring, go a long way to assure the success of such a facility.

APPROPRIATE PULP AND PAPER TECHNOLOGY FOR DEVELOPING COUNTRIES

by

B. Kyrklund[1/]

INTRODUCTION

In the sixties the industrialized countries focussed their interest on developing countries' large forest resources as a possible source of supply of market pulp. A number of projects were identified and some feasibility studies carried out but very few of these projects materialized. In the meantime, the minimum viable size of an export pulp mill was growing continuously. This development followed from the necessity of pulp mills in developed countries having to make the best possible use of the economies of scale because of the increases in investment and costs of operation as they were developing in those countries at a rate even faster than that of the growth of the mill size. For instance, over the past ten years or so, the minimum viable size of an export pulp mill has roughly doubled whereas the investment cost has increased ten times.

With perhaps a few exceptions, the economy of the developing countries today, as well as their possibilities for raising the necessary funds from outside sources, do not allow establishment of such mills in their countries. Therefore, it has been emphasized in more recent years that the technology, both as regards scale of operation and detailed mill design, has to be adapted to the conditions of the developing countries; i.e., the technology introduced has to be appropriate. Although there has been general agreement on the need for appropriate technology, there is a wide range of opinion as to what appropriate technology is like.

LARGE OR SMALL?

The tendency in the past was to think only in terms of the size of industry which was appropriate in the industrialized world at that time. As the minimum viable size grew out of proportion for introduction in developing countries, the pendulum swung to the other extreme with 'small is beautiful' as the main slogan. Although this, no doubt, was appropriate in certain conditions, it very soon became a fixation. The main fault in the overemphasis on mini or small-scale pulp and paper mills was that it was assumed that the conditions were the same in all developing countries. This assumption was made to the extent that it was suggested that standard small pulp and paper mills be developed by the U.N. system for installation in developing countries. Although some of these efforts of standardization provided design concepts which were useful as indicative solutions to be applied in some cases, they did not lead to any successful manufacture of that type of equipment nor any installation based on these concepts.

It has been stated that the existing paper industries in the industrialized world started on a small scale and, consequently, the developing countries should start in the same way. On the other hand, the mills in the industrialized world 50-100 years ago did not have to compete with large-scale, extremely cost-efficient industries with a world-wide marketing network, capable of dumping in their view insignificant quantities into the markets of the developing countries in times of surplus. These 'insignificant quantities' might in some developing countries correspond to their entire annual consumption and production of a specific grade of paper.

1/ Forest Industries Division, FAO.

India is often shown as an example of where mini-scale manufacture of paper at a production rates of 10 to 30 tons per day has been successfully introduced, using waste paper or agricultural residues as raw material. There is no doubt that waste paper based manufacture of paper can be financially viable in developing countries on a very small scale especially if second-hand equipment is used. It is, in fact, a very recommendable first step of development of a paper industry. Use of agricultural residues, whenever available within an acceptable transport distance in sufficient quantities, can also be recommended on a small to medium scale.

The fact that the mini paper mills in India are financially viable is due to several reasons, many of them very specific to India. The success of these mills depends in the first instance on Government policy. Since there is shortage of paper in the country, the Government has introduced incentives for private investors to produce paper locally from available raw materials. By granting substantial subsidies and providing incentives for mini-scale mills, an interest has been raised among local entrepeneurs in establishment of such mills. The investment requirement for these mills is within the range of funds which can be raised by the local private sector. Through this Government policy, there is now a situation in India where, roughly speaking, 25 percent of the paper produced in the country is manufactured by 75 percent of the mills, the remaining mills being of a capacity between 100 and 300 tons per day. This development has been possible in India for several reasons:

(a) Availability of know-how for design and construction of pulp and paper mills;

(b) Availability of know-how for equipment design and manufacture;

(c) An abundance of engineers with know-how in pulping and paper making as well as skilled and semi-skilled labour to operate the mills, available at low cost in a low-cost environment.

First of all, availability of know-how within the country means that no or very few expatriates are required for establishment of pulp and paper mills in India. Secondly, since there is an abundance of people at all levels with knowledge in pulping and paper making, installation of a number of small mills instead of a few large ones, which would satisfy the very large pulp and paper market in India, provides job opportunities for these people. In most other developing countries, there is a shortage of suitable personnel and already for that reason installation of a number of mini paper mills to meet the demand of paper does not fit their conditions, since these countries would have difficulties already in manning one mill.

Nevertheless, since the markets in the developing countries, with some exceptions, are comparatively small, a mill supplying the domestic market would by necessity have to be of a small size. On the other hand, these countries have very little or no know-how in pulp and paper making. Accordingly, expatriates would have to be employed for an initial period to operate the mill and train the mill personnel. For a very small mill this additional cost of transfer of technology is excessive and the paper produced in such a mill would by necessity be very expensive. Considerable subsidies would then be required, including protection against imported paper. In such cases, it would be preferable to aim at supplying a subregional market. This would allow establishment of a somewhat larger mill although still small by international standards. However, the cost of transfer of technology would then be spread out over a larger tonnage and the chances for financial viability would be much improved.

From the above, it can be concluded that there is no standard small mill which can be recommended for use in all developing countries nor is it possible to exclude large-scale production since conditions may be found which are favourable for this as well. The size of the mill has to be adapted to each specific set of conditions in a country or subregion. In general, however, it can be stated that in most developing countries the mills serving domestic or subregional markets would have to be of small to medium size. The definition of small or medium depends on factors such as the raw material used (waste paper, straw, bagasse, wood) and the product manufactured (newsprint, printing and writing paper, industrial grades). A general indicative figure for a small mill would be under 100 tons per day capacity whereas medium would be from 100 to 300 tons per day.

NEW OR OLD TECHNOLOGY?

It has sometimes been recommended that developing countries install mills with the kind of technology which was used in industrial countries fifty years ago. The main reason for this is that the technology of those days was comparatively labour-intensive. Since there is a lack of sufficient employment opportunities in developing countries, this type of technology would seem to be well suited to their conditions. Again, this solution might be applicable in some very specific circumstances but two questions that arise from such a concept are:

(a) Who can design such a mill today? and
(b) Who can deliver the equipment needed?

For this reason it has been recommended that efforts should be made to provide designs of this type of mills and that equipment manufacturers be stimulated to produce the type of equipment needed. Some equipment manufacturers have shown interest in this to the extent that designs have been made specifically for developing countries in accordance with the guidelines given in various discussions. Nevertheless, they have found in general that their designs have not been accepted by the clients in developing countries who have placed their orders with manufacturers of more conventionally conceived equipment. Second-hand equipment may seem to offer a solution to the problem of availability of old technology, but in very many cases even second-hand equipment has gone through several steps of modernization. Paper machines, for instances, are frequently rebuilt or reconditioned.

Chemical pulping is the process technology which is most difficult to scale down. The investment in the fibre line of a sulphate pulp mill today is only about 25 percent of the total investment in plant capital. The remainder is investment in recovery systems for heat and chemicals, steam and power plants, chemical preparation plants, pollution abatement measures, etc., not necessarily in that order of importance. Although it is possible to achieve some cost reductions in the fibre line by reducing the sophistication of the equipment, this still only refers to 25 percent of the plant capital. Even if the capital cost of the fibre line were reduced by 50 percent, the investment requirement would still be about 90 percent of the original sophisticated technology mill of the same size, unless significant reductions can be made in the other departments of the mill.

An effort was made in 1979[1/] to reduce the investment required in a fine paper mill producing 35 000 tons per year by simplification of the process equipment in practically all departments and by reducing the instrumentation and automatic controls. This resulted in an overall reduction in total investment of about 25 percent, compared to an over-sophisticated mill of the same size. This is obviously still not enough.

More promising results in this regard may be possible with sulphur-free pulping which allows considerable simplifications to be made in the heat and chemical recovery systems and also reduces the costs of pollution abatement measures to some extent. In these research efforts, the interests of developing countries and industrialized ones coincide since the latter have the same concern as the Third World countries about the high investment costs in pulp and paper mills, although on a different level, and aim at efforts to reduce these costs.

A field where there seems to be some promise for small to medium size technology is in the application of recently developed mechanical and chemi-mechanical pulping processes. In such mills the main part of the investment is in the fibre line itself, not in the ancillary departments and the economies of scale are much less pronounced. These processes, however, have certain constraints as to their applicability for the production of certain products. However, they are extremely well suited for production of cultural papers such as newsprint and other printing and writing papers, even to the point where fully acceptable fine paper type grades can be produced. The problems involved in these processes are

1/ Comparative Study for SIDA/FAO of Small-Scale Pulp and Paper Mills for Woodfree Printing and Writing Paper, 35 000 t/year.
Jaakko Pöyry International Oy, Helsinki, 1979.

usually a comparatively high energy input requirement and the stumbling block for many of these projects with regard to financial viability is the necessity of using imported chemical pulp as part of the furnish. However, there are recent developments in which part of the mechanical pulp is modified chemically and then returned to the paper making furnish, replacing the imported chemical pulp. The high energy requirement in the mechanical pulping process can in some cases be reduced by recovery of the heat generated in the refining process and using this heat for drying of the paper, achieving savings in fuel cost. Again these developments have resulted from research carried out in developed countries which, accordingly, have come up with solutions which are applicable to developing countries in spite of the fact that the reasons for the research efforts may have been entirely different.

In view of the above, it seems that recent developments in technology have resulted or may result in the near future in technologies which are better suited to the conditions in developing countries than present-day technology. Although the technology fifty years ago may not be the best option or even obtainable today, there is no doubt that a number of simplifications in the instrumentation and automation can easily be introduced in the mills built in developing countries. In this way, mills of more appropriate technology can be achieved for these countries.

TECHNOLOGY AND QUALITY

In the discussion on appropriate technology for developing countries in the field of pulp and paper, it has often been stated that the paper produced in the industrialized countries is very often of a quality which is unnecessarily high for the developing ones. This may be true in many instances, especially as regards fine papers used for stationery, books, etc. On the other hand, when it comes to grades such as newsprint, careful consideration has to be given to requirements of the printers and their clients, the advertisers. If the newspapers use offset printing processes, the quality of the newsprint needs to be of international standard. Similarly, production of corrugated medium and linerboard for corrugated boxes has to take into account that the boxes are usually intended for packaging of products for export to other countries where they have to meet with standard specifications of those countries, for instance as regards banana boxes.

Acceptance of lower quality papers and boards in developing countries can accordingly not be taken as a generally applicable rule. In deciding on what is appropriate technology for manufacture of certain grades of paper or board, due consideration has to be given to the quality requirements of the end-users of the product. This puts demands both on the selection of the raw material, including imported ones, and on the process technology to be adapted.

CRITERIA ON APPROPRIATENESS

In the light of the preceding sections, it is obvious that appropriate technology can mean different things under different circumstances and conditions. Appropriateness, therefore, has to be evaluated against some sort of a check-list. Thus an evaluation has to be made in each case of:

(a) Raw material resource - quantity and quality;
Market - size and special requirements;
Product - quality appropriate for the market;
Technical capability - to produce and use;
Managerial capability;
Financing - national capacity to raise, service and handle;
Employment - direct and indirect;
Environment;
Political and policy considerations.

The above list of criteria may not be complete and the criteria may not carry the same weight under all circumstances. In many cases the alternative chosen might be dictated by special emphasis on one or two criteria which may have implications on the weight of the others. One criterion not mentioned above is financial viability of the project. This is perhaps one of the most important ones but basically follows from the evaluation of the various aspects given in the check-list above. Even if the project were not financially viable in the initial years due to the additional costs of transfer of technology, the aim should always be that, within a reasonable period during which some subsidy or protection might be granted, the project should become financially viable.

POSSIBILITIES OF COST REDUCTION IN ESTABLISHING A PULP AND PAPER INDUSTRY IN DEVELOPING COUNTRIES

by

H.J.I. Huuhtanen[1/]

GENERAL

Investment costs in new pulp and paper mills are today so high that strict discipline and cost control are required at every phase of their establishment whether this be in an industrialized or a developing country. Naturally, many specific factors exist in most developing countries which make the establishment of industry more complicated there than in the industrialized world.

The entire process of mill establishment has many phases and all these have to be considered when examining the possibilities of cost reductions in investment. Very often, attention is paid only to the questions concerning technology (i.e., mill design, selection of processes and equipment) since the possibilities seem more obvious there. However, other aspects of the project could offer possibilities for cost savings as well. Three obvious phases for consideration would seem to be those of financing, contracting and equipment purchasing.

MILL DESIGN

Factors Common to Industrialized and Developing Countries

There are some general rules which have to be observed wherever the mill is being established. While aiming at an optimal solution, the costs have to be kept at the minimum without sacrifices in the efficiency of the mill and in the quality of the final product. Of course, the quality has to be adapted to the requirements of the market, but there is no reason to maintain too high a quality which is often produced at an inappropriately high cost.

Some aspects, which come readily to mind, where the basis for an optimum solution is more or less the same wherever the mill is being established, are mill location, site lay-out and auxiliary equipment.

The mill location is mainly determined by the available infrastructure and transport costs of various materials involved. In many cases the cost of personnel transport is overlooked although this is usually the responsibility of the mill. A study prepared for FAO in 1979 indicates that the annual cost of personnel transport per km could be higher than the transport cost per km for incoming wood raw material, even without putting any value to the personnel time lost during transport. In this specific case, locating the mill closer to the forest would have actually increased the annual operating costs, other costs remaining unchanged.

While the site layout must provide for potential future expansion, it has to be as compact as possible without encumbering the operation and maintenance of the mill. A too lavish use of space will increase both investment and operating costs.

Regarding auxiliary equipment like motors, couplings, gears and bearings, pumps, piping, valves and other fittings, measuring and control devices, and transport vehicles, these have to be standardized as far as possible in order to reduce spare part inventories and maintenance and repair costs.

1/ Forest Industries Division, FAO.

Aspects Specific to Developing Countries

For well-known reasons, large pulp and paper mills cannot be built in a great number of developing countries. On the other hand, because of the economies of scale involved, small mills tend to be financially non-viable. There are also other factors which have to be considered in planning pulp and paper industry in developing countries, such as lack of skilled labour and of experience in the use of advanced technology.

Mention is made in the following of some design concepts which usually should be applied as far as possible in planning pulp and paper mills in these countries. Although they may seem only too obvious, past experience from many projects in developing countries indicates that many of them may have been ignored.

1. Equipment chosen should be reliable, as simple as possible, and easy to operate by trained local personnel, requiring only simple maintenance and repair.

2. Only well-proven processes and process equipment should be selected, since developing countries are not suitable as trial grounds for new inventions.

3. In general, processes should be as labour intensive as possible, although this is often difficult in view of the nature of the pulp and paper industry. On the other hand, this should not be considered a universal rule to be applied without appropriate judgement.

4. Structures and buildings should be as simple as possible using local building methods and materials wherever applicable. The buildings should give only the necessary protection and as much equipment as possible should be placed out in the open, with only roofing provided whenever required.

5. Process controls should in most cases be manual, where possible, and automatic controls should be used only when really necessary; for instance, when manual control is dangerous or difficult to apply. Instruments should be from a locally well-established supplier (if available) in order to ensure a good maintenance service.

6. Where the stability of the power supply could be a problem, the prime movers should be as insensitive to voltage variations as possible, and even steam turbine drives could be considered under some conditions for large pieces of equipment (paper machines, grinders, large refiners, etc.). For paper machines, a single motor (line shaft) drive may be preferable to a sectional drive, although it requires more power.

Some examples of how the above design principles might be applied for various mill departments in the case of an integrated bleached pulp/fine paper mill are given below.

Wood yard

(a) Use of short length, small to medium diameter wood which would allow maximum manual handling.

(b) Manual debarking in the forest, especially if bark is not used as fuel at the mill. This makes handling and transport of wood easier, and no debarking and bark handling equipment would be required at the mill.

(c) Operation seven days a week. This requires smaller equipment, reduces storage space requirements and offers more employment.

Digester plant

Batch digesters[1/] with direct heating: lower investment, easier maintenance, savings in power, minimum control instrumentation. Heat requirements would be higher with direct heating but this is not a drawback if the mill has to generate its own power.

1/ Continuous digesters cannot be considered in most cases. They require a sophisticated control system and good maintenance and it could be disastrous to rely on one digester only.

Bleach plant

Four-stage bleaching with chlorine and hypochlorite (CEHH) can be sufficient in many cases and gives a brightness level of 80. In addition to making the plant simpler and cheaper, this would save also in chemicals and extensive chemical preparation systems.

Evaporation plant

Three-effect evaporation with a cascade evaporator (or venturi scrubber) at the recovery boiler, especially if power is generated in a back-pressure turbo-generator.

Recovery boiler

Depending on the mill location and environmental regulations, the expensive electrostatic precipitator(s) could be replaced by a venturi scrubber which could also replace the cascade evaporator/concentrator.

Causticizing plant

(a) Single clarifier-type equipment with integral storage.

(b) No lime kiln if burnt lime easily and cheaply available (and especially not if the fibrous raw material has a high silica content like in straw and bamboo).

Paper machine

(a) As markets are normally small, the mill should be able to produce several grades, which requires flexibility from the paper machine. Therefore, depending on the production volume, two simple machines may be preferable to one high-capacity one. With one machine, a narrower, faster running machine may sometimes be a more economic solution than a wide, slow machine and may prove easier to operate.

(b) Manual broke handling.

(c) If calendering or coating required, these should be off-machine.

Paper finishing

Finishing department offers wide possibilities for manual operation: manual sorting, manual wrapping, manual ream stacking, etc.; but these should be carefully studied from case to case.

Effluent treatment

When settling ponds or aerated lagoons are required, these should be excavated ponds instead of clarifiers and concrete basins.

Effect of 'Simplification' on Investment Costs

Table 1 shows a comparison of direct plant capital between two integrated pulp and paper mills, one ('Modern') using the latest technology and the other ('Simplified') based on the design principles presented above. Relative costs are shown for installed equipment, including electrification, piping, insulation, etc., and instrumentation by various mill departments and as a total for mill site and civil works. The 'modern' mill forms the yardstick for comparison and the costs are shown as percentages of its total direct plant capital.

The two last columns show also the departmental costs of the 'simplified' mill as percentages of the corresponding departmental costs of the 'modern' mill of the same capacity. A review of the cost structure of the reference mill shows that the major parts of the cost of plant capital refer to paper mill departments (25.5%), the pulp mill fibre line (20.5%), the recovery system (13.2%), and mill site and civil works (18.0%). This emphasizes the fact that cost reduction attempts should aim at reducing primarily the costs of these items.

Table 1

Comparison of Plant Capital Costs

Mill Department	'MODERN'		'SIMPLIFIED'			
	Percent of total direct plant capital		Percent of total of 'Modern'		Percent of corresponding department of 'Modern'	
	Equipment	Instrumentation	Equipment	Instrumentation	Equipment	Instrumentation
Wood yard	1.7	-	1.1	-	67.9	-
Digesting	5.7	1.2	1.6	0.1	28.5	9.4
Washing & screening	3.0	0.5	3.0	0.2	100.0	39.6
Bleaching	7.5	1.6	2.8	0.2	36.7	12.1
Bleach chemical preparation	2.6	0.7	0.5	0.2	20.9	32.9
Evaporation	2.4	0.2	1.4	0.1	58.1	36.8
Recovery boiler	7.2	0.6	6.1	0.4	84.6	57.8
Causticizing	1.6	0.3	1.3	0.1	78.9	20.0
Lime kiln	2.0	0.2	-	-	0	0
Power boiler	5.1	0.5	4.8	0.3	93.8	64.4
Power generation and distribution	2.4	0.2	2.4	0.1	98.4	64.7
Stock preparation	2.7		2.1		77.4	
Paper machine	20.4	1.5	17.7	0.6	87.0	39.5
Paper finishing and warehouse	2.4		2.4		101.6	
Water supply and effluent treatment	2.7	0.3	2.3	0.1	86.1	51.9
Services	4.9	-	4.4	-	90.2	-
Subtotal equipment	74.3		53.9		72.6	
Instrumentation	7.7		2.4		30.5	
Mills site and civil works	18.0		16.1		89.2	
Total direct plant capital	100.0		72.4		72.4	

A comparison of the data shown in the different columns of Table 1 indicates that an overall cost reduction of about 28 percent can be achieved through introduction of the measures listed in the previous section. However, as direct plant capital is only about two-thirds of the total investment required, the reduction may not be more than 20 percent of the total investment, depending on the financial structure of the project and the interest rate payable on loans and credits.

For equipment, the reduction is about 27 percent, for instrumentation as high as 70 percent and for civil works about 11 percent. As the cost of instrumentation is less than 8 percent of the total direct plant capital, even the large relative reduction makes only slightly over 5 percent of the total plant capital. Largest relative and also absolute reductions department-wise (including the cost of instrumentation) are in the digesting and bleaching (including bleaching chemical preparation) departments, for the bleaching department almost 9 percent and for digesting just over 5 percent of the total plant capital. In the lime kiln, the relative reduction is of course 100 percent, but only 2 percent of the total plant capital. On the other hand, if the lime kiln needs to be included, the overall reduction would be 2 percent lower.

In other mill departments the absolute cost reductions are small (one percent or less) except in the paper machine. Although the relative cost reduction is only 13 percent, the absolute reduction is over 3 percent or about 10 percent of the total reduction, because the paper machine department has a dominant position in the mill - over 20 percent of total plant capital. In paper finishing the situation is somewhat contradictory because the equipment cost for the 'simplified' mill is higher than for the 'modern' mill. This is an example of the principle of using as much manual labour as possible resulting in the doubling of basic equipment.

The comparison presented is somewhat artificial in the case of small-scale mills, since it is very improbable that a small pulp mill would be designed with continuous digesting, continuous diffuser washing and displacement bleaching. However, there are also some other design ideas which could be applied to further reduce the costs, although some of these would still need further study. A few examples:

- Washing: belt filters, screw presses, batch diffusers.
- Screening and cleaning: using high consistency systems requiring less pumping (smaller pumps, pipes, etc.); abandonment of the whole brown stock screening could also be contemplated, but this has to be weighed against increased bleaching costs.
- Gravity flow of especially thick stock by using a vertical design concept in the pulp mill. However, this solution is most readily applicable in semi-chemical or mechanical pulping.
- Sulphur-free cooking: (a) fluidized bed[1/] system for black liquor burning;
  (b) auto-causticizing systems.
- Lime mud burning: fluidized bed[1/] system.
- Paper machine: reconditioned, second-hand paper machines.

FINANCING

Pulp and paper mill projects are very capital intensive. Therefore, the choice between sources of financing is limited and savings in financing costs may be difficult to achieve.

Interest payments due during the construction period are the main expenditure which increase the financing costs of a project. Therefore, keeping the interest costs at a minimum will also reduce the total project costs, although a well-planned use of the

1/ If fluidized bed combustion is applied, it must be ensured that the material to be burnt does not cause smelt formation in the bed.

loans committed will reduce commitment fees and thus also assist in controlling project costs. What are then the ways of reducing interest costs? As we are dealing with the establishment of the industry, we are concerned only with interest during construction. There are naturally also other interest costs, and much higher, after the mill has started operation, which can be affected by the financial structure of the company and types of loans taken, but these are not included in the total investment and do not come under review here.

Leaving out, for the time being, the prevailing interest rates, on which the project's promoter has often very little influence, the two main factors affecting the amount of interest during construction are the equity/debt ratio and the length of the mill's construction period. Of course, the higher the share of equity, the lower are the interest payments. On the other hand, there are several difficulties in raising adequate equity in developing countries, as stated by von Stauffenberg.[1/]

The length of the construction period has a very distinct effect on the interest charges during construction. This is clarified by a simple comparison. Assuming a US$ 100 million project with an equity/debt ratio of 40 to 60 and an average interest rate of 10 percent, the total interest charges during a three-year construction period would be roughly US$ 6 million while, for a five-year construction period, these would be about US$ 10 to 11 million, a difference of over US$ 4 million. For a large pulp mill project costing US$ 500 million, the difference could be over US$ 20 million. There is thus a clear incentive to keep the construction period as short as possible through careful planning and using efficient design and construction companies and reliable equipment suppliers.

By selecting the composition of the debt portion from available export credits, commercial loans and loans from international finance institutions, there is some possibility of influencing the level of interest rate. However, as stated by von Staffenberg,[1/] the loans for pulp and paper projects have to carry long payment terms and, therefore, the choice is not very wide. Various export credits (suppliers' credits, buyers' credits) are available, at least at the moment, at very favourable rates, and a maximum use of them should be made. However, they cannot form the whole loan package.

CONTRACTING

The selection of subcontractors and the type of contract entered into can also influence the cost of mill construction, either directly or through the length of the construction period. However, there are no generally applicable rules in this respect since local conditions and the resources of the operating company are often the determining factor. However, the selection of subcontractor(s) is a crucial factor in the implementation of the project, which requires sound judgement and good knowledge of the past record and capabilities of the companies bidding for the job. There are examples of unwise selection of contractors which has led to lengthened construction periods, slow start-ups, long running-in periods and difficult operation of the mills built, resulting in sharply increased costs of the projects.

The two main types of contracts are the split-responsibility one, where the design and construction functions are separated, and the single-responsibility or 'turnkey' contract. In the latter type of contract, there is the possibility to achieve a shorter construction period because the interim phase of bidding and the selection of the subcontractor(s) for construction falls off. This will reduce interest payments during construction and will also expedite the start-up of the mill. Jacobs[2/] estimates that a single-responsibility contract can save up to six months in construction time, or up to 8-10 months if equipment delivery times are longer than eight months, compared with a split-responsibility contract. Other advantages of a single-responsibility type of

1/ Financing of Pulp and Paper Projects. FO:PAP/82/Inf.7, June 1982.

2/ Construction Contracts in Modern Cost Engineering: Methods and Data. McGraw-Hill Publishing Co., New York, 1979.

contract are better communications and a sense of common purpose between the designer and constructor. Although this can definitely save the owner from some trouble, its effects on the costs are difficult to evaluate.

In the split-responsibility type of contracts, there is always the possibility of selecting subcontractors, at least for some part of the construction, from the country where the mill is being built or from some other developing country with lower labour, supervision and overhead costs. However, in this case, proper judgement and careful selection are required because even if the contract price may seem attractive, the reliability of the firm might be questionable.

Whatever type of contract is being chosen, there is always the need, for the owner, to monitor the progress of work through the use of senior specialists with extensive engineering and construction experience. Depending on the quality and reliability of the subcontractor(s), this monitoring may be costly and may cancel the savings achieved in contracting, which only emphasizes the importance of judicious selection of subcontractor(s) as already mentioned.

Regarding the price of the contract, the basic types are the fixed price and cost-plus fixed fee contract, with several variants between them. Here, too, it is impossible to establish any general rules, so much depends on local conditions, on the quality of subcontractor(s) and, not least, on the monitoring organization of the owner. The cost-plus fixed fee contract has a distinct advantage in permitting the owner to exercise substantial control over the work to be carried out. This can save from many costly errors which could also lengthen the construction period. In a fixed price contract, there is also always the danger that the contractor, in trying not to lose money with the contract, will not do his best, which may cost dearly later on, in the start-up and operation of the mill. A fixed price contract may also result in increased costs if the subcontractor is not able to adhere to the planned construction schedule thus causing additional interest costs to the owner.

EQUIPMENT PURCHASING

The price of the equipment is not the only deciding factor, equally important can be the delivery times and the reliability of the supplier, and the origin (country) of the equipment. Delivery times and reliability of the supplier can have a profound effect on the construction schedule and, consequently, on the amount of interest during construction, as already indicated. Careful monitoring and expediting of equipment deliveries will assure that delivery schedules are kept and possibly also reduced.

The country of the equipment supplier may affect the final cost of the equipment by two ways: through the currency in which the payments have to be made, and the interest rates and other conditions of export credits available from the country in question.

CONCLUSIONS

Various possibilities of cost reduction in the establishment of pulp and paper industry in developing countries have been examined above. It is obvious that most of the possibilities of reducing costs are not specific to developing countries but apply everywhere where pulp and paper mills are built.

Generally, cost reductions are considered only in connection with the technology applied, i.e. in the design of the mill, while there may be possibilities of cost savings also in other stages of the mill establishment. Cost reductions in mill design are of course the most obvious ones, as specific conditions in many developing countries offer possibilities of using simplified or more labour-intensive technologies.

USE OF SECOND-HAND PAPER MACHINES IN DEVELOPING COUNTRIES

by

S.L. Keswani[1/]

GROWTH OF PAPER INDUSTRY IN DEVELOPING WORLD

The demand for paper in developing countries is very much restricted due to limited supply, which may in turn be due to poor or non-production of paper in those countries, restricted imports (due to unfavourable foreign exchange earnings), etc. As such, the published estimates of demand of paper may not be realistic and the actual demand may be much more.

Due to all round improvement in the living standards of the people, more urbanization, greater stress of various layers of government on education and uplift of the masses, the demand of paper is bound to rise. The gradual industrialization of developing countries and the stress on literacy would cause the demand for both cultural and packaging papers to increase considerably and there is vast scope ahead.

Some of the countries which never had any paper mill so far are considering setting up such units to meet their captive consumption and others are increasing installed capacities to meet their ever increasing demand. The percentage growth in such developing countries is much greater than that in the advanced countries which are approaching a saturation level. In the developed countries, due to ecological reasons and other factors, there is a tendency to curb the demand and also to restrict the growth rate of the paper industry.

From the production figures of paper and board as furnished for various countries for 1979 and 1980 (Table I), it will be observed that for the top thirteen developed countries the production in 1980 was lower by 0.7 percent as compared to 1979 figures. The Asian countries (Table II) have registered a rise of 8.1 percent on the average during the same period while the rise is 8.7 percent for Latin America (Table III) and 5.5 percent for the African countries (Table IV).

Mexico registered a growth rate of 9.7 percent while the United Kingdom registered a fall in production by 9.6 percent. Bangladesh has shown the highest growth rate of 30.9 percent and the next in series come Costa Rica and Peru at 30 percent and 25 percent respectively.

On the consumption front, the total figure for the whole of Europe was 56.58 million tons in 1980 as against 56.78 million tons in 1979. Similarly, consumption in North America dropped from 67.45 million tons to 65.06 million tons. On the other hand, the Asian countries registered a rise in consumption from 31.0 million tons to 32.59 million tons. Latin America showed a rise from 9.51 million tons to 10.12 million tons and a similar trend was shown by Africa as is evident in its rise of consumption figures from 2.35 million tons to 2.65 million tons.

Thus it is observed that there is a significant rise in production and consumption of paper and board in the developing countries, justifying the scope and need for further addition to capacities in Asia, Latin America and Africa. However, the major constraints are finance, sufficient infrastructure and qualified and skilled manpower to meet the growing

1/ Managing Director, Chemprojects Design and Engineering Pvt., Ltd., India.

Table I

Production of Paper and Paperboard

Top 13 in the World

thousand tons

S.No.	Country	1979	1980	%
1	U.S.A.	57 498	56 764	- 1.3
2	Japan	17 861	18 088	+ 1.3
3	Canada	13 531	13 471	- 0.4
4	Sweden	6 281	6 182	- 1.6
5	Finland	5 738	5 919	+ 3.2
6	France	5 262	5 152	- 2.1
7	Italy	5 101	4 955	- 2.9
8	United Kingdom	4 198	3 793	- 9.6
9	Spain	2 534	2 565	+ 1.2
10	Mexico	2 245	2 462	+ 9.7
11	Netherlands	1 705	1 714	+ 0.5
12	Austria	1 565	1 616	+ 3.3
13	Norway	1 400	1 373	- 1.9
	Total	124 919	124 054	- 0.7

Table II

Production of Paper and Paperboard

Asia

thousand tons

S.No.	Country	1979	1980	%
1	India	971	1 088	+ 12.4
2	Turkey	443	470	+ 6.1
3	Thailand	333	349	+ 4.8
4	Philippines	345	334	- 3.2
5	Indonesia	214	230	+ 7.5
6	Iran	78	103	+ 32.0
7	Viet Nam	87	90	+ 3.4
8	Pakistan	82	89	+ 8.5
9	Bangladesh	55	72	+ 30.9
10	Iraq	57	57	0.0
	Total	2 665	2 882	+ 8.1

Table III

Production of Paper and Paperboard

Latin America

thousand tons

S.No.	Country	1979	1980	%
1	Brazil	3 002	3 468	+ 15.5
2	Mexico	2 245	2 462	+ 9.7
3	Argentina	800	705	- 11.9
4	Venezuela	511	501	- 2.0
5	Colombia	351	372	+ 6.0
6	Chile	306	326	+ 6.5
7	Peru	180	325	+ 25.0
8	Cuba	95	100	+ 5.3
9	Uruguay	64	64	0.0
10	Puerto Rico	50	50	0.0
11	Guatemala	42	45	+ 7.1
12	Ecuador	41	41	0.0
13	El Salvador	26	20	- 23.1
14	Panama	16	18	+ 12.5
15	Costa Rica	10	13	+ 30.0
	Total	7 739	8 410	+ 8.7

Table IV

Production of Paper and Paperboard

Africa

thousand tons

S.No.	Country	1979	1980	%
1	Egypt	121	137	+ 13.2
2	Morocco	92	100	+ 8.7
3	Algeria	75	75	0.0
4	Kenya	61	61	0.0
5	Zimbabwe	51	51	0.0
6	Tunisia	28	29	+ 3.6
7	Nigeria	14	14	0.0
8	Madagascar	13	13	0.0
	Total	455	480	+ 5.5

Source: Pulp and Paper International - Annual Review 1981

LIMITATIONS OF SETTING UP SOPHISTICATED MODERN PAPER MACHINES IN DEVELOPING COUNTRIES

The quest for economically viable small and medium scale pulp and paper mills will become a matter of some urgency in the coming years, particularly for developing countries where abundant raw material supplies are not available at one place to meet the requirements of the paper industry. In the situation prevalent in these countries where labour wages are relatively low, the need of the hour is increased employment, relatively easy operation of the plant and comparatively less sophistication of mill equipment. Such spare parts are required which could be partly made locally or in the mill maintenance shop. However, one aspect which should be kept in view while planning such mills is to keep sufficient provision for energy, chemical and fibre conservation equipments.

Modern paper machines are very sophisticated items of equipment, with modern process control devices and usually computer-controlled operations, to save labour and improve quality. Based on the conditions prevalent in developing countries, these are not the machines one would like to install in such countries due to the above-mentioned limitations, thus justifying shifting of capacities from economically advanced countries to lesser developed countries by using existing capital equipment.

Limitation of Capacity Development Due to Restricted Demand

Depending upon the demand pattern, availability of necessary raw materials, infrastructure facilities, etc., the developing countries require paper mills in the capacity range of 50-150 tons per day. The economically advanced countries, on the other hand, have developed sophisticated technology and have developed much larger capacity machines ranging from 250-1 000 tons/day, to suit their requirements. As such, the 50-150 tons per day capacity paper machines have become redundant and obsolete for their purpose.

Limitations in Building of Small Capacity Paper Machines Due to Fast-Changing Technological Concept in Machinery Supplying Countries

As discussed earlier, the developed countries have created high-speed wide paper machines of capacities ranging from 250-1 000 tons per day for writing and printing, magazine grade papers and toilet tissue papers to suit their requirements except for the air-mail tissue and other speciality papers (which have lower capacities). Obviously such large machines cannot be controlled manually in an efficient way and as such highly sophisticated control systems have also been developed to meet the demand. This cuts down the labour/manpower involvement which over the period has become prohibitive and scarce in those countries. The small paper machines of capacities 50-150 tons/day are more or less obsolete for them. When the paper machinery manufacturers are requested to quote for small paper machines of capacity 50-150 tons per day without much automation, they find it difficult to quote at a price which could justify economically viable projects particularly in view of high manufacturing cost in supplier countries. This creates the problem of higher project costs and thus viability of the new paper projects.

Limitation of Skilled Personnel for Operation of Modern Pulp and Paper Mills

The personnel in the developing countries do not possess the required skills to handle highly sophisticated machines. Even if some people are trained to properly operate such machines, it becomes a great problem in case of failure of any parts/components as the required skill and expertise will not be available in the area to rectify the defect. In such cases, the highly sophisticated machines may even come to a standstill. The necessary infrastructural facilities and development of the area and manpower is a must, which most of the developing countries lack particularly in the forest areas where paper mills have to be set up. Hence the very sophisticated machines in the capacity ranges available are not recommended for the developing countries.

Although we in India have gained considerable experience in the operation and maintenance of paper plants over the past three to four decades, even then it is not fully geared up to use sophisticated plants due to continuously improving technological concepts. When the sophisticated instruments for operation and control go out of order, even we have to do without them for want of skilled manpower to rectify the sophisticated instruments. The position of other developing countries is unlikely to be dissimilar as many of them would face the same proble

Calling experts from developed countries every now and then is an expensive and impractical proposition, thus affecting production and viability of such units.

Limitation of Capital Resources and Other Infrastructural Facilities

As the developing countries are producing machines mostly of higher capacities to suit their requirement, their offers become out of tune when they quote for comparatively smaller paper machines in the range of 50-150 tons per day. For example, the offers for 150 tons per day new writing and printing paper machines would be of the order of Rupees 160 million (US$ 15.0 million; 1 US$ = Rs. 9.5) in addition to the cost of pulping equipment, stock preparation, finishing equipment and other auxiliaries.

A total paper plant for writing and printing papers with capacities of 100 and 150 tons per day including all the associated facilities would cost about Rs. 800 million and Rs. 1 100 million respectively (US$ 84.2 and 115.8 million respectively). The costs are based on Indian conditions. The total project costs would be of course different for each developing country, depending upon local facilities and fiscal levies, etc.

The developing countries find it difficult to invest such huge amounts even though they have the necessary raw materials and the internal consumption potential. Even if they decide to go about it in stages, by starting the plants without pulping and recovery and use only waste paper in the beginning, the resultant project costs come to about 50 percent of the original. This is by no means a small percentage.

The lending rates for the money required (at the rate of 14-18 percent) and high gestation periods of new paper plants (42 to 48 months) increase the project cost considerably. Further, the foreign reserves of the developing country may not be sufficient to allocate such huge sums of money for the new paper plants.

Arranging loan from the national and international financing agencies is also a time-consuming job. All these things together have hampered the growth of the paper industry in the developing countries.

SPEEDING UP THE DEVELOPMENT BY USING LESS SOPHISTICATED CAPITAL EQUIPMENT AT THE INITIAL GROWTH STAGE

The delivery periods of new paper machines are in the range of 18-24 months requiring an implementation period of 48 months while the second-hand paper machines can be purchased from developed countries and brought to site within six months, thus cutting down the gestation period for project implementation about 18 to 24 months.

At the initial stage the second-hand paper machines may be commissioned without pulp mill and recovery plant. The plant may be run initially on waste paper. It is possible to produce paper in this way within 18-24 months as against 42-48 months for new paper plants in a conventional way.

The total project outlay is considerably reduced due to a shorter gestation period and the consequent lower pre-operative and preliminary expenses. The second-hand paper machines cost about 10 percent of the new paper machines. This will reduce the project cost drastically.

It may be better to first commission the paper machines using waste paper. Pulping facilities, etc., may be added gradually over two-three years thereafter. Thus with the internal generation of funds, it should be possible to meet the finances of the pulping plant.

Provision should be made for installing recovery plant and power generation to some extent in an economical way, in stages using high pressure steam for power generation and utilising the potential energy before it is consumed in the pulp mill or paper machine at lower pressure.

SOME SUGGESTIONS WHILE SETTING UP PAPER MILLS USING RECONDITIONED MACHINERY

The proper selection of second-hand paper machines with sufficient residual life is very important. Further, the machine configuration should be such that it is suitable for the use of local raw materials. In general, the second-hand paper machines from the western developed countries are based on long-fibre wood pulp while the developing countries have more resources of short fibres like bamboo, eucalyptus, and other mixed hardwoods mainly tropical, kenaf, wheat/rice straw, bagasse, etc. These machines should be properly reconditioned; the cost of which as per our experience would not exceed 10 to 15 percent of the cost of the new machine by replacing worn-out parts, components, bearings, etc., and some design modifications which may include increase in wire length or drying capacity or modification of press part, etc., as the case may be. Such properly selected second-hand paper machines, after reconditioning and rebuilding, may still have a residual life of 25-30 years.

Based on our experience and data available with us for second-hand paper plants in India, Table V gives comparative investment costs of non-integrated paper plants for the manufacture of writing and printing papers.

Finally, Tables VI and VII give an indication of developing countries where there could be scope for either expansion of the existing industry or establishment of new mills.

Table V

Capital Cost Structure of Non-Integrated Paper Mills
(second-hand paper machine)

million US$ 1/

	Capacity tons per day:	50	100	150
1.	Land and buildings including housing for essential staff	2.0	3.0	4.0
2.	Plant and machinery, of which:	5.0	8.0	10.0
	(a) Paper mill machinery including renovation and reconditioning	2.0	3.5	4.5
	(b) Utilities - water, steam, power, etc.	3.0	4.5	5.5
3.	Freight, erection and start-up expenses	2.0	3.2	4.0
4.	Engineering services	0.5	1.0	1.0
5.	Contingencies	0.5	0.8	1.0
	Total	10	16	20

1/ The cost does not include interest on capital, company formation and allied expenses, margin money for working capital, customs duty and other local taxes, etc.

Table VI

Producing Countries with Potential for Growth

Paper and Paperboard

thousand tons

Country	Production 1979	Production 1980	Consumption 1979	Consumption 1980	Gap in supply 1979	Gap in supply 1980
Asia						
India	971	1 088	998	1 088	27	-
Iraq	57	57	123	115	66	58
Israel	129	126	309	311	180	185
Jordan	5	5	33	33	28	28
Malaysia	46	55	285	328	238	273
Pakistan	82	89	135	144	53	55
Philippines	345	334	447	457	102	123
Singapore	6	6	208	237	202	231
Sri Lanka	20	20	37	37	17	17
Syria	3	3	64	63	61	60
Thailand	333	349	475	494	142	145
Turkey	443	470	511	523	68	53
Latin America						
Colombia	351	372	429	446	78	74
Costa Rica	10	13	130	130	120	117
Cuba	95	100	143	148	48	48
Ecuador	41	41	83	83	42	42
El Salvador	26	20	71	70	45	50
Guatemala	42	45	36	89	-	44
Panama	16	18	84	83	68	65
Puerto Rico	50	50	230	230	180	180
Venezuela	511	501	751	741	240	240
Africa						
Algeria	75	75	180	180	105	105
Arab Rep. of Egypt	121	137	289	315	168	178
Morocco	92	101	166	219	74	118
Tunisia	28	29	45	45	17	18

Source: Pulp and Paper International - Annual Review 1981.

Table VII

Non-Producers: Consumption and Imports with Potentiality of Investment

Country	Population	Per caput consumption of paper and board (kg)	Import of paper and paperboard	
			1979 (tons)	1980[e]
Ghana	10 600 000	4	40 000[e]	40 000
Ivory Coast	6 500 000	5	35 000[e]	35 000
Malawi	5 500 000	3	9 580*	13 000*
Senegal	5 200 000	2	12 000[e]	12 000
Zambia	5 870 000	4	20 000*	20 000*

e = estimate

* = official figures

Source: Pulp and Paper International Annual Review 1981.

IMPLEMENTING PULP AND PAPER PROJECTS:
The Initial Operating Years

by

D. von Stauffenberg[1/]

INTRODUCTION

Last year, I had the honour of addressing the twenty-third session of the FAO Advisory Committee on Pulp and Paper on the topic of financing new projects in your industry. That presentation dealt mainly with how to design the financial structure for a greenfield pulp and paper project. Today, I would like to pick up where last year's discussion left off and talk about the crucial period after project start-up.

Both my earlier remarks on project financing and today's presentation draw on the experience of the International Finance Corporation (IFC), an affiliate of the World Bank dedicated to the support of private enterprise in developing countries. Over the years, we have invested in many pulp and paper projects in the Third World. I am not going to talk about any one of them in particular. Rather, I have tried to extract those points which seem to recur again and again and which suggest that there is a pattern which is widely applicable.

The behaviour of pulp and paper mills is determined to a large extent by their capital intensity. Fixed charges - interest and depreciation - typically constitute an important part of expenses which, in turn, makes high capacity utilization extremely important. I suspect that the tendency to be over-optimistic in one's assumptions about how fast a new plant can be brought up to full production is to some extent related to capital intensity as well.

It simply makes an enormous difference to a project's finances whether you assume that you will be able to reach capacity production in two, three or four years and it is hardly surprising that feasibility studies tend to build their assumption on what is theoretically possible in, say, the U.S. or Finland or Canada rather than on what is likely to happen in practice in a country where industry is still in its infancy.

This tendency to be optimistic in one's assumptions about how long it takes until a plant is fully operational is reinforced by the long time which is necessary to build a plant. It may be that it would be just too discouraging for a sponsor if he were told that it will not only take three or four years to build his plant but that he may well have to allow for an equally long time after project completion until his project starts to make money.

But then one wonders whether any of the great building feats of humanity, the pyramids, the gothic cathedrals, the Panama Canal, would ever have been begun if it had been known from the beginning exactly how long it would take to finish them. Perhaps a bit of illusion - some would call it insanity - is necessary to achieve something truly great.

Be that as it may, my colleagues in the financial world have very little patience with such a poetic approach to the problem. And that is understandable since, in the final analysis, our livelihood depends on how accurately we foresee the prospects of a new project. For us, and really no less for the owners of a project if it is return on investment they are interested in, it is extremely important to know how long it will take to complete their undertaking.

1/ International Finance Corporation.

For a money-making venture like an industrial plant, completion does not just mean physically finishing a project, the moment when a plant is inaugurated and starts to produce - however intermittently. For a financial viewpoint, a project is completed when it reaches the point where it is able to do what it was designed to do: to produce the quantity and at the quality its owners had envisioned when they decided to invest. Today, I would like to look into those factors which determine how long a project needs until it reaches its full production. Attention usually focusses on the construction phase. But the early years of operation, when a project is often financially stretched to the limit, decide the financial fate of many ventures.

GENERAL OBSERVATIONS

Why is it that the time needed to bring a new plant to full capacity production is so often underestimated in developing countries?

Looking at individual cases, some problems recur sufficiently often to qualify them as major contributing factors. Dominating all of them appears to be the human element. The people operating the new plant. But there are others as well: Raw materials or other inputs are not available in the required quantity or quality, the transport network and utilities are unable to accommodate the sudden load generated by the plant, vital spares run out and cannot be replaced sufficiently fast, the market does not develop as expected and - particularly relevant nowadays - foreign exchange is scarce.

Before dealing with these factors in more detail, I would like to address the general problem which causes them. For a developing country, a paper mill signifies a large step, a veritable leap, on the way to industrialization. Whereas other industries tend to grow bit by bit, expanding slowly until they eventually reach a significant size, a pulp or paper plant is one of those undertakings where economies of scale dictate that the project be very large from the outset. Industries which grow slowly experiment as they go along. They find out what is possible from experience, they adapt to the environment in which they operate and, vice versa, their environment adapts to them.

I am not using the term environment in a narrow ecological sense but rather to describe all points of contact - human, physical, financial - between an industrial enterprise and the outside world.

Electricity supply, for example, provides a simple example for this. As long as electric power is not available, industries requiring electricity will not develop just as plants which require water will not grow in an arid environment. A small power grid will lead to enterprises which have limited electricity requirements; as more electric power becomes available, industry responds with production techniques which consume more electricity and so on up to the extreme point where vast hydroelectric schemes attract very energy intensive industries, aluminum smelters, for example.

The example is of course simplified but it demonstrates the point that industries tend to grow more or less organically in their surroundings. Electricity supply is only one of innumerable elements of those surroundings. But the others - manpower, raw materials, transport network, etc., etc. - influence industrial development in much the same way.

Let me illustrate this point further through an example which I gather is close to the experience of most of you. Take a tree. A small tree, a seedling, will grow to the extent that its environment will allow it to grow. The composition of the soil, moisture, climate, these and many more factors determine whether and how fast the seedling develops. If the environment is inhospitable, the seedling will not take root, or it may take root but never grow beyond a limited size. Only a minute proportion of seedlings will ever develop into giants.

What does this have to do with industrial plants? Well, their development is not fundamentally different from that of a tree. They will prosper to the extent that their environment allows it. Planting a small tree is not too difficult and your chances of success are pretty high, particularly if you know that the type of tree you are planting

grows in the area you have selected. The problem of pulp and paper mills is that building them in a developing country tends to be like transplanting a fully grown tree, a giant, into an environment which has not known trees before.

You can analyze the obvious things, the soil and the climate, but you can never be sure that your tree will immediately take root and grow. More probably, there are some factors which you had not foreseen and to which your tree will have to adapt before resuming its growth.

But let me go on to mention the principal points of contact between a project and the surroundings in which it tries to establish itself.

PEOPLE

The first and probably most important one is constituted by the people who run a plant. The obvious problem which is always recognized, if not always solved, is that of management. Most developing countries simply do not yet have people who can run such a plant successfully.

The solution is to import know-how. But there is more to this than the casual observer would think. Let's start at the top with the general manager. Clearly, you need someone who knows his business very well indeed, but that is not enough. In our experience, during the early years of operation, the leadership qualities of the manager are crucial - possibly even more so than his technical qualifications. In this phase, management has to deal constantly with unforeseen events and, at the same time, those running the plant have to be integrated into a working team.

Talking about teams, it is important that the management group works together well. This has a bearing on how you recruit your expatriate experts. One approach, which we have found not too successful, is to entrust the task of recruitment to a consultant who advertises internationally and then screens the candidates. You will end up paying the consultants considerable overhead for something you could just as well have done yourself. If screening of candidates is a problem, we have found that pulp and paper associations in industrialized countries will often be glad to help. Recruitment through international advertising will yield the required number of qualified individuals but it does not assure that they will be able to work together.

A more effective approach is to turn to a pulp and paper manufacturer who can assemble the necessary team from his staff. In that case, the expatriate experts share a common background and they tend to function as a homogeneous group.

Assembling a locally recruited work-force presents more serious problems still. The need for training is of course normally recognized. But the nature of the task is nonetheless often overlooked. The challenge facing a new plant is not just to teach its people certain skills - plants all over the world are doing that all the time. But a new mill in a developing country can bring about a complete transformation in the lives of the people depending on it for a livelihood. Whether the plant is aware of it or not, it has set these people on the road from a rural to an urban society. We have seen cases where a paper project in a rural area has, within ten years, completely changed the life-style in its vicinity, where a small backward village was transformed into a bustling town. It is not surprising that such a transformation, which amounts to a revolution in sociological terms, affects the productivity of workers in the plant.

Another phenomenon is that a large sophisticated employer like a paper mill easily becomes a training ground for surrounding industries. No sooner are workers trained than they are snatched away by other companies. This affects particularly skills such as electricians, turners, fitters, etc., who can easily be used by others. We have seen cases where the production of paper plants financed by IFC was significantly affected because the annual turnover of their workers approached 100 percent.

RAW MATERIALS

Raw material supplies quite often present a problem in the early years of operations. Feasibility studies tend to be optimistic about the availability of basic raw materials. Forest inventories can be inaccurate or sugar mills may decide that they really have less excess bagasse than they originally had indicated, or the transport network cannot handle the sudden increase in loads. We know cases where the pulpwood was available as expected but, during the rainy season, it proved simply impossible to move the required quantities to the plant. Most of these problems can be traced down to the fact that a pulp and paper mill represents a very large increment in the country's demand for the raw material in question. Time is needed until supply responds to this extra demand.

The list of difficulties associated with raw materials or other inputs could be extended, but let me just mention that even imported inputs present links with the local environment which can be strained by a new plant. Theoretically, you just order whatever you need and wait until it is shipped to your plant. In practice, the good in question has to pass local ports and customs - often formidable bottle-necks - foreign exchange is required to pay for it and an import licence may be needed.

UTILITIES

I have already mentioned electricity supply. Let me just make the general point that a plant of the size of a pulp and paper mill cannot expect to simply plug itself into the existing utility network. More often than not, it will have to supply its own electricity and water. But there are cases, and they are not infrequent, where a new factory is timed to coincide with completion of a new power plant or transmission line. And in these cases, it pays to remember that public investment projects follow a different set of priorities than industrial plants. It is hard to be too conservative in one's assumptions as to when a new power plant or other major public investment will be completed. A large Latin American project we have recently financed, for instance, requires a 70 km transmission line. That line is now under construction and we are fairly sure that it will be in place before the plant is completed three years from now. I would not be so confident if it were not for the fact that the power company will have to pay damages for every day of delay in completing the transmission line after the scheduled completion date in the middle of next year. In return, our client had to pay the full construction cost in advance. I believe it was worth it.

SPARES

Again and again, even well-managed plants will have to shut down because they run out of some crucial spare part. For a capital intensive plant, it is worth it to invest heavily in a spare parts inventory, particularly if it takes weeks or months to obtain replacements. Beyond the safety margin afforded by a well-stocked inventory, it is crucial that an early warning system be in place which gives sufficient advance notice to allow restocking before the plant has to be stopped. This is difficult in the early phases of production when consumption patterns are not yet well established but today's small computers make it possible to introduce very sophisticated inventory management systems at a minimal price.

MARKET

Even a moderately sized paper mill can usually meet the entire needs of an average developing country. This means that the plant has to achieve nearly instantly 100 percent market penetration for its products. This is obviously ambitious and very often impossible. Governments will usually help by protecting the local producer to some extent. My colleague, Mr. El Serafy, will deal in a separate paper with the issues raised by protection.

I recall one interesting case where paper users began to stock up on imported paper as the local paper mill neared completion. They naturally did not trust the quality of the local product and they anticipated that it would be more expensive. As a result, our mill - I say 'our' even though IFC had only a small participation - had a very limited market for about a year or so until its prospective clients had drawn down their huge inventories. I may add that this mill has become a significant exporter in the meantime. The worries about the quality of its produot do not seem to have been justified.

I do not have the time to do justice to the topic of marketing and of what can be done to oover an entire market virtually from one day to the other. But I would be glad to discuss separately, with those of you who are interested, some of the techniques which in our experience have been successful.

FOREIGN EXCHANGE

For many developing countries, foreign exchange is a scarce resource - at times, extremely soarce. There is nothing new about that but the message has been driven home with a vengeance during the last years and many pulp and paper projects are suffering the consequenoes.

The sucoessive oil shocks of the seventies were a severe blow, particularly for recently completed plants whose design was based on cheap oil. At a time when they were burdened with high financial charges, they suddenly had to cope with a manifold increase of their energy costs. Usually, the answer was to raise new money somehow and to modify the plant, either by including energy saving devices or by switching entirely to other fuels. This added complication more often than not meant that the time needed to reach full capacity was extended by a few years.

The present decade has brought a variant of the same problem. As developing countries slid into a debt crisis, devaluations of 100 percent or more became common. Suddenly not only one input - fuel - is much more expensive and often unavailable at any price, but now a whole range of items, all those requiring foreign exchange, are affected.

A few years ago, one would have thought that most companies could not withstand sudden devaluations of that magnitude, but we are witnessing cases of extraordinary adaptability. Producers who would never have thought of exporting suddenly penetrate foreign markets. Imported inputs are substituted by local products or the product is changed to cut down on import requirements.

In one example, a producer of box board had operated for about two years and was about to overoome the typical teething problems of a new plant when his country was seized by a balance of payments crisis. The supply of imported high quality pulp and waste paper was virtually cut off and, as the industry turned to local raw materials, domestic waste paper of the required quality beoame scarce. The oompany has reacted by shifting its product mix and we are now financing a modification of its plant which will allow it to use low quality local waste paper.

It is too early to come up with a final verdict on the impact of the foreign exchange crisis on producers in many developing countries but, somewhat to our surprise, the results have so far not been as catastrophic as they might have been.

CONCLUSION

I am afraid that my remarks have sounded like a tale of woe. You may be tempted to conclude that, faced with personnel problems, raw material shortages, missing spare parts, lack of electricity, in short with the whole panoply of events which collectively make up Murphy's law, it is hardly worthwhile to embark on a pulp and paper project in a developing country.

Well, the truth is fortunately not quite as sombre. Investment in pulp and paper in developing countries is by no means hopeless. Quite to the contrary. We have invested in many projects and we have been successful in most of them. But we have learned some

lessons and we still go on learning. My intention was to point out some of those lessons in an area which tends to receive much less attention than the actual construction of a plant: to bring a new mill from start-up to full capacity production.

If I had to couch our experience in the briefest terms possible, I would do it as follows:

- Be flexible. You will come up against a host of problems you had not foreseen and you will have to cope with them.

- Choose a design which works under local conditions - in other words, keep it simple - and get a technical partner with a stake in the success of your venture. Finally,

- Allow plenty of running-in time - three to four years seems to be a good rule of thumb.

I am aware that what I have said barely scratches the surface of my topic, but then my intention is less to tell you exactly what problems a new project is going to face. The purpose is rather to point to the existence of those problems and to shed some light on their general character.

I would be glad to go into much greater detail with you individually and, if I cannot help you, I can probably direct you to someone who can. It is quite likely that, among the many pulp and paper projects we have helped implement over the years, there is one or the other which has taught us something that is relevant to your situation.

ACHIEVING OPERATING EFFICIENCY, MEETING MARKET NEEDS AND CONTROLLING GENERAL COSTS

by

Julio Molleda[1/]

INTRODUCTION

The successful development of a pulp or paper mill depends on many factors, all of them interrelated. However, it is impossible to say that any one of them is the only fundamental factor or that it takes priority over the others. All are important, and neglect of any one of them has a negative effect on the project.

A brief overview will be given below of those activities which should be conducted, and their possible implications for the future development of the mill. The purpose of all this is:

- To ensure a high level of efficiency in the operation of the plant for the manufacture of the established product mix;
- To establish a marketing policy to facilitate sale of the production under the best possible economic conditions;
- To keep fixed and variable costs as low as possible.

To achieve all this, the activities must necessarily be carried out in three distinct phases:

- Before the start of the design and construction of the mill;
- During the construction, assembly and starting up;
- In the period of normal operation.

It is obvious that the activities in the three stages sometimes overlap and are not clearly differentiated in time; however, it is absolutely necessary that promoters inculcate in their working teams, from the first moments, a philosophy of responsibility, efficienoy and austerity in the development of the project. If this spirit is not present from the start, there is a strong probability of failure.

PHASE ONE OF PROJECT

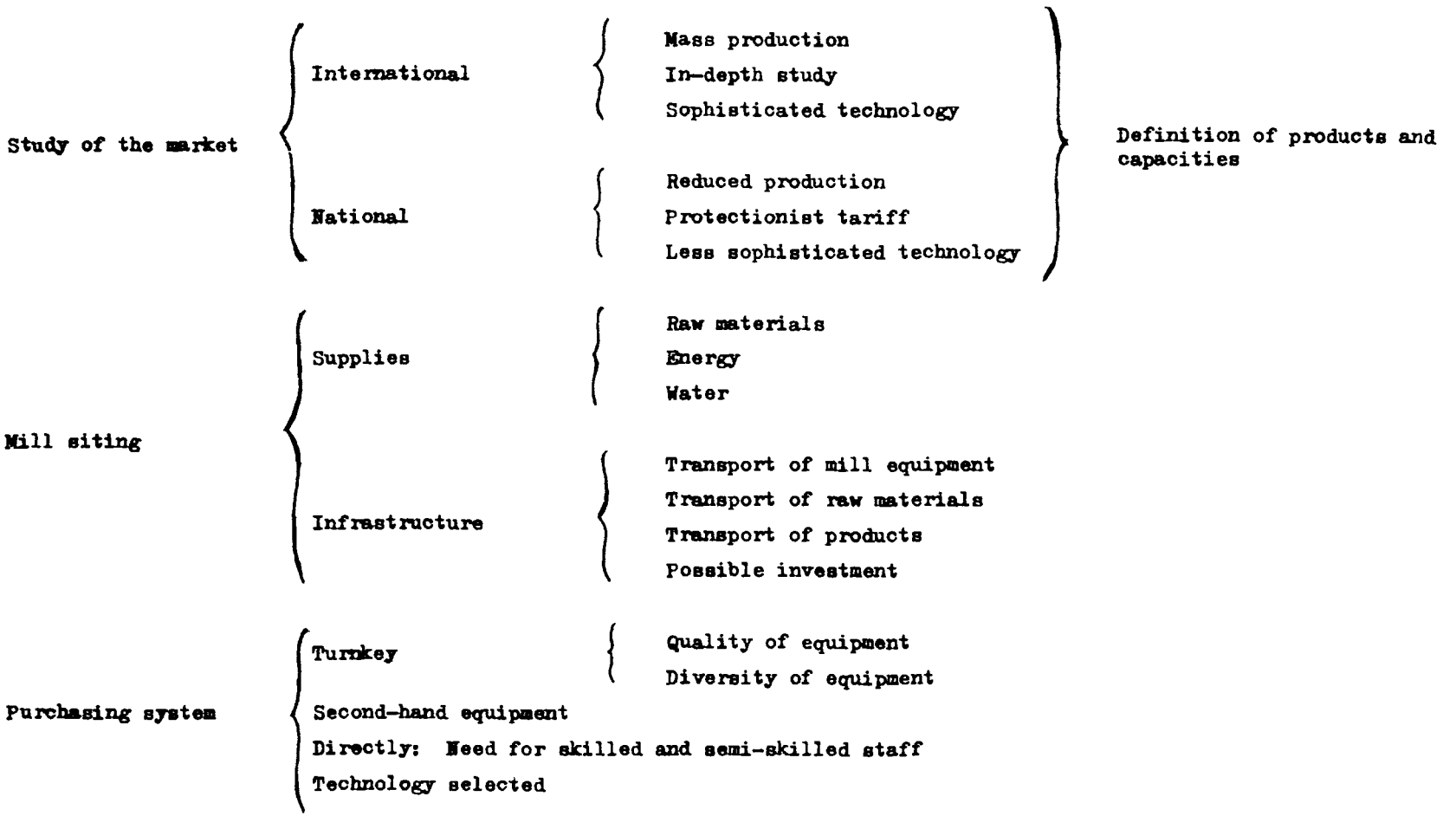
The main reasons for establishing this type of industry in a developing country have already been explained. Once these ideas and reasons have been accepted, action before the start of construction should be concentrated on the following points: knowledge of the market, location of the mill and choice of the system of purchasing the plant, as indicated in Figure 1.

The extension and depth of the study of the market depends basically on the latter's characteristics. For example, whether or not there is already an established manufacturer, or whether it is a national or regional market which could in the future be protected from outside competition by tariffs or other measures.

1/ Managing Director, Empresa Nacional de Celulosas, S.A., Spain

Figure 1

Actions Before Construction



The decision as to whether the market is national or international is very important, since it can affect the whole concept of the mill. For international markets it will almost always be necessary to have plants of large capacity, since the products will usually be bulk grades. If, on the contrary, the market is national or regional, the output will probably consist of a number of grades. In that case the volume will be low and less sophisticated technology can be employed.

As well as the market study, the availability of the different raw materials, water and energy, must be ascertained both for the foreseeable production and for possible future expansions, in the location where it has been decided to establish the mill. Insufficient availability of any of these could give rise later to some high costs of operation.

Special attention should be paid to the study of the available infrastructure, since unfortunately in developing countries it tends to be inadequate. This infrastructure should be studied, not only from the point of view of supply of raw materials and transport of products, but also bearing in mind construction of the plant, which will require handling and transport of very heavy and very large pieces of equipment from other countries. At the same time, the requirements on housing and services for the staff of the mill should be studied and, in the initial phase, for the technical personnel for installation of the equipment, very often expatriates.

A decision on the raw materials to be used, the product or products to be manufactured and the production capacity will already provide an approximate idea of the investment required and, therefore, define in principle the financial structure needed for implementation of the project, which could have a very important effect on the fixed operational costs.

One fundamental aspect of this first phase is that changes can be made during it, without direct economic implications for the future operation of the project, which is not always the case in the later stages. It is, however, also true that at this stage decisions are frequently taken which are inappropriate and irremediable and affect the viability and success of the project.

As a final phase of this first stage, it is necessary to define the system for purchasing equipment;

- Turnkey contract;
- Individual purchase of new or second-hand machinery by the promoter of the business.

This subject has already been presented and here emphasis will be given only to the possible implications for the future development and operation of the mill.

Turnkey delivery could occasionally lead to equipment of inadequate quality which, although it meets the required technical specifications when delivered, later results in low efficiency of the plant and high maintenance costs. It could also lead to a great diversity of spare parts, which increases the capital tied up, with negative effects on economic results.

The only possible way of dealing with these problems, if a mill or plant is purchased on turnkey terms in a developing country, is to employ technical advisers of proven competence and responsibility.

When establishing mills in developing countries, it might be recommendable to purchase second-hand equipment from another mill where it has been replaced by other equipment, more modern or of greater capacity. This has advantages and disadvantages. Among the advantages are its lower cost, its operational record and its quicker delivery. The principal disadvantages are that possibly it is obsolete and that it may have a limited useful life. One of the main factors which influence any decision on this is the market for which the final product is intended. Only if it is a national or regional market, in which there will be no excessive competition, should the possibility of second-hand purchase of equipment be seriously studied.

Another item linked to the selection of the approach to purchasing is the choice of technology and, consequently, the way of awarding the engineering contract. Generally speaking, for mills in developing countries it is not desirable to select very advanced and sophisticated technology since it normally requires highly skilled staff for operation. This is seldom found in developing countries. It also tends to create dependence exclusively on one contractor who quite often is far away from the country in question. It is preferable to select fully tested and reliable machinery which is easier to operate, although the technology may be less advanced.

Despite the above, the proviso should be made that, where bulk products intended basically for competition on international markets are concerned, it is essential to install machinery of high productive capacity and technology similar to that of one's future competitors.

EXECUTION OF PROJECT

In the second stage (that is, during the execution of the project, construction, installation of equipment and start-up), the situation will become less flexible and the promoters should be fully aware of the fact that any modification of decisions previously made might give rise to important increases in investment which could have a lasting effect on the profitability, and sometimes even the viability, of the project.

The activities indicated in Figure 2 for this second stage do not necessarily have a pre-established order, but in many cases they take place or are modified in the order indicated.

The plant should be set up, bearing in mind the possibility of future expansion and, therefore, planning the infrastructure for a capacity higher than that initially required. The same consideration will apply to the plant layout. Usually these provisions do not substantially change the initial investment and, in fact, leaving them to a later date could be very costly. They might then prevent expansions of fundamental importance for the future of the business.

Sometimes there is also the possibility of manufacturing more sophisticated products at a later stage, either because of market changes or because this was foreseen from the beginning. This should also be borne in mind during the engineering work.

While the plant is being installed, systematic collection should be started of all information concerning the mill; description and plans of machinery, catalogues, systems of operation, recommendations for maintenance, etc. This type of information, which is extremely useful for the normal operation of the plant, since it facilitates repair work, usually starts to be received relatively early within the development of the project; however, it is seldom properly filed, and can even get lost, which later gives rise to problems and difficulties of operation and maintenance.

In this second stage, the training of the staff who will work in the mill should be carried out, up to a minimum level of foreman. This training should be both theoretical and practical and should be arranged in plants similar to those of the new mill. It should be extensive, both for the manufacturing staff and for the maintenance and laboratory staff, and it is desirable that it should take place in different mills, thus facilitating a comparison of the different systems of operating the installation.

The enormous and fundamental importance of training staff cannot be overemphasized, since on this depends the proper use of the equipment. In developing countries, it is hard to find technical staff skilled in this type of industry. In addition, there is seldom any similar mill in the country which would provide initial help.

The length of the staff training period depends on whether or not they have any basic skills and also on the degree of complexity of the equipment; however, it should be as long as possible, although at first sight this seems very expensive.

Figure 2

Actions During Construction, Assembly and Starting up

- Engineering work
  - Expansions of capacity
  - More highly processed products
- Training of staff
  - Up to the level of foreman
  - In different mills
- Collection of technical information
- Purchase of national machinery: standardization
- Plenty of spare parts
- Well ordered storage of machinery
- Assembly: Participation of future maintenance staff
- Starting up
  - Standards of the manufacturer
  - By departments
  - Unloaded
  - In the presence of the manufacturer
  - Possible defects
- Reception of machinery
  - Correcting defects encountered
  - Fulfilment of guarantees
    - Production
    - Inputs
    - Quality

As regards the purchase of additional equipment, with relatively short-term delivery, it is desirable to stardardize. This leads to a reduction in both outlay and in spare parts inventory.

An adequate, indeed more or less plentiful supply of spare parts is a very important aspect in projects of this type, and involves necessarily and inevitably an additional cost compared with the cost of this item in similar mills in developed countries. The reason is obvious - a large part of the equipment will normally come from abroad, which means that it could be difficult and will take some time to get the necessary supply. The mill may have to close down for this period of time if the spare parts needed are of cardinal importance.

As regards equipment installation, which is normally done under the supervision of consultant engineers, it is important, in developing countries, that the future local maintenance staff participate as actively as possible. This will considerably facilitate repairs and the proper operation of the mill in the future.

The equipment is normally started up by its manufacturer, but the technical staff who will in future have to run the mill must necessarily take an active part in this operation. This is why training programmes for the staff should be completed in good time before start-up.

Sometimes the start-up of the equipment overlaps with its acceptance and tests; from this moment the responsibility of the manufacturer for the operation of the equipment ends and that of the mill-owner begins. The latter's technicians should check on all contractual guarantees, such as production achieved, quality obtained, inputs, etc. Obviously the start-up and acceptance of the equipment are extremely important for the future development of the plant. The detection of possible defects or maladjustments will avoid difficulties and disadvantages later, which could be very serious and costly. It is therefore advisable and quite normal that the new company employs technical staff from other enterprises with experience in production, for a limited period, to assist it during the start-up, adjustment and formal acceptance of the equipment.

PLANT OPERATION

In the following stage, which could be defined as that of normal operation of the plant, the three basic aspects on which continuous action should be taken are: achieving the nominal capacity of the mill, product quality control and reduction of inputs, as shown in Figure 3.

Figure 3

Actions During Normal Operation Once the Starting-up Phase Is Over

- Achieving nominal capacity
  - Preventive maintenance
  - Well-equipped maintenance workshop
- Quality control
- Reduction of inputs

It is common knowledge that not even in countries with a long tradition of this type of industry is the nominal capacity of the mill reached in the first, nor on many occasions in the second year of operation. It is also true that frequently this production can be exceeded in successive years. It is necessary to insist on the great importance of reaching nominal capacity as soon as possible (and exceeding it to the extent possible), because of the great influence this has on reduction of fixed costs per unit produced. The profits or losses of the business will depend to a large extent on the production level reached.

The other two aspects mentioned are also very important for the success of the project. The quality of products obtained in the first period of operation, following the start-up of the machinery, tends to be below standard and such products are, therefore, probably sold at a lower price than normal market price. Moreover, variable costs in such a period tend to be higher than those in the normal operation of the mill. Since both questions, quality and variable costs, directly affect the results of the business, it is clear that they should be given particular attention during the first period of operation of the plant. It should, however, be noted that the achievement of high levels of quality is much less important when the products are destined for local or regional markets than when they are sold on international markets.

MAINTENANCE

In most cases the nominal capacity of the plant is not obtained because of interruptions due to breakdowns and because the equipment cannot perform as specified. The establishment of an adequate preventive maintenance programme could solve the problem. This plan should be prepared before starting up the machinery; however, experience shows that in developing countries production requirements always make this very difficult. In any case, it must be introduced within the shortest possible time. It should be pointed out that preventive maintenance often shows up defects which can be corrected relatively easily and which, had they not been detected, could have caused serious breakdowns, with major implications for production.

In developing countries, it is essential to have available some maintenance workshops in the mill itself, well equipped with machinery and staff, since normally they will have to do much of the work which in countries with a long industrial tradition could be entrusted to the manufacturer of the equipment or to other specialized workshops. This means that in these countries the work-load of repair and maintenance workshops in the mill is normally much higher than in developed countries.

MARKETING

Mention was made at the beginning of this document of the need to carry out a study of the market for which the product or products to be manufactured are destined. On many occasions, and because a fairly long period of time usually elapses from when the first studies are made until the plant is started up, the original studies are out of date. It is therefore desirable to carry out an updating of the first market studies in order to implement appropriate production and marketing policies when the time comes to start up the plant, particularly when the products are destined for international markets. A general review of marketing activities is given in Figure 4.

Figure 4

Marketing Activities

Revision of market study

Client-shareholder possibility
- Lower price
- Dependence
- Withdrawal of other clients

Marketing network
- The mill's own network
- Sales agent

Technical assistance from the mill

Breaking into a market normally fed by regular suppliers is diffioult, unless it is a national or regional market which enjoys some kind of protection. To deal with these undoubted initial difficulties, it is common to include as a shareholder in the company a potential client or clients. This participation often includes an undertaking to purchase a certain quantity of the production.

Solutions of this kind, which can be advantageous and appropriate in many cases, also have disadvantages which should be considered and analyzed in depth. The first one is the fixing of the sales price to be paid by the client-shareholder, which would usually be below normal market price. Secondly, the participation of this client could oause other potential purchasers, competitors of the shareholder, to withdraw. Another possible disadvantage, finally, could arise from the fact that the quantity purchased by the client-shareholder might represent such a high percentage of the total production that it could create excessive dependence and thus influence the future development of the business. It is usually preferable - and even more so in the case of developing countries - to diversify sales and thereby the risk which could follow the failure of some clients.

When foreign markets are to be developed, the question always arises, in this type of project, of whether it is desirable to establish a marketing network which belongs to the mill, or rather to contract agents or representatives for the sale of products. The decision will depend on many and very varied factors (type of produot, number and type of clients, size of each market, etc.). It is not possible to lay down general rules or to make specific recommendations in this respect. It is, however, a question of great importance for the sucoess of the business, which should be studied and decided in each oase bearing in mind the many factors involved.

Another important point for maintaining a position in a competitive market is the creation of an image. A bad initial image, defects in quality, mistakes in service or in price policy can cause very serious difficulties in breaking into a market, or set a mill back in years once it has already built up its clientele. Therefore, apart from establishing a scrupulously efficient system of quality control, the mill should also have a good marketing service to attend to clients and also technicians who could visit them and discuss and clarify with them any possible problems.

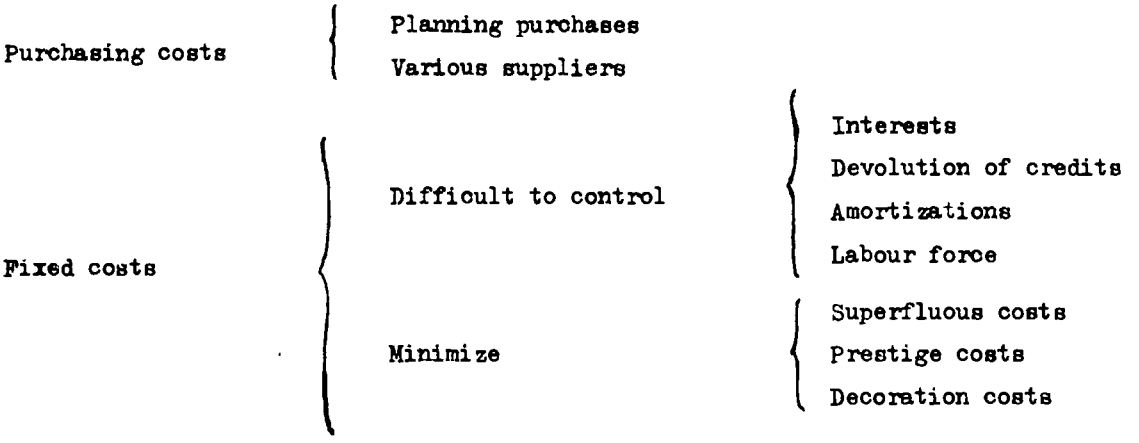
In cases where projects are planned and developed to supply their products to strongly protected markets, it is absolutely necessary that the promoters accept from the very first moment the principle that situations of this type are always temporary. Protection in the medium or long term will disappear, and competition will arise that could put the life of the business in danger, unless it is borne in mind from the beginning that the achievement of international competitiveness sooner or later is essential and unavoidable.

COST CONTROL

Up to this point, analysis has been made of those actions that enable, or should enable, plants to operate well, both technically and commercially. There is a third group of factors which could also be decisive for the success or failure of the business. They are those concerning purchasing, limitation and control of the company's fixed costs and financial expenses, as shown in Figure 5.

Figure 5

Cost Control



To appreciate what an efficient purchasing policy could mean, it must be borne in mind that, in this type of industry, the variable cost is almost always higher than 50 percent of total cost and that, within this variable cost, there are usually two or three elements of great weight inasmuch as an efficient purchasing policy is or can be a decisive factor for the results of the venture. It should never be forgotten that the supply of the necessary raw materials can present sporadic difficulties, in many cases sudden and unexpected (international shortage, strikes, etc.). Transportation of some raw materials is difficult and takes a very long time. All this implies, particularly in developing countries, special effort and attention to purchasing services.

In general, it is preferable to have more than one supplier, not only for reasons of economic competitiveness, but also because of possible problems of availability of supplies.

Another major item that has a considerable influence on the cost of the product and, therefore on the result, is that of the fixed costs of the business. Depreciation is often determined by law or by purely technical considerations. The cost of the labour force depends on the social labour situation in the country so that the most important aspect is to control the number of employees. In the medium or long term, human productivity will be one of the deciding factors of competitiveness. It is, however, usually under the heading of general costs that greater deviations appear in developing countries from what could be considered normal. Their control and reduction to a minimum must be one of the priority tasks to be considered. In the initial stages of the project, high costs of promotion and establishment should be avoided, and all those which often are incurred only for the pretended prestige of the people or the institutions participating in the project should be eliminated. The same could be said of superfluous costs such as decoration of administrative offices or of the mill. The design should be as functional as possible.

CONCLUDING REMARKS

Two other problems which should be avoided and which sometimes arise in developing countries are, on the one hand, excessive bureaucratic formalities which make the implementation of the project unnecessarily long and increase its cost and, on the other hand, the creation of complicated and costly managerial units, with many high-level people who are almost always more political than technical. This is frequent in projects which, because of their scope, have profound implications for the country's economy. They hinder rather than help the taking of decisions, frequently lead to very costly delays in the implementation of the project, and raise problems in the running of the business.

No specific mention is made here of financial costs, whose influence on the development of any business is fundamental, because they lie outside the limits of this work. It is merely supposed that a project which is not satisfactorily financed will not be implemented.

It must be borne in mind that the pulp and paper industries, because they are basic and, to a large extent, heavy industries, do not usually generate large profits. This has always been so and it seems unlikely that it will change in the future, at least in the next few years. It requires special strictness and austerity in planning, which is not always the case in projects planned in developing countries.

In conclusion, I should like to emphasize the need for the type of venture to which this work refers, to look ahead constantly and know how to interpret changing surroundings It could have the best possible plant, a constant and growing share of the market, and perfect control of fixed and variable costs, but if it is not prepared to adapt itself to changing conditions, its future will be compromised and its survival threatened.

TECHNICAL AUDITING OF OPERATING PULP AND PAPER MILLS

by

B.A. Linderholm[1/]

DEFINITION

Complete technical auditing of an operating mill in the pulp and paper industry consists of examining the condition of the mill and its equipment, establishing potentials for minor and major mill expansions, assessing the ability of the mill to change manufacturing programmes, if required, ascertaining production and technical performances and efficiencies including those of management and labour, investigating actual and potential profitability of existing and proposed operations and determining profit sensitivity to changing conditions.

The emphasis on these activities will vary with the exact purpose of the technical audit, but as a rule it will include scrutiny of a mill in respect of the following:

1. Physical conditions
2. Expansion potentials
3. Production statistics
4. Production, cost and management control
5. Management and labour skill

In principle, the above definition also applies to mechanical wood product industries as well as to many other industries. Technical auditing may also be limited to a specific mill department, such as a bleach plant, or be concentrated on a subject, for example energy conservation throughout a mill.

REASONS FOR TECHNICAL AUDITING

There are many reasons for technical auditing of operating mills and some examples are mentioned in the following paragraphs.

A company may wish to be certain that maximum efficiency and highest possible profit is obtained from its present mill operation, because it may be felt that improvements are possible, or it may be that present profit is unsatisfactory.

A new owner, or a prospective new owner, of an existing mill may wish to have a technical audit to gain a more detailed understanding of the mill's earning power and of how its production may be modified to suit an overall manufacturing programme in a group of mills.

Another reason may be that insufficient production and cost data are generated at a mill for effective management control.

A change, or an anticipated change, in the market may justify technical auditing of a mill to determine the best manner to meet the new conditions.

A government may wish to have a technical audit of the country's pulp and paper industry as a guide to measures needed to protect the industry and to create a favourable climate for its future growth.

1/ Linderholm and Company, Limited, United Kingdom.

A turnkey mill owner may desire to have a mill audit to check that the contractor has fulfilled his performance guarantees and that expatriate mill management not only operate the mill efficiently, but also have an efficient active programme of transferring technology to the nationals, who will operate the mill after the completion of the expatriate management contract. In this connection it is worth mentioning that technical auditing of feasibility studies and of turnkey contracts before, during and after the signing of the contract is paramount for a final suocessful mill design and operation, considering that minimum capital cost often needed by a prospective contractor to become successful does not necessarily equal minimum operating expense or best equipment selection. Further, turnkey contractors often use their country's government sponsored export finanoe schemes, which understandably require a major portion of the equipment to originate from that country. This could impose a serious limitation on the selection of a vital major piece of equipment. Technical auditing at the negotiations stage could eliminate this risk. There are also infrastructural aspects, often not part of the turnkey contractor's responsibility, which may be overlooked. Technical audit at this stage is, strictly speaking, outside the scope of this presentation, but it is important to recognize that a technical audit at or after the mill commissioning may not yield a satisfactory result for either party, if a careful audit was not made before the signing of the turnkey contract.

Technical auditing may also be a key function of arbitration related to equipment supply and performance guarantees.

APPLICATION OF TECHNICAL AUDITING

General

Technical auditing should be conducted by a technical specialist in the pulp and paper field experienced in the evaluation of equipment, performances, processes and complete mills and in assessments of these activities in the manner of techno-economic analyses. He should be able to judge the correctness of information received during mill interviews and be able to assess if the information is complete and if consumption values and costs are within a reasonable range for the operation. Such information should also be cross-checked by him by making control calculations.

He should be knowledgeable in production - cost and management control systems and related procedures.

Physical Conditions - Mill Site

The location of the mill is investigated for major mill expansion possibilities in respect of external services, such as roads to the site, main road traffic intensity, railroad connections, nearest suitable harbour for export and imports, electricity supply, water availability and quality of water, effluent disposal and regulations, air pollution abatement requirements, nearness to additional fibrous raw material supply, trained labour availability and housing facilities for additional mill personnel.

It may be found that the road leading to the mill can hardly cope with the present traffic and that road improvements are unlikely for various reasons. Usually ports can be expected to cater for increased tonnages, but there can be physical and handling limitations particularly for smaller ports. These limitations may not be easily solved. Additional water may not be available from wells and/or rivers and, if major water economies are impossible in the mill, a mill expansion cannot be contemplated. Electricity supply may or may not be critical depending upon the size of the expansion and the practicality of generating electricity at the mill.

The mill layout is assessed for logical expansion possibilities considering present and future material flows, storage requirements and service facilities. If a mill has been laid out without consideration to future mill expansions, it may be very difficult to find space to extend departments in a suitable manner.

From these examinations of the mill location and the mill layout it is possible to establish if it is physically logical to expand or restructure the operations at that mill site.

Physical Conditions - Equipment

The equipment, its arrangement and links in the process are examined for suitability and efficiency. Performances of major equipment and of individual departments are assessed together with unit consumptions and their relationship to performances. The age of the equipment together with estimated remaining life of it is recorded. Bottle-necks are identified and assessments made on possible measures to eliminate them by duplicating some equipment, changing process methods, augmenting some equipment, improving efficiencies, etc.

In a pulp mill, as an example, it may be possible to introduce pre-evaporation and concentrators for the black liquor evaporation and to improve wood chip quality to allow cooking the pulp to a higher Kappa number hereby achieving an increased pulping yield and a lower black liquor solid content per ton of pulp. Either one of these measures could eliminate a bottle-neck at the evaporator plant and also have other advantages, primarily economy of operation.

In a paper mill, it may be possible to increase the capacity by adding dryers, improve press section and felt dewatering capacity and by improving sheet handling from the forming device and press section, etc.

The production increases possible by reducing bottle-necks can be relatively small, but attractive incremental investments. For paper and board machines the additional output from modifications can be substantial. In some instances, it has been possible to almost double the production, but the potential increase will vary with the type of machine and products made.

Major rated over-capacities of some equipment may occur in a direct process line and this is recorded in the event the equipment may be used differently in the process. It may also be interesting to know the reason for such over-capacities.

It is important to record the estimated remaining life of major pieces of equipment, because it can be of paramount importance in planning future mill expansions. The black liquor recovery boiler in a pulp mill is a typical example, because its size often governs the total output of the pulp mill, or a major part of it if there are more than one of them, and the recovery boiler has the longest time of delivery of major equipment for such a mill. Therefore, possible future mill expansions or product changes should be established before the order is placed for the recovery boiler replacement. The remaining life and type of a stock preparation plant in a paper mill is also important to evaluate. Plans on paper mill expansions or contemplated introduction of new products with different preparation requirements should be decided upon before the stock preparation equipment replacement is due.

These are only a few examples of the type of thinking needed in assessing equipment and bottle-necks in a mill and there are no standard solutions applicable to all mills.

Production Information

Detailed statistical consumption and cost data are collected for the total mill operation together with specific process information and production rates for the equipment, as previously indicated. Cross-checking of statistical data by making 'control loop' calculations of process performances is very important particularly when the information is only provided verbally together with department production data during a tour around the mill or during a general discussion. Information obtained in this manner may be useful, but often does not stand up to statistical analyses. If the information proves to be out of balance, further questioning is needed to clarify the information.

Consumptions of steam, electricity and water by equipment processes and departments are scrutinized throughout the mill together with steam generation and, when applicable, electricity generation in the mill.

Mill manning and the administrative organization are investigated to permit evaluation of overmanning in departments, of labour and administration costs and the like. Classification of employees according to age groups may sometimes be of interest.

Production, Cost and Management Control

The production cost control system used, or the lack of it, in a company and its mill(s) is a very strong indicator of mill operating efficiencies and of the management's awareness of efficiencies, performances and actual costs of production.

An effective production and costs control system provides management with prompt 'cost' information, i.e. output performances and consumption of consumables information for making a specific product at the time of production, also immediately informing operating personnel on how they are meeting their targets. This system provides management with information on overall production efficiencies, maintenance times versus breakdowns, lost time analysis and continuous updating of performances, targets and actual costs.

Such a control system provides management with complete information and possibility of flexibility in meeting changing market demands enabling them to judge which grades or operating level offer the highest profit margin to the company. Likewise, production personnel have a realistic information bank on performances and costs and can use this information as a guide to further mill improvements.

Fixed manufacturing costs for a product are the cost of using the mill for making it. The fixed cost can therefore be expressed as an 'hourly rate' for the mill and the unit production during the hour broadly speaking determines the fixed manufacturing cost according to weight for the product.

Variable manufacturing cost is the cost of consumables such as raw materials, steam, electricity, water, etc. Only a very minor part of steam and electricity costs are fixed and they refer to heating and lighting of the plant, the offices, and the like. Continuous monitoring of consumptions of consumables for the product with comparisons against standard consumptions offers a means of controlling variable manufacturing cost.

Obviously, a serious approach to establishing and updating performance targets and standard consumptions for a product is vital for maximum manufacturing profit.

The production and cost control systems for pulp mills differ from those of paper mills, which are more complex particularly in mills with a wide production range. The paper mill application will be described first in some detail followed by general comments on a system for pulp mills.

Starting at the paper machine, the instruction to the crew should list quality requirements, other special requirements for each order with target operating speed for the grade and basis weight to be made. The target speed should be based upon the highest possible speed at which an acceptable quality can be produced and it should be based upon current updated information. If a target is not reached the operator should provide an explanation to be recorded on the production sheet, not to be considered as an alibi, but as constructive information for present and future production improvements. The supervisor's attention should also be drawn to the problem. Targets based upon historical assumptions are of little value.

The overall production efficiency of a paper machine or mill should be established through the system considering production efficiencies, which is actual production versus target production; time efficiency, which is actual running time versus available running time; and trim efficiency, which is the actual trim utilized compared to possible maximum.

Maintenance times used for the paper machine should be recorded in respect of scheduled maintenance, breakdowns and operational down-times for wire and felt changes, etc. The aim should be to balance scheduled and breakdown maintenance to achieve maximum effective operating hours.

Lost time analysis should be available from assessments of production records to direct management to urgent operating problems and bottle-necks requiring prompt attention. Expressing lost times not only as tons or time lost, but also in monetary terms is a valuable feature, because money is understood by all and technical and production personnel

will get an insight to the expense of problems and lack of performances. Further, the relative importance of problems is evident from the monetary value (expense) allocated to them.

The degree of preventive maintenance practised in a mill, or its absence, is an indicator of management's concern about achieving maximum output from the mill.

In summary, it may be stated that a paper mill using a production and cost control system as described, or similar, also has a major part of a management control system, if the system is used as a tool, and maximum possible profit should result from the manufacturing programme. However, there are paper mills that do not practise analytical accounting, i.e. have no production or cost control system. Consequently, they have a very limited idea of what goes on or which grade of paper contributes to the profit. The paper mill where only gross production is known is obviously a very crude operation.

Production and cost control in pulp mills is different in that monitoring of consumptions of consumables at various stages of the manufacturing process is extensive and continuous by means of process controls, flow metres and the like. Process deviations, therefore, become evident more or less as they happen and the daily production of the mill according to target is simple to evaluate. This does not mean that pulp mill operation is simpler than that of a diversified paper mill, but the control principle is different. Monthly formal production reports for pulp mills suffice. An effective report should list actual unit consumptions of chemicals, etc., and actual costs of these items per ton of pulp presented with a comparison to the unit consumptions and costs of the budget and accumulative totals for the current and last year. Written comments upon important features and events should be made by the production management preparing the report to ensure that the significant features are evident to readers with less time for analyzing tabular information than those preparing the report.

Management and Labour Skill

The description of production and cost control systems shows the more important information required to manage a mill to achieve lowest fixed and variable costs to maximize profits. A management using such a system should have a complete understanding of the operation whereas those with limited or practically no control systems usually have defused ideas of their operation. This becomes evident during interviews, because basic questions on production often result in rather imprecise information.

Overmanning in a mill is often, but not always, an indication of a less skilled work-force. Lack of training of operatives is more evident in mills with a management having a less systematic approach to the operation, but lack of training facilities for workers in general in a country may be the major cause of a shortage of skilled labour.

The size of the maintenance staff is another indication of available skilled labour or of mill training of workers.

TECHNICAL AUDIT AND FINANCIAL ANALYSIS

Financial analysis may appear to be a separate subject to technical auditing of a mill, but it is difficult to make suggestions and recommendations as the result of such an audit without having some knowledge of the company's profit and loss statement and balance sheet. Assessment of actual and potential profit without consideration to this information can be misleading. For instance, there are companies with an attractive profit margin based on mill costs, but finance charges may convert the profit into loss. The recommendations of a technical audit in this situation will be different to that of a company which, for instance, has fully amortized and depreciated its mill.

The working capital also reflects the size of raw materials and finished goods storage. During technical audit the quantity of wood or pulp stored at or for the mill is evaluated in relation to the supply pattern and the consumption of these raw materials and the extent of finished goods stored and not invoiced is judged to establish if they are of a reasonable size. One mill visited had a large quantity of sold finished goods

in and outside its warehouse. The goods were not shipped or invoiced, because of lack of a serious approach to transport at its head office. The net sales value of the stored quantity of US$ 4.6 million equalled a monthly interest cost to them of approximately US$ 85 000. The company had high finance charges and difficulty in raising further funds, which makes it difficult to understand the situation.

Technical audit may incorporate valuation of a mill and it is then necessary to appraise the financial status of the company. The approach to the valuation will depend upon its purpose, which may be for a purchase of the company, a bankruptcy assessment, an income tax evaluation, etc.

The book value of a mill is obviously not its real value or worth.

ACTUAL AND POTENTIAL PROFIT

To obtain a reasonably complete understanding of a mill situation the basic technical audit should be augmented by information on the mill's present profit situation, which can be presented in the form of break-even charts. These charts are a pictorial type of profit and loss statement showing the effect of operating the mill at varying rates of production and show at which output level costs and income are equal. Unit operating cost curves may be added to these charts, which in some cases is useful in cost analyses.

These charts are also useful tools in analyzing the effect of finance charges and head office expense for the operation and may be used to illustrate the effects of refinancing, efficiency improvements, production increases resulting from eliminating various bottle-necks in the mill and of profit sensitivity to varying assumed cost and sales revenue changes.

It is concluded that a technical audit of a mill benefits from profit analyses under varying assumed conditions and that break-even charts incorporating unit operating curves are useful for this purpose.

PERFORMANCE GUARANTEES

Technical auditing may be limited to performances of specific equipment, departments or complete mills.

In theory, a guarantee should give the equipment purchaser a compensation for operating costs above the guaranteed figures. The amount should compensate for the increased operating cost over the life of the equipment and be based upon the present worth of the increased cost at the interest rate for borrowed capital or at the earnings rate on the mill investment. In practice it is unusual that such a favourable guarantee for the purchaser can be obtained.

The output performance should also be guaranteed but the value of the guarantee as such is limited. In a mill with major equipment A, B, C and D linked in a direct process line, there is no way that a performance guarantee can compensate for an insufficient output for one of the major pieces of equipment, because such a slow-down affects the total output of the process line. Since a performance guarantee cannot exceed the total cost of the equipment, the penalty would most likely be insufficient, in such a case.

Consequently, output and operating cost guarantees are of limited value in respect of compensation for reduced performances. Further, in some instances, to be legally enforceable, a penalty for lack of performance may require a bonus to the supplier for performances exceeding the guarantee level.

These comments upon guarantees have been made to illustrate that they are not a 100 percent assurance of a perfect supply or worry-free operation, even though performance guarantees have their use.

A justified confidence from a reputable equipment supplier with a reasonable guarantee, including commitments to rectify the equipment if needed, is much more valuable than an extensive impressive guarantee from a little known source of supply.

ACCURACY OF TECHNICAL AUDITING

The accuracy of general comments and impressions based on technical audit surveys will vary with the time allowed to conduct the survey, as it is usual with any type of survey or study. In a recent technical audit exercise of about a dozen mills, usually only permitting two to three days' visits to each of them, the opportunity later presented itself to discuss the impressions gained from a group of four pulp mills with an independent person, who had spent a substantial time in each mill. The impressions were practically identical in each case, which should indicate that even surveys based on short mill visits can be accurate on subjective assessments depending upon the faculty of judgement.

Impressions from technical mill audits may also be inaccurate, especially when based upon short mill visits. This is particularly suspected when it comes to judging the quality of papers normally produced in the mill; assessing the chief paper maker's skill in maintaining quality control through the production or of making new paper grades; determine the efficiency of quality control; determine efficiency of daily production - maintenance - engineering meetings; and of establishing the effectiveness of applying production and performance control from what may be an efficient system. Judgement on these points usually requires longer exposure to the mill operation to be certain of the correctness of observations made.

A detailed approach to collecting statistical and cost data and performance information is required to be sure that received information is accurate. Very little extra time is needed to obtain the detailed information compared to the off-the-cuff general data. Because the collected information will be used for detailed analyses and studies of assumed operations under substantially varying conditions, the initial data must be as accurate as possible.

If the questions are phrased in a general loose manner, the answers will usually also be in the same vein.

A major problem of collecting this material is that persons being interviewed may not be aware of the exact purpose of the audit and the detailed information required for such an audit.

An example of the importance of exact information refers to a pulp manufacturer. One cost component was said to be 25 to 27 Currency Units (CU) per kilogram and more precise information could not be obtained from the executive. There are approximately 75 CU to a US dollar so that at a casual glance it may appear to be a reasonable piece of information. However, the range becomes US$ 31 per ton of pulp for one cost component only. When this figure is compared to a low company profit of approximately US$ 0.10 per ton of pulp, it is very evident that this piece of information does not meet the requirements for serious audit and study work.

IMPORTANT FACTORS OUTSIDE TECHNICAL AUDITING

One important major item outside technical auditing, not mentioned so far, is a market study dealing with market availability, marketing methods and the producer's customer image.

The market assessment may also be augmented by cost component comparisons with competition in other countries.

The present and future potential market conditions should be investigated in some detail and through the technical audit it should be established how the mill may meet the specific anticipated changes in production make-up or production increases. A series of assessments using break-even charts as part of the exercise will be needed.

Another item which may be considered outside a technical audit is financial analyses of the company with various financial ratio comparisons.

It is very important that a technical audit is carried out in the spirit of a complete assessment and that important factors outside the strict interpretation of the audit are included as far as possible and practical and that the need for such activities as market studies and detailed financial analyses be brought to the attention of the client at the earliest possible opportunity.

RESULT OF TECHNICAL AUDITING

A technical audit should provide recommendations on action required in line with the purpose of the audit and it should highlight the most important findings.

The audit should indicate areas of improvements, equipment condition, studies to be made and planning required to meet future conditions in the most effective manner.

Suggested studies and extensive analyses of potential profits from different types of operation may be a second phase of investigations resulting from the initial audit.

PROTECTION AND THE PULP AND PAPER INDUSTRY

by

Salah El Serafy[1/]

PROLOGUE

Developing countries, eager to industrialize, tend to give protection to their newly established industries in the belief that these industries, though initially unable to compete with the more established foreign industries, will one day be able to do so. The forms of protection are varied, and are used singly or in combination, including outright prohibition of imports, quotas, tariffs, special exchange rates, and direct and indirect subsidies. Before the infant industry matures and protection is removed, the economy of the industrializing country is harmed, but such harm is tolerated in the expectation that it would be offset, or more than offset, by future benefits in terms of cheaper product, employment creation and export markets which would accrue to a mature industry. The harm perpetrated on the foreign exporting industry by protection is very seldom considered.

This paper argues against protection generally, and in particular of an industry such as pulp and paper, which is capital intensive, dependent in a developing country setting on imported technology, and feeds on highly specialized inputs. While it is not impossible that a newly established pulp and paper industry might one day stand on its own feet and become competitive without protection, I shall argue that this is generally unlikely. A developing country, planning to give protection to a nascent industry in the belief that the industry will eventually overcome its initial handicaps, should consider whether its costs can later fall sufficiently to offset the losses incurred during the years of nurturing the infant industry. Otherwise it should realize that it will be embarking on a loss-making endeavour with no certainty of ever realizing profits. In the course of this paper I shall elaborate the conditions that must be present before such an activity should be encouraged, and propose guidelines for protection that would minimize the cost borne by society during the formative years.

FROM FREE TRADE TO PROTECTIONISM

It was not an accident that free trade as a movement and a doctrine began in Britain about the first half of the last century after the Industrial Revolution had taken root in that pioneering country. The British classical economists identified the free interplay of market forces as the driving force behind the new productive processes, leading to specialization and higher productivity. Catering to a larger market afforded the producers the opportunity of realizing economies, which competition forced them to pass on to their trade partners. They found no difficulty, therefore, in advocating the unhampered interaction of market forces, whether domestically or internationally. Following comparative advantage, specialization among trading nations was viewed as increasing skills, enabling further division of labour, and leading to larger scale production, more economies and reduced costs. Free trade would ensure competition, and force the inefficient to give way to the more efficient so that costs and prices would come down, thus progressively enlarging the markets and bringing the product to the reach of greater numbers of people. Provided that expansion did not lead to the emergence of monopoly power - and if it did the state would combat this by legislation - the advantages of free trade were almost self-evident. Conversely, interfering with free trade would lead to inefficiency, smaller markets and higher costs and reverse the process of expansion.

1/ World Bank. The views expressed in this paper are those of the author and should not be construed as necessarily reflecting those of the World Bank.

Late-comers to industrialization, however, soon pointed out that free trade, as advocated by the already industrialized, would forever favour established industry over the interests of the new-comers, who may indeed have a latent comparative advantage that would find expression only after they had begun production. And since they would not be able to begin production and sell their product in the face of competition from the more efficient, older producers, the state should afford the new producers some transitory protection. The essence of the doctrine of infant industry protection is its temporariness, for once the industry has been established and given time to mature behind protective barriers, its costs would come down sufficiently for the barriers to be removed, and once again free trade would rule to the benefit of all. Protecting infant industry, therefore, was nothing more than a transitory suspension of the rules of the game until participants became equal to compete.

In more recent times the principles of international specialization associated with free trade have been further elaborated. The comparative advantage of market participants which had been assumed by the earlier economists was traced to its root causes. The comparative advantage which nations or regions enjoyed emanated - it was claimed - from their resource endowments. Countries tended to specialize in lines of activity that reflected their endowment with the factor or factors of production which these activities required: whether minerals or forest products, fuel, labour or technology. Since processes of production change all the time as well as the relative supply of factors (not least in reflection of changes in productivity) the Heckscher-Ohlin theorem of comparative advantage, that gave expression to this more modern interpretation, has increasingly been given a dynamic bent. Though not universally accepted without reservation, it remains a highly suggestive and convincing doctrine, capable of explaining international specialization in basic terms. Brazil or Argentina can specialize in livestock, Australia in mineral production, the Far Eastern countries in electronics, the Scandinavians and North America in pulp and paper, etc. - all according to their natural endowment with resources, including human ingenuity which adapts and develops the natural endowment. This pattern of specialization changes all the time through the incessant search for new and more efficient processes, thus inducing countries to reduce or abandon older lines of production in favour of new ones and this brings diversity among nations and creates fresh opportunities for trade. All the time new and efficient production replaces less efficient ones, and the engine of free trade distributes the fruits of this progress among the participants in trade whether buyers or sellers. Recent evidence suggests that countries that have adopted open-door policies and exposed their economies to international competition have fared better in terms of economic growth and balance of payment equilibrium than countries that have adopted protective policies. Closing the door on outside competition isolates domestic industry, depriving it of the benefits of new ideas that are transmitted through international intercourse, and foster habits of thought and behaviour among the domestic industrialists that eventually lead to inefficiency.

THE PULP AND PAPER PROCESS OF PRODUCTION

In its modern form the pulp and paper industry is a process industry whose capital requirements are considerable in relation to the job opportunities it creates. Essentially simple, the process falls in two parts, the making of pulp and the processing of pulp into paper. The pulp-making stage requires a cellulosic base in combination with chemical solvents as well as heat, in order to transform the raw material into pulp in a semi-liquid state before this is moulded, bleached and dried into various paper products.

The pulp-making stage depends on the availability of logs or similar raw materials (bagasse, rice stalks, cotton linters, other plant parts) which are usually bulky and expensive to transport so this stage tends to be ideally located where a source of the raw material exists. Though in the process of preparing the raw material for production some parts less fit for processing may be burnt as fuel, the industry is quite intensive in energy use, which costs at present about half of the variable costs of processing. The paper-making stage is as intensive in capital and energy use as it is highly mechanized, and the technology is dominated by the old established manufacturers. Typically, a capital investment of US$ 200 000 or more is required per job created in this stage.

For practical reasons the two stages of processing are integrated, often under one roof. Though it might appear to make sense to locate the pulp plants close to the sources of cellulose and the paper mills in the proximity of the final markets, there would certainly be no saving in transport cost. Besides, in order to get the pulp to the paper mill, further processing would be needed, using expensive energy to desiccate the pulp for transportation, and later liquefy it in the paper mills before processing it into paper. The cost involved in all this would be prohibitive. That is why the pulp and paper industry tends to be located close to the sources of logs in countries richly endowed with suitable forests. The opportunity does, however, exist for some paper processing taking place away from the sources of the raw material. Low quality paper is often manufactured using recycled older paper, with the application of less advanced techniques which are usually labour intensive. Local sources of cellulose can also be used as ingredients either on their own or mixed with recycled paper. Such processing is usually profitable and needs no protection from the state against the importation of rival products. Besides, the product is usually of low value in comparison to transport cost, and is very seldom traded internationally anyway. But the low value of the product makes also for low value added, and manufacturing this type of paper, though advantageous to the economy, would not bestow great benefits on the processing country. The bulk of the paper market, even in a developing country, is of relatively high quality, and this type of low quality paper, though useful, is usually a small fraction of total consumption.

SETTING UP A PULP AND PAPER INDUSTRY

A developing country, attempting to set up a modern, integrated pulp and paper industry under conditions where it is cheaper to import the paper should give careful consideration to the rationality of this endeavour. If the costs of production are perceived to be only initially high and are projected eventually to fall, then the reasons behind the initial high cost and the sources of improved productivity in future must be discussed and analyzed. It is not sufficient just to rely on the intuitive belief that familiarity with the industry will inevitably reduce costs. The country concerned will presumably already possess or would in time develop a large enough market to sustain the plant size it has chosen. Countries with small populations and low *per caput* incomes do not usually have a sufficiently sizeable market to sustain a viable industry, and it is often wishful thinking to plan on exporting a product which does not already have the benefit of a large enough domestic market. But the availability of a market, though necessary, is certainly not sufficient. Given the market, it would brighten the prospects of the new industry to have local sources of the pulp-making raw material, ideally as logs of appropriate quality to suit the available technology, but other suitable sources of cellulose may be acceptable in varying degrees depending on the quality of the paper manufactured. The availability of trained managers, chemists, engineers, sources of fuel, labour, transport, credit and maintenance facilities would be distinctive advantages. Without these it is unlikely that a country would gain much 'learning by doing', sustaining an initially losing industry, lacking in the elements that usually enhance productivity and reduce costs.

It should be clear to whoever takes a decision to protect an industry on grounds of infancy that protection inevitably involves losses. These losses include not only the difference between cheap imports and high cost domestic production, but also the opportunities lost in forfeiting production due to higher prices in this as well as in other sectors as a result of the price distortions introduced by protection. If it can be clearly demonstrated that these losses will prove to be temporary and will be more than offset by future gains, then protection is warranted. Otherwise there is no justification for protecting an industry that will forever generate losses.

FORMS OF PROTECTION

Once a conscious decision has been made to set up an initially losing, but eventually profitable pulp and paper industry, economic analysis teaches a set of rules that would optimize protection. On efficiency grounds, the best way to afford protection is by direct subsidy. A subsidy paid out of the public Treasury to a newly established industry would at once be recognizable and measurable so that the cost of infant industry subsidization is known and subject to review periodically when the budget is set. In this way the level of subsidy can be reduced *pari passu* with the maturation of the industry. This method has

the advantage that domestic prices would not be altered by protection and is therefore superior, from the point of view of allocative efficiency, to other methods of protection. Failing this, however, protection should take the form of a tariff rather than quantitative restrictions, and the level of the tariff should be as low as possible, commensurate with profitability, and should further be reviewed periodically. For there is a tendency once a protective tariff is in place that political pressure by vested interests would perpetuate it. When costs are eventually reduced and the producers can realize profits without protection, the tariff loses its raison d'être.

Another rule derived from economic analysis is that the level of tariff should not be too much out of line with other protective tariffs, the aim being to equate as much as possible effective tariffs on all goods that are being protected. The concept of effective protection relates the tariff not to the price of the product, but to the value added content of this price. With value added in the production of pulp and paper being in the neighbourhood of 40 percent of the final price of paper, a 20 percent tariff levied on imported paper is equivalent to 50 percent effective protection. As much as possible a good policy rule is that the levels of effective protection should be both low and convergent among various lines of industrial activity.

Protection through tariffs or quantitative restrictions on imports does raise domestic prices, and therefore upsets the balance of relative prices that had developed from the interplay of supply and demand. Such 'distortion' causes prices to deviate from reflecting simultaneously the wants of society as well as the costs of production and thus leads to costly misallocation of resources.

The projection that the initial high cost of the industry will give way to lower costs and eventual viability must be carefully debated and scrutinized. For is it likely in the case of a processing industry like pulp and paper that mere familiarity with the productive process will reduce cost and increase productivity? The pulp and paper industry is not one that is powerfully linked backward and forward with other industries so that its development could lead to the development of connected activities, thus creating external economies of production. In fact it is much more likely that difficulties will develop after the industry has been set up because of unfamiliarity with the machinery, inadequate maintenance, shortages of parts or essential ingredients or plain mismanagement. To project that the new industry will get over its initial difficulties and be able to stand on its own feet when initially it is unable to do so will have to be proved by special reasoning. If such reasoning is not forthcoming, the best alternative is to refrain from setting up the industry altogether for there is no point in creating an activity that would remain a drain on the economy, generating losses instead of surpluses.

CONCLUSION

Let me conclude briefly by restating certain points which are presented here as guidelines.

(i) You should think twice before protecting a pulp and paper industry. Given its present-day technology it is unlikely that an industry whose costs are high initially would turn over time into one that can compete effectively with internationally traded paper.

(ii) If a sizeable domestic market is absent it is unlikely that the industry would become viable. Also, if no raw materials suitable for the imported technology exist domestically, it is unlikely that protection will be productive.

(iii) Some scope can be provided by small-scale labour intensive and low quality pulp and paper processing based on recycled paper or local material such as bagasse. The benefits reaped from such production are, however, likely to be small.

(iv) An industry can only be justifiably protected if its future costs are projected to fall so that initial losses due to high cost are later more than offset.

(v) If an industry is to be protected, a direct subsidy to the manufacturers is the best type of protection; it would not distort prices and would be subject to periodic review. In this case its elimination in time becomes more likely.

(vi) Failing a direct subsidy, a tariff is preferable to quantitative restrictions on imports, and a lower tariff is preferable to a higher one. There should be an attempt to equate the rates of effective protection among all protected activities to avoid distortion.

(vii) If protection is decided upon, it would be useful to set out a clear timetable for phasing it out over a number of years. Such a programme confirms the transitory nature of protection, induces higher efficiency, and provides a certain stability for the industrialists.

(viii) In the final analysis, the industry being set up should be subjected to an ex ante evaluation by estimating the costs and future benefits over a long enough period that would extend beyond the infancy stage. All prices used in the analysis should reflect true opportunity costs of inputs and outputs. If such an analysis is carried out and the project is found to be worthwhile after the streams of costs and benefits had been properly discounted, then obviously protection will pay and the industry should be set up. In the context of such an evaluation care should be exercised to indicate the sources of the projected rise in productivity and the future lowering of costs.

EPILOGUE

In proposing the above principles, I am aware that international prices of products and capital goods alike (which should form the basis of investment and other decisions taken by the developing countries) may sometimes fail to reflect the free interplay of market forces, could be the product of indivisibilities and elements of monopoly, and are often subject to fluctuation, and even to artificial manipulation, including the practice of 'dumping'. Such imperfections, where they exit, should be addressed in the calculations behind the protection policy before it is decided upon. But however imperfect the international markets may be, they often offer opportunities for gains to be realized by participants through trade.

Another point worth mentioning is the vocal opposition, coming from certain quarters, to the principle of free trade, even where international prices reflect true comparative advantage. International specialization among unequal partners, it is argued, would lead to the continued underdevelopment of the less developed countries and would force upon them the perpetuation of specializing in primary activities. The suggested alternative to free trade, in this regard, is economic isolation - hardly the path to growth for the smaller countries - and encouragement of trade among the less developed countries which, though good in theory, is likely to be in practice of limited scope and benefits. I have considered this proposition and view it as a repetition of the nineteenth century's protection argument against free trade and this, to the best of my belief, is already covered by the discussion in this paper.

PROTECTION OF THE PULP AND PAPER INDUSTRY
AN OPINION FROM A DEVELOPING COUNTRY

by

Pedro M. Picornell[1/]

INTRODUCTION

For many years, the markets for paper and paperboard products in developing countries were of limited interest to the pulp and paper industry in the developed world. Demand was small and usually handled by established western traders. These traders, some of whom became very interesting figures in this business, usually represented a number of mills in the developed world and covered a lot of ground. When there was an oversupply of paper and board, these products were readily available but quite expensive. When the supply was tight, paper and board products were just unavailable unless one paid the price. Consequently, paper and paperboard in undeveloped countries was expensive when the supply was good and very, very expensive when supply was tight.

As the economies of the developing countries began to expand in the late fifties and through the seventies, the markets for paper and paperboard began to increase and these countries began to look into establishing their own pulp and paper industries. There were four main reasons which encouraged developing countries to build their own mill. These are listed below not necessarily in order of importance:

1. To make use of raw materials available locally and thus save on tightening foreign exchange resources. However, many of these raw materials were not the traditional raw materials used in developed countries and in many cases new technology had to be developed to use these.

2. To protect local consumers from the high prices and wild swings of the international pulp and paper market.

3. To develop local industry and give employment.

4. Because having a pulp and paper mill was believed, rightly or wrongly, to be a part of industrial development.

The effects of some of these reasons such as those of cheaper raw materials could be readily measured. Those of the others such as the promotion of employment and the savings in foreign exchange were more difficult to evaluate.

CHARACTERISTICS OF MILLS IN DEVELOPING COUNTRIES

A pulp and paper mill in a developing country was usually justified by the availability of cheap raw materials and labour. It also had the freight advantage, the amount of money that would have to be paid in bringing the products from the point of manufacture to the point of use. However, it usually also had the following disadvantages:

1. A relatively small market. Most of the mills in developing countries were built to supply the domestic market, as they had little hope of competing with the large mills in developed countries in the export markets. As a result of this, these mills were usually small.

1/ Executive Vice-President (Planning), Paper Industries Corporation of the Philippines (PICOP), Philippines.

2. A company building a mill in a developing country usually had only one mill manufacturing a limited number of products. This put this company at a disadvantage when competing with the giants in the developed world who owned many mills of different sizes and in different stages of depreciation and could spread depreciation and overhead charges over a number of mills or products, or concentrate these charges on specific mills and products if necessary.

3. The mill had to cost more than a similar mill in a developed country as almost everything in it had to be imported. And, as most of these mills were also smaller than mills making the same products in developed countries, these lost out in the economies of scale.

4. There was usually no trained personnel available to start up and operate such mills, which usually had to be started up with the use of very expensive foreign technicians, whose services had to be retained while the local staff gained expertise.

5. The cost of energy and imported chemicals and other materials and supplies was usually higher in developing countries.

6. The cost of domestic money was also higher in developing countries.

Thus, most of us in the developing countries knew from the beginning that mills built in these countries would not have too many advantages over those in developed countries, if any, but at prevailing and projected prices, we had a good chance of holding our own in the domestic market, mainly because of the freight advantages once these were operating normally at capacity.

While it is true that some mills in developing countries never had a good reason to exist, and that there were abuses and irregularities in establishing these, most of these mills were carefully planned and built with the assistance of internationally known consulting firms, many times under the auspices of international financing institutions.

There is another characteristic of mills built in developing countries - the involvement of government. Due to an almost chronic shortage of capital by the private sector, it many times became necessary to get government involved in such projects to guarantee loans, to lend money to the mills and, in some cases, as owners of equity. And, government approval had to be obtained before any pulp and paper mill could be built as is now also the case in most of the developed countries.

PROTECTION DURING INFANCY

When the more important pulp and paper mills in developing countries were planned, it became obvious that these would have to be protected during their 'infancy' in much the same way as children have to be protected, even from themselves, during their early years. We knew that these mills would be inefficient during their start-up periods, that operating bugs had to be worked out, crews trained, product quality improved and markets developed. The question was one of how much protection should be given. This matter usually boiled down to how much was the country willing to pay to get a new industry started, to make more efficient use of its raw materials and, most important, to create employment. Unemployment has been a chronic problem in developing countries for many, many years, while it has only gained importance in developed countries during the last two to three years of recession.

The imposition of import duties on imported merchandise is an accepted way of raising revenues used by all governments I know of, in the same way as the imposition of sales taxes and other taxes. Import duties on many types of imported paper and board existed in developing countries before the building of the mills as revenue raising schemes. The imposition of duties on imported pulp and paper did not come with the building of mills in developing countries, it was usually there before the mills were built.

In most developing countries, extraordinary protection given to new industries was always assumed to be temporary. It was supposed to be removed gradually as the industry matured and operations 'normalized'. This seemed fair and feasible in the relatively stable economic conditions of the sixties and early seventies when demand and price projections could be made with relative ease. It must also be remembered that governments themselves did not particularly cherish over-protection as it means higher prices for local products, and high prices are not liked by consumers who, after all, represent so many votes. But, before these industries could be left on their own, unprotected by government, the energy crisis suddenly came on them completely disrupting the economic environment in most of the developing countries.

EFFECT OF GENERAL COST INCREASES

As the cost of energy rose rapidly, particularly in developing countries with no oil of their own, the few competitive advantages that these pulp and paper mills had, rapidly disappeared. Mills that tried to change over to cheaper fuels such as coal or wood were hit by rapidly increasing machinery costs in the developed world and soaring interest rates. Very badly hit were also raw materials costs as the cost of transporting these to the mills rose rapidly with the increasing cost of oil, and as the demand of some of these as fuel, such as sugar-cane bagasse, increased their cost time and again. And to make matters worse, the price of oil went up at a faster rate in developing countries than in most developed countries, particularly in North America. I am in no position to give you the reason for this, but the net effect of this was one of a substantial subsidy for the North American mills which further eroded the competitive position of most of the mills in the developing countries.

To drive for fuel efficiency and greater productivity in an attempt to survive also led to the erosion of the other competitive advantage that mills in developing countries had, that of cheap labour. We did know that cheap labour does not necessarily represent low labour costs in the production of paper and board as this has to be tied to labour productivity.

Increasing social charges during the last few years also started to increase the cost of labour in the mills and we now find ourselves in a situation where, in order to increase produotivity, labour had to be upgraded and, in order to upgrade it, higher and higher wages have had to be paid. I believe that it can be said that developing countries no longer have that substantial advantage in labour costs that they were once said to enjoy.

DUMPING FROM DEVELOPED COUNTRIES

While it is true that mills in developed countries have had to spend huge amounts of money in areas like that of pollution control, it is also true that these mills expanded substantially, particularly in the commodity grades during the late seventies, in anticipation of increasing demand, particularly in North America. Then came the recession of the eighties, and as capacity began to outstrip demand, these mills turned to the export market in order to maintain their operating rates.

You all know too well the effects of the current recession (or call it depression) on the pulp and paper industry in the developed world so I shall just talk of what has happened in the Philippines where I can talk of personal experience. Within the short period of eighteen months, prices of commodity type papers such as linerboard from the developed countries dropped from US $ 500 per metric ton c.i.f. to as low as US$ 285 per metric ton c.i.f. As freight from North America to South-East Asia runs about US$ 90 per metric ton, this represents a price of US$ 195 f.o.b. North American port. I do not claim to know the detailed costs of linerboard produced in North American mills but I know enough to be able to say that the total cost of producing linerboard in North America is higher than that and that average prices there were also higher than these. During the last semester of 1982, a total of 13 000 metric tons of linerboard was imported into a country like the Philippines for its domestic market at these prices. This may be a very small volume for a developed country but in a country where the total demand for linerboard runs about 45 000 metric tons a year, I shall leave it to your imagination on

what this did to our market. We experienced the same thing, although to a lesser degree, in newsprint and printing and writing papers; in fact, by the last quarter of 1982, the entire pulp and paper industry in the Philippines faced immediate collapse.

To forestall the filing of dumping charges, much of this very low-priced paper was being invoiced as side runs, stock lots, start-up tonnage, etc. There was paper from the very well known manufacturers as well as that of relatively less known ones, and it is the first time that I have heard of 29 inch and 36 inch newsprint rolls labelled as side runs. It is true that such practices are one of the more serious problems in our part of the world; but, if there were no people on the other side of the ocean ready to cooperate in order to move a few tons of paper, the solution of our problem would be that much easier. It is true that, under the international tariff agreement, the local industry could file dumping charges; but, under the principle of Western Law that one is innocent until proven guilty, this takes time and our industry had run out of time.

It is claimed that this drop in prices in developed countries benefitted the consumers in developing countries. In my experience there was no drop in the price of a can of milk or a bar of soap or a composition book during this period. The benefits all accrued to a very small amount of merchants. At least, the mills gave employment which the merchants did not.

INTERVENTION BY GOVERNMENT

Faced with the collapse of the pulp and paper industry, our Government had to step in because such a collapse would be disastrous for the country's economy. Not only would it aggravate a very serious unemployment situation, but it would create a further load on the Government's foreign exchange reserves and the resources of the Government financial institutions who held a substantial exposure in the industry. What could you expect our Government to do? Did it have any choice? Will a government in a developing country allow an entire industry to collapse just because the mills in developed countries decide to dump a very small portion of their capacity to keep up machine utilization?

The Philippine Government moved in to save the country's pulp and paper industry from total collapse by transferring the burden of proof that the grades declared in the import papers are the internationally accepted grades and that the prices charged are in line with the home consumption value of the paper in the country of origin. In an effort to conserve foreign exchange, it also requires importers to get a certification from the Board of Investments that the paper they want to import is not available locally at a reasonable price. This, of course, has added to what the red tape importers have to go through.

There are, of course, many questions that remain to be answered. Some of these are:

- What really is a reasonable price for the local product?
- What is the true home consumption value in the country of origin?
- How much is a consumer in a developing country supposed to pay for having a domestic pulp and paper industry?
- How inefficient should a so-called inefficient industry in a developing country be that it should get no protection and be allowed to collapse?
- How long should such protection last?

These and many others have, in my opinion, no absolute answers as these lie in the relative conditions of the country involved.

FREE TRADE OR PROTECTION?

And finally, in developing countries we feel that, while much lip service is paid to free trade, particularly in the developed world which is criticizing us for our protectionist policies, the developed world is far from practising what it preaches. There are indirect restrictions on many imported items in Japan, France makes it difficult for Japanese electronic devices to enter by restricting their clearance to only one port of entry and, inland at that, the United States has quotas on sugar and is talking of restricting textiles and garments while recently increasing duties on motor cycles by a very big multiple, the EEC is restricting the entry of agricultural products from non-EEC countries, the Scandinavian countries improved their competitive positions by devaluing their currencies and so on and so forth. In looking at this entire mess from a developing country, I remember the story in the Holy Scriptures where Jesus Christ tells those who are about to stone a woman accused of adultery, "Let him who is free of sin throw the first stone." In this story, this solved the woman's problem - she was not executed. How to apply this to the problems of the pulp and paper industry, I am afraid, will be far more difficult. And the feeling in developing countries that the pulp and paper industry in developed countries was ready to crush that in developing countries by unfair competition, just to keep up their machine utilization rates, will persist for a long time.

I wish I had a magic formula to solve this world-wide situation but, unfortunately, I do not and I have to limit myself to list problems without being able to suggest immediate solutions. Perhaps it is in conferences like this one that we can try to understand each others' problems and work for mutually beneficial solutions.

SOME THOUGHTS ON THE QUESTION OF DUTY PROTECTION FOR INFANT PULP AND PAPER INDUSTRIES

by

Carl C. Landegger

As an advisory group to the FAO on pulp and paper we have historically seen our function as assisting the less developed member countries of the FAO in establishing their own pulp and paper industry.

In this context I would like to suggest that we have the expertise within our group to suggest to the FAO certain steps that it might wish to recommend to its member countries on how they could maintain their fledgling pulp and paper industries in the recession portion of the business cycles to which our industry seems to be perpetually doomed.

I believe the record shows that since the second world war the paper industry has been subjected to approximately five-year cycles.

It is my contention that approximately one year in five can be considered boom times in which the world borders on a shortage of pulp and paper, and as a result pulp and paper producers achieve sufficient profits to stimulate reinvestment. Three years are relatively normal; one year in five finds our industry in an extremely depressed stage.

Certainly, the year 1982 is a clear illustration of what happens to the paper industry in the developing world during these recession phases of the cycle.

I suggest that we, as a group, can make recommendations which might be useful to the developing world in combating the incredible financial pressures; I think it is not an exaggeration to say the deadly financial pressures to which small developing paper industries are subjected in times of recession.

May I start my discussion with a number of basic assumptions.

First, developing countries desire to have their own pulp and paper industry

(a) To assure self-sufficienoy for printing, writing and packaging papers,
(b) To reduce their foreign exchange requirements,
(c) The desire for technical job creation.

Second, the normal international procedure for securing relief from unfair and short-sighted international competition is via a legal anti-dumping procedure.

Unfortunately, the legal procedure under which anti-dumping actions are brought against foreign imports is extremely complicated and, above all, time consuming. Because the recession portion of the business cycle is usually in the range of twelve to eighteen months, the reality is that by the time a government is in a position to seriously taking action against the dumping of pulp and/or paper, the cycle is on the upswing, the action is no longer needed, and the damage has been done.

A suggestion which may be considered by developing countries is to set up a trigger mechanism which would automatically change the duty rate applying to the specific paper grade imported into the developing country as soon as unfair trade practices appeared in effect.

1/ Chairman, St. Anne-Nackawic Pulp and Paper Co., Canada.

The function of the trigger mechanism is to ensure that relief is not only efficient but, equally important, that the action is taken rapidly enough to avoid major financial injury to the developing paper industry.

A suggested trigger mechanism would be to establish an automatic protective anti-dumping duty of 100 percent on the c.i.f. value of the offending paper that would go into effect at such time as either;

(a) The imported tonnage of a particular grade of paper increases by 25 percent over the amount imported in the previous twelve months. I stress that I am referring to a continually rolling twelve months and not a calendar or fiscal year of twelve months.

(b) The price of paper being imported drops by 10 percent from the average c.i.f. price of the previous six months.

A formula along these lines would establish a meaningful trigger mechanism that would permit fledgling paper companies in developing countries to secure protection they need against either:

(a) The indiscriminate sale of 5/10 000 tons, which is a small amount of tonnage for a single major producing firm in the developed world, but which could force a meaningful reduction of production in a small developing industry.

(b) The sudden dumping of paper by a major company in the developed world, which may make the economic decision to secure US$ 25 to apply to its fixed costs by running its machines full by dumping its surplus paper into a market in which it has little or no long-term interest.

It is axiomatic for us from the developed world that one company's normal market area is another man's dumping ground. To illustrate; any company regularly supplying paper to Asian country 'X' will see merit in doing its part to help maintain a profitable price level in the country. It may, however, place a lower priority in maintaining a price level in African country 'Y' where it has no normal continuing interest.

The economic reality is that almost any major western producer can seriously affect the financial viability of the pulp and paper industry of almost any small industry by short-sighted export policies.

In the same sense that we at this conference feel a responsibility to assist the Third World with our technical and commercial know-how, it is my thesis that we have the same responsibility to bring to the attention of the FAO members from the Third World that they must protect their newly born industries in times of recession from those members of the industrial community that are not prepared to assume their long-term moral responsibilities.

I suggest that an automatic trigger mechanism along the lines I am suggesting is perhaps the only method of establishing relief quickly enough to be effective.

Lest some of you here feel that I am preaching economic heresy, may I call to your attention the indisputable fact that our own industries grew up under the protection of extremely heavy tariffs. I certainly advocate free trade, but I think we must put a curb on destructive short-term policies that wrap themselves in the flag of free trade while attacking the long-term interests of our industry as a whole.

SOCIAL INTEGRATION OF PULP AND PAPER INDUSTRIES IN DEVELOPING COUNTRIES

by

C. Chandrasekharan[1/]

THE CONCEPT EXPLAINED

An industry is established because there is demand for its products, it is a profitable avenue of investment and it helps socio-economic development. As a concept, social integration of an industry indicates its net contribution to the welfare of the community, directly or indirectly, by providing increased employment, income, social amenities and quality of life. The extent and nature of social integration of an industry may vary depending on many factors - technology, labour requirements, special skills needed, types/volumes of raw material, nature and use of final products, supporting services, etc., and its importance as a community economic base. Social integration of industry attempts to maximize its positive impacts and to minimize the negative impacts on the community affected by it. The community may be composed of employees, raw material owners and suppliers, people involved in the service industry and/or the inhabitants of the locality in general.

Social integration of pulp and paper industries will have to consider the socio-economic situations of the developing country concerned as well as the technical characteristics of the pulp and paper industry. In this regard, social integration is related to the concept of appropriate industry, and is influenced by social values, national policies and local/regional development objectives.

Pulp and paper industry is a combination of activities or components (e.g., pulpwood production, wood chipping, pulping, paper production) which can be carried out as separate independent enterprises or integrated vertically or horizontally. The size and complexity of the industry will vary, depending on several factors such as the nature and extent of integration of the components, quality and types of final products and markets. The range can be from a 'cottage' unit producing sheets of hand-made paper to large units producing several hundred tons of different varieties of paper per day. Similarly, all the component activities may be confined to one specified area or they may be scattered over distant places, e.g. pulpwood or wood chip production (captive or otherwise) may be in another locality or even in another country.

The question of the social integration of the pulp and paper industry necessarily assumes a policy/equity dimension and often is complicated by arguments regarding positive and negative impacts of it on society.

The pulp and paper industry can positively contribute to social welfare, directly and indirectly, through one or more of the following:

- Provide additional income and employment to the local community;
- Creation and strengthening of infrastructure - roads, buildings, community facilities;
- Encourage local entrepreneurship and involvement in supporting/subsidiary/secondary and service industries related to pulp and paper (e.g., pulpwood plantations, logging, transport, marketing, paper processing, etc.);

1/ Forestry Department, FAO.

- Direct participation in production by resource owning communities and operators of small units (a simple example is the production of hand-made paper using the LOCHTAR plant by villagers of Nepal);

- Cater to the local needs of paper for cultural, educational, packaging and other purposes;

- Help the creation of rural and social institutions - such as cooperatives and other forms of socio-economic groupings. These groupings can provide a useful framework to understand and promote economic interrelationships;

- Facilitate effective and efficient utilization of the wood raw material by appropriate integration with other wood-using industries;

- Foster research related to local resource use (e.g., mixed tropical hardwoods), resource creation (e.g., pulpwood plantations), appropriate technology and equipment, etc., taking social realities into consideration;

- Contribute to activities related to socio-economic development of the community (schools, medical facilities, supply of electricity, support to socio-cultural programmes);

- If components of the pulp and paper industry are developed as a 'community economic base' with a logical structure which corresponds to the social realities of locality, it will have multiplier effects on community welfare.

An aspect to be highlighted in this regard is the possibility of involving local people in pulpwood production and supply - as part of a programme of forestry for local community development.

In spite of the possibilities, an argument is sometimes advanced that the pulp and paper industry is often insensitive to the problems and needs of the societies affected - namely those living in and around the vicinity of the mills or raw material sources. Those who advance this argument see pulp and paper as a capital-intensive industry, catering to the needs of other industrial or export markets and bypassing the local population in the distribution of benefits, preoccupied by concerns related to economy of scale and profit maximization and causing degradation of resources and environmental pollution.

Other aspects mentioned in this connection by those who stress the negative impacts of pulp and paper industry are:

- Depriving local population of the resource use for their pressing needs, such as for fuelwood, construction poles, etc.;

- Exclusion of local population from any form of participation, leading to a transfer of wealth from poor to rich or rural to urban and even from developing to developed;

- Drop in quality of life and income of the local people, in real terms;

- Neglect of land-use aspects and local cultural values leading to such effects as development of cargo-cult and import of consumption goods into the area;

- Disruption of traditional social structures and cultural extinction.

The problems of developing countries, most of them with a predominantly agricultural economy, have to be seen in the right perspective of their history, tradition, culture and the need for rational development. The communities involved, in social terms, are disadvantaged by lack of information and education, lack of any effective organization to develop meaningful contact with modern and well-structured industrial enterprises, lack of alternative opportunities for employment, etc. For such societies of developing countries, an appropriate integration with modern industries which use local resources is an important (and in many cases the only) avenue for socio-economic progress. The

social and economic role the pulp and paper industry can play in this regard (as a partner in development) is significant. The exact nature of the social integration may depend on several factors and would vary considerably, for example from the remote forest areas of the Amazon in Brazil to the thickly populated island of Java in Indonesia.

A national policy which balances the social equity objectives of the government on the one hand and the efficiency consideration of the industry on the other, reflected through appropriate sizes of mills and technologies and appropriate institutions/institutional linkages, is very relevant in this connection. The roles and responsibilities of the government and the industry have to be clearly defined, depending on the situations existing in the countries. Some general principles to be considered in this connection are the following:

- Social integration of pulp and paper industry in the developing countries should be attempted taking the actual situations and constraints into consideration. Social integration should help to utilize the local human and natural resources for the overall benefit and welfare of the local community. It presupposes that the technology and/or scale of the industrial enterprise is such as to provide increased local involvement. It should be suited to the socio-cultural and economic situations and should also be environmentally safe and sound.

- In situations of high unemployment, labour intensive technology should be preferred, facilitating the community to earn a reasonable living. Common sense and flexibility are needed in the designing of various activities. This could be further promoted through decentralization of certain activities (e.g., logging, transport), encouraging participation of local groups/cooperatives in feasible aspects of production and helping to increase the proportion of economy under local control.

- Integration of pulp and paper industry with other types of wood-based industries which are technologically less demanding should be promoted to provide employment to as many local people as possible and to rationally and efficiently utilize the local resources, avoiding wastages. Replanting of logged-over areas is an important component in this regard both as a means of increased employment generation and resource replenishment.

- Research to improve the use of local resources (e.g., mixed tropical hardwoods) as well as to improve resource stock and yield (e.g., fast-growing pulpwood plantations).

- Progressively, and to the extent feasible, the community should be integrated with the industry for provision of services (e.g., electricity, health, water supply, fuel supply, etc.) and in the development of infrastructure (e.g., roads). This could be made more effective by providing support to local initiatives for starting service activities as well as supporting programmes of technology transfer and improvement.

- Attempts should be made to match the technology to the characteristics of the local community and the natural resources (including agriculture, fisheries, forests, etc.) by analyzing the linkages and plans for integrated development.

POINTS FOR DISCUSSION

Regarding the subject matter of this paper, the committee may wish to discuss the following:

- Is social integration a clear enough and/or relevant concept in the context of the pulp and paper industry?

- Should 'social integration' be considered as an appropriate objective/obligation of the pulp and paper industry?

- Does 'social integration'/social obligations prescribed by governments affect the 'efficiency' of the industry? Or does it serve as a disincentive?

- Consistent with the objectives of growth with equity, what should be the scope (or limits) of social integration?

- How can social integration be achieved and what should be the respective responsibilities of government, industry and society (including social organizations)?

- Can social integration be achieved within the existing institutional structures? What are the problems foreseen?

PART II

SUMMARY OF DISCUSSIONS

SUMMARY OF DISCUSSIONS HELD AT THE SESSIONS OF THE FAO ADVISORY COMMITTEE ON PULP AND PAPER, 1981-1983

INTRODUCTION

During its twenty-second to twenty-fourth sessions in 1981-83, the FAO Advisory Committee on Pulp and Paper devoted a main part of the meetings to discussing the items covered by the papers presented in this volume. This report gives a general presentation of the ideas expressed during the discussions, including statements which were made to emphasize points raised already in the presentation of the papers. Since there was considerable overlapping in the discussions in comparison to the subjects introduced in the papers, the following constitutes a synthesis of the opinions presented under various headings, which do not necessarily relate to the papers as such. It is not intended to be a verbatim report of the discussion but mainly a presentation of important points raised.

One point which was mentioned on several occasions and emphasized strongly during the discussions was that every project must be considered individually. This is because there is no single 'right' approach to suit all circumstances. The discussion must accordingly be interpreted against this background.

Attention was also drawn to the importance of non-wood fibrous raw materials for pulping in developing countries. Although the world capacity in non-wood fibre pulping corresponds to about only 8 percent of the total pulping capacity, its average share in developing countries in 1982 was 34 percent. This is shown by the data in Table 1 from the FAO Survey of Pulp and Paper Capacities 1982-1987. According to the figures presented, the share of non-wood fibre pulping capacity in developing countries is expected to maintain its position and remain at 34 percent in 1987.

Table 1

Raw Material Base for Pulping Capacities in Developing Countries 1982-1987

(million tons per year)

Raw material	Pulping capacity	
	1982	1987
Straw	2.82	3.03
Bagasse	1.48	1.85
Bamboo	1.33	1.54
Other	1.72	1.99
Total non-wood	7.35	8.41
Wood	14.43	16.35
Total capacity	21.78	24.76
Percent non-wood pulping capacity	34	34

China alone accounts for 66 percent of the straw pulping capacity and for 48 percent in 'other' non-wood fibre utilization for pulping. India is the most important bamboo pulp producer, with a capacity of 1.07 million tons in 1982 which corresponds to 81 percent of the capacity in this grade.

REASONS FOR ESTABLISHMENT OF PULP AND PAPER INDUSTRIES IN DEVELOPING COUNTRIES

The establishment of pulp and paper industries in developing countries is based on two basic types of objectives - positive ones and defensive ones. The positive objectives relate to creation of employment, development of skills, rural stability and foreign exchange earnings. The defensive objectives, on the other hand, aim at safeguarding the supply of paper for the development needs of the country and at utilization of available domestic resources to reduce imports wherever possible. Thus the available foreign exchange can be set aside for raw materials and products which cannot be produced in the country, for instance for fuel oil.

Although the employment provided by a pulp and paper mill in relation to the investment requirement is very small, there are secondary employment opportunities offered as a multiplier effect in activities such as logging and transport, as well as an increase in the economic activity in general in the area where such a mill is established.

Establishment of a pulp and paper industry thus provides prerequisites for rural stability by reducing the migration of people from the rural areas seeking employment in urban communities. It also serves to develop skills which facilitates introduction of other industries in a country.

As regards savings or earnings of foreign exchange, especially the latter depends to a great extent on the foreign capital - either equity or loan - which is invested into the project, as well as on the conditions offered on foreign loans. Savings in foreign exchange may be more successfully achieved when the pulp and paper mills are geared exclusively toward meeting the requirements of the domestic market.

Securing of paper supplies for the development activities of a country such as education and communication can, of course, be achieved even without establishment of a pulp and paper mill. This can be done, for instance, by stocking up paper when there is a surplus on the market and using the stocks built up when there is a shortage and paper is available only at high prices. Long-term contract agreements with suppliers might also be entered into to secure a steady supply of paper at a reasonable price, although a problem in this regard is that the quantities involved in the supply of paper in the developing countries are small. This means that very often the suppliers are not interested in entering into long-term agreement with these countries.

Because of the fluctuations in the paper market and price situation, paper is very often dumped in developing countries during difficult market conditions. A developing country with a long-term contract may then find that it is paying more for its paper than the neighbouring countries. In many cases this has led to cancellations of such contracts although the cancellations may have been regretted later on when the supply situation has tightened up.

HOW SHOULD PULP AND PAPER MILLS START AND DEVELOP?

The production of pulp and paper in a developing country may relate to a strategy of wider scope than the supply of paper alone, such as the development of an integrated forest industry in general or the wish to utilize an existing large resource. A development from sawn timber production through chip export and further to pulp and paper production may be a sensible approach to step-wise development. The value of the forest would gradually then increase and the integrated industry would provide a tool and economic incentive to forest management.

In considering the raw material base for a pulp mill, attention should be paid to the use of agricultural residues and other non-wood fibres in addition to forest-based raw materials such as wood and bamboo. Although there are several competitive uses for agricultural residues which sometimes limit their availability for pulping, they are in some developing countries the only available fibrous raw materials. The use of waste paper as a fibrous raw material for paper making should also be given due consideration.

Technology has advanced to the point where various raw materials can be used for pulping and paper making. However, the suitability of the raw material for the end-product needs to be taken into account, in addition to its availability. After all, the project must be able to produce an end-product acceptable to the market aimed at.

A pulp and paper industry in a developing country can also be established gradually starting with the converting operations, followed by establishment of an unintegrated paper mill using waste paper as raw material, perhaps with addition of some imported pulp. The pulping operation might then be added on at a later stage when sufficient know-how exists in the country for operation of the plants already established and some cash has been generated.

There is a demand in developing countries for cheap grades of grey board and wrapping papers. Unless these are made locally from waste paper, they would not be available to the developing countries simply because they are no longer produced in the developed ones. Due to the low value of these products, they cannot carry the additional cost of long distance transport. Since these grades are made from 100 percent waste paper, they are suitable for manufacture in developing countries to meet the local demand.

Industry today tends to move away from the forests toward the neighbourhood of urban areas. In this way, the benefits from the establishment of the industry are given to areas which are already fairly well developed. It would be desirable to keep the major part of the benefits for the people in and around a forest area while developing a pulp and paper industry.

In some developing countries there is a serious depletion of the forest resources. Government incentives have, therefore, been provided for establishment of industrial tree plantations based on fast-growing species, particularly in areas which have been denuded of forests. This creates employment in the rural areas and, at the same time, replaces depleted resources, thus forming a future supply of raw material for the industry in the rural areas.

Where there is an existing pulp and paper industry, it is less costly to expand such operations than to establish entirely new mills. This, of course, presumes that the raw material resources available in the area will be sufficient for such expansion or that the wood supply to the mill can be appropriately increased, for instance through tree farming projects involving the local agricultural population.

Improvement of the operational efficiency of existing mills, especially through training, would also constitute an important means for expanding the production of paper to meet the increased local demand. However, it may not always be possible to do this due to constraints such as the condition of the existing equipment or the grades of paper which can be produced by the mill, compared with the grades required by the market. Although expansion of mills with obsolete equipment is usually not recommendable, expansion of mills of an age of 20-25 years or less is normally more viable than establishment of an entirely new mill.

Raising the loan capital for expansion of existing mills is often easier than for new mills. One of the reasons for this is that the existing mill already has a track record to show and thus the risks involved may be smaller.

Large-scale export pulp and paper projects may be appropriate under very special conditions in developing countries, but such projects involve far greater financial risks for the country than intermediate or small size projects. Smaller mills may have wider scope of production and can often easily cope with temporary difficulties. The selection of the size and type of mill, of course, depends entirely on the local conditions and prospective

markets. Large export-oriented pulp and paper projects are risky, even more so if there is no domestic market to absorb a major share of the production. Lack of know-how and expertise in the country also increase the risks involved in large-scale projects.

Very small integrated mills using agricultural waste as raw material and of a capacity of up to 30 tons per day may be viable under special conditions. However, inintegrated paper mills based on waste paper as raw material may be smaller still. The investment in these mills, usually built with second-hand equipment, can often be raised by private entrepreneurs. This approach to meeting the local demand for various grades of paper may be appropriate in certain conditions. In that case such a mini mill may form a first nucleus for development of skills in the country for later expansions. However, the viability of such an enterprise often hinges on granting of certain incentives and subsidies or exemption from obligations such as pollution abatement.

Establishment of large-scale operations, say, of a capacity of 50 to 300 tons per day usually needs government involvement in one form or another. It should be mentioned in this context that there is a difference in approach between the private entrepreneur and government. Whereas a private entrepreneur on establishing a mini mill aims at developing a business and at making a profit, the government has other priorities and obligations. Thus the government wants to provide economic growth and development. Economic returns and social benefits may, therefore, in these larger, government-sponsored projects be of higher priority than purely financial returns. On evaluating and selecting the strategy to be followed, the projects, whether small or intermediate scale, need to be scrutinized thoroughly. Thus the prices charged by the mill, as well as the costs it does not need to pay, must be evaluated in a greater context.

Eventually the society will have to pay in one form or another to make domestic production of pulp and paper financially viable, whether the mill is built by private entrepreneurs or by the government. It is, therefore, in the interest of the country that it receives a maximum economic and social benefit from the project in exchange for the cost it has incurred.

The markets for pulp and paper in developing countries are usually small compared to those of industrialized ones. The most attractive proposition for domestic production, judging from the size of the potential market, would be mass-produced commodity-type papers such as newsprint and container board. However, these products are also the ones that bring the lowest price on the market and large-scale production is very often required for competitiveness with internationally supplied products. The large-scale manufacture of these commodity-type papers, which would require entering into the export market, may be beyond the scope of a particular developing country which, accordingly, may have to decide not to produce the grades of paper which are most urgently needed. As regards more sophisticated grades of paper, on the other hand, the markets in developing countries are minimal and establishment of viable production of these types of papers in these countries is, therefore, in most cases questionable. Ultimately, however, the choice of types of paper to be produced may depend, to a great extent, on who makes the choice - the government or private investors.

IDENTIFICATION AND EVALUATION OF PROJECTS

When identifying a possible pulp and paper project in a developing country, an important prerequisite is that some form of infrastructure already exists in the area to be considered in order to avoid too high capital charges to the project for establishment of this during the implementation stage. Also, the importance of reliable international statistical information on capacity, production and trade, including forecasts for the future, cannot be overemphasized in the context of planning a pulp and paper industry in developing countries. This information serves to establish the grades of paper which might be produced economically in the country without unduly tough competition from the outside.

Pre-feasibility studies are an important preliminary step in surveying the possibilities of pulp and paper manufacture in an area, be it in a developing country or in a developed one. However, this preliminary study is even more important in a developing country where a number of uncertainty factors have to be established. Thus, the pre-feasibility study should sound government attitudes with regard to tax exemptions, loan

guarantees, repatriation of profits on foreign investment, etc. In addition, the study should survey local conditions and peculiarities including socio-political and socio-economic aspects. By defining at a very early stage both the local conditions with their various aspects and the project outline in sufficient detail, much work and disappointment can be saved in the continuation of the development of the project.

The pre-feasibility study should also provide a reasonable assessment of the potential market and special emphasis should be made on the estimation of the expected cost of the fibrous raw material delivered at the mill whereas determination of pulping and paper-making characteristics of the fibrous raw material is of lower priority in the pre-feasibility study. Introduction of appropriate technology should also be given due consideration already at this stage.

An in-depth analysis is required of the availability of skilled labour and services and specific licensing requirements and aspects of the country's economy which may exert an influence on the project.

An assessment of the environmental impact of the establishment of the mill is important in order to assess the costs involved in pollution abatement both as regards capital investment and cost of operation.

Among the danger areas in feasibility studies, special mention can be made of the determination of the local market size and the capital cost estimating. The domestic market depends, to a great extent, on the government policies and availability of foreign exchange, which makes forecasting of the potential consumption of paper made in a domestic mill very difficult. Another danger area is that capital cost estimates in feasibility studies for developing countries are very often too low since they do not always take into account investment costs in infrastructure and local constraints in the rate of implementation of the project. Thus, there may be a serious overrun in the capital investment cost already caused by underestimation of the time required for implementation of the project. Delays in project implementation cause considerable increases in the investment partly due to inflation and partly caused by interest which has to be paid during the non-productive construction period. The accuracy of the capital cost estimates depends, to a great extent, on how well the project has been defined initially and, therefore, the importance of defining the project in sufficient detail at an early stage cannot be over-emphasized. Otherwise the project may run out of funds half-way through the construction period.

FINANCING AND FINDING PARTNERS

The cyclical nature of pulp and paper markets and prices is typical for a capital intensive industry in which the supply cannot be easily adjusted to the demand. Even when demand is weak, production has to continue which leads to cut prices. Especially mills in developing countries then tend to find themselves in diffioulties due to dumping from their foreign competitors. When downturn in the pulp and paper industry coincides with a general economic recession like in 1982, the viability of these mills becomes even more critical.

The lack of supply/demand flexibility of the industry makes it important to pay special attention to the financial structure of the company when it is established. Although the debt to equity ratio can be as high as 80/20 under favourable loan conditions, such as those sometimes provided under export credit agreements, the prevailing interest rates in 1982 made a ratio of 60/40 more likely. The debt service capacity of the enterprise, seen against interest rates and loan conditions, is the limiting factor for the debt to equity ratio. Usually in a new project the requirement is that it should be able to generate 150 percent more cash than what is needed for the annual debt service payments. At the generally prevailing interest rates and loan conditions in 1982, this condition was met at a debt to equity ratio of about 60/40.

A further illustration of the importance of appropriate financial structuring of the enterprise is that the interest rates in 1982 called for a cash generation of US$ 200-400 per ton of pulp or paper to service debt alone. At low market demand and cut prices, it becomes very difficult, if not impossible, for many mills to service their debts if their financial structure has been based on too high a loan proportion.

In the search for partners to establish a pulp and paper or any industrial enterprise, it is important that both the local and foreign partners have common or complementary objectives. If there is a conflict of interest between partners, the project is bound to get into difficulties sooner or later. Foreign partners in developing countries often have vested interest in the project, which means that there are some conditions tied to the partnership. For instance, the equity investment may be tied to a construction contract, supply of equipment or other deliveries during the operational stage. Foreign partners are usually willing to invest only in projects which provide securities for return on investment in view of the fact that they have their responsibility to their shareholders. If the risk involved in the enterprise is high, there is usually a requirement on very quick high returns already during the early stages of operation.

An inherent difference in interests between foreign and local partners may consist in, for instance, that the country expects a technical partner to train people, to provide know-how, equipment, etc. The partner, on the other hand, wants profit. Reasonable demands by the government on the one hand and acceptable returns for the foreign partner on the other are, therefore, essential items to be discussed at a very early stage. However, no universal formula can be found for such sponsor/partner relationship but each case has to be looked upon in its own context.

The foreign partner needs to have a thorough understanding of the local government requirements and the legal constraints imposed both on the local and foreign partners in an enterprise. In large-scale pulp and paper industry projects, the amount of capital required for investment usually calls for outside financing to a considerable extent. Consequently, the foreign partners would want to have control over the investment for many years after the establishment of the mill. This conflicts with the wishes of the local government to control the destiny of the enterprises in the country. In some cases suggestions have been made that the foreign partner would not obtain any returns on his investment for, say, the first ten-year period. To compensate for this, he would instead obtain extremely high returns during the second ten-year period of operation. Although this might seem to be a satisfactory solution in theory, there are no guarantees that the rule is not changed after completion of the first ten-year period, which means that the no-return period might be extended.

Political stability now and in the foreseeable future in a developing country is, therefore, a very important prerequisite for finding suitable foreign partners in a pulp and paper enterprise which requires foreign know-how and investment.

IMPLEMENTATION OF PROJECTS

One of the first steps in the actual implementation of a pulp and paper project in a developing country - if not a prerequisite for the start of consideration of such a project - is the establishment of a management team with clearly defined fields of responsibility assigned to each member of the team. This should consist of members with the required expertise and an overall high quality manager as a team leader to ensure cooperation within the team. If necessary, the local management team may be reinforced with expatriates in certain fields of responsibility. This in some cases means hiring of expatriate advisers for key positions in the management team.

The critical activities and paths of project implementation should be identified at the early stage in order to avoid delays in construction which would increase the overall cost of the project. In granting of contracts for engineering, equipment deliveries, construction, etc., several approaches are possible, ranging from giving the whole implementation task to one contractor who then carries out the project with the help of subcontractors to handing out a number of separate contracts for the various phases of the implementation. Whichever approach is selected, the responsibility must be clearly defined in each case.

It is obvious that, by splitting up the work over a large number of contracts, it becomes increasingly difficult to identify the responsible contractors in case there are delays or something goes wrong in the project implementation.

The type of contract granted depends on the country where the mill is going to be built. A country with an existing pulp and paper industry would grant a different type of contract compared to a country with no experience of this type of industry. Accordingly, the right balance between domestic and foreign inputs/supplies would have to be found individually for each country and project.

A very important aspect in the implementation stage, which also has a bearing on many activities carried out prior to this, is the identification of problems of transfer of technology. This subject was dealt with in great detail in Technology and Manpower, presented to the Third Consultation on World Pulp and Paper Demand, Supply and Trade held in Tunis in 1977.[1/]

REDUCTION OF CAPITAL COSTS THROUGH MILL DESIGN AND USE OF SECOND-HAND EQUIPMENT

The various means offered in mill design concept for reducing the capital costs of a pulp and paper mill have to be reviewed and evaluated for each specific case. Among the items to be taken into account in this context there could be mentioned the type of fibrous raw material and its characteristics, the process to be applied, products and product quality to be produced, pollution abatement requirement, cost of chemicals and the extent to which losses need to be prevented as well as labour cost and productivity. Capital costs should by no means be saved at the expense of effective design, since the cost of improvement in the design at a later stage, once the mill has been built, is far more costly than introducing the appropriate design from the start.

In setting the standards for quality, the requirements of the printers and converters need to be taken into account. Although it would seem preferable to base the mill design on simple controls, the need for consistent and uniform quality may, on the other hand, require quite sophisticated instrumentation and controls. The expenditure for these may be recovered through improved process economy by reduction in the percentages of waste.

Although it may seem that labour intensiveness would be a desirable characteristic of the process design, it should be borne in mind that, because of quite often low productivity of labour in developing countries, such an approach may lead to excessive labour costs which might have serious consequences for the financial viability of the enterprise.

A very effective way of reducing the capital costs of a mill can be installation of second-hand equipment. This applies especially to paper machines which can be purchased at very favourable prices compared with new machines. Quite often such machines are sold with spare parts included for a value which may exceed the actual price.

However, a number of developing countries do not allow import of second-hand equipment. The reason for this is that in many cases the second-hand equipment imported in the past has performed so badly that the countries do not want a repetition of this bad experience. Loan applications for projects are also frequently turned down when it is stated that the equipment to be installed will be purchased second hand. This is especially true for international financing agencies.

It should be emphasized that, although there are a number of cases where purchasing of second-hand equipment has been a mistake, there are also quite a few success stories in the use of second-hand equipment. The key to successful purchasing of such equipment is know-how and its selection has to be based on case by case evaluation. Second-hand equipment is bought on a condition of 'as is, where is'. A second-hand paper machine has to be disassembled, transported to the new site and rebuilt, very often with certain modifications during the course of this process. Very few developing countries have

1/ FAO Forestry Paper 4: World Pulp and Paper Demand, Supply and Trade, Vol. 1, pages 235-260, Rome (1977).

facilities for rebuilding the machines and thus this important work has to be carried out in a developed country with expatriates taking care of the disassembling and installation as well. This adds to the final cost of the installed equipment. Technical cooperation between developing countries could alleviate this problem, using know-how from developing countries where it is available.

When evaluating the cost of a second-hand paper machine it has to be borne in mind that the freight cost of a second-hand machine is the same as, if not higher than, for a new machine. The costs of the foundation and building are also the same. Most likely, the energy consumption is higher than of a new machine and its efficiency lower. These factors affect the operating costs of the machine and consideration needs to be given to this when evaluating the overall cost of the machine in comparison with a new one.

The question of second-hand equipment is a sensitive one. It is not only a question of old versus new equipment but includes problems of training and political priorities. It has been felt that use of 'old' equipment would set limits to the development of skills and the level of training in a country. Developing countries also fear that they will become a dumping ground for obsolete equipment from the industrialized countries. On the other hand, use of second-hand paper machines can make a small paper mill project a viable proposition.

Second-hand paper machines are not machines of outdated technology. They are frequently rebuilt and a more appropriate and a more acceptable term would be reconditioned machines. The reason why such a machine is for sale might be simply that it does not operate at a high enough economic efficiency as required by the competitiveness of the mill where it was installed originally. This may be due to items such as cost of labour or that the conditions require a switch to other grades of paper which cannot be produced economically on that machine. Such a machine might be perfectly adequate for the production programme of a mill in a developing country, or even for another mill in an industrialized country.

Selection of a second-hand paper machine is extremely important as well as the evaluation of its suitability for the requirements of the mill in which it will be installed. Any replacement parts installed initially or at a later stage should be new, so that the machine will be gradually rebuilt and further reconditioned from revenues received from operation of the machine.

The evaluation of a second-hand paper machine should preferably be made while it is still operating so that the need for improvements can be established. Another reason for this is that, unless the machine is operating, it may have been cannibalized to supply spare parts to other machines. Other items of importance for selection of a machine are:

- Past performance of the machine; i.e. how many hours per day has it been operating;
- Maintenance requirements, based on information in maintenance records;
- The extent to which the machine needs to be rebuilt and the requirement of replacement parts;
- The spare parts which will be provided with the machine.

An assessment made by the International Finance Corporation indicated that, if carefully selected, a second-hand paper machine on the average would be about 40 percent cheaper than a new machine, taking into account the costs of rebuilding, although this figure may vary within wide limits.

TRAINING AND OPERATION

In the context of successful operation of a pulp and paper industry, the critical importance of appropriate training at all levels cannot be overemphasized. The training activities should commence at a very early stage of project implementation and, depending on the level and amount of training required, can be given in training institutions or mills abroad or in the country itself especially, when the mill is becoming operational, with the aid of expatriates.

Management capabilities are usually insufficient in developing countries for comparatively large-scale projects. It is, therefore, important that management training is provided to the project management team in the initial stages of the project.

It must be ensured that people given training abroad actually return to their country and that they are then given jobs which correspond to their training. These jobs should be made sufficiently attractive since otherwise they may be offered better conditions by competitors.

One problem which is sometimes met with in training people from developing countries in a mill in an industrial country is the differences in degree of instrumentation, automation and other operating conditions compared to mills in developing countries. The trainee may find it difficult to adapt his newly acquired knowledge on his return to his own country where the mill has been designed appropriately for the local conditions. There may also be problems with trade unions in industrialized countries who may be against training of foreign labour in their mill. However, the experience in this regard has sometimes been very favourable with the trade unions supporting this type of activity.

Although expatriates are extremely expensive, there is no doubt that employment of expatriates in key positions help to ensure achievement, within a comparatively short period, of the operational rate of production for which the mill has been designed. The increased efficiency of the mill operation through employment of expatriates usually provides more than compensation for the extra outlay for expatriates' salaries. However, expatriates should not be needed for extensive periods and their use should be gradually phased out during the initial years of operation of the mill.

It is important that the expatriates are utilized efficiently. However, this is not always clear in some projects since there have been cases in the past where the expatriates have been hampered in their work through lack of provision of necessary support for their duties. This has led to frustrations on both sides and usually in such cases the expatriates have left the project.

There is a conflict of interest between trainees and expatriate crews used for the operation of the mill during the initial period. The expatriates would want to get the mill on stream as soon as possible and do not look favourably upon interference in their work from the trainees. A suitable balance should, therefore, be found between these two activities; i.e., start-up and training, perhaps somewhat deferring the emphasis on training until the mill has started to run comparatively smoothly and then involve the trainees to a much greater extent in the operational activities.

Labour relations should not be neglected in the establishment of a pulp and paper mill. Good, firm agreements with the labour unions are necessary both during the construction and the operation of the mill. In some countries negotiations with the trade unions are simplified by having trade unions which relate to a specific form of industries rather than unions which relate to specific skills and types of work. For instance, if there is only one labour union with which negotiations need to be entered for a pulp and paper mill, it becomes much easier to ensure smooth relations than if a separate trade union exists for transport, workshops, welders, paper machine operators, etc.

TECHNICAL AUDITING AND PERFORMANCE GUARANTEES

Technical auditing of the performance of a mill needs to be introduced with due consideration given to the people involved at different levels. Without their understanding and support, the task of technical auditing can become impossible. This is recognized as the key issue when this type of auditing is undertaken in industrial countries by people of the same nationality and cultural background. It becomes even more important when a consultant from an industrialized country is to carry out technical auditing in a mill in a developing country. In such cases the consultant needs to proceed with utmost caution especially during the initial stages, trying to find out what motivates people and how they see the problems in the mill.

A problem of technical auditing of mills operating in developing countries is often the lack of measuring devices for each step of the process, which would be required for appropriate cost control. Installation of all instrumentation needed for the most efficient cost control system may require investments which are beyond the possibilities of the mill. It is, therefore, obvious that a different approach needs to be used for a small mill of 30 tons per day capacity and a mill of 800 tons per day.

Auditing during the construction period can be very useful, since it is then possible to identify faults at an early stage. Rectification of these faults at a later date when the mill is already operating can be quite costly.

In the context of auditing of performance guarantees, it is important that an agreement is reached on who the technical auditor will be already at the stage when the equipment is purchased. To make such an audit meaningful, it is essential that the mill is operated during the auditing period by an experienced crew, usually brought to the mill for this purpose by the contractor.

It is essential that a commitment to rectification of faults is included in the performance guarantees. If the supplier of equipment is expected to take the overall responsibility of performance, it may require that he provides equipment against departmental specifications rather than against specifications for individual items of equipment. This would provide more practical guarantees, since rectification of faults in performance may be very time consuming in developing countries with import regulations and long distance of supply of equipment.

The time after start-up referred to in performance guarantees is sometimes not quite clear to the parties involved. A distinction needs to be made between:

- The running-in period, usually about six months following which a well-trained crew - most likely expatriate since the mill personnel is not yet sufficiently skilled - should be able to run the mill at full guaranteed capacity for a short period of a few days;

- Time required to achieve full production capacity on a continuous basis which - with the mill crew - usually takes three to five years, depending on the training given in advance to the mill personnel.

Another distinction needed to be made to avoid confusion is that between design capacity and production capacity, the latter of which is lower and usually referred to in the performance guarantees.

PROTECTION AND SUBSIDIES

The reasons for granting protection or subsidies to an industry generally fall under three different headings:

(a) To provide support to newly established industry during the initial years of operation until full operating efficiency is achieved and the mill personnel has been adequately trained;

(b) To provide temporary support to an existing industry which, due to more rapid modernization of the industry abroad, needs time to invest in measures to improve cost efficiency, thus to increase its competitiveness;

(c) To provide protection against dumping from industries abroad during periods of low market demand and overcapacity.

With a few exceptions, the reasons falling under headings (a) and (c) are most common in developing countries, whereas those under heading (b) usually refer to countries which are already fairly industrialized.

Establishment of a pulp and paper industry in developing countries is very often achieved at a capital cost which is higher than in industrialized ones. This is because there are significant additional requirements on investment in infrastructure and training The capital costs are also increased by higher freight costs and by the necessity of, in most cases, employing foreign contractors for erection of the mill. After the mill start-up, expatriates are usually needed in the initial years to ensure efficient operation and to train local personnel on the job. It is, therefore, almost inevitable that production of paper in developing countries, especially in the initial years, is less cost efficient than in industrialized ones where manufacture of paper is an already established branch of industry. A consequence of this is that the price of the paper produced in a developing country will be higher than if the same grade were produced in a developed one. On the other hand, the cost of transport, port handling, etc., for imported paper may in some cases considerably reduce the advantage of foreign producers.

In most instances, however, some sort of protection of the domestic production will be required.

Domestic manufacture of paper in a developing country can be seen to be a result of two main principles of reasoning; i.e., securing supply of paper and saving foreign exchange. Consequently, the difference in cost of manufacture between a mill in a developing country and one in Europe or North America may in many cases constitute an insurance payment for security of supply. The question which needs to be raised is then how much could reasonably be paid for such an insurance.

Similarly, savings in foreign exchange by substitution of import may contribute to the overall economy to the extent that protective measures for the domestic industry are well worth introducing. The potential contribution of the enterprise to the development of skills in a country may also warrant some initial support to a new industry.

It is obvious from the above that some form of subsidy is usually required for establishment of pulp and paper industries in developing countries. These can consist of:

Subsidized cost of raw materials;
Low rates of interest on some loans and otherwise favourable loan conditions;
Incentives which relate to rates of depreciation, tax and excise duty exemptions;
Customs duty protection.

In all these alternatives it is the consumer or taxpayer who ultimately pays for the subsidies.

Although some form of subsidy is necessary in order to allow establishment of pulp and paper industries in developing countries, continued subsidies over a long period usually lead to insufficient efforts to operate the mill efficiently because of comfortable feather-bedding. It is, therefore, recommendable that such subsidies be gradually removed according to a schedule of which the mill management is well aware in advance at the time of establishment of the enterprise. In the case of taxes and depreciation allowances this is quite obvious. However, direct subsidies through low raw material costs, exemption of excise duty and customs duty protection may well be expected to be continued without changes over fairly long periods. It is, therefore, essential that the mill management is made aware of the fact that all these subsidies will be gradually removed according to

a pre-established plan, preferably agreed upon in advance between the parties concerned. This ensures that every effort is made to run the mill as soon as possible with the maximum operational efficiency, aiming at financial viability of the operation in the future without government support.

The product mix of a particular mill may have a bearing on the necessity for subsidies in order to make domestic manufacture of pulp and paper financially viable. A thorough survey of available statistical information on production capacities in various countries compared with local market data may lead to an optimization of the product mix so that certain grades which are uneconomic to produce within the country would be imported whereas others, the production of which would improve the viability of the operation, may be selected for domestic manufacture.

Because of the fluctuations on the pulp and paper market in the world, there are times when quantities, insignificant from a developed country point of view, are dumped at extremely low prices on the markets in developing countries. Such quantities may be insignificant from the seller's point of view, but might very often constitute the total annual consumption of that paper grade in the developing country. This can have disastrous effects on a mill in a developing country and it is, therefore, important that the governments under such circumstances are willing to protect their own industry temporarily through adequate measures. Since governments often have participated in the financing of the mill at least through the provision of guarantees for loans, it is in their own interest to protect the mill during difficult times.

Although protection in some form against dumping is warranted for a mill producing pulp and paper for the domestic market, it should not be used for feather-bedding of export oriented mills which should be able to withstand on their own the difficulties brought about by market fluctuations. The mechanism and the basis for application of such protective measures may vary considerably from country to country. Accordingly, it may take the form of protective customs duty tariffs or policies in the granting of import licences. The customs duty tariffs may be either a more or less arbitrarily set percentage or based on the value added on the product to arrive at the effective protection. A study of the effective protection in various countries has shown that this may be quite high in many industrialized countries as well. In fact, protective measures are quite often introduced in highly industrialized countries, such as in the U.S.A. and the EEC, although not necessarily in the field of pulp and paper.

The question which arises from this is, which should be the mechanism to trigger off the anti-dumping measures? Introduction of trigger mechanisms tailored by individual countries independently may lead to a dangerous spiral of anti-dumping measures being introduced in international trade. Although the mechanism to deal with dumping in the GATT code is highly unsatisfactory, it seems preferable to strengthen and improve the GATT code to make it more efficient, perhaps to include a trigger mechanism which would apply to all countries. In fact, the GATT Secretariat initiated in 1983 a study of trade in forest products, including pulp and paper, and it is expected that the results of the study will bring about an improvement in the GATT code with regard to anti-dumping measures.

SOCIAL INTEGRATION IN THE PULP AND PAPER INDUSTRY

The social structure in the country or area where a pulp and paper mill is to be established needs to be studied carefully and appropriate measures adopted to make the project socially acceptable. Otherwise the project may fail completely, since social structures cannot be changed rapidly. Unless the project is socially acceptable to the environment into which it is established, it will be seen as an encroachment of industry on the traditional rights and habits of the societies in that area.

Social integration should be considered an objective, not a burden to the enterprise. Cooperation and support from the government is obviously needed to achieve the objectives and the cost of this often needs to be borne initially by the public sector. These costs can, of course, be recovered later, for instance in the form of stumpage prices. Nevertheless, how the social integration is achieved and the respective roles in this of government, industry and society, need to be established separately in each case. In selecting strategies for this, a distinction must also be made between social integration within the

enterprise, in the form of supplying social and educational facilities, and social integration between the enterprise and its environment, for instance, to ensure distribution of benefits from the mill activities to the local population.

Social integration should be seen as part of the concept of appropriate industry which is wider than the idea of appropriate technology. The keyword in social integration is communication between the different segments of society involved. Although the problem issues may be different, there is very little difference in this respect bstween industrialised and developing countries.

Unless there is sufficient communication between the various groups of interest, political problems may arise and pressure groups may call for a ban against the establishment of the mill. Local communities may question what benefits they would derive from the enterprise or point out negative aspects of its establishment, such as exclusion from traditional activities providing earnings or simply air and water pollution. On the other hand, if there is sufficient communication already at an early stage of implementation of the project, the participation and support of the local communities and population can be ensured.

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ISBN 92-5-101423-X