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UNITED NATIONS
ECONOMIC
AND
SOCIAL COUNCIL

Distr.
GENERAL

E/CN.14/AS/II/2/d/1
28 September 1965

Original: ENGLISH

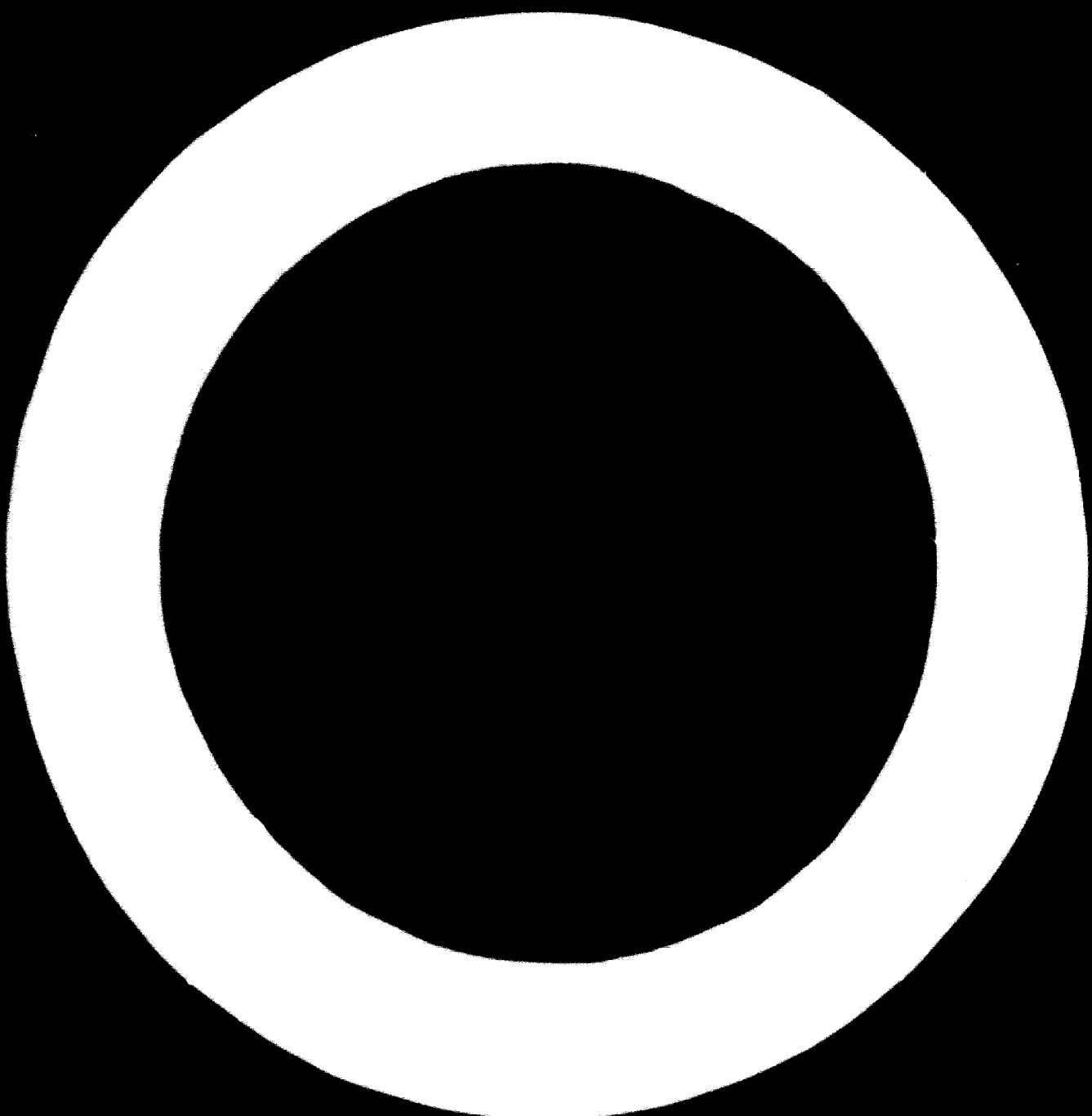
04894

ECONOMIC COMMISSION FOR AFRICA AND
CENTRE FOR INDUSTRIAL DEVELOPMENT
Symposium on Industrial Development in Africa
Cairo, 27 January - 10 February 1966

PULP AND PAPER INDUSTRY IN THE UAR

(Presented by the Government of
The United Arab Republic)

M65-78



PULP AND PAPER INDUSTRY IN THE UAR

The Government of the UAR recognizes the important and strategic role of adequate supplies of paper and paperboard in its efforts to raise the cultural and material living standard of the people.

Since the revolution in 1952 the country's consumption of paper and board has more than doubled; from an average of 79 thousand tons in 1951/53 to about 185 thousand in 1961/63, corresponding to an annual growth rate of some 8.9 per cent. In the same period the per capita consumption rose from about 3.7 kilograms per year to 6.7 kilograms, or by 6.2 per cent annually.

The consumption of cultural paper, that is, newsprint, magazine paper and papers for printing and writing went up faster than that of industrial paper and board, from 36 thousand tons in 1951/53 to 88 thousand in 1961/63. This rapid rise of about 9½ per cent each year partly reflects the ambitious educational programme, the aim of which is to virtually eliminate illiteracy by 1980.

The usage of industrial paper and board rose from 43 thousand tons to 97 thousand, i.e. by 8½ per cent annually as a result of the industrialization programme and improved standards in the packaging and distribution of consumer goods.

Paper and board production in the country was only about 20 thousand tons in 1951/1953 and consisted mainly of cheap grades of wrapping paper and paperboard made largely from waste paper. In 1962, the output had been raised to almost 90 thousand tons and preliminary data for 1963 indicate a production level of about 98 thousand tons, of which some 10 thousand of board were produced from waste paper in small mills. Thus in one decade the country's output of paper and board was raised to almost five times of the level at the time of the Revolution.

In spite of the successful efforts to raise the domestic production the country had to increase her imports of paper and board to satisfy the local needs. In 1951/53, the imports averaged some 59 thousand tons; in 1961/63 the quantity was close to 100 thousand tons and the foreign exchange expenditure (excluding imports of pulp) had risen to over nine million Egyptian pounds. In addition the country raised her imports of pulp for paper manufacture from about 5500 tons in 1951/53 to 36 thousand tons in 1963 the import value of which was £2,500,000 (Two and ½ million Egyptian pounds) in the latter year.

Therefore by increasing the domestic output (by building the Rakta fine paper mill; and the Kraft paper mill in Suez) we have succeeded to break the upward trend in paper and board imports which fell from a peak level of 120 thousand tons in 1961 to 88 thousand in 1963. The imports of paper pulp, however, continued to rise, in spite of the fact that the domestic output was increased by some 20 thousand tons of pulp from rice straw and reeds (at the Rakta mill).

Several estimates have been made of the future levels of paper and board requirements of the country. As is often the case, they differ because different methods were used in projecting the demand and as a result of different assumptions about the future course of the various factors (for instance, economic growth and population trends) which will affect the consumption of paper. Consequently, two alternative assessments were prepared; the lower of these estimates the total needs of paper and board, which were 147 thousand tons in 1959/61, may reach the levels of some 285 thousand in 1970 and 565 thousand tons in 1980, i.e. the consumption will about double in each of two decades from 1960 to 1970 and from 1970 to 1980. The higher of the two appraisals foresees an increase of demand to 340 thousand tons in 1970 and 785 thousand in 1980.

Regardless of whether the lower or the higher of the above estimates of paper and board demand in the country will better reflect the actual course of development, it is quite clear that the country cannot afford to cover those increased requirements through imports. Unless additional production facilities are established the foreign exchange expenditures on paper and board would reach the levels of £117½ million in 1970 and £146½ million in 1980 (1963 prices) according to the lower estimate and £ 23 million in 1970 and £ 65½ million according to the higher assessment.

It has been included in the present Five Year Plan of Social and Economic Development (1960/61 to 1965/66) several projects which intend to forestall this potential drainage of foreign exchange. The development programme includes production facilities not only for paper and board, but also for paper pulp with a view to achieve a maximum of foreign exchange savings (or earnings).

In the paper and board sector the projects, which include the expansion of existing mills as well as new mills, would add some 310 thousand tons of productive capacity of which 100 thousand tons of newsprint and magazine paper and 75 thousand tons of corrugating medium. The pulp mills will add some 100 thousand tons of market pulp besides the quantities of pulp which are needed for the integrated production of newsprint and corrugating medium.

The UAR is devoid of forests but has ample fibrous raw material resources for pulping in the shape of straw from the rice plantations in the Nile Delta and of Sugar cane bagasse from the existing and planned sugar mills in Upper Egypt. For technical and economic reasons first priority will be given to bagasse.

The realization of the High Dam project will bring vast areas of unproductive land under cultivation and transform hundreds of thousands of acres from basin to regular irrigation. For climatic reasons sugar cane is the agricultural crop which gives the highest net revenue from the land in Upper Egypt and the plantations which presently cover an area of about 41 thousand hectares will, after the

High Dam is completed, be almost trebled to a total area of some 115 thousand hectares in the beginning of the "seventies". The existing five sugar mills, which in the 1963/64 season crushed about 3.8 million tons of cane will be expanded and three new mills will be built. This will bring the total crushing capacity to some 10 million tons and the combined output of whole (bone dry) bagasse will reach one and a quarter million tons, which is sufficient to produce some 350-375 thousand tons of chemical pulp each year (after some quantities are set aside for other industrial uses, for instance, for particle board).

All the sugar mills are located at or close to the Nile with easy access to river transport and all of them, except Armant and Edfu, have railway connexion to Cairo and Alexandria. Three of the mills - Deshna, Nag Hamadi and Baliana - with a combined crushing of 4.2 million tons and located within a maximum distance of 50 kilometers, form a unique bagasse supply centre capable of feeding a chemical pulp mill with a capacity of over 500 tons per day.

The cost of bagasse as raw material for pulping in the UAR is low compared with the pulpwood prices in many of the large pulp producing and exporting countries. Thus it may be mentioned that the cost of bagasse per ton of bleached pulp will be about US$30 as compared with the cost of some US$55 per ton of pulp currently paid for broadleaved pulpwood in Scandinavia.

We are therefore attaching special importance to the development of a pulp and paper industry based on the future bagasse resources of the country with a view to supply the domestic market and also to earn foreign exchange from exports. Studies are presently under way to determine what mill units should be established and what products should be made to achieve a maximum of economic return from the bagasse resources.

One project which is of particular importance is the projected mill at Qus which will produce newsprint and magazine paper from

bagasse and which will be the first mill of its kind to be established. Several processes have been studied and estimates of the economics of production have been made which indicate that newsprint may be economically produced at a cost equivalent to that of imported newsprint.

Availability and Technical Aspects and economies of bagasse pulping

Bagasse is often referred to as an "Agricultural residue". Strictly speaking, this term is incorrect. To begin with, the bagasse is obtained as an "industrial" by-product at the sugar mill and does not have to be collected in the field like other agricultural residues, such as rice and wheat straw. Secondly, the word "residue" commonly denotes something of little or no value which is left over from a process whereas the bulk of the bagasse, as already mentioned, has a substantial value to the sugar mill as fuel.

The length of the sugar mill grinding season varies considerably from one country to another depending upon climatic conditions and the variety of cane which is propagated. In the UAR the grinding season is only some 120 to 130 days. Because of the heavy capital investment in pulp and paper mills these must, however, for economic reasons, run for as many days in the year as is possible taking into consideration existing labor laws and the time necessary for major repair work. It follows that bagasse when used as a fibrous raw material for pulp production must be stored to feed the pulp during that time of the year when the sugar mill is not operating. Because of its bulk and for other reasons which we will discuss later the cost of storing bagasse is high and therefore, makes up a large part of the total cost of the material for pulping.

As we have already seen, bagasse contains three different fractions, or elements, one of which, that is the pith (or parenchyma), has a non-fibrous structure. For technical as well as economic reasons, the pith should be removed before the chemical or semi-chemical pulping of bagasse. Furthermore, bagasse contains

extraneous matter such as trash from the cane, silt, sand, etc.... which must also be taken out before pulping.

The final cost of bagasse as prepared for the pulping operation is thus made up of three items:

(a) the fuel replacement value;
(b) the storage costs; and
(c) the cost of depithing and cleaning

To this list may be added a fourth cost item, transportation - in case additional bagasse quantities are brought in from another sugar mill.

In the following paragraphs some of the technical problems connected with the preparation of bagasse for pulping as well as of the costs involved are briefly discussed. The discussion will, of course, be held with particular reference to the conditions in the UAR.

First however, what are the quantities of bagasse which may be obtained from the different sugar mills today and where the expansion programme is completed.

Present and future quantities of Bagasse fibres

The amount of bagasse which is obtained from one tone of cane varies with the species, the climate conditions and the degree of maturity when the cane is cut. In the UAR one may count on an average content of bagasse of 12-13 per cent, i.e. one ton of cane will yield some 125 kgs of bone dry bagasse. (Unless otherwise specified the bagasse quantities will be given in terms of bone dry (BD) material).

It is estimated that the total annual output of bagasse today is around 475 thousand tons, which quantity will increase to one and a quarter million tons in the beginning of the seventies, when the present expansion programme for the sugar industry is completed.

Four of the mills Nag-Hamadi, Kom Ombo, Qus, and Baliana - will each produce close to 190 thousand tons of whole bagasse per year, a quantity sufficient to feed a chemical pulp mill with a daily capacity of about 200 tons (66 thousand tons per year). The three mills of Deshna, Nag Hamadi and Baliana which are located within a maximum distance of about 50 kilometers will have a combined annual output of some 525 thousand tons of bagasse, a quantity which could yield 175 thousand tons of chemical pulp per year or some 530 tons per day (330 working days per annum).

The surplus bagasse is, naturally, of no value at all to the sugar mill unless it can be sold or be used as an industrial raw material. In the UAR there is presently no demand for bagasse as fuel. It is possible, however, that a larger quantity may be sold if the material is made into fuel briquettes which are easier to transport and handle and which burn at a slower and more easily controlled rate than the baled bagasse. However, the production of fuel briquettes from bagasse requires investments in equipment at the sugar mill and the operating expenses are fairly high. The sugar mill's net revenue from the sale of fuel briquettes would be very small, if any at all, and this way of disposing of the surplus bagasse should only be considered as a somewhat better alternative than the straightforward burning in an incinerator.

In our economic evaluation of the prospects for bagasse pulping in the UAR we have assumed that the sugar mill will be paid for the fuel substitution value of the total quantity of bagasse which is delivered to the pulp mill, i.e. also for the amount which is actually in excess of the sugar mills own needs of fuel. This will give the sugar mill a considerable net revenue from the sale of bagasse and will provide an incentive to improve the thermal efficiency of the plant. For instance, a mill with an annual crushing of 1-1/2 million tons of cane will have a total output of about 185-190 thousand tons of bagasse of which some 55 thousand tons may be in excess of the

mill's heat requirements. At a fuel substitution value of L.E.2.50 per metric ton this would give the sugar mill an annual net revenue of about L.E.140,000 (US$320,000).

The amount of bagasse which may be used for the production of particle boards in the existing and planned particle board plant is estimated to reach some 120 thousand tons in the beginning of the seventies and the total quantity which could be set aside for pulping may thus be in the order of 1.1 million tons.

It should be noted that the above estimate of the total bagasse quantities are based on the present yields of cane with an average fibre content of 12½ per cent. There are good prospects, however, that the yield per hectare of land may be raised over the present average of some 96 tons and that the industrial capacity may become higher as a result of prolonging the grinding season. Also, the average fibre content of the cane may increase in the future. One of the cane varieties presently under trial has, in fact, a fibre content of 13½ per cent, and the possibility should not be excluded that the propagation of new varieties with still higher content of fibres - even if this is achieved at the expense of a somewhat lower yield of sugar - may give a higher net revenue of the land than at present.

This present study does not take into account these potential increments in the bagasse quantities and therefore appraisals of the development prospects for the bagasse pulp industry are based on a total availability for pulping of about 1.1 million tons of bagasse in the beginning of the seventies.

The Cost of Bagasse for Pulping

A. Fuel replacement value

It has already been mentioned that a modern raw sugar mill which is designed for a maximum of heat conservation will have a surplus of bagasse and that this surplus may often create a problem of disposal.

The amount of excess bagasse which can be obtained is, of course, primarily a function of the ratio between the fibre and sugar contents of the cane. When this ratio is high there may be a surplus of bagasse amounting to one third of the total quantity or sometimes even more.

Experience has shown that six tons of mill run bagasse (of 50 per cent moisture content) may be replaced by one ton of heavy fuel oil. In the old sugar mills this substitution of fuels requires a change, or modification of the existing boiler installations; in the new mills, however, the use of fuel oil instead of bagasse may be planned beforehand and in this case does not require additional investments. Here we have taken the view that the modification of existing boilers (most of which are old) should be paid for the net revenues from the sale of surplus bagasse to the pulp mill and by simpler and cleaner boiler house operations.

Heavy fuel oil is sold in Upper Egypt, where the sugar mills are located, at a standard price of L.E.7.50 per metric ton (US$17.25), delivered at mill site. The fuel replacement value of the bagasse is thus L.E. 2.50 per ton of bone dry (BD) material (US$5.75). This is also the cost of the bagasse as it leaves the sugar mill, i.e. before baling and depithing, which has been accepted for the present appraisal.

B. The Cost of Baling and Storage

As already mentioned, the grinding season in the UAR is about 120-130 days per year whereas the pulp and paper mills, in view of the heavy capital investments, must be run for as many days in the year as possible. In this survey it has been assumed that the pulp mill will run for 330 days of the year. To provide a margin of safety, it has also been assumed that the pulp mills will use fresh bagasse during only 100 days of the grinding season which means that bagasse will have to be stored to feed the mill during 230 days.

Before examining the costs of baling and storage of bagasse, some technical problems will, however, be briefly discussed.

Bagasse leaves the sugar mill with a moisture content of about 50 per cent and it normally contains about 4 per cent of water soluble materials about half of which is sucrose.

The present evaluation of the cost of bagasse for pulping in the UAR is based on the conventional practice of baling and storage, except in the case of bagasse for mechanical pulping which, it is assumed, will be artificially dried before baling.

The obvious advantages of bulk storage make it tentative however, closely to examine the possibilities of adopting this system which is also likely to be less expensive than is indicated below for the conventional method.

The cost per ton of bagasse (BD-basis) is:

$$Y_2 = 1.81 + \frac{25.000}{q_1} \quad \text{L.E. per ton.}$$

where q_1 denotes the quantity of bagasse which is baled per year.

C. <u>The cost of dry depithing</u>

As mentioned earlier the pith is of non-fibrous structure. The cells are thin-walled and easily collapse when subjected to the action of the cooking chemicals. When collapsed these cells have only a detrimental effect on the paper making characteristics of the pulp; they add nothing to the strength of the paper but will reduce the freeness of the pulp. (Slower drainage on the paper machine) and give to the paper a tinny or parchment-like character with low capacity. In addition the pith, after pulping, has a tendency to clog up the paper machine wire and the felts and to cause "picking" by sticking to the drying cylinders.

In the production of chemical (and semi-chemical) pulps the bagasse should therefore be properly depithed before pulping.

A number of methods and different types of equipment have been suggested and are used for the depithing of bagasse. In the present context the disdussion of the depithing problem is limited to a few principal comments.

The depithing methods fall into three categories:

(1) Dry depithing: which is essentially a screening or dusting of the dry bagasse after storage. The operation is carried out at the pulp mill and the pith, or dust fraction, is used as fuel.

(2) Moist, or "humid" depithing: which is carried out on the bagasse as it leaves the sugar mill. The methods used range from a simple screening to treatment in specially designed equipment for mechanical loosening and subsequent separation of the pith fraction. The pith (50 per cent) dry is usually returned to the sugar mill for burning and the fibres are baled for storage.

(3) Wet depithing: which is carried out in dilute water suspension. Two different types of equipment are used; hydrapulpers and disc refiners. Wet depithing which gives the best separation is generally carried out at the pulp mill prior to pulping. The main disadvantage of this method is that the pith must be dewatered before it can be used as fuel.

It is desirable to remove as much as possible of the pith at the sugar mill since this will reduce the quantity of bagasse to be baled, handled and stored.

The estimates of depithing costs are based on a system which implies moist depithing of fresh bagasse which goes directly to pulping and dry depithing of the baled (whole) bagasse after storage. These operations are both followed by a wet depithing at the pulp mill, which operation, however, is considered to be an integral part of the pulping process and is not included in the present calculations of the cost of bagasse for pulping.

The moist, as well as the dry depithing, is carried out by means of hammer mill type of equipment which loosens the pith from the fibre bundles. The pith fraction is later separated and removed from the fibre in pneumatical classifiers.

The costs of dry (and moist) depithing of bagasse are:

$$Y_3 = 0.29 + \frac{2000}{q_2} \text{ L.E. per ton (BD);}$$

where q_2 denotes the quantity of bagasse which is depithed per year.

In moist and dry depithing 20 per cent of the material will be removed as a pith (dust) fraction which is used as fuel in the pulp mill. The fuel value of this material is L.E.2.50 per ton (BD) and the value which should be credited to the operating costs is thus L.E. 2.50 : 0.20=L.E.0.50 per ton of bagasse.

The net cost of the dry and moist depithing of bagasse is thus estimated at:

$$Y_4 = \frac{2000}{q_2} \ldots 0.21 \text{ L.E. per ton (BD);}$$

where, again, q_2 is the annual quantity of bagasse.

Total cost of bagasse per ton of pulp

As already mentioned, the maximum quantity of (whole) bagasse which will be available at any one of the sugar mills is about 185 thousand tons, sufficient to feed a pulp mill of about 200 tons/day capacity. However, the economics of scale in pulping are very important and the transport of bagasse from one sugar mill site to another will be fairly inexpensive particularly in the centre of Nag Hammadi--Baliana-Deshna. These conditions indicate that it may be economical to increase the size of the pulp mill by drawing the necessary bagasse supplies from two or more sugar mills.

Therefore the cost has been calculated of bagasse per ton of pulp at different production levels up to 500 tons/day (unbleached pulp), the quantity which may be produced from the combined future

bagasse resources of the three sugar mills at Nag Hamadi, Baliana and Deshna. The following Table showing the cost of bagasse per ton of unbleached and bleached chemical (sulphate) pulp is quoted. Since it is of interest to compare these costs with the cost of other fibrous raw materials for pulping in other parts of the world the costs are shown also in terms of US$ dollar equivalents at the present exchange rate of US$2.30 per one Egyptian Pound.

Cost of bagasse per ton of pulping at different production levels of one pulp mill

(Refers to the bagasse supply centre of Nag Hamadi, Baliana, Deshna).

PULP PRODUCTION: tons/day	50	100	200	300	400	475	500
BAGASSE COST FOR:	----- L.E. per ton of pulp						
Unbleached pulp	12.53	11.50	11.61	13.62	14.81	15.26	15.38
Bleached pulp	13.16	12.13	12.66	14.66	15.84	16.27	
	------ US$ per ton of pulp --						
Unbleached pulp	28.82	26.45	26.70	31.33	34.06	35.10	35.37
Bleached pulp	30.27	27.90	29.12	33.72	36.43	37.42	

For comparison it may be mentioned that the costs of coniferous pulpwood per ton of pulp in Scandinavia (Finland, Sweden) around US$69 and US$78 for unbleached and bleached grades, respectively. For short fibred pulp (birch sulphate) the cost is approximately US$51 and US$55, respectively. To these costs should be added the costs of storage, barking and shipping to make the costs comparable with the costs of bagasse per ton of pulp in the UAR. (The cost of wet depithing is paid for by the fuel value of the pith which is recovered).

The cost of broadleaved pulpwood in the United States is probably around US$8.50 per solid cubic meter which gives a cost per ton of unbleached pulp of about US$ 31 and per ton of bleached pulp of some US$ 33, i.e. approximately the same cost levels as in the UAR.

This leads to the conclusion that bagasse in the UAR is a cheap fibrous raw material for pulping and may be obtained in quantities large enough to feed modern, large-scale pulp mills.

OUTLINE OF A DEVELOPMENT PROGRAMME TO 1975

The programme outlines a development for the utilization of the potential future bagasse resources of the UAR to produce pulp, paper, and paperboard as well as fibre board and particle board. It covers a period of ten years - from 1965 - 1975 - must, of course, be linked with the existing Five-Year Plan for expanding and modernising the paper and board industries in Alexandria, Cairo and Suez.

At first sight, the development programme may appear to be nothing more than an ambitious target since it includes the installation of additional production capacities of over 400 thousand tons per year for integrated paper and board manufacture, 15 thousand tons of fibreboard, and 50 thousand tons of particle board. The plan calls for an annual investment over the ten years of some L.E.11 million (about US$25 million) of which almost two thirds, or over 7 million per year will be foreign exchange. Also, the successful realization of the programme requires that a large number of engineers and technicians be educated and trained to operate the new mills.

General Objectives of the Plan

The development programme has two central objectives:

a. the sugar cane bagasse resources of the UAR could be made available at low cost as a raw material for pulping and

b. the total cost of pulp and paper produced from bagasse will be lower than the present international price levels.

The main objectives of the plan are:

(1) To utilize the entire bagasse output of the existing and planned sugar mills as an industrial raw material; and

(2) To make the country virtually independent of imports of pulp, paper, and board; necessary imports of special products being compensated for by exports of other grades.

The last objective gives the framework of the plan for the paper and board sector while the pulping capacities (and those for fibreboard and particle board) are largely determined by the future output of bagasse in the different sugar mills.

The plan also contains a third important aim which is to make maximum use of the other cheap sources of fibrous raw materials which are potentially available in the country in the form of waste paper and rags, or textile waste.

Attention was drawn to the need to integrate semi-chemical pulping of bagasse with a full chemical pulping process in order to solve the difficult problem of effluent disposal. Attention was also drawn to the excellent properties of semi-chemical bagasse pulp for the production of certain types of paperboard, in particular corrugating medium, which is likely to find a ready export market. Consequently, all the mill projects, except the newsprint mill at Qus, include semi-chemical pulping sections with capacities which are approximately one third of the capacities for chemical pulp.

It is possible, however, that, as further experience is gained in the production of mechanical pulp from bagasse and in the potential use of such pulp for the manufacture of different grades of paper and board, one or two of the semi-chemical pulping sections may be replaced by mechanical pulping. This change in the development programme is also desirable because (a) it will increase the amount of papermaking fibres from a limited supply of fibrous raw material and (b) the low cost of electric energy - £ 0.002^{m}/m per kwh, or less than $\frac{1}{2}$ US Cent per kwh - makes the production of mechanical bagasse pulp economically attractive.

Waste paper and rags or textile waste will mainly be available in Lower Egypt (Cairo, Alexandria). Therefore, the utilization of these raw materials should be concentrated at the paper and board mills located in this part of the country.

It is estimated that some 90 thousand tons of waste paper may be recovered in 1975, mainly in Cairo and Alexandria. This corresponds to a recovery rate of about 18-19 per cent of the estimated local consumption of 470 thousand tons of paper and board in that year, or considerably less than the present rate of about 25-26 per cent. It is suggested that a large part (64,000 tons) of the waste paper should be processed in two modern plants to be installed, one at the National Paper Mill in Alexandria and the other at the Simo mill near Cairo.

The country is presently a net exporter of fairly large rapidly increasing quantities of textile waste and rags; the bulk of which is probably used for paper and board manufacture in the importing countries (mainly in the United Kingdom). The exports of textile waste and rags went up from about 12 thousand tons in 1958 to over 21 thousand tons in 1961 and it is estimated that the quantity available in 1975 would amount to about 30 thousand tons which is sufficient to produce some 20 thousand tons of rag pulp.

Bleached rag pulp will be used in the production of fine papers and the unbleached grades will serve to imporve the tearing strength of wrapping papers manufactured from bagasse pulp and/or waste paper. The cost of domestically produced rag pulp will probably be higher than the price of imported long fibred (coniferous) pulp, but smaller quantities will be needed to achieve the necessary tearing strength and the potential savings of foreign exchange, estimated at the equivalent of over two million Egyptian Pounds per year, weigh heavily in favor of establishing a local produotion of rag pulp.

Summary of the Development Plan

The proposed development plan would raise the production of paper and board by about 415 thousand tons to a total of 530 thousand in 1975, and the total pulp production (including waste paper and rag pulp), would be increased by over 445 thousand tons to a level of 520 thousand. The output of fibreboard and particle board would rise to 110 thousand tons.

Suggested expansion of Pulp, paper and board
Estimated production levels in 1975

	Expansion 1965-1975	Production 1975
	.....1000 metric tons ...	
Newsprint	100	100
Magazine paper	30	30
Printing and Writing	86	118
CULTURAL PAPER	216	248
Wrapping paper	57	90
Kraft paper and board	20	40
Glassine and Greaseproof	-	-
Paperboard	70	100
Corrugating medium	50	50
INDUSTRIAL PAPER & BOARD	197	282
TOTAL PAPER & BOARD	413	540
Mechanical pulp	60	60
Semi-chemical pulp bagasse	67	67
Semi-chemical pulp, rice straw	10	10
Chemical Pulp - Bagasse	255	273
Chemical pulp, rice straw	-	22
Rag pulp	20	20
Waste paper pulp	81	88
TOTAL PULP : all grades	493	520
Fibreboard	15	25
Particle board	50	85

Note: Some of the existing capacities (for instance, for waste paper pulp are rebuilt. Hence, 1965 production levels do not correspond to the difference between the two columns.

The following paragraphs give brief comments on each of the projects included in the development plan.

The Kom Ombo project

A particle board mill with a potential annual output of 20 thousand tons was built in 1963. It is suggested to improve the economics of this mill by adding a second production line with the same annual capacity.

As the sugar mill of Kom Ombo is located at 50 kms from Edfu, it is suggested that the balance of the bagasse supplies at Kom Ombo, some 120 thousand tons per year is transported to Edfu to be used to produce 100 tons/day of unbleached chemical and 30 tons/day of semi-chemical pulp.

The Edfu project

A mill with an annual output of about 20 thousand tons of unbleached bagasse pulp has recently been put into operation. The mill is designed with a view to double the capacity in the near future. It is proposed that the annual output of the pulp mill be raised to about 50 thousand tons and that a semi-chemical (soda) pulping unit with a capacity of 40 thousand tons per year should be added. The two mills will have a combined waste liquor recovery system.

The semi-chemical pulp together with some 15 thousand tons of unbleached bagasse pulp may be converted into 33 thousand tons per annum of different grades of paperboard.

The balance of the unbleached chemical pulp, i.e., 35 thousand tons per year, will be used together with 15 thousand tons of imported kraft to produce wrapping paper and possibly some quantities of liner for domestic consumption.

The Qus Newsprint Mill

This project is in an advanced stage. Tenders have been received which are presently being closely examined as regards the suggested technical solutions as well as the investment requirements.

The mill should have an annual output of 100 thousand tons of newsprint and should be equipped to produce, alternatively, some grades of magazine paper in the years until the domestic consumption of newsprint has caught up with the potential production.

Although a final decision cannot yet be taken on the fibre composition which will ultimately be used to manufacture newsprint, it appears likely that this will include a high percentage of mechanical bagasse pulp. In the estimates of the fibre needs at later date we have tentatively assumed a fibre furnish of one half of mechanical bagasse pulp and another half of chemical bagasse pulp.

On the basis of this fibre composition the bagasse supply from the Qus Sugar Mill is not quite sufficient to feed the newsprint mill and some 90 thousand tons will have to be imported from Armant. The capacity of the mechanical pulping section shall have an additional 20 thousand tons to be shipped to the Deshna mill where it will be used as part of the fibre furnish for magazine and printing paper.

When the Qus project is completed it would thus have the following production capacities:

	Total	For Sale
	.....1000 Tons/Year	
Newsprint	100	100
Bleached chemical pulp	50	
Mechanical pulp	70	20

The mill will also include an electrolytic plant producing the necessary amount of chlorine for bleaching and caustic soda which will be used as a make-up chemical in the pulp mill. There will be a small excess quantity of caustic soda about 1,500 tons/year, which will be sold in solid form.

Again, it is pointed out that the project as outlined above is not final. For instance, the experience from actual mill production may show that the percentage of mechanical pulp could be raised at the expense of the chemical bagasse pulp. Should this be possible,

it may prove to balance the supply and requirements of bagasse at Qus and to develop an independent mill unit at Armant which has a potential bagasse supply (150 thousand tons/year) sufficient to feed a chemical pulp mill with a capacity of about 50 thousand tons per annum.

The Deshna Project

It is suggested that an integrated pulp/paper mill producing 30 thousand tons of magazine paper and 20 thousand tons of other printing and writing paper should be built at Deshna. The pulp mill should include capacities for the production of 40 thousand tons of bleached chemical pulp and 12 thousand tons of semi-chemical pulp. Some 30 thousand tons of the chemical pulp will be used in the paper mill which leaves a balance of 10 thousand tons of market pulp. The semi-chemical pulp will all be shipped as wet-lap (or as needle pulp) to the proposed mill at Baliana to be used in the production of corrugating medium.

The balance of the fibre needs for the manufacture of printing and writing paper some 22 thousand tons per year - will be made up of 10 thousand tons of mechanical pulp (from Qus), 7 thousand of imported bleached pulp and 5 thousand of rag pulp and it is suggested that the latter be produced at site.

The Baliana mill

As already pointed out, the cost of transporting bagasse between Nag Hamadi and Baliana will be low since the two mills, which are located only 20 kms. apart, will be interconnected with a narrow gauge railway system. It has also been demonstrated that in this case great savings in the production costs will be made by pulping the combined bagasse resources at a central pulp mill.

Consequently, the suggestion is to establish a pulp mill with annual capacities of 100 thousand tons of unbleached chemical pulp and some 35 thousand tons of semi-chemical (soda) pulp at Baliana.

The chemical pulp will all be sold on the market (at least to begin with), whereas the 35 thousand tons of semi-chemical pulp, together with 12 thousand tons imported from Deshna and 5 thousand tons of waste paper will be processed into 50 thousand tons of corrugating medium.

Other mill projects and expansion plans

Since the other projects included in the development plan are only indirectly linked to the problem under discussion, that is, the use of bagasse for pulp and paper manufacture in the UAR, they will be present only in a very summary way.

Suez Kraft Mill

A doubling of the capacity of this mill has already been decided upon and is included in the five year plan. With additional minor modifications of the existing mills the capacity may be brought up to 40 thousand tons per year.

Presently, the mill uses almost entirely imported kraft pulp to produce sack paper and wrappings. It would appear that a large part of the kraft pulp may be replaced by unbleached bagasse pulp, provided that the paper machines are equipped to produce stretchable paper (with the Clupak or another system). It is therefore suggested that when the mill is completed the average fibre furnished be made up by some 25 thousand tons of unbleached bagasse pulp and 17 thousand of imported kraft.

The Rakta mill (Alexandria)

A board machine for the manufacture of 15 thousand tons per year of different grades of duplex and triplex is presently being installed and a second fine paper machine will be added which will increase the potential output of writing paper to 48 thousand tons per year.

The additional needs of paper pulp mill will be met mainly from the supply of bagasse pulp but it is suggested that some 3 thousand

tons of bleached rag pulp is included in the furnish and supplied from a proposed rag pulping unit at the nearby National Paper mill.

It is also suggested that a bleaching plant with a yearly capacity of some 30 thousand tons is installed for the imported bagasse pulp.

The National Paper Mill (Alexandria)

It is tentatively suggested that this mill should be modernized and expanded to include a fine paper machine with an annual output of 17 thousand tons (50 tons day). (An alternative plan, which may be better, is to include this machine in a further expansion of the Rakta mill). Also the production of wrapping paper and paperboard should be raised by together about 20 thousand tons.

The Simo Mill (near Cairo)

This mill is presently producing some 8-10 thousand tons of wrapping paper (so called Schrens paper) mainly from waste paper. It is suggested that the plant should be modernized and expanded so that the total output of the mill is raised to 45 thousand tons annually, of which 15 thousand tons of wrappings and 30 thousand tons of board (mainly chipboard).

The quality of the wrapping paper should be improved by using a fibre furnish consisting of almost one half of unbleached bagasse pulp with the balance made up of waste paper. Whether liner boards should be produced at this mill-which is suggested in the five year plan - or some other qualities, is a question which may require further study. In any case, the economics of producing liner boards for export (indicated in the plan) do not appear very promising. It has therefore been suggested that the mill should produce mainly chipboard (bending board and other qualities) from waste paper mixed with bagasse pulp.

Other mill projects

The proposed development plan includes the modernization and expansion of the Alba mill (near Alexandria) the output of which would be raised to some 15 thousand tons of wrapping paper made from waste paper and bagasse pulp.

As a result of the over-all development of the paper and board industry in the country, some of the very small mills producing wrapping paper and board from waste paper will probably be forced out of business and their present estimated combined output of some 8 thousand tons a year will fall to 5 thousand in 1975.

A very large share of the country's consumption of fine paper is in the capital. It is therefore proposed that a new fine paper mill with an annual capacity of 25 thousand tons be established in, or near to Cairo, provided that a suitable mill site can be found.

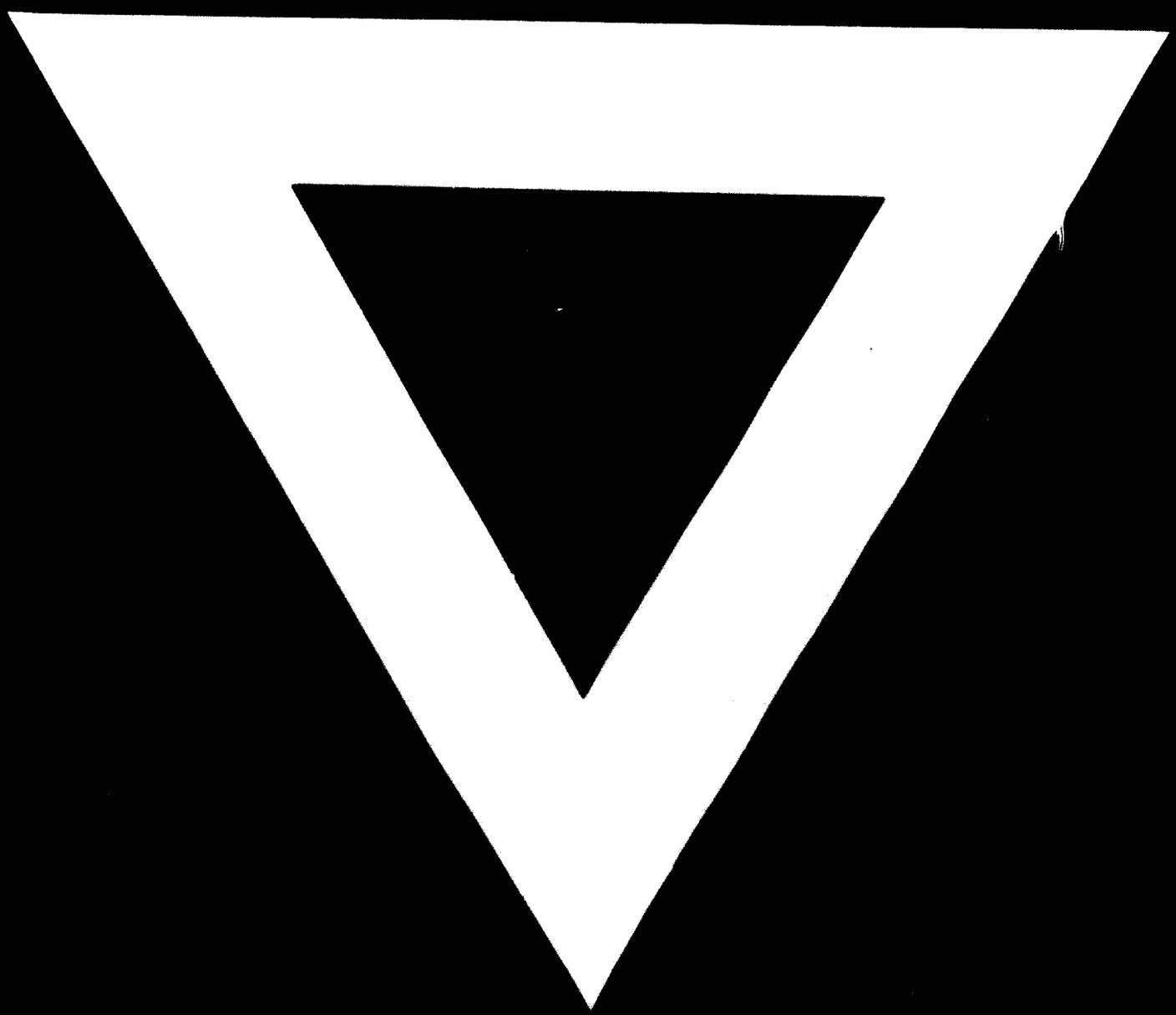
The mill should use mainly bleached bagasse pulp and rag pulp but may also include in the furnish some qualities of waste paper (white cuttings etc..).

A FINAL COMMENT ON THE PLAN

The development plan for the pulp, paper and board industries as briefly reviewed above spans a period of 10 years. It is quite obvious that such a plan must be flexible since many of the projects may have to be modified in the light of market development and technical progress (in the field of bagasse pulping). Also the plan must be co-ordinated with the development plans for other industries and be fitted into an over-all economic development plan for the country.

The UAR is presently in the process of rapid industrial development which unavoidably leads to an outflow of foreign currency to pay for the necessary imports of capital goods. This requires that the reserves and annual exchange earnings are allocated to the

different sectors of the economy according to specific priorities. It is, of course, possible that in marshalling the available resources with the view to achieve the maximum benefit to the country the above development programme for the pulp and paper industry will have to be delayed. Since, however, the plan is drawn up so as to cover the domestic needs in 197[illegible] which correspond to a given increase in the [illegible] National Product, any curtailment of, or delay in the execution of the programme should not be made without a previous investigation of the possible effects on other sectors of the economy and, in particular, on the educational programme.



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