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Report No. 466a-TA

Appraisal of the Kilombero Sugar Project Tanzania

July 30, 1974

General Agriculture Division
Eastern Africa Region

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International Development Association

CURRENCY EQUIVALENTS

US$1.00	=	Tanzania Shilling (Tsh) 7.14
US$1.00	=	Dutch Guilders (f) 2.8
US$1.00	=	Danish Kroner (DKr) 6.00
1 DKr	=	Tsh 1.2
1 f	=	Tsh 2.6

WEIGHTS AND MEASURES

Note: Tanzania is gradually moving over to metric units of measurement. In the 5-year transition both metric and imperial units are used. In this report the measures used by Tanzania in drawing up the Kilombero Sugar Project have been retained. Metric measures used are:

1 kilogram (kg)	=	2.2 lb
1 metric ton (m ton) = 1,000 kg	=	2,204.6 lb = 0.98 long ton
1 kilometer (km)	=	0.62 mile
1 millimeter (mm)	=	0.039 inch
1 liter (l)	=	0.204 US gallons

ABBREVIATIONS

CPM	=	Critical Path Method
EAAFRO	=	East African Agricultural and Forestry Research Organization
GEFCO	=	General Foods Company
HVA	=	H.V.A. International b.v. (Amsterdam)
K I	=	Existing Kilombero Sugar Company factory and estate
K II	=	Project factory and estate
KDDC	=	Kilosa District Development Corporation
KILIMO	=	Ministry of Agriculture and Cooperatives
KSC	=	Kilombero Sugar Company Ltd.
NAFCO	=	National Agricultural and Food Corporation
NSB	=	National Sugar Board
SDC	=	Sugar Development Corporation
TAC	=	Tanzania Audit Corporation
TCD	=	(Metric) Tons of Cane per Day
TPC	=	Tanganyika Planting Company Ltd.
TRDB	=	Tanzania Rural Development Bank

FISCAL YEAR

KSC	May 1 to April 30
Government	July 1 to June 30

MILLING SEASON

Approximately June 1 to December 20 (200 days)

TANZANIA

KILOMBERO SUGAR PROJECT

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This report is based on the findings of an appraisal mission to Tanzania in November/December 1973 composed of Messrs. J.H. Cleave, H. Malik (part-time), (IDA); J. Duyverman, T.G. Haworth and H. Idehara (Consultants); and accompanied by R. Stern (Loan Officer).

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SUMMARY AND CONCLUSIONS

i. Tanzania's development strategy puts emphasis on increased agricultural production, and aims at self-sufficiency in crops such as sugar which can be home-grown efficiently. However, following recent increases in sugar consumption, demand has outstripped domestic supply, thus resulting in substantial imports; in 1973 these imports had a foreign exchange cost of over US$18.0 million. Due in part to the recent drought, imports of other food commodities have also increased, and a combination of these and several other factors has resulted in serious balance of trade difficulties.

ii. The proposed Project is designed to help alleviate this situation by providing for increased domestic production of semi-refined sugar. The Project would include the development of a cane sugar estate and outgrowers land, as well as the erection of a 2,400 TCD factory capable of producing 45,000 m tons of sugar a year. Also included would be provision for ancillary facilities, training of factory and field staff, an increase in adaptive research, and a survey to identify future sugar developments.

iii. The Project would approximately double the production of the Kilombero Sugar Company (KSC) which is a wholly owned subsidiary of the recently formed, parastatal, Sugar Development Corporation (SDC) and has an existing factory, estate and outgrowers adjacent to the Project area. About 45% of the 7,300 acres of Project estate land would be under irrigation, and 40% of total cane area would be farmed by outgrowers, comprising ujamaa villagers, a small estate owned by the local District Development Corporation, and private growers. Overall Project execution and management would be by KSC, with the guidance of HVA International b.v. (HVA) who have been retained as managing agents since 1965. The factory would be supplied and erected by a Dutch/Danish consortium under the supervision of HVA operating under a separate contract: field development, including outgrowers' land, would be by KSC. Although the existing factory and estate (K I) and the new development (K II) would operate as entities, they would share experienced senior management, factory, and agricultural personnel.

iv. External financing of the Project would be in parallel by the Bank Group and by Danish and Dutch bilateral aid funds, together accounting for 84% of the total cost of US$55.8 million. It is proposed that Bank Group funds, consisting of an IDA Credit of US$9.00 million and a Bank Loan of US$9.00 million, would finance Part I of the Project; this would comprise land development (estate and outgrowers), non-factory ancillaries including community facilities, and the training, research and survey components. The Credit and Loan would represent 78% of Part I costs. Bilateral aid funds would be committed to Part II of the Project comprising the factory and its ancillaries, and supervision of construction, and would represent 86% of Part II costs. The proposed Credit would be on standard terms to Government

and the Loan would be for 25 years including 5 years of grace. The Dutch loan would be on the same terms as the IDA Credit, and the interest free Danish loans would be part repayable over 25 years with 7 years grace, and part over 35 years with 10 years grace. Bank Group funds except for the cost of the sugar survey which would be a grant to SDC would be onlent to KSC at 9% per annum. Bilateral aid funds covering Part II of the Project would be passed to KSC through SDC in such a way that not less than 30% nor more than 50% of the proceeds would represent an equity contribution.

v. Equipment in Part I of the Project, mostly for land development, irrigation and cane transport (about US$9.0 million) would be procured by international competitive bidding in accordance with Bank/IDA guidelines. In evaluation of bids local manufacturers would be allowed a 15% preference, or the existing rate of import duties, whichever is the lower, and bulked orders of less than US$30,000 would be procured in accordance with Government procedures. The survey would be by consultants chosen in accordance with Bank Group guidelines. Civil works construction (totalling about US$2.0 million), would be subject to international competitive bidding with local firms given a 7-1/2% preference in assessed bids over any foreign contractors bidding. KSC would undertake land preparation, and road and rail bed construction. East African Railways would procure and lay rail-line under their standard procedure.

vi. By 1980 the Project would result in incremental annual sugar production of 45,000 m tons, as well as 16,000 m tons of molasses; together these would be worth nearly US$17.0 million at 1974 values. The annual net saving or foreign exchange earnings would be nearly US$14.0 million. Per capita net incomes of outgrowers in ujamaa villages would increase from present levels of about US$40 to over US$140 after the seventh year when all development charges would have been met.

vii. In order to recover costs and give an acceptable return on capital employed, it would be necessary to increase the KSC sugar price. At present costs, the price would increase from the current price of Tsh 1,080 per m ton to over Tsh 1,450; this would compare with a 1980 import substitution projected price of Tsh 1,765 per m ton.

viii. The internal economic rate of return of the Project is estimated at 13% over twenty years. In this calculation all costs are included and foreign exchange costs and benefits are shadow priced at 140% of the official exchange rate. Without shadow pricing the return would be about 11%. A delay of one year in bringing the sugar factory into operation would only reduce returns by 2%, largely because the existing factory could handle much of the excess cane. A drop in sugar prices of 20% below forecast would reduce the return to 7% but prices 20% above forecast would raise the return to 18%.

ix. Six IDA credits and one Bank loan totalling US$83.1 million have previously been approved for Tanzania agricultural projects in agricultural credit, livestock (2), tobacco, tea, cotton and cashew. In addition an Education Credit provided US$3.3 million for agricultural education, and part of a US$6.0 million Credit to the Tanzania Investment Bank is for agricultural development. Performance on projects has been mixed, with problems particularly arising in management and the rate of participation of farmers.

x. The Project is suitable for an IDA Credit and a Bank Loan each of US$9.0 million to the Government of Tanzania.

TANZANIA

KILOMBERO SUGAR PROJECT

I. INTRODUCTION

1.01 Increased agricultural production and development of rural areas are given great emphasis in the Tanzania Second Five-Year Plan now in its final year. Crop priorities are set, based on production possibilities, market prospects and a goal of country self-sufficiency. Production is variously organized, but because of the country's socialist philosophy, private estates and individual farming are being discouraged in favor of production by subsidiary companies of parastatal organizations, by state farms, through local District Development Corporations and at the smallholder level, through ujamaa villages. One of the crops set for self-sufficiency is sugar. Projected production increases for sugar have not been achieved, and domestic demand has increased beyond anticipated levels; the increased demand has been largely due to increased per capita consumption, although this is still low by international standards, however. This has led to substantial sugar imports reaching a foreign exchange cost of US$18 million in 1973. In view of the recent deterioration in Tanzania's balance of payments - in which increasing food imports, partly caused by the recent drought, have been a significant factor - import substitution, where practicable, has become even more imperative.

1.02 The proposed Project is the most advanced of four sugar developments planned by Tanzania and which, in combination, could help the country achieve self-sufficiency in sugar by 1977. By 1980 (its 6th year), the Project would result in incremental sugar production of 45,000 m tons, thus leading to foreign exchange savings of about US$14 million a year. The increase would represent 43% on present production, and is nearly one-third of projected expansion by 1980.

1.03 Six IDA Credits and one Bank Loan totalling US$83.1 million have been approved so far for agricultural projects in Tanzania. These comprise one for agricultural credit, two for livestock, and one each for tobacco, tea, cotton and cashew. In addition, an Education Credit in 1971 provided US$3.3 million for agricultural training, and part of a 1974 Credit of US$6.0 million to the Tanzania Investment Bank (TIB) is for agricultural purposes. Progress in implementing these projects has been mixed. The agricultural credit project has been fully disbursed: it experienced difficulties due to the weakness of the credit institution - now the Tanzania Rural Development Bank (TRDB) - which has since been reorganized. Although the project is now operating well, its recovery rate remains disappointing. The first livestock project has been completed successfully and the second project has only recently become effective. The development of the tobacco project has been slower than expected mainly due to inadequate services (principally water) in the new settlement areas and pressure to cultivate collectively. The project has been rephased, a better water system provided, and most project farmers are being allowed to farm individual tobacco plots within ujamaa

villages. The smallholder tea project is also facing problems with farmer recruitment, and the planting program is two years behind schedule. Weak management and other difficulties have slowed progress, and it is expected that the project will be rephased. Construction under the agricultural training program is not now expected to be completed on schedule due to delays in tender procedures; however, all contracts for construction of various institutions have been awarded. The cotton project only became effective in April 1974. The Kigoma Rural Development Project is scheduled for Board presentation on August 6, 1974.

1.04 The application to the Bank Group was prepared on behalf of the Government of Tanzania by HVA International with assistance from the Regional Mission in East Africa (RMEA). This report is based on the findings of an appraisal mission to Tanzania in November/December 1973 composed of Messrs. J.H. Cleave, H. Malik (part-time), (IDA); J. Duyverman, T.G. Haworth and H. Idehara (Consultants); and accompanied by R. Stern (Loan Officer).

II. BACKGROUND

A. Agriculture in the Economy of Tanzania

2.01 With a per capita income of only US$110 Tanzania is one of the world's poorest countries, but one which is making determined efforts to develop as a self-reliant society. Of the total population, estimated in 1973 at 14 million, about 90% are dependent on agriculture for their living. The population is growing at about 2.8% a year, but with the exception of a few areas where soils and climate are particularly favorable, there is little land pressure and the overall density is under 15 per km^2. Agriculture contributes 80% of commodity exports and 40% of total GDP, but in the period 1968-1972 has had a disappointing real growth rate of 2.4% which can be attributed to a combination of poor commodity prices and low investment in farming. There are only limited prospects for non-agricultural exports or import substitution developments and with agricultural exports sluggish at a time when development efforts were making major demands on foreign exchange, the country has recently incurred a serious deficit in its external trade balance. More recently, unexpectedly high prices for sisal, coffee, tea and cotton improved this picture but foreign exchange resources were drained in 1973 by imports of other foods including sugar (US$18.0 million) and maize and wheat (each about US$5.0 million).

2.02 Tanzania's development policy aims at reducing inequalities in income distribution through State control or ownership of important industries, services, and large-scale agricultural enterprises, and through emphasis on a communal smallholder agriculture within the framework of the ujamaa village (para. 3.06) in which families group themselves to receive increased levels of Government services. Major responsibility for many development programs

has been decentralized to the 18 Regions of the country and within these to 63 Districts; nationalized enterprises are typically run as subsidiary and associate companies of parastatal organizations.

B. The Sugar Industry

Production Units

2.03 Tanzania's sugar is grown by four estates, all small by international standards: the Tanganyika Planting Co. (TPC), at Arusha Chini; Kagera Sugar Co. Ltd. in West Lake District; Mtibwa Sugar Estates in Morogoro District; and Kilombero Sugar Company (KSC), in the Kilombero Valley. TPC, operating since 1936 and still privately owned by Danish interests, is responsible for over half the country's production. All cane is irrigated, mostly estate grown, and a long milling season helps make this the most efficient plant in Tanzania. Plans call for a 60% expansion in production by 1978. Kagera, formerly a private estate and factory which opened in 1958, is principally growing rainfed cane. Government has recently acquired a 70% interest and is planning participation in a factory expansion, to start up in 1978, and scheduled to exceed 60,000 m ton/sugar a year by 1983. Current production is 8% of the national total. Mtibwa, privately built in 1960/61, is now an associate company of the Sugar Development Corporation (SDC) (para. 2.05) which holds 50% of the capital: the balance is private. Cane is supplied by both estate and outgrowers. The factory supplies about 7,000 tons (6% of production), but this is planned to expand to nearly 50,000 m tons by 1985.

Kilombero Sugar Company (KSC)

2.04 KSC is the newest of Tanzania's sugar plants, first producing in 1962. The principal investors, including IFC, sold out to Government in 1969, following a move by Government to reduce the assured ex-factory price of sugar from a level which it regarded as including a subsidy to KSC. The company had, in fact, experienced considerable problems in its development and earned a profit in only two of its first seven years of operation. A previously unknown cane disorder, "yellow wilt", had depressed cane yields and was only eradicated after drainage improvements were effected and new cane varieties introduced. On the management side, poor cost control and inadequate tractor maintenance were problems, but following a 1965 managing agency agreement with HVA International (a Netherlands company), these have been overcome. Except for a set-back in 1972 when a newly installed diffuser led to excessive down-time, KSC has recently been operating efficiently, as is reflected in its operating results (Annex 1).

Sugar Development Corporation (SDC)

2.05 A Sugar Development Corporation was established in February 1974 with powers to develop the sugar industry in Tanzania; to engage in sugar growing, processing and marketing; and to manage the affairs of any company in which it

holds a controlling interest. A General Manager was appointed on the creation of the Corporation, but regulations governing its mode of operation are still to be published and its staffing and structure to be decided. The Corporation has taken over the sugar sub-department of the National Agricultural and Food Corporation (NAFCO) from which it has also inherited investments in KSC, Mtibwa and Kagera. It may be expected later to directly participate in marketing and thus take over the present functions of the National Sugar Board (NSB) and General Foods Company (GEFCO).

Marketing Organization and Price Policy

2.06 The National Sugar Board is responsible for controlling and regulating the production and marketing of sugar on the Tanzania mainland, as well as for handling imports. NSB employs GEFCO, also a parastatal agency, as its marketing agent. For a fixed fee GEFCO distributes sugar to 132 depots where it is sold to wholesalers - in nearly all cases Cooperative Unions - who in turn sell to retail outlets, usually private shopkeepers.

2.07 Prices are set by Government at factory, wholesale and retail levels. Pricing policy is flexible and more pragmatic than it was at the time IFC and other investors relinguished their holding in KSC, and the factory price varies according to the assessed needs of each plant. Thus, because it is in the development stage, Mtibwa receives a higher ex-factory price than the other producers (Annex 2) and an appropriate formula would be worked out for KSC with the addition of the new factory and estate expansion (K II). Uniform wholesale and retail prices are set for the depots, although the retail selling price may be increased by the amount of transport costs for sales away from depots. The retail price was raised 25% in June 1972 when it was discovered that at the previous level smuggling to neighboring territories was taking place; a further 50% increase was put into effect in March 1974 in the face of high import prices. The present price (Tsh 3.00/kg) covers all costs of domestic production, meets the full cost of imports, and allows for a reserve for the future development of the industry to be built up. The varying margin between ex-factory prices and the uniform retail price is offset by varying the per ton levy paid into a reserve held by NSB. In April 1974 the fund was in deficit by about US$11.0 million equivalent, as it was used to purchase imported sugar when the levies were lower. It is however estimated that by 30 June 1974 the deficit will be reduced to US$4.8 million. The development fund levy should at that time total US$3.0 million.

Supply and Demand Situation

2.08 For historic reasons all four Tanzania mills produce semi-refined sugar, a higher grade than is found in many underdeveloped countries, but for which production costs are little different from those of "mill-white" sugar, the less refined grade. Between 1962 and 1972 production increased from 37,000 m tons to nearly 90,000 m tons annually, but it has since stagnated

around this level with existing factories operating at close to capacity. However, consumption has increased rapidly, and in 1968 Tanzania began importing sugar. In 1973 it imported 50,000 m tons, or 37% of national consumption, at a foreign exchange cost of Tsh 131.0 million (US$18.0 million). The increase in consumption was partly due to population growth, but there was also an unprecedented increase in per capita consumption averaging 1 kg or 15% per year between 1970 and 1972. This has been attributed to income growth and its more equitable distribution, urbanization, increased industrial use, and smuggling from Tanzania at a time of relatively low retail prices. The high growth rate did not continue in 1973, but with per capita consumption still only 10 kg per head a year 1/, continued growth in demand can be expected. Assuming an annual increase in per capita consumption of 0.6 kg, and population growth continuing at 2.8%, and with this Project and other plans for expansion effective, further sugar developments will need to be operational by 1981 if expanded domestic demand requirements are to be met (Annex 3).

Research

2.09 Sugar research in East Africa is coordinated by the East African Agriculture and Forestry Research Organization (EAAFRO) which has its headquarters at Maguga in Kenya, the plant quarantine center. The main EAAFRO sugar research station, responsible for the introduction and selection of foreign varieties and breeding of new varieties, is at Kibaha in Tanzania. Pest control research is based in Uganda. National research is the responsibility of the Ministry of Agriculture (Kilimo) but only limited selection and variety trial work has been carried out on its research station at Katrin, and most applied research has been carried out on sugar estates; even this has been inadequate in quantity and quality, however. KSC maintains two agronomists who run field trials including variety selection for commercial planting under a program prepared in cooperation with HVA. This research program and staffing should be stepped up (para. 4.13) and EAAFRO and Kilimo urgently need to improve the coordination and output of their work programs.

III. THE PROJECT AREA

3.01 The Project area is in the Kilombero valley, in Kilosa District, Morogoro Region. It covers some 37 square miles, located to the north of and next to the existing Kilombero (K I) estate, which has similar topography and climate. It is confined on the west by the Migomberama mountains, to the south by the Great Ruaha River and the K I estate, and on the east by Selous Game Reserve (Map). It is linked to Dar-es-Salaam by a railway and 370 km of all-weather road.

1/ Compared with annual per capita consumption in 1972 of 16.6 kg for Kenya, 14.8 kg for Uganda and over 50 kg for the U.S.A. and U.K. (Annex 3).

3.02 The mean annual rainfall is 1,550 mm, varying in 12 years from 1,050 mm to 2,480 mm. Nearly 85% of the rainfall occurs in the 6 months from December through May (Annex 4). The area is drained by a network of small rivers, tributaries of the Great Ruaha. Parts are subject to seasonal inundation, but this can be readily overcome by clearing existing streams and providing some additional drainage.

3.03 The Great Ruaha River would be the source of water for the factory and for irrigation. In its upper reaches the river is used for the Kidatu Power Project (Loan 715-TA), the reservoir for which is due to be filled in 1975. KSC has abstraction rights for 212 cusecs of water from the river, a quantity well in excess of the needs of K I and the Project factory (K II) combined, about 40% of the lowest recorded river flow. This quantity would continue to be available during the filling of the reservoir and after completion of the Kidatu Project.

3.04 About 95% of the area consists of neutral sandy to loamy alluvial soils with micas. There is a deep topsoil, rich in organic matter. It has fair to good structure, and is equally suitable for hand or mechanical cultivation. The physical and chemical properties of the soil are favorable for cane growing, and are generally better than those in the K I area. The Project area is covered by open low secondary forest and bush with patches cleared for shifting cultivation. Land clearing should present no difficulties.

3.05 The sparse population in the Project area is mostly engaged in traditional agriculture. Local crops are rice, cassava, maize, sweet potatoes and beans grown for subsistence. Few farmers grow significant amounts for sale; the only cash crop in the area is sugar cane, of which some 2,200 acres are cultivated by outgrowers presently supplying K I. Local families also provide labor for K I, but the skilled cane cutters tend to be seasonal migrants especially from Mbeya District. There would be no shortage of such labor for K II.

Ujamaa Villages

3.06 A major instrument of Government's rural development strategy is the encouragement of production on communal lines in ujamaa villages, typically of 60-70 families. Although the objectives of the ujamaa program are political and social, Government recognizes the need for the villages to be economically viable and encourages them to participate in new market-crop ventures. There are already six ujamaa villages in the Kilombero valley growing cane collectively for K I, and two of these - Kitete and Kidogobasi - are in the Project area. These two presently have 120 acres under cane grown under a strict schedule laid down by KSC. They still have difficulty keeping to harvest schedules, however, and it would be important to monitor the capacity of the villages in their early years with the new crop and to maintain flexibility in the outgrower development programs.

Kilosa District Development Corporation (KDDC)

3.07 The District Development Corporation (DDC) concept was launched in the mid-1960's as the local counterpart of the centrally organized parastatals. A DDC is a limited company and is, in effect, the commercial wing of the District Development and Planning Committee. Its objectives are to stimulate commercial activity in the District by participation in viable enterprises. KDDC was established in February 1973 with Tsh 500,000 capital. It is currently operating a petrol station and plans to take up new land in the Project area and operate as an outgrower to the Project. In conformity with national practice, Government would make a 25% grant contribution (about US$197,000) towards KDDC's development expenses.

Land Tenure

3.08 Land rights in Tanzania are vested in Government. The land required by the Project has already been earmarked for the various categories of growers. There are under 2,000 families in the Project area, including two small ujamaa villages and an outgrowers sugar estate. Some families have had to move from or within the Project area: they have resettled successfully, some joining ujamaa villages where they will take up cane growing; others moving to the roadside where they are trading and are a potential source of labor for K II and KDDC. Government has paid compensation for buildings and permanent crops to the families who have had to move.

IV. THE PROJECT

A. General Description

4.01 The Project would over five years (1974-1978) comprise two major elements: Part I, the development of a new sugar estate and outgrowers land adjacent to the existing Kilombero estate, which it is proposed would be financed with assistance from the Bank Group; and Part II, the provision of a new factory mainly financed by bilateral aid funds. By 1982 the Project would increase the annual production of semi-refined sugar by 45,000 m tons.

4.02 Specifically Part I of the Project would comprise:

(a) Land Development:

(i) development of a 7,300 acre sugar estate, partly under irrigation, and provision of cultivation equipment, roads and cane transport;

(ii) development of 2,400 acres of new, rainfed land for outgrowers, (comprising the Kilosa District

Development Corporation (KDDC) and farmers settled in ujamaa villages); and

(iii) expansion of about 2,200 acres of existing outgrowers land for K I to replace outgrowers whose production would be diverted to K II;

(b) Non-factory Ancillaries:

provision of staff housing, water supply and community facilities, and a rail link;

(c) Training and Research:

(i) on-the-job and overseas training for factory and field personnel;

(ii) provision to increase adaptive research at KSC; and

(iii) provision for the identification and preparation of feasibility studies on further sugar developments in Tanzania.

Part II would comprise:

(d) the erection of a 2,400 TCD (tons of cane per day) sugar factory complete with ancillaries under a fixed-price turnkey contract; and

(e) supervision of construction under a separate contract.

4.03 The Project would be executed by the Kilombero Sugar Company (KSC), initially under the direction of its managing agents, H.V.A. International b.v. (HVA) who would also undertake the construction supervision of the factory in Part II under a second contract.

B. Detailed Features

Land Development

4.04 The Project would provide for the purchase of equipment to clear and develop 7,300 acres of land north of the Great Ruaha River in the Kilombero valley for a sugar estate. This equipment would also be used to develop land for outgrowers who would, at full development, manage 4,600 acres of cane. Most of these would be new outgrowers in the K II area where relatively thick bush would be cleared mechanically; others, in the Msolwa area (Map), would be outgrowers currently supplying K I. The latter would increase their acreage

to offset the transfer to K II of existing outgrowers situated in the K II area. In order to bring the factory to full capacity operation as quickly as possible it is proposed that most land be cleared, prepared and planted in three dry seasons (Annex 5). The land development program is summarized below (figures in acres):

Final Use	1974/75	1975/76	1976/77	1977/78	Total
Nursery and irrigated estate	100	2,700	700	-	3,500
Rainfed estate	2,060 /1	220	760	760	3,800
New outgrowers, K II	-	960	960	480	2,400
Outgrowers, K I /2	600	600	500	500	2,200
Total	2,760	4,480	2,920	1,740	11,900

/1 Of which 1,400 acres for nursery and milling cane would be irrigated by portable pumps in the first year.

/2 Extension of existing areas, mostly hand-cleared.

Once the normal cycle was established, all cane land (estate and outgrowers) would be cropped in a 5-year rotation comprising one year of plant-cane and 4 ratoons.

4.05 Estate. To ensure an even supply of cane for milling, 3,260 acres of the estate milling cane, about 45% of the total, would be put under sprinkler irrigation. The 240 acres of nurseries would also rotate in the irrigated area. Estate development would include building 87 km of roads laid out on a 500 m square grid; construction of bridges and culverts; the improvement of natural drainage; and construction of about 22 km of drains. For the irrigation system a pressure pump station with a 1,470 l/sec. capacity would supply permanent underground mainlines feeding terminals from which portable sprinkler lines would deliver water to the fields. A portable sprinkler system has been operated successfully by KSC for some years.

4.06 Outgrowers (Annex 6). Outgrowers, who would work 40% of the cane area producing one-third of total milling cane, would consist of:

(a) Kilosa District Development Corporation (KDDC) (1,560 acres);

(b) three ujamaa villages with a total of 240 families (960 acres);

(c) two existing estates and about 120 smallholder farmers growing in total about 2,080 acres of cane and currently supplying the

K I factory. Their supplies to K I would be made up by expansion of production by about 520 families and 4 small estates in the Msolwa valley, south of the river (Map).

4.07 Provision would be made for providing these outgrowers with extension services. The land would be developed by the Project up to planting and would then be handed over to the outgrowers. The little new land clearing needed in Msolwa would be by hand. Subsequent land preparation services for new outgrowers, except KDDC, and cane transport would be by KSC. The full cost of development and subsequent services carried out by KSC would be recovered from outgrowers by deductions from cane sales (paras. 5.08 and 6.07).

4.08 Land Allocation. Although the areas for estate and outgrower development have been designated, it has been agreed by Government that the program could be revised in the interests of a viable sugar operation. Specifically, if the rates at which ujamaa villages expand and at which KDDC proved able to operate its cane land were slower than anticipated, KSC would develop and operate the fields until the outgrowers were ready to take over the developed areas. This arrangement would be at a negotiated price reflecting the costs and any returns to KSC of the development. At negotiations Government confirmed this arrangement.

Equipment Requirement (Annex 7)

4.09 The rate of cane-land development is critical to the achievement of target sugar production and the land development schedule is, in turn, dependent on the timely procurement of necessary machinery; this would include 31 crawler and 41 wheeled tractors, which with other equipment for land development and preparation are estimated to cost nearly US$3.0 million. Detailed requirements and a procurement timetable are at Annex 7, Table 6. As labor availability is limited, cropping operations on the estate, with the exception of cutting, would be mechanized. Cane transport would be by tractor-drawn side-loading carts on to which the cane, piled by the cutters, would be pulled by wheeled tractors - a system currently operating satisfactorily on the K I estate. A further 146 haulage tractors, loaders, trailers and implements valued at about US$2.0 million would be needed for harvesting and cane haulage.

Non-Factory Ancillaries

4.10 Supporting investments under Part I would consist of:

(a) construction of an access road and a rail siding to the factory;

(b) provision of two deep wells for potable water;

(c) development of housing areas including roads, water and electricity supplies, and construction of 47 senior and 120 junior staff houses, and housing for permanent and seasonal laborers;

(d) construction of a guest house, community center, sports field, shopping area, primary school, and police station.

Construction would be by local contractors under KSC supervision. The rails would be laid on a KSC built rail bed by East African Railways.

Training and Research

4.11 An on-the-job training program supplemented by compulsory work-time classes would be instituted for field and factory staff of KSC. This would be supported by training in Tanzania and abroad for selected managerial and technical posts. Training would not only aim to provide staff for K II but also to facilitate the eventual localization of all of KSC staff as well as the transfer of trained personnel to new sugar developments as they take place.

4.12 To allow for training time, the factory and field staff of K I would be over-staffed at supervisory and trainee levels, starting a season prior to the opening of K II and thereafter as needed (Annex 8). Provision for a full-time training officer, for his accommodation, for classrooms and equipment, and for 15 man-years of overseas fellowships and 60 man-years of training in Tanzanian technical schools would be included in Part I of the Project. In addition, nurseries included in Part II would cover five man-years of training in the Netherlands. The Training Officer would prepare training curricula for both K I and K II, and would supervise senior and supervisory staff responsible for training. This person would have long experience of training in the sugar industry. At negotiations assurances were obtained that this appointment would be made by KSC only after consultation with the Bank Group as to the candidate's qualifications and experience.

4.13 An increased program of adaptive research into irrigation and drainage, field mechanization, smut and nematode control, and cane quality of new varieties appropriate to the Project area is needed if KSC is to continue to improve its performance. Provision would be made for two additional qualified agronomists and two assistants to join the research division (currently under the Agricultural Manager) to undertake this program, as well as for the necessary supporting equipment.

Future Sugar Developments

4.14 To avoid continued piecemeal growth of the industry, the Project would include provision for a countrywide survey of sugar potential which would identify possible development areas and include preparation of detailed feasibility studies. Provision would be made for forty man-months of internationally recruited consultants' time for the survey and report preparation, and for support staff and travel. The survey team would consist of an agriculturalist with sugar and irrigation experience, a sugar processing specialist, an agricultural economist, and a financial analyst. Draft terms of reference for the study are at Annex 9. Because of the long lead time involved, and

particularly as pilot growing areas would need to be established, priority should be given to an early start to this study. At negotiations assurances were obtained that Government would ensure that SDC would obtain Bank Group approval on its proposals for organizing the study prior to finalizing the selection of consultants.

Sugar Factory

4.15 Part II of the Project would include the construction, in the new sugar growing area, of a sugar factory for producing semi-refined white sugar. The factory would be supplied under a fixed-price turnkey contract 1/ which includes the cane mill and refining plant, steam and power generation plants, factory and tractor workshops, warehouses and storage tanks, offices, pump stations and canals for factory and irrigation water supplies, a telephone system, and spare parts for the factory equipment (Annex 10). Part II of the Project would also include provision for supervision of the construction under a separate contract: the factory would be operated by the existing KSC management and most senior posts would be common to K I and K II (para. 5.01).

4.16 The factory would be a standard plant with off-the-shelf components. It would be capable of milling 2,400 m tons of cane/day (TCD) and producing 45,000 m tons of sugar in a 200-day gross milling season 2/ at an outturn of 10.5% sugar/cane. It would be located at the SW corner of the new estate and outgrowers development area. The size of the plant is restricted by the availability of proximate sugar land. The plant could, however, handle up to 10% more cane if yield improvements made this volume available, and the proposed factory layout and its design factors are such that if sugar prices permit haulage of cane over a greater distance, the plant could be expanded to 3,000 TCD to produce 60,000 m tons of sugar a year. The milling season is dictated by the influence of the rainfall pattern on cane ripening and harvesting conditions: over the last 12 years the average period of suitably dry weather has been 234 days and only once was the weather so wet that the net milling days could not have been achieved. The influences on the location of the factory are building and access costs and cane transport costs. Transport costs would be minimized by a central site which would, however, involve greater investment for water, power and a rail-line than a site closer to the river and railway. The SW corner site, now agreed upon, involves US$2.2 million less in investment costs and slightly increases the rate of return on the Project despite higher haulage costs over a central location. The proposed process, scale and location of the factory are discussed in Annex 11.

4.17 Start up of the K II factory is scheduled for July 1976; achieving this target would be important if the first cane crop - estimated to require 158 days to process including 15% down-time - is to be milled. It is estimated that the factory would take 26 months to complete from the date of

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1/ Signed on April 5, 1974.

2/ This allows for 10% down-time on the plant over the net milling requirement of 181 days.

contract effectiveness (April 26, 1974). The irrigation water supply system and the tractor workshops would be needed early in 1974/75 for use by KSC in the development of the estate. Immediate implementation would also be needed for the factory access road and preparation of a rail bed, and early completion of staff and labor housing would reduce the need for temporary accommodations.

4.18 A critical path analysis which brings together the interrelated estate, factory and ancillary developments is at Annex 12: the critical paths are shown as a heavy line on the diagram and key dates are indicated. Although the development program is tight, the factory construction schedule is the subject of the signed turnkey contract, while preliminary work already in progress at June 1974 indicates that the timetable for the estate and outgrower cane development (in part interchangeable (para. 4.08)) should be capable of achievement. The existence of some established facilities and management in K I should help facilitate this implementation.

C. Project Costs (Annex 13)

4.19 Total Project cost is estimated at Tsh 398 million (US$55.8 million), of which US$43.7 million or 78% would represent foreign exchange requirements. Details are summarized in the following table:

	Local (Tsh million)	Foreign	Total	Local (US$ million)	Foreign	Total	Proportion of Total (%) 1/	Foreign Exchange %
Part I								
Development Costs								
Land development, transport, and irrigation equipment	3.2	45.6	48.8	0.4	6.4	6.8	12	94
Other land development costs	11.0	6.7	17.7	1.5	1.0	2.5	4	38
Non-factory buildings and equipment	9.6	4.4	14.0	1.4	0.6	2.0	4	32
Water and electricity supplies	0.9	1.6	2.5	0.1	0.3	0.4	1	65
Community facilities	1.7	0.6	2.3	0.2	0.1	0.3	1	25
Access Railway and Road	1.7	2.7	4.4	0.2	0.4	0.6	1	60
Sub-total	28.1	61.6	89.7	3.8	8.8	12.6	23	69
Research and Training	3.1	3.0	6.1	0.5	0.4	0.9	1	49
Sugar Survey	0.5	1.6	2.1	0.1	0.2	0.3	1	73
Kilosa District Development Corp.	0.5	0.2	0.7	0.1	- 2/	0.1	- 3/	29
Total	32.2	66.4	98.6	4.5	9.4	13.9	25	67
Contingencies								
Physical	3.8	7.4	11.2	0.6	1.0	1.6	3 4/	66
Price	18.3	35.5	53.8	2.5	5.0	7.5	13 5/	66
Total Part I	54.3	109.3	163.6	7.6	15.4	23.0	41	67
Part II								
Factory (Turnkey contract including plant, machinery, freight insurance and local transport)	32.2	195.2	227.4	4.5	27.3	31.8	57	86
Factory supervision	-	6.9	6.9	-	1.0	1.0	2	100
Total Part II	32.2	202.1	234.3	4.5	28.3	32.8	59	83
Total Project Cost	86.5	311.4	397.9	12.1	43.7	55.8	100	78

1/ Including contingencies.
2/ Less than US$100,000.
3/ Less than 0.5%.
4/ 3% on total Project cost and 11% on Part I base cost.
5/ 16% on total Project cost and 54% on Part I base cost.

The taxation component of Project cost is estimated at less than US$0.2 million. Costs are based on the signed contracts for the turnkey factory, on the proposal for the supervision contract, and on appraisal estimates for ancillary items. Physical contingencies of 10% have been applied to all Part I items, and to these same items cumulative price contingencies averaging about 21% in year 1, 13% in year 2, 12% in year 3 and 11% in years 4 and 5 have also been applied to both local and foreign exchange costs. (Annex 13, Table 1). With the exception of freight and insurance (for which price contingencies have been added) the price agreed for the factory is firm for the duration of the contract and includes adequate built-in provision for contingencies (Annex 10).

D. Financing

4.20 Financing of Project costs would be shared as follows:

	Dutch Govt.	Danish Govt.	IDA	Bank	Tanzania	Total
	US$ (million)					
Part I (estate and ancillaries)	-	-	9.00	9.00	5.00	23.00
Part II (Factory)	11.00	17.30	-	-	4.50	32.80
Total Financing	11.00	17.30	9.00	9.00	9.50	55.80
Percent of Total	20	31	16	16	17	100

The Tanzania contribution includes KSC self-generated funds of about US$4.0 million (para. 6.08) and the Tanzania budgetary contribution is thus expected to be reduced to about US$5.5 million, 10% of total Project costs.

4.21 The proposed IDA Credit of US$9.00 million would be on standard terms and the proposed Bank loan of US$9.00 million would be for 25 years including five years in which interest only would be paid. Proposed Bank Group financing represents 78% of Part I costs including all foreign exchange costs and about 34% of local costs. The Dutch loan would be on the same terms as the IDA Credit. The Danish contribution representing parts of three loans to Tanzania would be part repayable over 25 years with 7 years grace and part over 35 years with 10 years grace, all at zero interest. For both Dutch and Danish aid funds, 75% of expenditure must be used for goods or services originating in the lending country. The composition of supplies for Part II takes this into account and the bilateral financing is expected to be available as needed under the terms of the turnkey contract (Annex 10, Table 1). Evidence of firm commitments of the funds by the Dutch and Danish Governments would be a condition of effectiveness of the proposed Loan and Credit. The Danish loan is part of a larger commitment to Tanzania which is

not tied specifically to this Project. At negotiations, Government assurances were obtained that it would commit not less than the equivalent of US$17.3 million of Danish loan funds to the Project.

4.22 Apart from funds required for the sugar survey (which would be a grant to SDC), Bank Group finance committed to Part I of the Project would be on-lent to KSC at 9% per year interest. The proceeds of both the Loan and Credit would be repayable by KSC over 25 years including 5 years in which interest only would be payable. Danish and Dutch aid would cover Part II of the Project and an assurance was obtained that not less than 30% nor more than 50% of the total proceeds would be passed to KSC through SDC as equity capital. The Tanzanian contribution, other than that derived from KSC's self-generated funds, would be passed to KSC as a 9% loan or equity as appropriate. The execution of financing agreements between Government and KSC acceptable to the Bank Group would be a condition of Loan and Credit effectiveness.

4.23 In order not to delay the start-up of the factory, preliminary work on land clearing and development, access roads, rail bed preparation and site clearing are already being undertaken. To meet such costs incurred between May 1, 1974 and Project effectiveness, provision would be made in the IDA allocation for a sum not exceeding US$0.7 million from which expenditures on equipment and civil works may be met by retroactive financing.

E. Procurement

4.24 Procurement from the proceeds of the Loan and Credit would be as follows:

(a) orders for vehicles and related equipment for land clearing and preparation, for cane transport, and for administrative and service staff, irrigation, potable water and electricity transmission equipment (US$7.4 million) would be bulked to the maximum extent possible. Procurement would be by international competitive bidding in accordance with Bank Group guidelines unless the bulk order was less than US$30,000 in which case procurement would be in accordance with Government procedures which are satisfactory. Any items retroactively financed would have had to meet these criteria. In evaluation of bids local manufacturers would be allowed a 15% preference or the existing rate of import duties, whichever is lower. The sugar survey and feasibility studies would be by consultants appointed in accordance with Bank Group guidelines;

(b) civil works construction (US$2.3 million) would also be procured by international competitive bidding except for small individual items costing less than US$30,000. Prequalified local firms would be given a 7-1/2% preference in the evaluation of their bids;

(c) land preparation, road construction, rail bed construction, and installation of irrigation equipment (US$2.6) would be by KSC which has an established organization able to undertake this work. Rail line would be procured and laid by East African Railways under their standard procedures. Potable water and electricity would be installed by KSC or by local contractors.

Assurances that the above procedures would be followed were obtained at negotiations.

F. Disbursement (Annex 14)

4.25 Disbursements would be made first from the Credit account and then from the Loan account on the following basis:

(a) 100% of foreign expenditure or 85% of local expenditure for land clearing and preparation equipment, other tractors, trailers and vehicles, irrigation equipment and potable water and electricity supply equipment and materials, furniture and equipment for non-factory buildings (US$8.4 million);

(b) 75% of expenditure on construction of houses, the community center and school and other non-factory buildings, railway, road and bridge construction, and land clearance and preparation equipment (US$4.2 million);

(c) 100% of foreign expenditure or 75% of local expenditure for the sugar survey and feasibility study and for research and training (US$1.1 million).

Disbursements would be fully documented. Any funds remaining in the accounts at the completion of the Project would be available for reallocation at the discretion of the Bank Group.

G. Accounts and Audit Procedures

4.26 Separate accounts reflecting the income and expenditure of K II, and normal commercial accounts geared to cost control and management information related to all operating departments would be kept by KSC. Current accounting systems need strengthening (Annex 1), and to this end KSC intends to recruit an experienced Financial Controller. Assurances were obtained at negotiations that such a person would be recruited. Accounts would also be kept by KSC for the cane-growing operations of the ujamaa outgrowers, and KDDC would be required to keep normal commercial accounts of its sugar operation. Assurances

were obtained at negotiations that the accounts maintained by KSC would be audited by independent auditors acceptable to the Bank Group and that the accounts and auditors reports would be submitted to the Group within 6 months of the close of their fiscal year. KDDC accounts would be audited by the Tanzania Audit Corporation (TAC).

V. ORGANIZATION AND MANAGEMENT

5.01 The K II factory and estate would be an integral part of KSC, which is itself wholly owned by SDC (para. 2.05). KSC - with the guidance of HVA, its managing agents since 1965 (para. 5.04) - would have overall responsibility for organizing and managing the Project. KSC has the capacity and experience to undertake both functions. Existing management staff of KSC and senior factory, agricultural and administrative posts would be common to the K I and K II estates and factories. The 18 joint posts are identified in Annex 15. However, except in such cases as a mill breakdown when cane from one estate or its outgrowers may be transferred to the other factory for processing, the day-to-day running of K I and K II would be separate and most field, factory and administrative personnel would be identified with one of the plants. Twenty-six new management posts, of which 12 are expected initially to be filled by expatriates, are also shown in Annex 15.

Project Construction Organization

5.02 The agricultural development program - estate and outgrowers - would be handled directly by experienced KSC staff of the Agricultural Services Division using additional machinery and equipment included in the Project. Most of the construction of housing and community facilities would be by local contractors. The factory development program, including irrigation water supplies, would be handled as a turnkey package with equipment provided by, and civil works undertaken by, a Dutch/Danish consortium of reputable firms with experience in the sugar industry. Supervision of the construction, equipping and testing of the factory would be by HVA under a contract to be signed with KSC.

5.03 HVA's proposal for staff under this contract, and the specifications, terms and conditions of the turnkey contract (para. 4.15) were reviewed by the Bank Group and suggestions made to Government prior to signing. Progress on construction would be checked by Bank Group supervision missions which would include a qualified consultant engineer: these progress checks would be purely advisory to Government. This arrangement is designed to meet some conflict of interest arising from the close links in the Project between those responsible for supply, supervision and execution, without the division of responsibility for Project development which would occur if a third party with executive powers were introduced as supervising engineer. Bank Group interest in all aspects of the turnkey package, other than to offer Tanzania

impartial technical assistance, would be solely concerned with the extent to which it would affect the overall viability of the Project. The Project organization at Annex 16 shows the composition of the supply consortium.

Management

5.04 Under a management agreement with KSC, HVA provides an experienced General Manager and Factory Manager, as well as technical and management supervision from Amsterdam, and is responsible for recruiting other senior personnel. The current 3-year agreement has been extended pending a renewal which would be back-dated to May 1, 1974. A condition of Credit and Loan effectiveness would be that the new agreement had been signed and that its terms were acceptable to the Bank Group. This agreement would extend only through the first season of operations for K II, but it is anticipated that it would be further renewed in 1977. At negotiations assurances were obtained that KSC would obtain the prior approval of the Bank Group to the terms of any renewal of this agreement or to any alternative arrangements to be made.

5.05 Factory Management. Under the joint Factory Manager, the Project factory would be organized into two departments. The Technical Department, headed by a Chief Engineer, would be responsible for cane handling and juice extraction, steam and power generation, and factory maintenance. The Process Department, under a Chief Chemist, would be responsible for juice and sugar processing, sugar storage, and quality control. Initially, of some 20 senior posts in the two departments, 10 including the Chief Engineer and Chief Chemist, are expected to be filled by expatriates. An organization chart with initial staffing proposals is at Annex 15, Chart 2. The senior staffing of the Technical Department makes allowance for expatriate staff whose primary role is training local staff and dealing with start-up problems. Reductions by one first engineer and three shift engineers may be anticipated after two years.

5.06 Agricultural Management. The organization of the Agricultural Services would follow that successfully operating in K I, under which the Project shares the services of the Agricultural Manager and a team of agronomists responsible for research and disease control (para. 2.09). Operations would be divided between a Field Department, headed by a Field Manager responsible for the cane areas, and a Mechanization Department, headed by a Tractor Workshop Manager assisted by four qualified engineers responsible respectively for irrigation, cultivation, harvesting, and general equipment and vehicles. The two Managers would be persons with considerable experience in their respective fields; it is anticipated that initially they would need to be recruited internationally. Other posts in the two departments are expected to be filled by Tanzanians (Annex 15, Chart 3).

Outgrowers

5.07 An assistant field manager and section manager would be responsible for supervision of, and assistance to outgrowers. They would prepare an annual planting program for the ujamaa outgrowers, and would also provide technical advice to ensure that outgrowers received optimum returns and that their production fitted factory schedules. The planting program, based upon an average of 4 acres of cane per family, could be modified in the light of experience. KDDC would also initially receive technical and managerial advice from Project staff as it has no experience in land development or sugar cane growing, but would, as soon as possible, maintain its own field staff trained by KSC. Ultimately, KDDC would employ an estate manager, accountant, and field officers; would hire labor on its own account; and would enter into contracts with KSC for land preparation, mechanical cultivation, planting and cane transport.

5.08 Outgrowers would be provided mechanical services and seed cane at cost. Contracts for purchase of milling cane would be signed annually. It is envisaged that KSC would recover the cost of establishing outgrowers sugar areas through loans ranging from 6-11 years at 9% interest annually which, together with the cost of cane transportation, would be recovered from cane proceeds. At negotiations it was agreed that the proposed agreements would reflect a full recovery of KSC costs.

VI. PRODUCTION, MARKETING AND FINANCIAL RESULTS

Cane and Sugar Yields and Production

6.01 The average cane yield projections for irrigated cane and outgrowers have been derived from the experience of KSC with the K I estate and outgrowers. The rainfed estate cane yields have been based on the records of the better-managed K I outgrowers actually situated in the K II area. The risk of a recurrence of yellow wilt which reduced yields drastically (para. 2.04) is considered slight, while the five-cutting system, based on results of field trials carried out by KSC, is the system used in K I. Trials are continuing and the system could be altered in the light of new results or if cost/price ratios change. The cane yield assumptions are:

Cutting	Estate Cane Irrigated	Estate Cane Rainfed	Outgrowers Cane Rainfed
	m ton/acre		
Plant Cane	60	40	33
1st Ratoon	50	44	35
2nd Ratoon	45	37	30
3rd Ratoon	40	32	27
4th Ratoon	30	27	25
Average	45	36	30

Cutting takes place on average at 12-month intervals.

6.02 The cane/sugar ratio at KSC has varied in recent years between 9.1% and 11.0% and averages 10.5%. With growing and processing conditions essentially similar, it is assumed that the latter figure would be achieved in K II.

6.03 Project cane and sugar production is estimated to develop as follows:

	1975	1976	1977	1978	1979	1980	1981 onward
Cane Production('000 m tons)	143	322	409	436	425	419	422
Irrigated Estate	47	125	161	157	150	143	147
Rainfed Estate	30	99	116	135	134	137	137
New Outgrowers	-	32	65	78	74	73	72
Existing Outgrowers	66	66	66	66	66	66	66
Sugar Production at 10.5% ('000 m tons)	15	34	43	46	45	44	44
Milling Days Required	66	149	189	201	196	194	195

Cane harvested in 1975 would be milled in the existing K I factory which would have adequate capacity at that time. The milling days required, within the 200-day season, allow for 10% downtime: performance should be significantly better than this.

Markets

6.04 Sugar produced under the Project would be consumed within Tanzania in substitution for imports. Most would go to the retail market which, on the basis of anticipated increases in population and per capita consumption and in view of existing plans for expanding production, is unlikely to be satisfied from domestic sources in the next decade (para. 2.08). Molasses, a by-product, would be exported.

Prices

6.05 By 1980 the price of sugar on the world market, expressed in 1974 constant dollar terms, is expected to be around 8.7 US¢ lb., raw, f.o.b. Caribbean, compared with 19.3 US¢ lb. in the first quarter of 1974 and an average for the 5 years, 1969 to 1973 of under 6.0 US¢ lb. (Annex 17). Constant term import substitution prices are used for evaluation. The 1980 price is the equivalent of about Tsh 1,765 per m ton c.i.f. Dar-es-Salaam for refined sugar, comparable with a current net ex-factory price of Tsh 1,370 per m ton for Mtibwa and Tsh 1,080 per m ton for KSC, TPC and Kagera (Annex 2). Under an agreement proposed with a private company (United Molasses Trading Company), the minimum price for molasses through 1981 would be Tsh 70.00 per m ton; a price of Tsh 150 per m ton is expected, however.

6.06 For cash flow purposes, from 1976 onward an ex-factory price of Tsh 1,450 m ton has been assumed for KSC as an entity, including the K II expansion (Annex 18). This implies the payment of the full long term import substitution price to K II and an increase of Tsh 55 m ton, to Tsh 1,135 m ton to K I. Even at present levels of operating costs (Annex 1), a need for at least this increase is required to give a reasonable return on the investment. At this level and with a debt/equity ratio of 50%, KSC would be able to service its debt and pay a dividend averaging about 9% on equity (Annex 18).

6.07 At negotiations Government agreed that, in recognition of the need to cover all costs, it would set an ex-factory price for KSC sugar which would give a return on all capital employed, taking one year with another, of about 9%: at present costs this would amount to between Tsh 1,450 and Tsh 1,500 per m ton. Retail prices will need to be reviewed regularly in the light of such factors as production costs and import prices (para. 2.08). At negotiations assurances were obtained that Government would undertake such reviews. A price of Tsh 50.00 m ton for outgrowers cane delivered to the factory weighbridge has been used in projections. This is an increase over the present price to outgrowers of Tsh 42.50 and is necessary to cover costs and give farmers an incentive to grow cane (Annex 19). The cane price to be paid to outgrowers was discussed at negotiations and an assurance was obtained that KSC would keep under review the price payable for outgrowers cane and would adjust this as necessary to ensure the maintenance of production incentives.

Government Budget and Foreign Exchange

6.08 Tanzania would finance US$9.5 million (about 17%) of the total Project cost (para. 4.20). At least US$4.0 million of this sum would be available from KSC self-generated funds whose net surplus after taxation in the 5 years 1973/74 to 1977/78 is expected to total about US$10.0 million (the balance mainly arises in the Project's final year). In the same period Government would expect to receive a further US$4.0 million in excise duty

on the incremental sugar from K II. There are no significant external costs imposed on Government by the Project, and from 1978/79, the Project's sixth year, Government is expected to show a positive net cash flow exceeding US$5.0 million a year (Annex 20).

VII. ECONOMIC BENEFITS AND JUSTIFICATION

7.01 The Project would improve Tanzania's foreign exchange position by substituting domestic production for sugar currently imported. From 1979 the Project would result in an average annual incremental production of sugar of 45,000 m tons and 16,000 tons of molasses together worth US$16.8 million on the world market. The annual net saving or earning of foreign exchange would be nearly US$14.0 million equivalent. The impact of the Project on foreign exchange reserves is shown in Annex 20, Table 2. The Project would provide a cash crop for nearly 800 farm families mostly organized in ujamaa villages, and give a recently formed District Development Corporation a valuable enterprise to operate.

Economic Rate of Return

7.02 The internal economic rate of return (IER) on the Project is estimated at 13% over 20 years (Annex 21). In this calculation foreign exchange costs and earnings were shadow priced at Tsh 10.00 per US$1.00 (140% of the official rate of Tsh 7.14 per US$1.00) to reflect the economic value of foreign exchange to Tanzania. Without shadow pricing the return would be 11%. All other costs and benefits are taken at long term market prices, in 1974 terms, less taxes and excise. The estimate of 13% is lower than it would be if it had been possible to define and omit an element of price contingencies included in the fixed price negotiated for Part II of the Project. Normally such contingencies would be removed for IER calculation.

Sensitivity Analysis

7.03 The Project could be adversely or favorably affected by several factors and the influence of these on the internal rate of return have been tested (Annex 21). Risks faced in the Project are, in particular, unforeseen delays in land development and factory construction, lower than anticipated sugar prices, and yields below estimates. The consequences of the K II factory not coming on stream for the 1976 season (para. 4.17) would not be critical because part of the cane could be processed in K I and the rest left in the field until the 1977 season at relatively small loss in yield and sugar content: the delay would reduce the return to 11%. A drop in sugar price of 20% would reduce the return to 7%, and yields consistently 20% below estimates would result in a return of 9%. Falls of this magnitude are unlikely. The Project return would be less sensitive to variations in costs of estate development, and factory and estate operating costs.

Employment and Income Benefits

7.04 Direct paid employment benefits would arise from estate and factory operations and from KDDC offering training and up-graded jobs as tractor drivers, cane cutters and about 200 supervisory and technical posts. There is virtually no labor displacement involved; the farmers who have been displaced in the estate area are expected to continue working either as members of an ujamaa village or in paid work on sugar or ancillary services.

7.05 Outgrower ujamaa farm families would earn an annual net farm income including subsistence of around US$275 (US$55 per person) from the second year and average about US$725 (US$145 per person) once development costs are paid off (Annex 6, Table 4). The current average agricultural income, including subsistence, of a rural family in Tanzania is estimated at US$215 (US$43 per head) and incomes in the Kilombero area are below the national average.

Ecological and External Effects

7.06 Non-toxic liquid residue from sugar processing would be discharged into the Great Ruaha River. It would contain some 200 tons/day of filtermud, a dilution of solids to water equivalent to only 2 parts to 10,000 by weight of the lowest daily average river flow recorded in any month in 15 years. The river flows through an uninhabited game reserve for 170 km immediately after leaving the Estate and the effluent would not have any deleterious environmental effect. The application of irrigation water and fertilizer would be carefully controlled, taking place on estate land only: no build up of salts, no contamination of human drinking supplies, and no erosion problems are anticipated.

VIII. AGREEMENTS REACHED AND RECOMMENDATION

8.01 During negotiations agreement was reached on the following points:

(a) that Government agreed that in the event that outgrowers are unable to meet the schedules laid down for them, their land may be developed and operated by KSC until the outgrowers are ready to take over the developed areas (para. 4.08);

(b) that KSC's appointment of a Training Officer would be made only after consultations with the Bank Group (para. 4.12);

(c) that Government would ensure that SDC would obtain the approval of the Bank Group on its proposals for organizing the sugar study prior to finalizing the selection of consultants (para. 4.14);

(d) that Government would commit not less than the equivalent of US$17.3 million of Danish loan funds to this Project (para. 4.21);

(e) that not less than 30% nor more than 50% of the total proceeds of the Dutch and Danish aid would be passed to KSC through SDC as equity capital (para. 4.22);

(f) that the procedures detailed in paragraph 4.24 for procurement under the Project would be followed (para. 4.24);

(g) that an experienced Financial Controller for KSC would be recruited (para. 4.26);

(h) that the accounts maintained by KSC would be audited by independent auditors acceptable to the Bank Group and that the accounts and auditors reports would be submitted to the Association within 6 months of the close of their financial year (para. 4.26);

(i) that prior approval of the Bank Group would be obtained to the terms of any renewal of the managing agency agreement due to become effective on May 1, 1974, or to any alternative arrangements which may be made (para. 5.04);

(j) that Government would set an ex-factory price for KSC sugar which would give a return on all capital employed, taking one year with another, of about 9% (para. 6.07);

(k) that retail prices for sugar would be reviewed regularly in the light of such factors as production costs and import prices (para. 6.07); and

(l) that KSC would keep under review the price payable for outgrowers cane and would adjust this as necessary to ensure the maintenance of outgrowers production incentives (para. 6.07).

8.02 Conditions of effectiveness of the Credit and Loan would be:

(a) receipt by the Bank Group of satisfactory evidence of firm commitments by the Dutch Government to provide the equivalent of US$11.0 million and the equivalent of US$17.3 million by the Danish Government, to meet the cost of the turnkey factory and supervision (para. 4.21);

(b) the execution of financing agreements, acceptable to the Bank Group, between Government and KSC (para. 4.22); and

(c) that a new managing agency agreement had been signed between KSC and HVA on terms acceptable to the Bank Group (para. 5.04).

8.03 Subject to the above conditions, the Project is suitable for an IDA Credit of US$9.0 million and a Bank Loan of US$9.0 million to the Government of Tanzania.

TANZANIA

KILOMBERO SUGAR PROJECT

Kilombero Sugar Company Ltd. (KSC)[1/]

History

1. The Kilombero Sugar Company was formed in 1960, with IFC as one of its shareholders. The other initial investors were the Commonwealth Development Corporation (CDC), the Nederlandse Overzeese Financierings-Maatschappij N.V. (NOFC), and Verenigde Klattense Cultuur Maatschappij, followed later by Rubber Cultuur Maatschappij Amsterdam and the Standard Bank (East Africa) Ltd. The initial mill was rated at 1,300 tons cane per day, which it achieved in the 1964 season. It was expanded to 1,750 tons cane per day in 1965 and 1966, and to 2,150 tons cane per day in 1972.

2. KSC's early years were not profitable, partly due to operational problems, and partly because the price fixed by Government to be paid for sugar was inadequate to cover costs of production. At April 30, 1968 accumulated losses amounted to Tsh 10 million. On September 1, 1968, Tanzania Government reduced the price paid for sugar from Tsh 1,100 to Tsh 920 per long ton--that paid to the Tanzania Planting Company. Although substantial progress had been made in improving KSC operations, the principal investors and the Board of Directors concluded that KSC could not be viable at that sugar price; Government then indicated it would be receptive to an offer by the principal investors to sell their interests, and an agreement to that effect was signed on February 3, 1969. IFC's write-off was about US$200,000, which represented 28% of its cash investment in KSC equity. Investments at that time of the takeover were:

(Tsh Million)

	Shares		Loans		
	Ordinary	Preference	Debentures	Income Notes	Total
IFC	6.5	-	8.7	14.3	29.5
CDC	17.2	-	7.2	6.2	30.7
NOFC	6.2	-	3.0	3.3	14.2
Standard Bank (E.A.)	4.1	-	-	-	4.0
Tanzania Government	6.0	-	-	-	6.0
Rubber Cultuur Maats. Amsterdam	2.5	-	-	-	2.5
Public	-	0.8	-	-	0.8
	42.5	0.8	18.9	23.8	87.7

1/ Financial years end April 30. Milling seasons are usually complete by December 31; i.e., "The 1972 season" is that which takes place in the financial year ended April 30, 1973.

3. In the four years since Government acquired the capital, KSC has done slightly better than break even, but with a low return on capital. There have been two reasons for the improved position. First, with the technical problems solved, sugar production increased and per ton operating costs fell by considerably more than would have resulted from the mere economy of scale. Second, a financial reconstruction took place in 1970 to convert loans to equity and to write off past losses; this removed the burden of interest charges from net income. Thus, profitability was achieved despite the 1968 reduction in the price payable for sugar. For the year ended April 30, 1974, a net profit of Tsh 4.6 million is estimated, representing 7-1/2% return on invested capital: this results from a further considerable increase in sugar production and from restoring the sugar price to its pre-September 1968 level. This improved position will be difficult to maintain without an increase in the ex-factory sugar price as unit costs of production have now started to rise.

Present Constitution, Shareholders and Board

4. On the departure of the overseas investors all KSC's capital was held by the Tanzania Treasury. The financial reconstruction, as well as writing off accumulated losses, created a capital structure of Tsh 36 million ordinary shares and Tsh 36 million 7% non-cumulative preference shares. Treasury transferred the former to NAFCO in 1972 and NAFCO to SDC in 1974. Under the present Articles of Association, the preference shares have the same voting rights as the ordinary: a conversion right expired in 1970. However, these Articles are in several respects unsuitable to the present circumstances of KSC, and Tanzania Legal Corporation is currently drafting a replacement for submission to a General Meeting of the company.

Estate Operations

5. Planting started in the 1961 season of an irrigated 7,500 acre estate, which was substantially completed in 1965. At average yields at that time of around 35 m tons cane per acre, harvested cane amounted to 250,000 m tons per year. Outgrowers then produced about 60,000 m tons cane (20% of the cane milled), though at considerably lower yields. Cane yields were low in the middle 1960's due to a severe disease problem, yellow wilt, which affected estate and outgrowers from 1964 to 1970. Despite research by KSC, neither cause nor cure has been definitely explained, but its reduction has been achieved partly by abandoning the more susceptible cane varieties and partly by closer control of overhead irrigation and improved drainage. An unfortunate result of yellow wilt is excessive reliance on a single cane variety, NCo376 (in which, however, KSC is by no means alone), but its adoption has undoubtedly been one of the causes of the increases in cane yields to 49.5 m tons per acre, 60% above their lowest point in 1968-69. Sugar yields too have improved from an average of 9.6% in the six years to 1967-68, to 10.6% in the five subsequent years.

6. In the period 1965-1971, estate cane production stayed steady, while outgrower production doubled to 136,000 m tons (37%). It fell to 126,900 m tons, following the fragmentation in 1971 of the Kilombero Cooperative Society into ujamaa villages, and this drop in production was made up by the estate. The targets for 1973-74 set estate cane production to rise 50,000 m tons (22%) to 280,000 m tons, and outgrowers 13,000 (10%) to 140,000 m tons, in order to provide enough cane following the 1972 factory expansion; unfortunately, the target estate production is unlikely to be attained due to late rains which delayed the start of the milling season. Unfavorable weather also resulted in late closes to the seasons and hence low milling efficiencies in both the 1966 and 1967 seasons. In 1968 poor cane yields from yellow wilt but good harvesting weather resulted in an early end to the season; the three following season to 1971 all lasted about 210 days at a reasonable average of 90% milling efficiency, and there were few stoppages for lack of cane.

7. The estate is irrigated by water from the Great Ruaha river. The system is of open canals, from which mobile diesel pumps supply portable sprinkler lines. The water distribution system has become more effective over the years, and the impeded drainage of the fields furthest from the mill, where the gradient is less than 1.2%, is no longer important following the decrease in estate acreage.

8. The growing period in the estate is approximately eleven months. Five crops--plantcane and four ratoons--may be taken from a plant; however, planting is often done after the third or fourth crop. Cane is burnt the evening before cutting, which is manual. Cane cutters stack their cut into bundles; these are either winched on to side-loading trailers, or, less commonly, on to back-loaded trailers. The side-loaders carry 3-1/2 tons cane apiece and are hauled by 65 hp tractors in trains of three. The back-loaded trailers also carry 3-1/2 tons; they are self-contained units with their own winches on the tractors. The side-loading trailers are more effective and they will be used on the K II estate.

9. Plantation costs per acre fell from 1967 to 1971 due mainly to reducing the amount of irrigation and to mechanizing the cultivation processes. Harvesting costs per m ton cane likewise fell over this period; the most important causes were replacing an aged tractor fleet and a decrease in the average distance to be hauled as the estate was reduced. Since 1971 both plantation and harvesting costs have risen with the increases in cost of all factors of production.

Outgrowers

10. Sugarcane was being grown in the Msolwa valley for the production of jaggery at the time of KSC's formation. The outgrower fields have increased from 1,400 acres of rainfed cane in 1966 to 5,300 acres in 1973. Most of the development is south of the Great Ruaha river, immediately East of the Gologolo mountains whose influence on rainfall makes this the wettest part of the cane-growing region supplying KSC. However two estates, one of approximately

900 acres and the other of 450 acres, grow cane in the Project area north of the Great Ruaha river, and although over a mile from the mountain range have the highest cane yields per acre of the outgrowers; this indicates that a lower rainfall can be offset by good husbandry on good soils. A few individual growers and an ujamaa village have recently started growing cane in the Project area.

11. Outgrowers contract with KSC for the sale of cane. Under the current contract the grower agrees to supply fixed quantities of cane up to three years ahead. If he delivers less than 90% of his quota, KSC may reduce his quota for the following year by the amount of the shortfall; the company may also make such a reduction during the season itself. In practice the KSC field staff agree the quotas each year with the growers, following inspection of their cane fields; the only limit from KSC's point of view on the amount of cane a grower may plant, is that which he can cultivate and harvest. Short-falls are rare, the most significant having taken place following the break-up of the Kilombero Cooperative. The cane price is fixed by the Ministry of Agriculture, on a scale which depends on the percentage of sugar in the cane; below 8.5% sugar the company may reject the cane. The current price is Tsh 41.50 per m ton cane at 10% sugar. The steady increase in outgrower cane supplies indicates a profitable activity, but projections made in the course of Project appraisal suggest that the new growers (particularly KDDC) will need Tsh 50 per m ton at 1974 prices to cover costs and service capital. Proceeds of cane are paid to growers firstly as an advance of Tsh 30 per m ton on delivery, and the balance at the end of the season (Annex 21).

12. KSC has no obligation under the contract to provide extension service to the growers. It does have the right to inspect growing and cutting of cane, and imposes obligations in that respect on the grower. However, a small-scale extension service is being provided. Outgrowers are otherwise normally self-reliant, providing their own machinery and labor for land-clearing, cultivation and cane transport; the relatively large size of most of the growers has made it unnecessary for KSC to supply these services (in 1973 75% of the cane was supplied by 7 estates, 20% by individuals or associations of individuals, and 5% by ujamaa villages).

Factory Operations

13. The expansion to 2,150 m tons cane per day which was undertaken for the 1972 season involved replacing two of the six existing mills with a De Danske Sukkerfabrikker (DDS) type diffuser, designed to give high sugar extraction and increased molasses production. Many start-up problems arose, and over 20% down-time was recorded. As a result, the season was extended to a record 256 days, with unavoidable stoppages in the latter part due to the difficulties of hauling cane in wet conditions. Further engineering work was carried out in the offcrop and into the 1973 season, which started one month late. The required capacity rating has now been achieved, but milling efficiency, at 84%, is still low. The extra costs of putting the new diffuser in working order, which included the salaries of several expatriate technical

experts for many months, were reflected in a 50% increase in per ton mill costs in 1972 over the previous year; in 1973 to date they have fallen, with the cessation of such activities, to levels which reflect inflation, but not the full economies of the expansion, which are expected next season.

Sugar Sales

14. Sugar is sold to the National Sugar Board (NSB), whose agents now are General Foods Company Ltd. (Annex 2). The price currently paid at the mill gate for 99.7 degrees polarization and 0.1% maximum moisture sugar in 50 kg or 100 kg bags is Tsh 1,080 per m ton. Shipments are made against orders by NSB, and ownership passes with loading onto trucks in the railway siding; NSB however pays 8% per annum interest on the selling price of stocks held by the factories at any time in excess of one-twelfth of a year's production.

Molasses

15. Until recently, molasses was used for road maintenance in the estate, and occasionally on the fields themselves. Contracts are about to be signed between KSC, Mtibwa Sugar Estates Ltd., SDC and United Molasses Trading Company Ltd. (UM), a subsidiary of Tate and Lyle Ltd., for the shipment of molasses through Dar-es-Salaam. UM has formed a company, Tanzania Tank Storage Ltd. (TTS), in which it has 40% equity interest; Tanzania Planting Company holds 40% and SDC 20%. TTS will erect storage facilities in the port of Dar-es-Salaam with a capacity of 8,500 m tons molasses; the cost has been estimated at Tsh 3 million, and storage rental charges would be such as to give a return of 15% on invested capital. TTS will sign contracts with UM for the supply of molasses and with KSC and Mtibwa for its purchase. Under these contracts, the estates will receive the USDA New York-New Orleans average price for molasses at date of shipment from Dar-es-Salaam, less deductions for storage rental loading, and freight from Dar-es-Salaam to Gulf/East Coast USA. The minimum price to be paid by TTS to the producers would be Tsh 70 per m ton delivered at the storage terminal. KSC and Mtibwa are to garantee to deliver to TTS 140,000 m tons molasses in the seven years from July 1, 1974; this would be possible with an average joint annual sugar production of 60,000 m tons, provided none was used for animal feed or other local production in Tanzania. If these uses of molasses were to become economically more desirable than their export, the manufacturers would be able to terminate their contracts on or after July 1, 1977 on payment of Tsh 36 per m ton as compensation for the shortfall on 140,000 m tons.

Operating Results

16. Table 1 shows KSC's operating results from incorporation to April 30, 1973 and the estimated figures for the year ended April 30, 1974. Table 2 shows balance sheets for the years ended April 30, 1970 through 1973.

17. At April 30, 1973 KSC had Tsh 36 million tax losses and allowances to carry forward. Under the 1973 Income Tax Act these and future losses and

allowances must be used within three acounting years from their generation or from January 1, 1974, whichever is the later.

Management

18. Until 1965, KSC was managed by staff seconded or recruited by the investors, particularly by CDC. In 1965, KSC entered into a management contract with HVA International b.v. (HVA), a firm of sugar consultants and managers based in Amsterdam. The contract was extended, pending a 3-year renewal, on May 1, 1974. Under it HVA acts as Managing Director of KSC, provides the General Manager and Factory Manager on secondment, and makes available whatever services--such as engineering or agronomic advice, and recruiting--may be needed on a visiting or an overseas arrangement.

19. Until the departure of the overseas investors in 1969, CDC provided an accountant. HVA has since recruited expatriates, mainly from the Netherlands, for technical positions in the factory and on the estate. KSC has trained Tanzanians where possible for staff jobs, and the number of expatriates has slowly declined over the years; however, Tanzanians are not available to fill all senior posts in the agronomic and factory departments (Annex 16). Government has recognized this as a general situation throughout Tanzania, and in October 1973 the Prime Minister issued a directive designed to speed up procedures by which parastatals can acquire necessary expatriate staff. Offsetting this realistic approach, however, is the effect of the 1973 Income Tax Act which has imposed tax increases that will deter many expatriates from working in Tanzania; for example, a field manager earning Tsh 200,000 per annum would now pay over 60% in tax, a 20% increase on his previous tax, unless exempted from the recent increase.

20. Management and accounting systems were instituted by the original investors. Each department submits monthly or twice-monthly operating reports to the General Manager. The Accounts Department prepares monthly cost comparisons with estimates, which constitute a regular report to KSC Board. Unfortunately, they present cost information rather than management information, they do not relate to the reports of the operating departments, and they are frequently rather late. The higher-level employees in the Accounts Department lack both the time and the experience to do much more than deal with routine transactions and complete monthy and annual accounts. Recently, an Internal Auditor was appointed to take care of systems work; this was made necessary by the change in auditors to National Audit Corporation, who themselves are not able to provide the systems reports provided by their predecessors. However, the Internal Auditor is responsible to the Chief Accountant, and most of his time is spent on routine accounts department work.

21. In May 1968, IFC issued to KSC a report on its accounting and reporting systems. None of IFC's recommendations for improvements were acted on. The report describes the analyses of transactions into cost elements and cost centers (the latter correspond to the various functional departments) and

points out that certain costs were understated due to defects in the allocation methods. In particular, depreciation was not allocated to cost centes and hence it is not possible to determine from the cost statements whether, for instance, mechanization programs have paid off. Interest on investments in fixed assets is likewise not allocated to functional departments. IFC also commented that although the analyses of transaction information is very fine (for example, cost data are available for each field in the estate), neither its use nor its retrieval is satisfactory.

22. A somewhat unsatisfactory situation was therefore inherited from the original investors, but there is little doubt that it has deteriorated since 1969. KSC recognized the problems and plan to appoint an expatriate Financial Controller. The most important tasks of the new Financial Controller would be to examine and improve systems and internal control and to introduce more meaningful management reporting. It is desirable that both would be completed before the K II factory opens; KSC might consider appointing financial consultants familiar with the sugar industry to assist in the second task.

Conclusion

23. KSC is currently profitable. HVA's presence as Managing Director, and the continuing service of several key expatriate technicians, are important to KSC's continuing recovery and to the success of the Project, even though improvements are desirable in the conduct of certain functions. Cost increases will rapidly erode margins over the next few years, and the continuing profitability of K I, on which the Project depends for part of its finance, will depend on regular reviews of the price to be paid for its sugar and on the immediate implementation of the necessary increases (para. 6.07).

July 16, 1974

TANZANIA

KILOMBERO SUGAR PROJECT

Kilombero Sugar Company Limited: Operating Results Since Incorporation

Season Year Ended April 30	1962 1963	1963 1964	1964 1965	1965 1966	1966 1967	1967 1968	1968 1969	1969 1970	1970 1971	1971 1972	1972 1973	1973 Estimates 1974
Estate												
Cane Fields - Acres	1,816	2,827	4,562	5,352	7,087	6,810	6,861	6,502	5,520	5,251	5,102	5,600
Tons of Cane	105,280	144,610	172,550	207,136	243,288	248,502	211,558	246,549	231,131	222,535	231,891	280,000
Tons of Cane per Acre	58	51.2	37.8	38.7	34.3	36.5	30.8	37.9	41.9	42.4	45.5	50
Tons of Sugar	9,570	11,020	17,700	20,598	21,303	24,582	21,985	26,265	25,931	23,796	23,153	29,140
Tons of Sugar per Acre	5.3	3.9	3.9	3.8	3.0	3.6	3.2	4.0	4.7	4.5	4.5	5.2
Percent Sucrose in Cane	9.1	7.6	10.3	9.9	8.8	9.9	10.4	10.7	11.2	10.7	10	10.4
Outgrowers												
Cane Fields - Acres	-	-	-	-	-	2,803	3,085	3,948	4,734	5,019	5,152	5,529
Tons of Cane	17,230	19,910	27,400	40,300	55,176	65,887	62,110	95,320	123,881	135,708	126,924	140,000
Tons of Cane per Acre	-	-	-	-	-	23.5	20.1	24.1	26.2	27.0	24.6	25.3
Tons of Sugar	1,458	1,670	2,797	4,215	4,800	6,168	5,991	9,776	13,163	13,590	12,395	14,560
Tons of Sugar per Acre	-	-	-	-	-	2.2	1.9	2.5	2.8	2.7	2.4	2.6
Percent Sucrose in Cane	8.5	8.4	10.2	10.5	8.7	9.4	9.6	10.3	10.6	10	9.8	10.4
Mill												
Milling Season - Days (gross)	221	140	182	209	223	239	n.a.	211	208	214	256	(say) 217
Percentage Milling Efficiency	63%	89%	83%	86%	86%	75%	n.a.	90%	91%	89%	66%	(say) 90%
Tons Cane per Milling Day	928	1,085	1,333	1,382	1,555	1,769	n.a.	1,777	1,849	1,848	1,882	2,150
Tons Sugar Made	11,028	12,690	20,497	24,813	26,103	30,750	27,976	36,041	39,093	37,386	35,548	43,700
Income Statements (Ton million)												
Revenue												
Sugar Sales					29.1	34.2	28.5	32.9	35.5	34.0	32.2	45.5
Other Revenue					0.2	0.1	0.3	0.2	0.4	0.3	0.5	0.2
Total Revenue					29.3	34.3	28.8	33.1	35.9	34.3	32.7	45.7
Direct Costs: (costs)												
Plantation (Tsh 1,000 per acre)					(1.16)	(1.04)	(0.86)	(0.78)	(0.80)	(0.92)	(1.04)	(1.29)
Total					8.2	7.1	5.9	5.1	4.4	4.8	5.3	7.2
Harvesting (Tsh per ton cane)					(13.6)	(16.7)	(17.4)	(16.4)	(15.0)	(14.8)	(15.6)	(13.4)
Total					3.3	4.2	3.7	4.0	3.5	3.3	3.6	3.8
Cane Purchases (Tsh per ton cane)					(36.67)	(36.59)	(37.75)	(39.33)	(39.92)	(38.90)	(37.83)	(39.50)
Total					2.0	2.4	2.3	3.7	4.9	5.3	4.8	5.5
Mill (Tsh per ton sugar)					(217)	(198)	(198)	(171)	(155)	(180)	(249)	(245)
Total					5.7	6.1	5.5	6.2	6.0	6.7	8.9	10.7
					19.2	19.8	17.4	19.0	18.8	20.1	22.6	27.2
Other Costs (Tsh million)												
Overheads					6.0	7.4	8.4	8.3	7.2	6.1	6.3	7.7
Depreciation					4.0	4.2	4.3	4.2	4.2	4.2	4.7	5.7
Amortization					0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Financial					2.2	2.2	1.7	-	-	-	-	-
Total Costs					31.9	34.1	32.3	32.0	30.7	30.9	34.1	41.1
Net Income/(Loss) per year (Tsh million)					(2.6)	0.2	(3.5)	1.1	5.2	3.4	(1.4)	4.6

June 13, 1974

ANNEX 1
Table 1

TANZANIA

KILOMBERO SUGAR PROJECT

Kilombero Sugar Company: Balance Sheets, 1970-1973
(Tsh '000)

	1970	1971	1972	1973
Capital				
Equity	42,496	42,496	36,000	36,000
Preference Shares	770	770	36,000	36,000
Capital Reserves	4,973	4,973	11,087	10,950
Profit & Loss Account	(11,563)	(6,305)	3,337	1,942
	36,676	41,934	86,424	84,892
Deferred Creditors				
Loans	18,857	18,857	2,800	2,686
Income Notes	23,868	23,868	-	-
	79,401	84,659	89,224	87,578
Assets				
Fixed Assets	84,167	83,672	85,034	102,674
Less Depreciation	(28,779)	(30,955)	(34,091)	(38,022)
	55,388	52,717	50,943	64,652
Work in Progress	63	3,888	14,828	197
	55,451	56,605	65,771	64,849
Current Assets				
Plantation	4,104	4,494	5,109	5,404
Sugar in Store	1,510	395	452	1,704
Stores	5,366	5,276	6,179	6,896
Debtors	1,220	1,884	1,857	1,495
Cash	4,523	8,472	5,453	2,588
	16,723	20,521	19,050	18,087
Current Liabilities	(5,305)	(4,168)	(3,268)	(2,518)
	11,418	16,353	15,782	15,569
Intangible Assets	3,838	3,519	-	-
Development Expenditure	12,785	12,785	12,785	12,785
Less amounts written off	(4,091)	(4,603)	(5,114)	(5,625)
	12,532	11,701	7,671	7,160
Net Assets	79,401	84,659	89,224	87,578

May 14, 1974

TANZANIA

KILOMBERO SUGAR PROJECT

Current Price Formula for Sugar (set February, 1974)

Prices at ex-factory, wholesale, and retail at main wholesale centers are set by Government. The current price formula is as follows:

Tsh/m ton

	Mtibwa	KSC, TPC, Kagera	Average /1
Ex-factory/Export	1,370	1,080	1,700
Excise/Duty	413	413	413
Ex-factory (gross)	1,783	1,493	2,113
Sugar Reserve Fund /2			
(a) basic	230	230	230
(b) balance	337	627	7
Development Fund Levy	300	300	300
Administrative Expenses	18.70	18.70	18.70
Distribution Cost	70	70	70
Marketing Agents Commission	13.30	13.30	13.30
Board Handling Charge	60	60	60
Total On-Costs	1,029	1,319	699
Price to Wholesalers	2,812	2,812	2,812
Wholesale Margin	65	65	65
Price to Retailers	2,877	2,877	2,877
Retailers Margin	123	123	123
Retail Price /3	3,000	3,000	3,000

/1 The average price is derived from imported needs and domestic sugar from the new (Mtibwa) plants, and the older established factories.

/2 The basic reserve is for application to sugar developments. The balance represents transfers to meet the cost of imports which are currently 2-3 times the domestic price.

/3 At main centers.

June 12, 1974

TANZANIA

KILOMBERO SUGAR PROJECT

Supply and Demand Projections

1. Between 1962 and 1972 sugar production in Tanzania increased from 37,000 m ton to 90,000 m ton but has stagnated around this level for the past 5 years with existing factories close to capacity utilization. Sugar consumption was growing on the average at the rate of 0.2 kg per head of population annually during 1953-69. However, between 1969 and 1972, this rate accelerated resulting in an annual average increase in consumption of about 0.8 kg of sugar per head; it slowed down somewhat in 1973. This increase has been attributed to income growth and more equitable income distribution, urbanization, increased industrial use and also smuggling from Tanzania at a time when the domestic wholesale price was below that in neighboring countries. An increase in the controlled price in mid-1972 helped to rectify this situation, and distribution difficulties caused by a shortage of railway wagons also reduced consumption in 1973 but it remained well above domestic production.

2. Although until recently self-sufficient, Tanzania, therefore, has had to import large quantities of sugar since 1970. The following table shows recent consumption, production, import quantity and costs and changes in per capita consumption (excluding Zanzibar):

Year	Consumption	Production	Imports	Import Costs (million Tsh)	Consumption Increase % p.a.	Annual Per Capita Consumption		
						Kg	Increase Kg	Increase %
	'000 m ton							
1960-62	54	32	22	16	-	5.3	-	-
1966	70	70	-	-	3	6.1	0.2	2
1967	72	72	-	-	3	6.1	-	-
1968	80	81	5	3	11	6.5	0.4	6
1969	85	92	3	2	6	6.8	0.3	5
1970	100	87	4	3	18	7.8	1.0	15
1971	117	96	27	26	17	8.8	1.0	13
1972	133	89	50	72	14	9.8	1.0	11
1973 /1	136	105	50	131	2	10.0	0.2	2

/1 Estimates.

3. Some increase in Tanzania's per capita GNP at current market prices can be anticipated and Government's economic policy is aimed at a more even income distribution. Sugar has a high income elasticity of demand at the income level found in Tanzania and demand tends to be price inelastic. Continuing expansion in per capita consumption can, therefore, be expected -

probably above the rate of the 1960's but not at the exceptionally high rate experienced in 1969-72. Tanzania's per capita annual consumption of 9.2 kg in 1972 was less than adjacent countries: in Kenya it was 16.6 kg, in Uganda 14.8 kg and in Zambia 14.9 kg. All of these are low by international standards however (e.g. UK 52.3 kg, USA 50.3 kg, Japan 30.4 kg) and it seems reasonable to assume that the trend of per capita consumption will be a steady rise in the immediate future. Constant absolute increases have, therefore, been assumed in Table 1.

4. Government is actively pursuing finance for enlargement of Kagera: work is in hand on Mtibwa and new investment is scheduled at Arusha Chini. The timing of expansion plans for these existing sugar factories is, however, uncertain. The assumptions for future production shown in Table 2 are tentative and possibly optimistic. On the basis of these and with an annual per capita consumption increase of 0.4 kg, there would be a small surplus from the domestic sugar production between 1976-84, but at higher level of annual increase in per capita consumption of 0.8 kg a considerable shortfall will occur. A position between these two levels may be expected with an annual increase in per capita consumption of about 0.6 kg and given the estimated increase in sugar production, the country would have a deficit in most years between 1973 and 1984 (Table 1).

June 12, 1974

TANZANIA

KILOMBERO SUGAR PROJECT

Estimated Population, Per Capita and total Sugar Requirement and Production 1/

			A. With per capita consumption increase at 0.4 kg per annum			B. With per capita consumption increase at 0.6 kg per annum			C. With per capita consumption increase at 0.8 kg per annum		
Year	Population 2/ (million)	Production 3/ ('000 m tons)	Per capita Consumption (kg)	Total Requirement ('000 m tons)	Surplus Deficit ('000 m tons)	Per capita Consumption (kg)	Total Requirement ('000 m tons)	Surplus Deficit ('000 m tons)	Per capita Consumption (kg)	Total Requirement ('000 m tons)	Surplus Deficit ('000 m tons)
1973	13.62	105	10.0	136	-31	10.0	136	-31	10.0	136	-31
1974	14.00	115	10.4	146	-31	10.6	148	-33	10.8	151	-36
1975	14.39	123	10.8	155	-32	11.2	161	-38	11.6	167	-44
1976	14.79	171	11.2	166	5	11.8	175	- 4	12.4	183	-12
1977	15.20	184	11.6	176	8	12.4	188	- 4	13.2	201	-17
1978	15.62	224	12.0	187	37	13.0	203	21	14.0	219	5
1979	16.05	234	12.4	199	35	13.6	218	16	14.8	237	- 3
1980	16.49	245	12.8	211	34	14.2	234	11	15.6	257	-12
1981	16.95	255	13.2	224	31	14.8	251	4	16.4	278	-23
1982	17.42	264	13.6	237	27	15.4	268	- 4	17.2	300	-36
1983	17.90	272	14.0	251	21	16.0	286	-14	18.0	322	-50
1984	18.40	275	14.4	265	10	16.6	305	-30	18.8	346	-71
1985	18.91	278	14.8	280	- 2	17.2	325	-47	19.6	371	-93

1/ Exluding Zanzibar.
2/ Estimated increase at 2.8% per annum.
3/ See Annex 3, Table 2.

June 12, 1974

ANNEX 3
Table 1

ANNEX 3
Table 2

TANZANIA

KILOMBERO SUGAR PROJECT

Estimated Sugar Production
('000 m tons)

	Existing Factories					New Factories		
Year	Arusha Chini	Kilombero I	Mtibwa	Kagera	Total	Kagera	Kilombero II	Grand Total
1973	50	44	4	7	105			105
1974	56	45	7	7	115	-	-	115
1975	60	45	11	7	123	-	-	123
1976	66	45	19	7	137	-	34	171
1977	76	45	23	7	151	-	33	184
1978	80	45	26	-	151	30	43	224
1979	80	45	29	-	154	36	44	234
1980	80	45	33	-	158	43	44	245
1981	80	45	37	-	162	49	44	255
1982	80	45	38	-	163	56	45	264
1983	80	45	42	-	167	60	45	272
1984	80	45	45	-	170	60	45	275
1985	80	45	48	-	173	60	45	278

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KILOMBERO SUGAR PROJECT

Rainfall in mm, Period May 1961 - April 1973
at the site of Kilombero Sugar Estate

	1961/62	1962/63	1963/64	1964/65	1965/66	1966/67	1967/68	1968/69	1969/70	1970/71	1971/72	1972/73	12-Year Mean
May	124	87	45	48	73	129	257	135	102	23	118	241	115
Jun	55	6	58	5	1	33	52	68	18	7	23	-	27
Jul	75	9	5	4	15	3	56	-	7	7	38	8	19
Aug	7	54	1	18	12	5	14	-	4	5	-	4	10
Sep	37	15	1	1	33	15	71	10	-	47	-	115	29
Oct	187	38	18	22	49	22	52	9	14	9	26	24	39
Nov	253	40	393	9	108	95	199	151	87	-	41	303	140
Dec	475	115	118	62	224	66	467	122	15	153	102	141	172
Jan	277	186	207	216	112	92	172	94	436	121	108	198	185
Feb	146	196	196	194	193	128	119	126	230	82	244	171	169
Mar	278	490	367	316	207	167	294	164	250	228	324	142	269
Apr	293	356	388	284	298	298	658	658	216	385	344	405	382
	2,207	1,592	1,797	1,179	1,325	1,053	2,411	1,537	1,379	1,067	1,368	1,752	1,556

Source: Kilombero Sugar Estate Reports.

Months during the normal milling season when rainfall exceeded 150 mm are underlined.

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ANNEX 4

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KILOMBERO SUGAR PROJECT

Land Development and Cane Production

1. The agronomic conditions of the Lower Ruembe Valley are good for cane growing, even better than the area of the existing Kilombero Sugar Estate (K I). The Project estate (K II) will grow 3,500 acres of irrigated cane and 3,800 acres rainfed, and cane will be milled from 2,200 existing outgrowers' cane as well as 2,400 acres of new outgrowers' cane. K I will replace its old outgrowers' land by development of 2,000 outgrowers' acres in the Msolwa valley, S and SW of its own area.

2. The Project area is shown on the map. Sections B, C are assigned to the new estate. Most of Section B will be irrigated from the Great Ruaha River, Section C, parallel to the western border will be developed for rainfed cane. It receives in general a little more rainfall than the remaining valley area. The outgrowers' land in Section D will be developed as a compact cane area for the Kilosa District Development Corporation. It should have a layout similar to K II's cane area in order to optimalize land use, extention services, yields and cane transport. Areas A, E, F and G are allocated to outgrowers who will devote part to food-crop production.

Yield Capacity of the Planned Cane Land

3. Based on mean cane yields of K I the new cane area is expected to produce the following quantities of cane per year, after full expansion, excluding 240 acres of nurseries:

3,260 acres (28%) of irrigated cane x 45 tons cane/acre	=	146,700 tc (35%)
3,800 acres (33%) of rainfed cane x 36 tons cane/acre	=	136,800 tc (32%)
4,600 acres (39%) of outgrower cane x 30 tons cane/acre	=	138,000 tc (33%)
11,660	Total	421,500 tc

Sugar outturn is expected to average over 10.5% at which production of sugar would be 44,300 tons. This outturn can be achieved by the 2,400 TCD capacity factory, working 7 days a week, in 176 days, or 193 allowing for 10% downtime. The milling days available depend upon:

(1) the ripening period of the cane, and

(2) harvesting conditions.

Both factors are defined by climatic conditions, particularly rainfall. Rainfall figures are given in Annex 5 (it is reasonable to assume the existing and the new areas, 7.5 km apart, have similar characteristics). The biological and operational influences of monthly rainfall are difficult to guage objectively, but ripening data and harvesting experience at K I indicate that a mean monthly rainfall of 150 mm does not hamper the ripening process or delay harvesting operations at all and, depending on the rainfall pattern, only short delays occur in months with rather higher rainfall. Only in 2 out of 12 recorded years were the May figures for rainfall higher than 150 mm, and this is the normal month to start milling. November is wetter 5 times out of 12 and December 3 times out of 12, but only twice in the 12 years was there less than 6 full months with rainfalls below 150 mm. Experience on K I has been that adequate ripening and milling days will be found in the 234 day-period May 1st - December 20th: a period which gives a 33% margin over the needs of a 2,400 TCD factory.

4. The new factory is targeted to start its first milling season by September 1, 1976. Up to that date all cane grown in the Project area will be milled at K I. To achieve this, in 1975/76 K I would have to increase its milling capacity to 2,250 TCD or rely on an abnormally long milling season. This increase is, however, under 5% and is expected to be readily achievable by an established factory. (If there were a shortfall in the target, cane would be left for harvesting until the following season: the loss in sugar content would be at least offset by increased cane yields and the delay in obtaining returns would not have significant effect on the returns to the operation). For the milling season 1976/77, K II's first season of operations, a harvesting area including existing outgrowers of 7,540 acres is expected, which would produce 323,000 tons of cane. This can be handled in 148 days, allowing for 10% downtime.

5. It is planned, after the first milling season, to increase cane production as quickly as possible. This would necessitate a crash program for land clearing and preparation, followed directly by the planting of cane. The projected schedules of land clearing and preparation for milling cane, cane planting, harvesting, and sugar yields in the Project area are shown in Tables 1 and 2, and are summarized below:

Crop Year	74/75	75/76	76/77	77/78	78/79	79/80	80/81	81/82	82/83
Clearing & preparation acres	2,160	3,880	2,420	1,240					
Milling cane acres	2,200	3,660	7,540	10,320	11,660	11,660			
Cane yields ('000 m tons)	66	138	323	410	439	415	415	418	426
Sugar yields ('000 m tons)	7	15	34	43	46	44	44	44	45
Milling days	31	62	135	171	183	173	173	174	178

Land Clearing and Preparation Schedule

6. The land clearing and preparation schedule allows for:

(a) a program enabling the estate to develop 11,660 acres of millable cane land and 240 acres of nurseries: a total of 11,900 acres in four years;

(b) the development of equal acreages for the 5 cuttings within each kind of estate cane as follows:

5 blocks of 700 acres for irrigated estate cane of which 240 would be in nurseries = 3,500 acres

5 areas of 760 acres for rainfed estate cane = 3,800 acres within 5 years.

(c) the development of equal acreages for the 5 cuttings of outgrowers' cane, incorporating the existing 2,200 acres and adding 2,400 acre new fields, resulting in 5 x 920 acres = 4,600 acres of cane within 5 years;

(d) with (a) above, land clearing and preparation, started in the dry season (May-Sept.) of 1974/75 will be finished in 1977/78. To ensure timely land clearing and preparation and the planting, these will be executed by the estate on behalf of the outgrowers at cost. Starting in 1978/79 all the outgrowers' planting will be done by the estate annually.

7. Tractor and equipment requirements for land preparation and cane operations are set out in Annex 7.

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KILOMBERO SUGAR PROJECT

K II: New Land Development Schedule
(acres)

	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80	1980/81
Irrigated Estate							
Nursery*	620	700	340	240	240	240	-
Plant Cane	780	2,000	360	460	460	460	-
Cutting II	-	100	2,700	700	700	700	-
Cutting III	-	-	100	2,100	700	700	-
Cutting IV	-	-	-	-	1,400	700	-
Cutting V	-	-	-	-	-	700	-
Uprooted			700	700	700		
Rainfed Estate							
Plant Cane	760	220	760	760	760	760	760
Cutting II	-	2,060	220	760	760	760	760
Cutting III	-	-	2,060	220	760	760	760
Cutting IV	-	-	-	2,060	220	760	760
Cutting V	-	-	-	-	1,300	220	760
Cutting VI	-	-	-	-	-	540	-
Uprooted				760	760	760	
Rainfed New Outgrowers							
Plant Cane	-	960	960	480	480	480	480
Cutting II	-	-	960	960	480	480	480
Cutting III	-	-	-	960	960	480	480
Cutting IV	-	-	-	-	480	960	480
Cutting V	-	-	-	-	-	-	480
Uprooted				480	480	480	

* Allows for 1 acre seed cane for every 7 of planting in first 3 years, and thereafter 1:10.
◯ = new land. Arrows indicate treatment of land in subsequent years.

ANNEX 5
Table 1

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KILOMBERO SUGAR PROJECT

K II: Cane Production Schedule (at Average Yields)
(m tons)

	1975/76	1976/77	1977/78	1978/79	1979/80	1981/82	1982/83
Irrigated Estate							
Plant Cane	46,800	120,000	21,600	27,600	27,600	27,600	
Cutting II	-	5,000	135,000	35,000	35,000	35,000	
Cutting III	-	-	4,500	94,500	31,500	31,500	
Cutting IV	-	-	-	-	56,000	28,000	
Cutting V	-	-	-	-	-	21,000	
Total	46,800	125,000	161,100	157,100	150,100	143,100	143,100
Rainfed Estate							
Plant Cane	30,400	8,800	30,400	30,400	30,400	30,400	
Cutting II	-	90,640	9,680	33,340	33,440	33,440	
Cutting III	-	-	76,220	8,140	28,120	28,120	
Cutting IV	-	-	-	65,920	7,040	24,320	
Cutting V	-	-	-	-	35,100	5,940	
Cutting VI	-	-	-	-	-	11,880	
Total	30,400	99,440	116,300	137,800	134,100	134,100	134,100
Rainfed, New Outgrowers							
Plant Cane	-	31,680	31,680	15,840	15,840	15,840	15,840
Cutting II	-	-	33,600	33,600	16,800	16,800	16,800
Cutting III	-	-	-	28,800	28,800	14,400	14,400
Cutting IV	-	-	-	-	12,960	25,920	12,960
Cutting V	-	-	-	-	-	-	12,000
Total	-	31,680	65,280	78,240	74,400	72,960	72,000
Existing Outgrowers	66,000	66,000	66,000	66,000	66,000	66,000	66,000
Total Cane	143,200	322,120	408,680	439,140	424,600	416,160	415,200
Sugar Production (at 10.5%)	15,000	33,800	42,900	46,100	44,600	43,700	43,600

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ANNEX 5
Table 2

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KILOMBERO SUGAR PROJECT

Outgrowers Development and Returns

1. Sugarcane would be grown on 4,600 acres by Project outgrowers in Ruembe valley. Outgrowers would consist of (a) 3 ujamaa villages with 240 families, farming 960 acres; (b) Kilosa District Development Corporation (KDDC), farming 1,560 acres; and (c) 122 individual families and 2 estates, cultivating 2,080 acres (Table 1). Of the total area to be farmed, 2,400 acres would be developed over three years under the Project, and 2,200 acres are now under sugarcane grown by (a) 126 ujamaa families in 2 villages farming about 120 acres, and (b) 122 individual families and 2 estates growing 2,080 acres of sugarcane. This latter cane is milled by K I, and the diversion of cane to K II would be offset by expansion of acreages of existing outgrowers in Msolwa valley.

2. Under the Project, Kilombero Sugar Company (KSC), would be responsible for providing extension services and drawing up of annual planting programs. It would clear and prepare land, plant and replant cane for ujamaa villages and KDDC at cost. It would supply to all outgrowers seed cane and would provide all cane transportation to ujamaa villages and KDDC, and for about 50% of cane produced by other outgrowers excepting the two existing estates. KSC would purchase all cane produced in accordance with the annual planting programs. It would also construct roads and drains in the new outgrowers areas. Appropriate agreements including delivery schedule, prices to be paid, and charges for services rendered by KSC would be executed between KSC and the outgrowers.

Ujamaa Villages

3. The two existing ujamaa villages, like other ujamaa villages, are communally organized for farming, storage, marketing and other activities. Each of these has an elected Chairman, a Secretary and a Treasurer with various committees viz. Executive, Planning, Works, Trading, Education, Health and Concilliation. A Primary School Teacher and a Medical Dresser reside in each village. Food crops produced communally by a village are shared according to the needs of all the families including the teacher and the medical dresser, and proceeds from marketable surplus if any and of cash crops are distributed to the families according to their labor input for such crops. A portion of the sale proceeds is used to pay the teacher and the medical dresser who also sometimes help in farming operations. The rest goes to a reserve fund which may be used to meet communal needs of villages such as purchase of a grain husking machine, expansion of a school building or establishment of a village hall. Ujamaa villages when fully developed are to be registered as multi-purpose cooperative societies.

4. The two ujamaa villages - Kitete, with a population of 71 families, and Kidogobasi, with a population of 55 families - have about 120 acres of sugarcane. The other principal crops are rice and maize and pulses. These two villages, together with another village to be established, would have a total of about 960 acres of sugarcane, of which 840 acres would be developed under the Project. Each village on an average would have about 80 families growing about 320 acres of sugarcane as a cash crop and 160 acres of rice (4 acres of cane and 2 acres of rice per family). It would be possible for a family of 2 adults and 3 children to care for 4 acres of sugarcane and 2 acres of rice (Table 2). Two acres of rice would meet the stable food requirement of a family (Table 3).

5. KSC would develop sugar land and plant cane for ujamaa villages, to which it would be handed over after planting. In an average ujamaa village with about 320 acres of sugarcane, about 130 acres would be developed and planted with cane in Year 1 (1975-76) and Year 2 (1976-77) and the remainder in Year 3 (1977-78). The initial operations would consist of treedozing, clearing, levelling, ripping, heavy duty and shallow harrowing, furrowing, supply of seed cane, planting and first uphilling. 1/ For these operations, and road and drain construction, KSC would charge the full cost estimated at Tsh 2,450 per acre in 1973-74. These costs will be met by a 6 year loan with interest at 9% annually and deductions would be applied to cane deliveries which would come to Tsh 27.50 per ton for 48,000 tons of sugarcane. In cases where land would be handed over later, proportionate deductions from the charges would be made based on the profit accrued to KSC from such land. KSC would perform annual mechanical uphilling operations at a 1973-74 base price of Tsh 43 per acre. At replanting, KSC would prepare land and plant cane (stubble and deep ploughing, harrowing, furrowing, planing, hilling, seed cane and planting) at a base price of Tsh 1,716 per acre. KSC would provide cane transportation for which the base price is estimated to be Tsh 10 per ton. All the charges would be deducted by KSC at the time of advance payment for cane delivered. The rest of the operations viz. weeding; clearing ditches, internal roads and trash removal; pushing cane; cutting and loading, would be performed by ujamaa villages. All operations for rice would be the villagers' responsibility. Tsh 8,000 would be provided to purchase farm tools for an ujamaa village of 80 families (Tsh 100 per family) as a short-term loan by the Tanzania Rural Development Bank (TRDB) at 8-1/2% interest p.a., payable in 3 years with capital repayment in the 3rd year.

6. At full development i.e. from the eighth year (1982-83), an average ujamaa village of 80 families would have an annual net disposable income of some Tsh 346,810 prior to deductions, including a contribution of 10% to a fund reserved for communal needs. Thus, at full development, annual net cash farm income of an ujamaa family would be about Tsh 4,340 in addition to the value of subsistence consumption of rice of about Tsh 570 and Tsh 250 for other farm produce viz. pulses, eggs, milk and meat (Table 4). The income from sugarcane compares favorably with the present income of a farm family in

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1/ The process of re-shaping ridges.

the area growing mainly rice or rice and maize. Calculated on the basis of mandays, also, it would be more profitable to grow sugarcane. Average net income per manday from sugarcane would be over Tsh 14.20, from rice Tsh 3.00 and from maize Tsh 2.00 (Table 5).

7. The two existing ujamaa villages, one of which has applied for registration as a cooperative society, and the new one to be established would require considerable guidance in the maintenance of cane fields and harvesting. Provision, therefore, has been made for two extension officers in KSC, who under the guidance and control of KSC's field department would provide necessary extension services to ujamaa villages and other outgrowers. Development of these villages will have to be carefully watched and their production capability evaluated before it is decided to expand the three ujamaa villages and/or to establish more villages which would take over additional sugarcane land developed by KSC.

Kilosa District Development Corporation (KDDC)

8. In accordance with Government's policy for development of District Government operated organizations to run commercial enterprises, including agricultural estates for selected estate crops like sugar, the Kilosa District Development Corporation (KDDC) was established by the Government as a limited Company in February 1973 with a share capital of Tsh 500,000. The objectives of the company include crop, livestock and fish production, establishment of abbatoirs, small industries, processing plants and cold-storage facilities, road and river transportation and assistance to cottage industries in establishing markets. KDDC is currently operating one petrol station and proposes to establish a goat ranch and, in partnership with adjacent district development corporations, introduce a rural bus transportation service.

9. Over a period of 3 years (1975-76 to 77-78) KSC would develop 1,500 acres of sugar land for KDDC (Table 1). It would clear and prepare land, supply seed cane and plant sugarcane. For these operations and road and drain construction, KSC would charge the full cost estimated at Tsh 2,410 per acre. In accordance with standard policy towards DDCs, twenty-five percent of these costs would be borne by the Government as a grant and the balance provided as a long-term loan by KSC. Deduction in respect of this loan would be applied to cane deliveries: on the basis of a 9% annuity over 11 years this would come to Tsh 12.30 per ton for 468,000 tons of sugarcane. KDDC would be responsible for all other operations (weeding, uphilling, clearing ditches, internal roads and trash; inter-row cultivation, pushing cane, cutting and loading). KSC would also perform subsequent land preparation and re-planting operations (stubble and deep ploughing, harrowing, planning, furrowing, hilling, supply of seed cane and planting) estimated at 1973-74 price of Tsh 1,716 per acre. KSC would provide cane transportation at a cost of about Tsh 10 per ton. All charges would be deducted by KSC from the advance payment to be made at cane delivery. KSC would draw up annual planting programs, schedule of harvesting and provide extension services free of charge.

10. Office building, store, and houses for the staff and 50% of labor would be constructed for KDDC under its supervision and a vehicle provided. 25% of these costs would be borne by Government as a grant and the remainder would be borrowed from TRDB as a long-term loan repayable in 10 years with a 4 year grace and an interest rate of 7-1/2% per annum. Working capital would be borrowed as a short-term loan from TRDB with an annual rate of interest of 8-1/2%.

11. At a price of Tsh 50.00 per ton of cane with 10.5% sucrose content the rate of return to KDDC would be 22%. At a cane price of Tsh 45 per ton the rate of return would be 12%. An income statement and cash forecast for KDDC is at Table 6.

12. KDDC has a Board of Directors which has appointed a Managing Director, a Secretary and an Accountant. The sugar estate would be operated as a self-contained unit with its own staff, including a Manager, an Accountant, Field Officer, other staff and laborers.

Constraints and Safeguards

13. District Government operated commercial enterprises, especially in the field of estate development, is a new venture. Lack of experience in such operations has prompted KDDC to obtain KSC's assistance in initial land clearance and preparation and planting of cane seeds and subsequent land preparation and planting at the time of re-planting. KDDC would receive KSC's technical and managerial advice when necessary and its field officers would be trained by KSC. Special attention is required to proper maintenance of accounts and close supervision of its operations should be given by District and Regional authorities.

Existing Outgrowers

14. Other than the existing outgrowers in the two ujamaa villages, about 122 families and two estates, Nahdi Kidodi and Riva Saw Mills, would continue to grow sugarcane on about 2,080 acres. The families belong to Kidodi Cane Growers Association, Kidogobasi Group Farmers Association, villages Maarifa Sukari and Saidi Legeza. KSC would draw up their annual planting program. All cultural operations would be performed by the outgrowers. KSC would continue to follow the present practice of providing transportation at cost to outgrowers needing it - expected to be all except the two estates.

Price and Payment Procedures

15. Cane would vary with sucrose content. The 1973-74 price used for projections is Tsh 50.00 per ton with 10.5% sucrose. Advances equivalent to about 85% of the price less deductions for services by KSC would be paid by KSC to the outgrowers at the time of delivery; the remainder of the price would be paid monthly after analysis and processing.

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Outgrowers Development Schedule
(acres)

	Ujamaa Villages				Kilosa District Development Corp.					
	New Planted Cane	Re-planted Cane	Ratoon Cane	Total	New Planted Cane	Re-planted Cane	Ratoon Cane	Total	Existing Outgrowers	Outgrowers Total
1975-76	336	-	-	336	624	-	-	624	2,200	3,160
1976-77	336	-	336	672	624	-	624	1,248	2,200	4,120
1977-78	168	-	672	840	312	-	1,248	1,560	2,200	4,600
1978-79	-	168	672	840	-	312	1,248	1,560	2,200	4,600
1979-80	-	168	672	840	-	312	1,248	1,560	2,200	4,600
1980-81	-	168	672	840	-	312	1,248	1,560	2,200	4,600
1981-82	-	168	672	840	-	312	1,248	1,560	2,200	4,600
1982-83	-	168	672	840	-	312	1,248	1,560	2,200	4,600
1983-84	-	168	672	840	-	312	1,248	1,560	2,200	4,600
1984-85	-	168	672	840	-	312	1,248	1,560	2,200	4,600

ANNEX 6
Table 1

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1. Labor Requirement over a Year (per acre)

	Sugarcane		Rice	
Months	Item	No. of man-days	Item	No. of man-days
Jan/Feb	Clearing trash	5.0	Cultivation	40.0
	Inter-row cultivation	2.0		-
	Weeding	6.0		-
	Pushing cane	0.5		-
		13.5		40.0
March	Clearing ditches	3.0	Weeding	5.0
April		-	Weeding	5.0
May/June		-	Harvesting & threshing	35.0
Nov/Dec	Cutting	15.0		-
	Loading	15.0		-
	Clearing ditches	3.0		-
	Clearing roads	0.5		-
		33.5		
Total No. of man-days		50.0	Total No. of man-days	85.0

2. Labor Requirement and Availability over a year for Sugarcane & Rice

	Man-days Required			Man-days Available
Months	Sugarcane (4 acres)	Rice (2 acres)	Total	(1 family) 1/
Jan/Feb	54	80	134	144 2/
March	12	10	22	60
April	-	10	10	60
May/June	-	70	70	120
Nov/Dec	134	-	134	144 2/

1/ 1 family consists of 2 adults and 3 children (3 children = 1 adult).
2/ In a busy month an adult can work 24 days a month. Normally he would work about 20 days a month.

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Subsistance Rice Requirement per Family (2 adults, 3 children)

Requirement

Adults 16 oz. clean rice per day 16 x 2 = 32 oz.
Children 10 oz. clean rice per day 10 x 3 = 30 oz.
62 oz. (say 4 lbs.)

Total daily requirement = 4 lbs
= 1.81 kg
Total amount requirement of clean rice (1.81 x 365) = 661 kg

Production

Yield of paddy rice per acre	560 kg
Yield from 2 acres	1,120 kg
Seed requirement (40 kg per acre x 2)	- 80 kg
	1,040 kg
Less husk (33%)	-344 kg
Total clean rice available	696 kg

June 12, 1974

TANZANIA

KILOMBERO SUGAR PROJECT

Model Ujamaa Farm Budget 1/

(Income Statement and Cash Forecasts)
(Tsh)

	Unit	Unit Cost	1975-76 No.	1975-76 Cost	1976-77 No.	1976-77 Cost	1977-78 No.	1977-78 Cost	1978-79 No.	1978-79 Cost	1979-80 No.	1979-80 Cost	1980-81 No.	1980-81 Cost	1981-82 No.	1981-82 Cost	1982-83 No.	1982-83 Cost	1983-84 No.	1983-84 Cost	1984-85 No.	1984-85 Cost
VALUE OF PRODUCTIONS																						
Sugarcane				-		278,784		635,392		700,800		700,800		700,800		700,800		700,800		700,800		700,800
Rice 2/				49,280		49,280		49,280		49,280		49,280		49,280		49,280		49,280		49,280		49,280
Other subsistance production 3/				20,000		20,000		20,000		20,000		20,000		20,000		20,000		20,000		20,000		20,000
Total				69,280		348,064		704,672		770,080		770,080		770,080		770,080		770,080		770,080		770,080
OPERATING COSTS																						
Farm tools	Family	100	80	8,000		-		-		-		-		-		-		-		-		-
Land preparation, seed cane and planting charge for re-planting 4/	ac			-		-		-	64	160,896	64	160,896	64	160,896	64	160,896	64	160,896	64	160,896	64	160,896
Annual uphilling charge 5/	ac			-	128	7,296	256	16,128	320	20,160	320	20,160	320	20,160	320	20,160	320	20,160	320	20,160	320	20,160
Cane transportation 6/	ton			-		54,912		121,856		134,400		134,400		134,400		134,400		134,400		134,400		134,400
Rice seed 7/	ac	22		3,520		3,520		3,520		3,520		3,520		3,520		3,520		3,520		3,520		3,520
Total Operating Costs				11,520		65,728		141,504		318,976		318,976		318,976		318,976		318,976		318,976		318,976
Gross margin				57,760		282,336		563,168		451,104		451,104		451,104		451,104		451,104		451,104		451,104
CASH INFLOW																						
Gross margin				57,760		282,336		563,168		451,104		451,104		451,104		451,104		451,104		451,104		451,104
Less subsistance consumption 8/				65,760		65,760		65,760		65,760		65,760		65,760		65,760		65,760		65,760		65,760
Net cash income				(8,000)		216,576		497,408		385,344		385,344		385,344		385,344		385,344		385,344		385,344
Loan for land development 9/			128	379,776	128	417,792	64	229,760		-		-		-		-		-		-		-
loan for farm tools 10/				8,000		-		-		-		-		-		-		-		-		-
Total Cash Inflow				379,776		634,368		727,168		385,344		385,344		385,344		385,344		385,344		385,344		385,344
OUTFLOW																						
Land development cost 11/			128	379,776	128	417,792	64	229,760		-		-		-		-		-		-		-
Debt servicing for land development 12/				-		116,160		239,360		264,000		264,000		264,000		172,480		-		-		-
Debt servicing for short-term loan 13/				-		680		8,680		-		-		-		-		-		-		-
Total Cash Outflow				379,776		534,632		477,800		264,000		264,000		264,000		172,480		-		-		-
Net Cash Flow Position				-		99,376		249,368		121,344		121,344		121,344		212,864		385,344		385,344		385,344
INCOME																						
Ujamaa village net cash income				-		99,736		249,368		121,344		121,344		121,344		212,864		385,344		385,344		385,344
Reserve fund 14/				-		9,973		24,937		12,134		12,134		12,134		21,286		38,534		38,534		38,534
Ujamaa village net disposable cash farm income				-		89,763		224,431		109,210		109,210		109,210		191,578		346,810		346,810		346,810
Ujamaa family net cash farm income 15/				-		1,122		2,805		1,365		1,365		1,365		2,395		4,335		4,335		4,335
Value of Ujamaa family subsistance 16/				822		822		822		822		822		822		822		822		822		822
Net Ujamaa family farm income				822		1,944		3,627		2,187		2,187		2,187		3,217		5,157		5,157		5,157

1/ For a village of 80 families. Each family would grow 4 acres of sugarcane and 2 acres of rice. Total acreage of crops: sugarcane 320 ac, rice 160 ac.
2/ Total rice acreage - 160; Average Yield @ 560; price @ Tsh 0.55 per kg of unhusked rice.
3/ Other subsistance production includes some pulses, meat, eggs and milk at about Tsh 250 per family.
4/ Base price per acre (73-74) - Tsh 1,716. With 10% p.a. price increase upto 77-78, price per acre from 78-79 would be Tsh 2,514.
5/ Base price per acre (73-74) - Tsh 43; with 10% p.a. price increase upto 77-78, price per acre in 76-77 would be Tsh 57 and from 77-78 onwards Tsh 63.
6/ Base price per ton in 1973-74 - Tsh 10; with 10% p.a. price increase upto 77-78, price per acre in 76-77 would be Tsh 13 and from 77-78 onwards Tsh 14.

7/ @ 40 kg per acre; price Tsh 0.44 kg (for 160 acres)
8/ @ 1,040 kg of unhusked rice equivalent to 696 kg of clean rice per family (See Table 3), at Tsh 572 per family (Tsh 55/kg of unhusked rice) and other produce viz some pulses, meat, eggs and milk at about Tsh 250 per family (Tsh 50 per person).
9/ Loan for LandDevelopment cost (initial land clearing, preparation, cane seed, planting, first uphilling, roads and bridges). See footnotes 11 and 12.
10/ Borrowed from TRDB with an interest rate of 8½% p.a. (farm tools replaced every eleventh years).
11/ Operations performed by KSC at Tsh 2,967 (75-76), 3,264 (76-77), 3,590 (77-78) per acre; base price in 73-74 - Tsh 2,452 per acre. Price increase @ 10% p.a. upto 77-78.
12/ For land development costs deducted by KSC from price of cane on the basis of 9% annuity over 6 years at Tsh 27.50 per ton for 48,000 tons of sugarcane.
13/ Repaid over 3 years, with full capital repayment in the 3rd year.
14/ 10% of village income.
15/ Net village disposable farm income distributed to 80 families(each family of 2 adults and 3 children on an average).
16/ See footnote 8.

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ANNEX 6
Table 1

ANNEX 6
Table 5

TANZANIA

KILOMBERO SUGAR PROJECT

Estimated of Average Costs, Yields and Cash Income from Farmers' Crops per Acre

Item	Rainfed Cane	Rainfed Rice	Rainfed Maize
Land development, preparation, seedcane planting/replanting 1/ and uphilling	456	-	-
Cane transportation 1/	300	-	-
Farm tools	20	20	20
Seed	-	22	5
Total Cost	776	42	25
Yield/acre	30 tons	560 kg	500 kg
Price (Tsh) 1/	50.00/ton	0.55/kg	0.35/kg
Gross Income (Tsh)	1,500.00	308.00	175.00
Net Income (Tsh)	724.00	266.00	150.00
Man-days	50	85	80
Income per man-day	14.48	3.13	1.88

1/ At base prices for costs and sugarcane.

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TANZANIA

KILOMBERO SUGAR PROJECT

Kilosa District Development Corporation (KDDC) Farm Budget

Income Statement and Cash Forecast
(Tsh)

	75-76	76-77	77-78	78-79	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90
INCOME STATEMENT															
Sugarcane income	-	1,359,072	3,097,536	3,416,400	3,416,400	3,416,400	3,416,400	3,416,400	3,416,400	3,416,400	3,416,400	3,416,400	3,416,400	3,416,400	3,416,400
OPERATING COSTS															
Staff Costs	242,409	529,361	779,135	797,881	797,881	797,881	797,881	797,881	797,881	797,881	797,881	797,881	797,881	797,881	797,881
Farm Tools 1/	10,900	17,820	10,527	1,210	-	-	-	-	-	-	12,100	19,602	10,527	1,210	-
Land preparation, seed cane and planting;															
Charges for replanting 2/	-	-	-	784,368	784,368	784,368	784,368	784,368	784,368	784,368	784,368	784,368	784,368	784,368	784,368
Cane transportation 3/	-	267,696	594,048	655,200	655,200	655,200	655,200	655,200	655,200	655,200	655,200	655,200	655,200	655,200	655,200
Vehicle running, maintenance and repairs 4/	18,150	19,965	22,962	22,962	22,962	22,962	22,962	22,962	22,962	22,962	22,962	22,962	22,962	22,962	22,962
Building maintenance 5/	-	37,268	54,505	67,178	67,178	67,178	67,178	67,178	67,178	67,178	67,178	67,178	67,178	67,178	67,178
Sundries	2,000	3,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
Total Operating Costs	273,459	875,110	1,466,177	2,333,799	2,332,589	2,332,589	2,332,589	2,332,589	2,332,589	2,332,589	2,344,689	2,352,191	2,343,116	2,333,799	2,332,589
CASH FORECAST															
INFLOW															
Gross Income	(273,459)	483,962	1,631,359	1,082,601	1,803,811	1,083,811	1,083,811	1,083,811	1,083,811	1,083,811	1,071,711	1,064,209	1,073,284	1,082,601	1,083,811
Government grant for land development 6/	454,740	500,292	275,184	-	-	-	-	-	-	-	-	-	-	-	-
Government grant for buildings, vehicles & equip. 6/	104,745	43,092	31,682	-	-	-	-	-	-	-	-	-	-	-	-
Long-term loan for land development 7/	1,364,220	1,500,876	825,552	-	-	-	-	-	-	-	-	-	-	-	-
Long-term loan for building, vehicle & equipment 8/	314,235	129,276	95,046	-	-	-	-	-	-	-	-	-	-	-	-
Short-term loan (working capital) 9/	340,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Cash Inflow	2,304,481	2,657,498	2,858,823	1,082,601	1,083,811	1,083,811	1,083,811	1,083,811	1,083,811	1,083,811	1,071,711	1,064,209	1,073,284	1,082,601	1,083,811
OUTFLOW															
Land Development 10/	1,818,960	2,001,168	1,100,736	-	-	-	-	-	-	-	-	-	-	-	-
Buildings	372,680	172,368	126,728	-	-	-	-	-	-	-	-	-	-	-	-
Office furniture & equipment	10,000	-	-	-	-	-	-	-	-	-	14,000	-	-	-	-
Vehicle 11/	36,300	-	-	-	-	43,900	-	-	-	-	43,900	-	-	-	-
Income Tax	-	-	365,990	192,610	193,184	193,184	193,184	193,184	193,184	193,184	188,344	264,557	418,621	422,348	422,832
Debt Servicing:															
Land development 12/	-	253,282	521,914	575,640	575,640	575,640	575,640	575,640	575,640	575,640	575,640	376,085	-	-	-
Buildings & equipment 13/	23,568	33,264	40,392	40,392	92,765	110,383	120,680	113,995	107,215	100,483	41,379	17,029	-	-	-
Short-term loan (working capital) 14/	28,900	28,900	368,900	-	-	-	-	-	-	-	-	-	-	-	-
Total Cash Outflow	2,290,408	2,488,982	2,524,660	808,642	861,589	923,107	889,504	882,819	876,039	869,307	863,263	657,671	418,621	422,348	422,832
Cash Balance	14,073	168,516	334,163	273,959	222,222	160,704	194,307	200,992	207,772	214,504	208,448	406,538	654,663	660,253	660,979

1/ Farm tools with base price at Tsh 100 per unit in 1975-76 with 10% increase p.a. upto 77-78, constant thereafter. 109 units in 75-76 and 85-86; 162 units in 76-77 and 86-87; 87 units in 77-78 and 87-88 and 10 units in 78-79 and 88-89.
2/ Base price per acre (73-74) - Tsh 1,716; with 10% p.a. increase upto 77-78, pricer per acre from 78-79 onwards would be Tsh 2,514.
3/ Base price per ton (73-74) - Tsh 10, with 10% p.a. increase upto 77-78, price per ton in 76-77 would be Tsh 13, and from 77-78 onwards would be Tsh 14.
4/ At Tsh 15,000 in 73-74, and increase at 10% p.a. upto 77-78, constant thereafter.
5/ At 10% capital costs.
6/ 25% capital costs borne by Government as grant.
7/ Loan advance by KSC for land development to be repaid with 9% interest p.a. over 11 years to be deducted from cane price.
8/ Loan from TRDB at 7½% interest p.a. repaid over 10 years with 4 years grace for capital repayment.
9/ Borrowed from TRDB at 8½% interest p.a. repaid over 3 years; capital repaid in third year.
10/ Base price (73-74) - Tsh 2,409 per acre, with 10% increase p.a. upto 77-78, price per acre in 75-76 would be Tsh 2,919, in 76-77 Tsh 3,207 and in 77-78 Tsh 3,528.
11/ Cost of one vehicle. Base price of one vehicle Tsh 30,000 in 73-74 and 10% increase p.a. upto 77-78, constant thereafter.
12/ Deducted by KSC from cane price on the basis of 9% annuity over 11 years at Tsh 12.30 per ton for 468,000 tons of sugarcane.
13/ Loan from TRDB at 7½% interest p.a., repaid over 10 years with 4 years grace for capital repayment.
14/ Borrowed from TRDB at 8½% interest p.a., repaid over 3 years; capital repaid in third year.

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TANZANIA

KILOMBERO SUGAR PROJECT

Machinery Costs and Requirements

Tractors for Land Clearing, Preparation and Planting

1. Land clearing and preparation can only be executed during the dry season. As an average this season runs from 1st May up to 20th December, comprising 234 calendar days. For calculation purposes and to allow for a reduction of days for breakdowns, illness of drivers, down hours in the Tractor Workshop, and interruptions due to rain showers, a month has been taken as 24 working days, the dry season thus comprising about 164 working days.

2. The planting of irrigated cane should be carried out as soon as possible. The planting of rainfed cane has to wait for the onset of the rainy season; the land clearing and preparation for rainfed cane land should be scheduled right before the onset of the rains, to be finished before 20th December.

3. The operational capacities in acres per working day for the various tractor types are given in Table 1. Tractor requirements are summarized below:

Fiscal Years	1974/75	1975/76	1976/77	1977/78
180 HP-crawlers (C180)	16	16	16	12
105 HP-crawlers (C105)	2	2	2	2
75 HP-crawlers (C75)	7	7	7	5
75 HP-wheel tractors (W75)	3	4	3	3

The tractors needed in the fiscal year 1974/75 (May-Dec.), should be purchased for delivery as early as possible in the period, or hired, although even with a delay in delivery to 1st October the clearing and planting program for the dry season 1974 could still be achieved. As of June 1974, procurement procedures are well in hand and should permit this schedule to be achieved.

4. Purchase costs of tractors and implements at December 1973 prices are given in Table 2. Tractor hours per acre, cost of operation per acre, and total costs of land clearing and preparation are shown in Table 3. The average total cost per acre is calculated at Tsh 824.

Estate Cropping Operations: Tractors Requirement and Working Days

5. The land clearing and preparation operations are directly followed by planting, and crop maintenance of plant cane (starting 1974/75) and ratoons (from 1975/76). The first replanting will be done in 1977/78. All estate operations except cutting are mechanized. From planting on, however,

the outgrowers take care of the maintenance of their crop, as they will do also for all their ratoons. The operational hours are summarized in Table 4 and the operational costs in Table 5.

6. Estimates of tractor requirements for cropping operations have been developed starting from areas to be cultivated, with speed of operations based on K I experience, and climatic limits. Considerations taken into account include:

(a) irrigated cane has to be planted early in the dry season and rainfed cane at the onset of the rains in December. For rainfed cane the operations following planting have to be performed in dry spells during the wet months of January and February. This necessitates quick performance calling for extra capacity in tractors and implements;

(b) maintenance of nurseries and irrigated cane is carried out during the first half of the dry season, and rainfed cane in the second half of the dry season, so that maintenance operations do not overlap. The biggest number of tractors needed in a cropping year is therefore the number needed by the biggest category of cane. In 1975/76 this would be the irrigated cane and nurseries category;

(c) trashraking (on ratoons) chiselling and herbicide spraying can be executed in the dry season, but fertilizing and ratoon reshaping can only be done after the onset of the rains, the latter only after the rains have resulted in new growth of the cane;

(d) replanting needs 6 operations from uprooting the cane stools of the harvested 5th cuttings and preparations of the land to replant. The following 5 operations, planting through uphilling, comprise the maintenance of the replanted crop. Experience might result in reduction of some land preparation operations such as deep ploughing, planning and TRCH-Harrowing, but allowance has been made for these.

Tractors Needed for All Cropping Operations

7. The total number of tractors needed for maintenance of replantings is given in Table 6. At the end of this table is shown the kinds and quantities of tractors needed per cropping year. Those for 1974/75 should be available at K II at October 1, 1974 at latest.

Implements Needed for Subsequent Operations

8. The implements needed subsequently are scheduled for the period 1974/75-1978/79 in Table 7.

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KILOMBERO SUGAR PROJECT

Tractor Capacities
(Land Clearing and Preparation, Planting, and Cropping)

Operation	Tractor[1/]	Work Rate	Cane Type[2/]
a. Clearing, Preparation and Planting			
Treedozing	C 180	1.00 acres per hour	
Clearing and Piling	C 180	0.34 acres per hour	
Ripping	C 180	0.92 acres per hour	
Levelling	C 75	0.42 acres per hour	
TRCH Harrowing	C 180	1.00 acres per hour	
Harrowing	C 105	2.00 acres per hour	
Furrowing	C 105	2.00 acres per hour	
Planting	W 75	1.00 acres per hour	
b. Subsequent Operations			
Trashraking	W 65	2.27 acres per hour	(R)
Chiselling	W 47	1.43 acres per hour	(F, R, P)
Fertilizing	W 65	1.43 acres per hour	(F, R, P)
Ratoon Reshaping	W 75-HC	1.89 acres per hour	(R)
Herbidice Spraying	W 65-HC	2.86 acres per hour	(F, R, P)
Uphilling	W 65-HC	1.54 acres per hour	(F,P)
Stubble Ploughing	W 65	0.70 acres per hour	(P)
Deep Ploughing	W 92	0.55 acres per hour	(P)
Planing	C 105	1.22 acres per hour	(P)
TRCH Harrowing	C 180	1.10 acres per hour	(P)
Harrowing	C 105	1.90 acres per hour	(P)
Furrowing	C 105	2.00 acres per hour	(P)

1/ C = Crawler, W = Wheeled, HC = High clearance. Figures are HP. Equivalents used on K I are:

C 75 - Caterpillar D4
C 105 - Caterpillar D5
C 180 - Caterpillar D7
W 47 - Massey Ferguson 135
W 65 - Massey Ferguson 165
W 75 - Massey Ferguson 185
W 92 - Massey Ferguson 1080

2/ F= First planting.
R = Ratoon
P = Replanting

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Unit Cost of Tractors and Implements

A. Tractors. For 1974 the purchase costs of the needed tractors, based on December 1973 prices, will be:

16 C 180 crawlers x Tsh 378,000	=	Tsh	6,048,000
2 C 105 crawlers x Tsh 248,000	=		496,000
7 C 75 crawlers x Tsh 153,000	=		1,071,000
4 W 75 wheel tractors x Tsh 53,000	=		212,000
Total	=		7,827,000

B. Tractor Implements

For treedozing, 3 treerakes @ Tsh 28,000	=	84,000
For clearing and piling, 8 clearing rakes @ Tsh 40,000	=	320,000
For ripping, 3 rippers @ Tsh 8,000	=	24,000
For levelling, 7 planers @ Tsh 70,000	=	490,000
For TRCH harrowing, 4 harrows @ Tsh 55,000	=	220,000
For shallow harrowing, 2 harrows @ Tsh 100,000	=	200,000
For furrowing, 2 furrowers @ Tsh 7,500	=	15,000

Additional

Stubble ploughs, 2 @ Tsh 20,000	=	40,000
Deep ploughs, 5 @ Tsh 10,000	=	50,000
Dozerblades: for C 108, 8 blades @ Tsh 62,000	=	496,000
C 105, 2 blades @ Tsh 35,000	=	70,000
C 75, 7 blades @ Tsh 31,000	=	217,000
Total		2,226,000

For Planting

4 caneplanters @ Tsh 17,500	=	70,000
Total Tractors and Implements	=	Tsh 10,123,000

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Land Clearing, Preparation and Mechanical Cultivation Costs

Clearing and Preparation			1974/75	1975/76	1976/77	1977/78	Total
Acres milling cane and nurseries			2,160	3,880	2,420	1,240	9,700
Required Tractor Hours							
Operation	Tractor	Hours/ Acre					
Treedozing	C 180	1.00	2,160	3,880	2,420	1,240	
Clearing and Piling	C 180	2.94	6,350	11,407	7,115	3,647	
Ripping	C 180	1.09	2,354	4,229	2,638	1,352	
Levelling	C 75	2.38	5,141	9,234	5,760	2,951	
TRCH harrowing	C 180	1.00	2,160	3,880	2,420	1,240	
Harrowing	C 105	0.50	1,080	1,940	1,210	620	
Furrowing	C 105	0.50	1,080	1,940	1,210	620	
Total			20,325	36,510	22,773	11,670	
Cost in Tsh		Tsh/hr					
Treedozing	C 180	121	261,360	469,480	292,820	150,040	
Clearing and Piling	C 180	121	261,360	469,480	292,820	150,040	
Ripping	C 180	121	261,360	469,480	292,820	150,040	
Levelling	C 75	85	183,600	329,800	205,700	105,400	
TRCH harrowing	C 180	162	349,920	628,560	392,040	200,880	
Harrowing	C 105	101	218,160	391,880	244,420	125,240	
Furrowing	C 105	113	244,080	438,440	273,460	140,120	
Total			1,779,840	3,197,120	1,994,080	1,021,760	

Mechanical Cultivation

Operation	Tractor Type	Cost/hr
Stubble ploughing	W 65	23
Deep ploughing	W 92	107
Planing	C 105	100
TRCH harrowing	C 180	162
Harrowing	C 105	101
Furrowing	C 105	113
Planting	W 75	24
Fertilizing	W 65	18
Herbicide spraying	W 65-HC	24
Chiselling	W 47	11
Uphilling	W 65-HC	28
Ratoon reshaping	W 75-HC	32
Trashraking	W 65	18

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KILOMBERO SUGAR PROJECT

Estate Cropping Operations Tractor Hours

Fiscal Year		1974/75	1975/76	1976/77	1977/78	1978/79	Total
Acres		2,160	3,880	2,420	1,240	-	9,700 1/
First Planting After Clearing	Hrs/Acre						
Planting	1.00	2,160	3,880	2,420	1,240	-	-
Fertilizing	0.70	1,512	2,716	1,694	868	-	-
Herbicide Spraying	0.35	756	1,358	847	434	-	-
Chiselling	0.70	1,512	2,716	1,694	868	-	-
Uphilling	0.65	1,404	2,522	1,573	806	-	-
Acres		-	2,160	5,080	5,840	5,840	3,680 2/
Estate Cuttings II-V							
Trashraking	0.44	-	950	2,235	2,570	-	-
Chiselling	0.70	-	1,512	3,556	4,088	-	-
Fertilizing	0.70	-	1,512	3,556	4,088	-	-
Ratoon Reshaping	0.53	-	1,145	2,692	3,095	-	-
Herbicide Spraying	0.35	-	756	1,778	2,044	-	-
Acres		-	-	-	700 3/	2,380 4/	-
Replanting							
Estate and Outgrowers							
Stubble ploughing	1.40	-	-	-	980	3,332	-
Deep ploughing	1.80	-	-	-	1,260	4,284	-
Planing	0.80	-	-	-	560	1,904	-
TRCH harrowing	0.92	-	-	-	644	2,190	-
Harrowing (2x)	0.53	-	-	-	371	1,261	-
Furrowing	0.50	-	-	-	350	1,190	-
Planting	1.00	-	-	-	700	2,380	-
Estate Only							
Fertilizing	0.70	-	-	-	490	1,666	-
Herbicide Spraying	0.35	-	-	-	245	833	-
Chiselling	0.70	-	-	-	490	1,666	-
Uphilling	0.65	-	-	-	455	1,547	-

1/ Including nurseries, excluding old outgrowers.
2/ Outgrowers ratoons will be maintained by themselves.
3/ Estate's CI and nurseries (460+240)acres.
4/ Including old and new outgrowers land to guarantee a good crop (920acres).

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Estate Cropping Operations Costs in Tsh

Fiscal Year			1974/75	1975/76	1976/77	1977/78	1978/79
First Planting Acres			2,160	3,880	2,420	1,240	-
Operations	Tractor	Tsh Cost Hour					
Planting	W 75	24	51,840	93,120	58,080	29,760	-
Fertilizing	W 65	18	38,880	69,840	43,560	22,320	-
Herbicide Spraying	W 65-HC	24	51,840	93,120	58,080	29,760	-
Chiselling	W 47	11	23,760	42,680	26,620	13,640	-
Uphilling	W 65-HC	28	60,480	108,640	67,760	34,720	-
Total			226,800	407,400	254,100	130,200	-
Tsh/acre			105	105	105	105	-
Estate Cuttings II-V Acres			-	2,160	5,080	5,840	5,840
Trashraking	W 65	18	-	38,880	91,440	105,120	-
Chiselling	W 47	11	-	23,760	55,880	64,240	-
Fertilizing	W 65	18	-	38,880	91,440	105,120	-
Ratoon Reshaping	W 75-HC	32	-	69,120	162,560	186,880	-
Herbicide Spraying	W 65-HC	24	-	51,840	121,920	140,160	-
Total			-	222,480	523,240	601,520	-
Tsh/acre			-	103	103	103	
Replanting Acres							
Estate and Outgrowers							
Stubble ploughing	W 65	23	-	-	-	16,000	54,740
Deep ploughing	W 92	107	-	-	-	74,900	254,660
Planing	C 105	100	-	-	-	70,000	238,000
TRCH harrowing	C 180	162	-	-	-	113,400	385,560
Harrowing	C 105	101	-	-	-	70,700	240,380
Furrowing	C 105	113	-	-	-	79,100	268,940
Planting	W 75	24	-	-	-	16,800	57,120
Estate Only							
Fertilizing	W 65	18	-	-	-	12,600	42,820
Herbicide Spraying	W 65-HC	24	-	-	-	16,800	57,120
Chiselling	W 47	11	-	-	-	7,700	26,180
Uphilling	W 65-HC	28	-	-	-	19,600	66,640
Total			-	-	-	497,600	1,692,160
Tsh/acre			-	-	-	711	711

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Total Tractor Requirement for Caneland

Fiscal Year	1974/75	1975/76	1976/77	1977/78	1978/79
Land Clearing and Preparation Tractors					
C 180	16	16	16	12	-
C 105	2	2	2	2	-
C 75	7	7	7	5	-
First Planting					
W 75	3	4	3	3	-
Maintenance first planted estate cane, estate ratoons, land preparation and replanting of estate and outgrowers' land, and maintenance of estate replanted land.					
C 180	-	-	-	1	3
C 105	-	-	-	3	7
C 75	-	-	-	-	-
W 92	-	-	-	2	5
W 75	3	4	3	3	4
W 75-HC	-	3	5	5	5
W 65	2	8	12	16	18
W 65-HC	3	5	8	10	11
W 47	2	5	8	10	10
Plant. mach.	3	4	3	3	4
Combined total of tractors for the caneland.					
C 180	16	16	16	13	3 onward
C 105	2	2	2	5	7 "
C 75*	7	7	7	5	- "
W 92	-	-	-	2	5 "
W 75	6	8	6	6	4 "
W 75-HC	-	3	5	5	5 "
W 65	2	8	6	6	4 "
W 65-HC	3	5	8	10	11 "
W 47	3	5	8	10	10 "
Plant. mach.	3	4	3	3	4 "

* one to be added for road construction and maintenance.

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A. Implements Needed for Crop Maintenance and Replanting Preparations

Fiscal Year	1974/75	1975/76	1976/77	1977/78	1978/79
Fertilizer hoppers	2	6	8	8	6
Herbicide sprayers	1	3	6	6	5
Chiselling units	2	5	8	8	6 1/
Uphillers	2	2	2	4	4 2/
Trashrakes	-	2	4	4	4
Ratoon reshapers	-	3	5	5	5
Stubble ploughs	-	-	-	2	4
Deep ploughs	-	-	-	2	5
Levellers	7	7	7	6	2
TRCH harrows	2	2	2	3	3
Harrows	1	1	1	2	3
Furrowers	1	1	1	2	2

B. For Land Clearing and Preparation Operations, Included in A Above

Levellers	7	7	7	5	-
TRCH harrows	2	2	2	2	-
Harrows	1	1	1	1	-
Furrowers	1	1	1	1	-

C. Dozerblades for Crawlers

C 180	8	8	8	6	3
C 105	2	2	2	2	-
C 75	4	4	4	2	2

D. For Land Clearing and Preparation Operations (additional to B)

Treerakes	3	3	3	2	-
Piling rakes	8	8	8	6	-
Rippers	3	3	3	2	-

1/ Cultivator sets.
2/ Moulding sets.

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Total Equipment, Quantities and Costs for Clearing, Preparation, Crop Maintenance, and Harvesting
(Tsh '000)

				Fiscal Year									
				1974/75		1975/76		1976/77		1977/78		1978/79	
	Unit Price Tsh 1,000	No.	Total	No.	Cost	No.	Cost	No.	Cost	No.	Cost	No.	Cost
Crawler Tractors													
C 180	350	16	5,600	16	5,600	-	-	-	-	-	-	-	-
C 105	225	7	1,575	2	450	-	-	-	-	3	675	2	450
C 75	140	8	1,120	8	1,120	-	-	-	-	-	-	-	-
Wheel Tractors													
W 92	98	5	490	-	-	-	-	-	-	2	196	3	294
W 75	53	8	424	6	318	2	106	-	-	-	-	-	-
W 75-HC	56	5	280	-	-	3	168	2	112	-	-	-	-
W 65-HC	45	11	495	3	135	2	90	3	135	2	90	1	45
W 47	33	12	396	5	165	2	66	3	99	2	66	-	-
Total			10,380		7,788		430		346		1,027		789
Tractor Implements													
Treerakes	28	3	84	3	84	-	-	-	-	-	-	-	-
Clearing rakes	40	8	320	8	320	-	-	-	-	-	-	-	-
Rippers	8	3	24	3	24	-	-	-	-	-	-	-	-
Levellers	70	7	490	7	490	-	-	-	-	-	-	-	-
TRCH-Harrows	55	4	220	4	220	-	-	-	-	-	-	-	-
Harrows	100	2	200	2	200	-	-	-	-	-	-	-	-
Furrowers	7.5	2	15	2	15	-	-	-	-	-	-	-	-
Stubble ploughs	20	3	60	2	40	-	-	-	-	-	-	1	20
Deep ploughs	10	5	50	-	-	-	-	-	-	2	20	3	30
Cane planters	17.5	4	70	4	70	-	-	-	-	-	-	-	-
Fertilizer hoppers	10	8	80	2	20	4	40	2	20	-	-	-	-
Herbicide sprayers	15	6	90	1	15	3	45	2	30	-	-	-	-
Cultivators	4	8	32	2	8	3	12	3	12	-	-	-	-
Moulding sets	10	4	40	2	20	-	-	-	-	2	20	-	-
Trashrakes	5	4	20	-	-	2	10	2	10	-	-	-	-
Ratoon reshapers	10	5	50	-	-	3	30	2	20	-	-	-	-
Total			1,845		1,526		137		92		40		50
Dozerblades For:													
C 108	62	8	496	8	496	-	-	-	-	-	-	-	-
C 105	35	2	70	2	70	-	-	-	-	-	-	-	-
C 75	31	7	217	7	217	-	-	-	-	-	-	-	-
Total			783		783		-		-		-		-
Roads and Bridges													
Graders	175	2	350	2	350	-	-	-	-	-	-	-	-
Roadrollers	50	1	50	1	50	-	-	-	-	-	-	-	-
Rotary cutters	6.5	2	13	2	13	-	-	-	-	-	-	-	-
Molasses Tank	7.5	1	7.5	1	7.5	-	-	-	-	-	-	-	-
Total			420.5		420.5		-		-		-		-
Various Transports													
Lowloader	50	1	50	1	50	-	-	-	-	-	-	-	-
Jumbo crane	125	1	125	1	125	-	-	-	-	-	-	-	-
Cesspool emptier	10	1	10	-	-	1	10	-	-	-	-	-	-
Firing trailer	75	1	75	-	-	1	75	-	-	-	-	-	-
Total			260		175		85		-		-		-
Vehicles and Motorcycles													
Pickup cars	38	11	418	8	304	3	114	-	-	-	-	-	-
Small buses	55	1	55	1	55	-	-	-	-	-	-	-	-
Saloon cars	40	1	40	1	40	-	-	-	-	-	-	-	-
4-Wheel drive cars LB	35	2	70	1	35	1	35	-	-	-	-	-	-
4-Wheel drive cars SB	30	4	120	3	90	1	30	-	-	-	-	-	-
Ambulance	60	1	60	1	60	-	-	-	-	-	-	-	-
Motorcycles	3.5	12	42	6	21	6	21	-	-	-	-	-	-
Lorries	65	1	65	1	65	-	-	-	-	-	-	-	-
Tippers	73	9	657	9	657	-	-	-	-	-	-	-	-
Total			1,527		1,327		200		-		-		-
Harvesting													
W80 tractor	85	25	2,125	-	-	18	1,530	7	595	-	-	-	-
W65 tractor	52	146	7,592	4	208	90	4,680	42	2,184	8	416	2	104
Lighting units	20	4	80	-	-	4	80	-	-	-	-	-	-
Sideload units	24	190	4,560	-	-	125	3,000	50	1,200	15	360	-	-
Pullers	10	8	80	-	-	6	60	2	20	-	-	-	-
Frames for pullers	3	8	24	-	-	6	18	2	6	-	-	-	-
Winches	22.5	6	135	-	-	4	90	2	45	-	-	-	-
Trailers	7.5	12	90	-	-	7	52.5	5	37.5	-	-	-	-
Total			14,686		208		9,510.5		4,087.5		776		104
Grand Total (Excludes Spares)			29,901.5		12,227.5		10,362.5		4,525.5		1,843		943

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Training Requirements

1. Because of the shortage of suitably trained manpower in Tanzania particularly at technical and higher levels, the Kilombero Sugar Company has experienced difficulties in recruiting adequate staff. The supply of trained personnel will continue to be limited for the foreseeable future and KSC has, therefore, developed a system to upgrade its staff at all levels. This consists of in-company training schemes coupled with the provision of fellowships for selected staff at institutions inside and outside Tanzania. These programs need to be expanded and strengthened to meet the training needs of K II as well as to contribute to further demands for skilled manpower resulting from the anticipated expansion of the Tanzanian sugar industry.

2. A study of the training requirements for the Tanzania sugar industry as a whole was prepared by a team of consultants provided under Dutch assistance in 1972. The report proposed the establishment of a Central Training Center (CTC), located near one of the larger existing estates, to be used for training and upgrading middle and lower level supervisory personnel, and for a number of Local Training Centers (LTC) to be established near the estates for training and upgrading of lower level workers. Government has concluded, and the mission agrees, that while the establishment of such a national sugar training scheme could assist the sugar industry in alleviating its manpower constraints, the present system of in-plant training coupled with sponsorship of employees on selected courses in Tanzania and overseas, forms the most suitable training system for the Project and for the needs of the sugar industry in general. Supervised specific on-the-job training coupled with day release classes and the provision of training materials can be made more relevant to middle and lower level jobs on the sugar estate than more formal full-time courses away from the place of work. In addition, more personnel can be released for training at any time. This is of special importance in the case of K II where the operatives, particularly for the new factory, will have to be trained within a short time period. Senior level staff and potential senior staff will, in addition to learning skills from their expatriate counterparts and supervisors, be offered fellowships both in Tanzania and abroad.

3. The present Kilombero Sugar Company training system will have to be made more comprehensive and vigorous to meet the needs of the Project. When the new factory becomes operational, experienced personnel will be divided between K I and K II. New staff will be recruited for on-the-job training well in advance of when they will be required to start performing their duties and trained in K I. A training coordinator/instructor, expected to be an expatriate with experience in training for the sugar industry, will be recruited under the Project. He will review and upgrade the present training

courses, curricula and procedures and supervise the senior and supervisory staff who are responsible for such instruction. More supervisory personnel than are strictly needed for management purposes will be recruited in order that they can devote time to training. It is also proposed that compulsory classes during work hours will be introduced (at present, instruction is given after work with the result that many potential participants do not attend and those that do are tired and find it difficult to concentrate) and provision is made for duplicate staffing to allow such release. Provision for training equipment and materials to be located in existing and new workshops and facilities is also provided under the Project, and support for the fellowship program will be made available, and an element has been included in the turn-key package for senior management training.

Field Department Personnel

4. Little difficulty is expected in recruiting suitably trained agricultural personnel at the junior management and supervisory levels. Graduates are available from University's Faculty of Agriculture in Morogoro for assistant field managers and section managers. Adequate numbers of "certificate" holders, who have undergone two years post secondary school training in agriculture, are expected to be available for the foremen posts. Personnel will be recruited about one year in advance of when they are actually needed and be given on-the-job training by existing staff. KSC will continue to sponsor selected employees for full-time training at Morogoro Agricultural College. Some employees will be sponsored for certain specialized overseas courses which are not available in Tanzania, e.g., in Agricultural Management at Managa in Swaziland. At the lower levels, headman and semi-skilled workers will be given on-the-job training by the supervisory staff; in the past such training has proved to be adequate.

Transportation Department and Tractor Workshops

5. Reflecting the overall country situation, shortages of skilled mechanics and engineers for the tractor and factory workshops are particularly severe. Instruction is presently given by foremen after work hours, some of whom have been sent to specialized overseas vocational training courses. The National Industrial Training Center, which is assisted by UNDP/ILO and located in Dar-es-Salaam, has established a series of trade tests and examiners visit the estates once per year to conduct examinations; however, results so far have not been encouraging. In order to meet the manpower requirements for K II it will be necessary to upgrade and strengthen the present workshop training schemes. The proposed training officer would have to give particular attention to this area. Training manuals need to be developed and compulsory

instruction should be introduced. Provision would also be made for fellowships for technical training in Tanzania and abroad for supervising personnel. No difficulties in recruiting sufficient drivers are expected; special training sessions are held for a few days prior to the commencement of the session.

Training of Factory Personnel

6. The new K II factory is in the fortunate position of being developed under the common management of the existing K I factory. Kilombero Sugar Company management will be able both to use the existing factory to train new personnel and also to allocate manpower among the two factories to utilize experienced personnel in key positions for startup and operation of the new K II factory. The training program will include double manning of about 50-factory positions with new personnel and upgrading of existing factory personnel. A list of positions it would be appropriate to double-man and the training period for K II is shown in Table 1. Over-manning would continue thereafter as needed for new sugar developments.

Technical Department

7. In common with the tractor workshop, this department has experienced great difficulties in recruiting and upgrading suitable Tanzanian supervisory staff and skilled and semi-skilled tradesman. On-the-job training schemes have been developed in cooperation with the National Industrial Training Center but these need strengthening. Skilled workers who will be employed in assembling the new factory are expected to be available for employment as operational personnel. The company's sponsorship scheme for students studying for certificate and diploma courses at the Dar-es-Salaam Technical College will be expanded under the Project.

Processing Department

8. The processing department has developed a systematic in-house training program with most formal instruction being conducted in the non-milling season. One supervisor devotes most of his time for training. Examinations, which are used as the basis of promotion, are held annually. Provision for overseas training in sugar processing has been included in the Project.

Other Departments

9. It is expected that one employee from the Civil Engineering Department will be sponsored at Dar-es-Salaam Technical College. Employees in Administration will be sponsored for accounting degrees, secretarial and correspondence courses.

10. As a result of the improved training schemes which will be instituted under the Project, the field, administration and processing departments of KSC are expected to become almost completely localized within the Project period: seven or eight of the initial ten senior expatriate posts would probably be filled by Tanzanians. However, although the Dar-es-Salaam Technical College and the newly instituted engineering course at the University are expected to produce an increasing number of engineers, severe country-wide shortage of such personnel will continue for some considerable time. The senior engineering staff of KSC will not, therefore, be fully Tanzanian until well after the Project period.

11. Cost estimates for the training program are shown in Annex 13, Table 5.

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Training-Factory Staff

	Trainees	Training in Period: May 1975 to Apr. 1976 No. Date	Training in Period: Apr. 1976 to May 1977 No. Date
TECHNICAL DEPARTMENT			
Administration			
Clerk	2	1 - May 75	1 - Aug. 76
Draftsman	1		1 - Aug. 76
Asst. Purchasing Officer	1		1 - Apr. 76
FACTORY			
Cane House			
Crane Operators	12		12 - Aug. 76
Cane Table Operators	3		3 - Aug. 76
Headman	3		3 - July 76
Milling/Diffusion Plant			
Mill Attendants	9		9 - July 76
Diffuser Operators	3		3 - July 76
Steam Generation Plant			
Feedwater Station			
Attendants	6		6 - July 76
Bagasse System			
Carrier Attendants	3		3 - Aug. 76
Boilers			
Laborers	9		9 - July 76
Operators	6	3 - May 75	3 - Jun. 76
Power Generation Plant			
Power House			
Engine Attendant	3	3 - May 75	
Switchboard Operator	3		3 - Jun. 76
Foreman	3	3 - May 75	
Pump Station			
Engine Attendant	3	3 - May 75	

	Trainees	Training in Period: May 1975 to Apr. 1976 No. Date	Training in Period: Apr. 1976 to May 1977 No. Date
FACTORY (Cont.)			
Shift Repair & Maintenance			
Mechanics	9		9 - July 76
Plant Repair & Maintenance			
Fitters	18		18 - Jul. 76
Welders	4		4 - Jul. 76
Foreman	1		1 - May 76
WORKSHOPS			
Stores			
Laborers	3		3 - Aug. 76
Attendants	1		1 - Jul. 76
Mechanical Workshop			
Machine Operators	10	5 - May 75	5 - Aug. 76
Machine Foreman	1	1 - May 75	
Fitters	10		10 - Aug. 76
Fitter Foreman	1		1 - Aug. 76
Welders	4	2 - May 75	2 - Aug. 76
Welder Foreman	1	1 - May 75	
Steel Sawer	1		1 - Aug. 76
Foundry Molder	2	1 - May 75	1 - Aug. 76
Blacksmith	2	1 - May 75	1 - Aug. 76
Electrical Workshop			
Laborers	2		2 - Aug. 76
Electricians	8	3 - May 75	5 - Jul. 76
Foreman	2	1 - May 75	1 - Jul. 76
Instrument Workshop			
Mechanics	5	2 - May 75	3 - Jul. 76
PROCESSING DEPARTMENT			
Administration			
Chief Clerk	1		1 - Jul. 76

	Trainees	Training in Period May 1975 to Apr. 1976 No.	Date	Training in Period Apr. 1976 to May 1977 No.	Date
PROCESSING DEPARTMENT (Cont.)					
Cane Weighbridge					
Attendant	4			4	Aug. 76
Clerk	2			2	Jul. 76
Laboratory					
Analysts	6			6	Jul. 76
Head Analysts	3	3	May 75		
Juice Processing Plant					
Clarification Station					
Operator	3			1	Jul. 76
Evaporator Station					
Operator	3			1	Jul. 76
Processing Foreman	3	3	May 75		
Sugar Processing Plant					
Sugar Boiling Station					
Sugar Boilers	9	9	May 75		
Head Sugar Boiler	3	3	May 75		
Centrifugal Station					
Headman	3	3	May 75		
Sugar Bagging and Storage					
Jute Bag Supply					
Filter Cloth & Bag Sewer	1			1	Aug. 76
Sugar Godown					
Laborers	15			15	Aug. 76
Headman	1			1	Jul. 76
Supervisor	1			1	Jul. 76

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Terms of Reference for the Development of Sugar in Tanzania

A. Background

1. Tanzania currently obtains its domestic sugar production from four estates: Tanganyika Planting Company, Mtibwa, Kagera and Kilombero. Recent production has been about 90,000 m tons per year and 45,000 m tons was imported in 1972 to meet domestic demand. Expansion programs have been prepared and undertaken by the various factories and it is estimated that the results of the current programs will be largely realized by 1978 when domestic production is projected to show surplus of from 5,000 to over 35,000 m tons depending on the rate of growth of consumption. However, it is likely that the surplus production will be short-lived as deficits are likely early in the 1980's.

2. To avoid continued piecemeal growth of the domestic sugar industry, the Kilombero Sugar Project includes provision for a team of consultants for the identification of further developments in the industry. They will conduct a country-wide survey to identify potential sugar areas and prepare detail feasibility studies and programs to permit Tanzania to be self-sufficient in sugar through 1990 and a general program through 2000.

B. Objective

3. The objective of the survey will be to prepare a detailed program which will enable Tanzania to meet its internal demand for sugar from 1979 through 1990 and a general program to 2000 at the least cost to its economy. To this end, the survey will provide:

(a) an assessment of Tanzania's current and future sugar requirements, through the year 2000;

(b) a detailed program for further expansion and development of existing sugar estates, factories and related facilities if technically and economically justified;

(c) a detailed program for the development, if technically and economically justified, of sugar production in new areas including the design of pilot trials of cane cultivation; and

(d) a general program of development for the following 10-years through the year 2000.

C. Scope of Services

General

4. The consultants shall perform all agricultural, engineering and other technical studies, economic and financial analysis, and field investigation work as required to attain the objectives. The consultants shall be responsible for the analysis and interpretation of all data collected or received and for the findings, conclusions and recommendations contained in their reports.

Current and Future Sugar Demand

5. The consultants shall examine the markets for sugar, the types and quality required and methods of production and distribution. On the basis of such data and on projections of future population growth and levels of consumption, the consultants shall estimate the country's sugar requirements through 1990 and indicate the likely demand through the year 2000.

6. The consultants shall also examine the production and marketing of by-products and end-products. They shall make recommendations as to the disposal of unmarketable products taking into account environmental considerations.

Cane Production - Existing Areas

7. The consultants shall review existing agricultural practices and cane production. They shall make recommendations for:

(a) improvements in method of cultivation and agronomic practices to increase current yields;

(b) modification and improvements of outgrower production;

(c) irrigation need and usage and improvements to existing systems;

(d) modifications and improvements in present cane harvesting and transportation systems to increase efficiencies; and

(e) inputs and actions required to implement the recommendations for expansion and for increasing current production.

Sugar Production - Existing Areas

8. The consultants shall examine the present factory equipment and production systems and assess the potential for factory expansion based on the evaluation of agricultural estimates. They shall also assess the processing methods based on the type and quality of sugar demand. The consultants shall make recommendation on:

(a) the expansion potential of existing factories with estimates of equipment costs, timing and economic return;

(b) the processing method for producing the recommended type and quality of sugar; and

(c) the economic handling of by-products and end-products.

Cane and Sugar Production in New Areas

9. The consultants shall examine all available data to identify possible sites for sugar development in new areas and make a field survey of the sites. They shall evaluate the suitability of each site for sugar production and assign a priority rating to them. On sites where favorable characteristics appear to be present, the consultants shall take steps to identify the area and the extent of suitable land available for cane cultivation, the appropriate factory capacity and potential sugar production. If economic production appears feasible, the consultants will design pilot treats for cane cultivation which would cover a period of three to four years and detail the personnel, facilities and finances required. The consultants shall also prepare physical and financial projections for a full-scale project with detailed estimates of production, investment and economic returns for the sites which they recommend to meet sugar demand through 1990. They shall prepare general estimates for a program to meet sugar demand through the year 2000.

Development Program

10. Based on the forecasts for sugar demand and the analyses and evaluation of the existing sugar estates and new cane areas, the consultants shall prepare a phased program for the development of Tanzania's sugar industry. The consultants shall prepare a specific and detailed investment program through 1990 and for the next 10 years in more general form.

Project Preparation

11. Within the context of Tanzania's objective to maintain self-sufficiency in sugar, the consultants will prepare a first phase project targeted to achieve results in 1979/80 when production from current expansion programs are expected to fall short of demand. The scope of the first phase project should be sufficient with a reasonable, phased expansion program to maintain self-sufficiency at least through 1985. The project should be prepared in a form suitable for submission for financing by a bilaterial donor or an international lending agency.

D. Costs

12. Projected survey costs are shown in Annex 13, Table 1. Provision is made for:

(a) four consultants, an agriculturalist, a processing specialist, an agricultural economist, and a financial analyst;
24 man-months field work
16 man-months analysis and report preparation.
(salaries and field living expenses)

(b) local support personnel;

(c) report preparation and printing; and

(d) international and local travel.

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KILOMBERO SUGAR PROJECT

Turnkey Factory

1. A 26-month development period, including Cold Testing and Trials, is set in the contract for the factory. Included in the turnkey contract are:

(1) a complete 2,400 TCD sugar factory for producing semi-refined white sugar including steam and power generation plants;

(2) a factory workshop equipped with tools and equipment;

(3) a tractor workshop equipped with tools and equipment;

(4) a 11,000 m ton capacity sugar warehouse;

(5) a general stores warehouse equipped with racks and shelves;

(6) a fertilizer warehouse;

(7) a main office building for the administrative and agricultural department staffs;

(8) a cane weighbridge and cane storage facilities;

(9) storage tanks and other miscellaneous items in the factory compound;

(10) a river pump station, sedimentation basin, irrigation pump station and canals for factory and irrigation water supplies;

(11) a telephone system with 50 telephones;

(12) spare parts for the factory machinery and equipment.

2. After completion of construction, the turnkey contractor will supervise startup and operation of the plant for a 12-week commissioning period during which he will train operators and run performance tests. A commissioning crew of 10 specialists will be provided for commissioning, and a crew of approximately 17 men per shift, consisting of mechanics, electricians, fitters, welders and instrument men will be retained from the erection staff to assist the commissioning crew.

3. Performance guarantees for the K II factory are:

(1) 2,400 m tons of cane per 24 hours when supplied with cane with a fiber content not exceeding 15%;

(2) when operating at the capacity specified above, reduced extraction of not less than 96.5%;

(3) when crushing cane with not less than 15% fiber and under normal processing conditions no extra fuel will be required for the boilers provided that the factory is in continuous operation at 2,400 m tons of cane per 24 hours;

(4) the quality of semi-refined white sugar shall be of the following standards or better:

(a)	reducing sugars, maximum	0.03%
(b)	ash by conductivity, maximum	0.03%
(c)	moisture content, maximum	0.05%
(d)	attenuation indices:	
	at 420 mu, maximum	110
	at 720 mu, maximum	35

4. The total cost of the contract is the equivalent of US$31.5 million (Tsh 224.9 million), payable in Dutch, Danish and Tanzania currency as shown in Table 1. Prices, except for Marine Transport, Marine and Local Insurance and Transportation in Tanzania (items totalling US$0.9 million) are firm for the duration of the contract. Provision for contingencies included in the price was a negotiated item.

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Turnkey Contract - Payment Schedule

Month		Dutch Florins	Danish Kroners	Tanz. Shillings
Apr./May 1974	1	8,000,000	33,980,000	2,996,825
	2	250,000	-	-
	3	250,000	-	-
Aug. 1974	4	1,627,000	1,500,000	1,000,000
	5	250,000	1,500,000	1,000,000
	6	250,000	1,500,000	1,000,000
	7	246,630	1,500,000	1,000,000
	8	1,050,000	5,000,000	1,000,000
Jan. 1975	9	1,050,000	5,000,000	1,300,000
	10	1,250,000	5,000,000	1,300,000
	11	2,050,000	5,000,000	1,300,000
	12	2,504,000	5,000,000	1,300,000
	13	2,550,000	6,000,000	2,000,000
	14	1,180,690	6,000,000	2,000,000
	15	519,000	5,000,000	1,500,000
	16	460,000	5,000,000	1,500,000
	17	460,000	5,000,000	1,500,000
	18	460,000	5,000,000	1,500,000
	19	460,000	5,000,000	1,300,000
	20	460,000	614,730	1,300,000
Jan. 1976	21	460,000	-	780,000
	22	460,000	-	780,000
	23	460,000	-	780,000
	24	460,000	-	780,000
	25	460,000	125,000	700,000
	26	260,000	125,000	351,425
	27	260,000	125,000	-
	28	260,000	-	-
	29	7,930	-	-
		28,415,250	102,969,730	29,968,250

Total = US$31.5 million equivalent
or Tsh 224.9 million equivalent

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KILOMBERO SUGAR PROJECT

Scale, Processs and Location of Plant

A. Scale of Plant

1. The proposal submitted by Government called for a 2,400 TCD factory with an output of 45,000 m tons of sugar during a 200-day milling season. During appraisal the mission questioned whether a larger (or smaller) scale plant would be more economic, but after evaluation was convinced that the scale proposed was correct. Increased cane production arising from higher than anticipated cane yields could be handled by improvements in the conservative 90% factory efefficiencies assumed and by extension of the milling season beyond 200 days. At 95% efficiency and a 10% longer milling season the factory out-turn would be 52,000 m tons sugar a year, 15% above rating.

2. Given achievable yields in the area, the size of K II is controlled by land available within economic distance of the factory, and the length of the milling season. Although a milling season in excess of 200 days, up to 225 days is possible in many years' (the season for K I has exceeded 200 days in 9 out of 12 years of operations) calculation on a 200-day basis reduces the risk of lowered productivity encountered when field conditions are affected by rain at the end of an extended period. On the other hand, although a gross area of 20,200 acres of arable land is encompassed by the areas of the Ruembe valley designated as suitable for sugar growing in the Project area, with allowance for rivers, major road areas, patches of poor soil, and areas needed for outgrowers food crops, only some two-thirds of this can be assumed available for planting. Other land is available in the Msolwa valley, South of K I, but at a distance which would make the transport of large quantities of cane uneconomic.

3. The proposed plant could physically be expanded to a 3,000 TCD capacity to produce 60,000 m tons sugar a year, but it is probable that the better approach to a further increase of capacity in the Kilombero valley, should this later be thought desirable, would be to establish a third factory and estate in the Southern area. Soil surveys have not yet covered this potential. However, a larger-scale development in a completely new area is expected to be a more economic solution.

B. Description and Evaluation of the Factory Process

The Factory Process

4. Estate cane would be transported to the factory by wheeled tractors pulling three single-axle carts each loaded with about 3.5 tons of chain-bundled cane. Outgrower cane would be similarly transported or by trucks or

trailers averaging about 5 tons per unit. Cane transport would be accomplished during two 8 hour shifts during the day and evening. All the cane would be weighed on a weighbridge at the entrance to the factory cane yard. Chain slings will be used to unload the cane from the transport units. The night cane supply would be stored in two cane storage bays. The cane bays would be equipped with overhead travelling cranes which unload the chained bundles of cane from the transport units to either storage or the cane tables. Cane would be conveyed from the cane tables to the main cane carrier which would be equipped with a leveller and two turbine driven cane knives for cane preparation prior to juice extraction.

5. Juice extraction would be by pre-pressing mill, diffuser and two bagasse dewatering mills. The extracted juice would be weighed over automatic juice scales and then heated to boiling by pumping through juice heaters. The heated juice would be limed and settled in a clarifier from which the clear juice overflow would pass through a multiple effect evaporator set for concentration into a thick syrup. The muddy underflow from the clarifier would be handled by rotary vacuum filters and the filter cake output would be hauled to the fields.

6. Raw sugar would be boiled from the syrup using a three boiling system of decreasing quality. Continuous centrifugals would be used to separate the raw sugar crystals from molasses in the first two boiling. Sugar from the third and final boilings would be separated from the final molasses by semi-automatic batch centrifugals and would be used as seed crystals for the first two boilings. The final molasses product would be stored for shipment and sale to the Tanzania Tank Storage Co. Ltd., who in turn will sell the industry's molasses to United Molasses Co.

7. Final product semi-refined sugar would be produced from treated raw sugar melt. Sugar produced from the first two boilings of the raw sugar processing system would be melted and treated with milk of lime and sulphur dioxide gas and filtered through filter presses. The clear melt would be boiled into final product sugar using a three boiling system. The filter cake would be hauled to the fields. The semi-refined white sugar would be recovered by automatic batch centrifugals. Runoff from the centrifugals would be boiled back into lower quality boilings. Generally, the sugar from the first and last refinery boilings would be mixed to produce a standard semi-refined product equivalent to sugar from the second boilings. The product sugar would be dried, cooled and screened before transport to a sugar bin. From the sugar bin, the sugar would be weighed and bagged by automatic machines into 50 kg paper bags and 100 kg jute bags. The final semi-refined white sugar product would be transported to storage prior to shipment and sale to the distributor.

8. Final bagasse from the juice extraction plant would be used as fuel for the boilers. During normal operations, the factory would be self-sufficient and generate all of its power requirements from bagasse. Excess bagasse would be stored and reclaimed from storage for use during factory stops.

Evaluation of the Proposed Process

9. About 80% of the current Tanzanian sugar production is semi-refined white sugar, and all imports are refined sugar. For competitive marketing reasons, the new factory would produce a semi-refined quality white sugar product. The semi-refined quality can be classified between plantation or mill white sugars produced by one of several processes, and refined sugar. The melt-sulphitation process proposed for the new factory is a technically simple process with reasonable operating costs. The double sulphitation-process could be considered as an alternative process if a lower quality sugar is acceptable but it is technically more difficult requiring close process controls. Refined sugar processes were not considered because in all cases capital and operating costs would be higher than the melt-sulphitation process. For local marketing conditions and because it is a relatively simple technical process, the melt sulphitation process is suitable for installation in Tanzania.

10. Two alternative juice extraction systems were considered by KSC. The first system is straight milling with a mill train consisting of five 3-roller mills. The second system is milling with diffusion consisting of a pre-press, mill De danske Sukkerfabrikker (DDS) type continuous cane diffuser and two dewatering mills. The selection of the juice extraction system was based on the financial evaluation of the alternative proposals submitted by tenderers and was finalized in the factory turnkey agreement. Typically the two systems have similar cost/efficiencies.

11. Milling has been used for many years while continuous sugar cane diffusers are a more recent development. Cane diffusion systems have, however, been successfully adopted by many sugar factories throughout the world. The existing Kilombero factory installed a DDS type diffuser in 1972 and after some start-up problems, were successfully operating the plant in 1973. Higher sugar extractions expected with the diffusion system would also result in higher non-sugar extraction and therefore greater final molasses production. The boiling house would be equipped to handle the higher non-sugar loads to minimize sugar losses in molasses and to maintain satisfactory boiling house recoveries.

C. Factory Site Location

Alternative Factory Sites

12. Three locations were evaluated as potential sites for the proposed factory:

(1) location alongside the existing Kilombero sugar factory;

(2) location on the North bank of the Great Ruaha River;

(3) location in the center of the new Ruembe cane growing area.

At the time of appraisal, the data available for an economic evaluation indicated that the site in the center of the cane growing area (3), and not the river-bank site (2) assumed in the project submission was most suitable. A detailed survey carried out by consulting engineers after the appraisal showed that soil bearing conditions for the construction of the factory, and for construction of water canals and rail access would considerably increase development costs and on the basis of these figures and in view of potential delays if the site be disputed further the mission endorses the river-bank site. Government has instructed the turnkey contractor to base operations on this location.

Criteria for Factory Site Selection

13. From the technical viewpoint, any of the sites could have been selected as the new factory site. Qualitative management and social factors probably favor sites closer to the existing factory and estate but these are not significant since all of the sites are in the same general locality and the distance between the two extreme sites under consideration is only 7 km. Each site provides the opportunity for joint management of both the new and existing estates by the senior management staff of KSC.

14. Among the specific factors evaluated for each site were:

(1) cane transport costs;

(2) water development costs;

(3) land use; and

(4) access to existing facilities.

15. In sugar cane operations, transport costs are usually critical because of the quantity of raw material required to produce the final product. For the new factory about 430,000 m tons of cane would be transported to the factory by carts each loaded with 3.5 tons of cane or by trucks and trailers each loaded with 5 tons of cane to produce 45,000 m tons of sugar. Cane transport costs depends on the factory location and the magnitude of the additional transport costs become significant as the factory site is moved away from the center of gravity of the factory's cane growing area.

16. For the three sites, the factory and irrigation water supplies would be developed from the Great Ruaha River. The facilities would include a river pumping station, settlement basin, factory water supply, irrigation water supply, irrigation water pump house and power lines from the factory site to the pumping stations. Capital and operating costs would depend on the site selected for the new factory and were evaluated for each site.

17. It is desirable to locate the factory, housing development and community facilities on agriculturally less suitable or unsuitable land. However, this factor is not significant for the two sites north of the Great Ruaha River when the 250 acres required is compared to over 20,000 acres of arable land available in the Ruembe Valley of which two thirds (13,000) is scheduled as the cane area for the new factory. Land availability in the general area does not impose any significant restrictions for selecting the factory site except for the location alongside the existing factory.

18. Access to existing facilities would be limited to connecting the new factory site to the all-weather public road to Mikumi and constructing a spur line from the East African Railways branch line to Kidatu. Construction costs for the access road and connecting rail line would depend on the location of the factory and were evaluated for each site.

Evaluation of Location Alongside K I

19. The capacity of the existing factory has almost doubled by several expansion programs over the past years from an initial capacity of 1,300 TCD in 1961 to its current capacity of 2,150 TCD. The congested physical conditions in the factory and the layout of the existing plant will not readily permit the magnitude of expansion necessary to handle the projected throughput from the new cane areas. A complete new plant would have to be built alongside the existing plant. Minimal factory costs, if any, would be saved by locating the new factory alongside the existing factory. However, savings of US$1 million to US$1.5 million would be possible in infrastructure development, such as roads, rail lines, workshops, storage buildings, housing, and community developments. If the new factory is arranged to permit supervision and management by the existing senior staff, annual savings in senior factory staff salaries would also be possible. Water development costs would be about the same as for a factory located in the center of the new cane growing area. Either location would require separate factory and irrigation water systems.

20. The major disadvantage of the existing factory site is its location on the south bank of the Great Ruaha River across from the new Ruembe cane growing area. In addition to long cane transport distances a new bridge will be required to handle the volume of traffic which was estimated at 30 crossings per hour. The existing road bridge is inadequate to efficiently handle public transport together with the projected volume of cane transport as it is only wide enough to handle one way traffic and will add about 10 km per journey over the closest alternative, the river-bank site, to the cane transport distance. The mission's estimate for a new bridge across the Great Ruaha River is about US$0.75 million. The savings in capital costs for factory support facilities and infrastructure development was cancelled by additional costs for water development and a new bridge across the Great Ruaha River. The savings in factory senior staff salaries were more than offset by increased cane transport costs.

Evaluation of Location on the North Bank of the Great Ruaha River

21. This site located on the north bank of the Great Ruaha River about 1.5 km downstream from the existing road and rail bridges was proposed for the new factory in the credit application. The site is located on the southern boundary of the new Ruembe cane growing area. Cane transport costs would be considerably higher than a more centrally located factory. Its water development costs, however, were the lowest of the three sites and investments in electric cable, piping, and rail access would be lower than the central site. An argument for this site was the possible future extension of cane development in the Msolwa area located about 25 km south of the Great Ruaha River. If cane were to be transported long distances from the south, this site would then be centrally located and therefore have a cane transport cost advantage over one in central Ruembe. However, the mission calculated that the proposed development of cane in the Msolwa area for K II was uneconomic (para. 3) and the advantages of the river site for any such expansion made little impact on a DCF analysis because they were so long term.

Evaluation of Location in the Center of the New Cane Growing Area

22. Initial economic evaluation showed that a factory which was centrally located in the new Ruembe cane growing area would be more suitable than a factory located on the north bank of the Great Ruaha River. The additional capital costs for a centrally located factory were estimated with agreement of HVA at under US$1 million. Lower cane transport costs offset the higher capital costs to give a 14% financial return on the incremental investment.

23. However, new estimates produced in March 1974 raised this estimate to US$2.2 million and the cost of constructing a railway was raised to US$1.3 following detailed survey for a routing. The return to this incremental investment would be only 6.5% over 20 years: i.e., would reduce the return on the Project. An alternative which accepted trucking sugar from factory to rail-side and trans-shipping would have given considerably higher returns (over 10%) but still would not have increased the Project return.

Conclusion

24. On the assumption that future transport cost increases would be broadly in line with other cost-increases, the central site would be less favorable than the river-side location despite the fact that this will involve over three times the cane transport of the central site. The cramped location and high transport costs preclude a site close to K I. On available data, the river site, as originally proposed, is therefore endorsed as the least cost alternative.

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KILOMBERO SUGAR PROJECT

Critical Path Analysis

1. The Critical Path Method is a means of scheduling activities which comprise a Project taking account of the sequence of execution of the activities and their interdependence. The Project is represented in a diagram with the activities depicted by arrows. The direction of the arrows shows the flow of execution of the activities. The beginning and end of an acitivity is marked by an event, depicted on the diagram by a small numbered circle. An activity can be referred to by its description or by the numbers of the starting and end events of that activity. A diagram of a complete sequence of activities and events is called a CPM network.

2. Sometimes it is not possible to depict completely the interdependencies of activities of a project by using only activities and events. For this purpose an arrow in broken lines called a dummy is used. The presence of a dummy shows interdependence which would otherwise not have existed. A dummy may also be technically interpreted as an activity which does not require any time to complete.

3. The sequencing logic of the project activities is obtained after lengthy discussions with the project architect who also provides the activity time estimates. In some cases involving delivery times for materials and plant, prospective suppliers are also consulted. The time estimates shown under the activity description in the CPM network are in months of project time.

4. The network is then analyzed by computer to obtain the project schedule. The schedule shows for each activity the earliest times the activity can start and finish and the latest times the activity must start and finish. It also shows which activities have slack or spare time (i.e. where the total available time for the activity is greater than the time it needs to execute the activity), and which activities are tight or have no slack. Activities which have no slack form a path (or paths) from the starting (first) event to the end (last) event of the project. This path is known as the critical path, and activities along the critical path have to be executed strictly according to schedule if a delay in project completion is to be avoided. These activities are therefore the ones which require the strictest supervision.

5. The Kilombero Sugar Project network contains 75 events and 136 activities including dummies. The degree of detail is such that it will be useful at a middle management level. One feature of the network is the way in which the allowable contract period can be compared with the estimated time for execution of the project activities under the contract. The path 5 - 65 - 74 giving the allowable contract period runs parallel to the rest

of the project contract activities. If upon analysis, this path is not critical while a critical path appears along the project contract activites, then the contract period allowed is not sufficient to cover the execution of the project contract activities, and vice versa. If critical paths are developed at the same time in the two areas, the contract period allowed will exactly equal the estimated time required to execute the project contracted. The network allows a half month head-start to the contractor from the time the contract award is made to the date the contract becomes effective (Activity 5-65).

6. The following critical paths are found in the network:

1 - 2 - 4 - 5 - 17 - 18 - 21 - 24 - 26 - 29 - 33 - 37 - 43 - 44 -

64 - 74 - 75

1 - 3 - 4

17 - 41 - 43

5 - 6 - 7 - 10 - 11 - 12 - 74

5 - 65 - 74

The time to execute the project contract activities and the contract period are both equal to 26-1/2 months, assuming contract work excludes plant commissioning. If the effective date of the contract is May 1, 1974, the completion date of the contract should be no later than July 15, 1976.

7. A scheduled date of June 1, 1975 appears at both Events 39 and 73. This is the date when the activities leading to these events have to be completed in order to provide facilities required for sugar cane planting. The analysis shows the following dates for these events:

Event	Earliest Possible Date
39	July 15, 1975 (6 weeks behind schedule)
73	April 15, 1975 (6 weeks ahead of schedule)

There will be no difficulty in meeting the scheduled date for Event 73, but for Event 39 it will be necessary either to crash (reduce) the times of activities before this event in order to meet the scheduled date, or to accept the consequences of failure to meet the scheduled date. In this particular case alternative provision for tractor maintenance has been made in the form of movable temporary workshops in the KII area, backed up by the facilities of KI. This area of Project execution should be closely supervised.

8. As with all kinds of schedules the CPM network should be reviewed regularly during the execution of the project with up-to-date information on actual project progress and more accurate time estimates of uncompleted and unstarted activities. Reviews may bring out anticipated delays in project

completion, so that remedial measures can be taken at an early stage. They may also point out that the critical path has changed and supervision focus may be altered accordingly.

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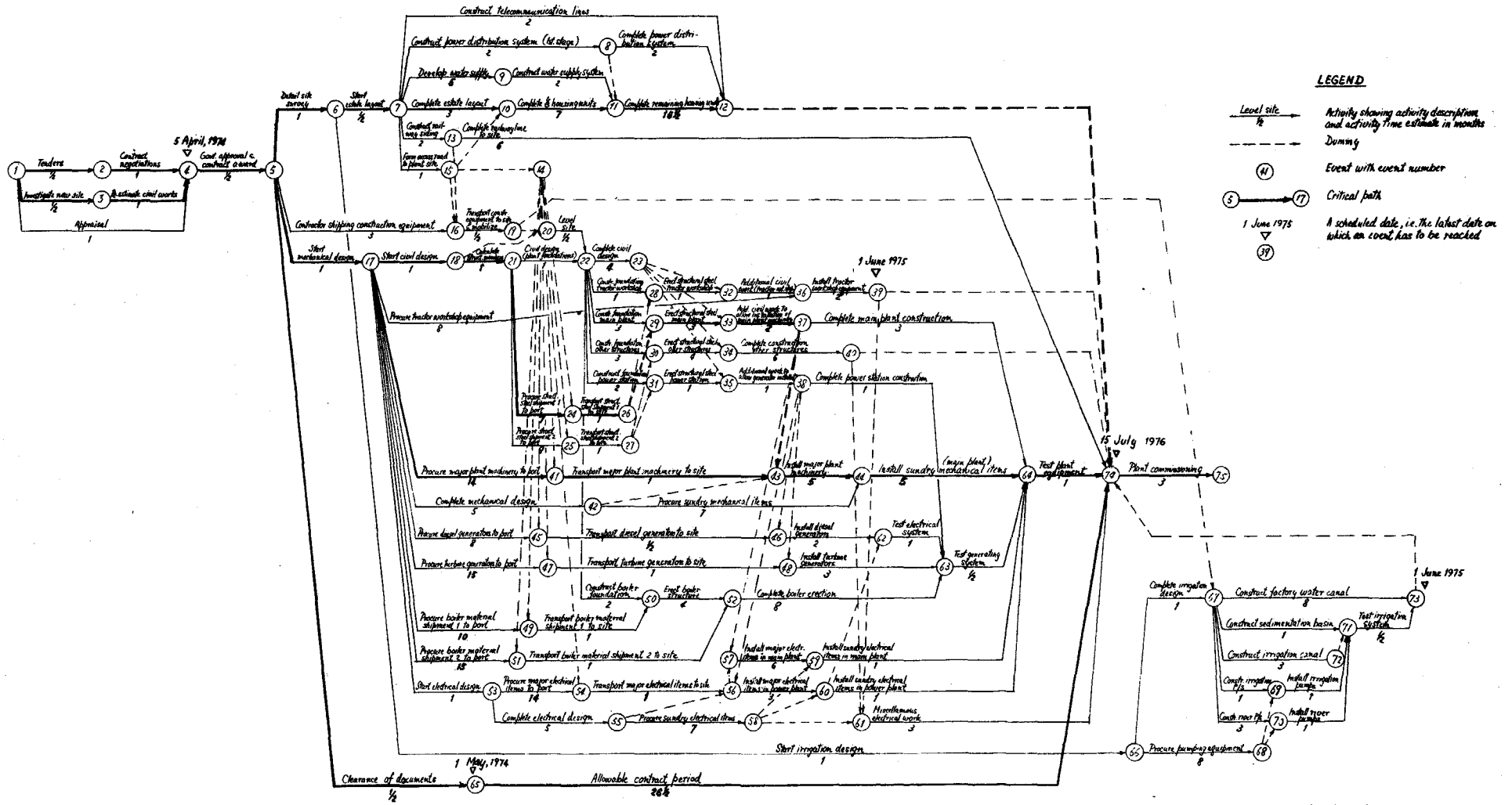
KILOMBERO SUGAR PROJECT – CPM NETWORK



Date: March 1974

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Summary of Development Costs
(Tsh '000)

Project Year	Reference	1 1973/74	2 1974/75	3 1975/76	4 1976/77	5 1977/78	Total	Foreign Exchange Amount	Foreign Exchange %
Part I									
Development Costs									
Land development, transport, and irrigation equipment	Table 2	-	12992	27570	5830	2392	48784	45650	94
Other land development costs	Table 2	2000	4004	6236	3646	1823	17709	6742	38
Non-factory buildings and equipment	Table 4	230	4614	7060	2098	-	14002	4443	32
Water and electricity supplies	Table 4	140	1270	700	350	-	2460	1599	65
Community facilities	Table 4	-	920	1080	300	-	2300	575	25
Access Railway and Road	Table 4	1130	2821	482	-	-	4433	2660	60
Sub-total		3500	26621	43128	12224	4215	89688	61669	69
Research and Training	Table 5	-	440	2191	2086	1380	6097	2986	49
Sugar Survey	Annex 10	-	714	1428	-	-	2142	1564	73
Kilosa District Development Corp.		-	-	419	172	127	718	206	29
Total		3500	27775	47166	14482	5722	98645	66425	67
Contingencies									
Physical 1/		150	3614	5354	1500	572	11190	7355	66
Price 2/		754	11270	26442	10429	4948	53843	35536	66
Sub-total		904	14884	31796	11929	5520	65033	42891	66
Total Part I		4404	42659	78962	26411	11242	163678	109316	67
Part II									
Factory (Turnkey contract including plant, machinery, freight insurance and local transport) 3/		-	131057	81093	15264	-	227414	186731	82
Factory supervision 4/		-	2968	2428	1530	-	6926	6926	100
Total Part II		-	134025	83521	16794	-	234340	193657	83
Total Project Cost		4404	176684	162483	43205	11242	398018	302973	76

1/ 10% physical contingency on all costs except turnkey contract.
2/ On equipment and vehicles: 20% in year 1, 14% in year 2, 11% in year 3, and 7.5% in year 4 and after.
On civil works: 24% in year 1, 18% in year 2, 15% in year 3, and 12% thereafter.
On all other costs, 20% in year 1, and 10% thereafter.
3/ Negotiated contract price and only factory freight and insurance is subject to escalation of 10% physical contingency and 10% per year compounded price contingency.
4/ Negotiated contract price, not subject to any contingency provisions.

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ANNEX 13
Table 1

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KILOMBERO SUGAR PROJECT

Estate Development
(Tsh '000)

Project Year	Unit Cost 1/	1 1973/74	2 1974/75	3 1975/76	4 1976/77	5 1977/78	Total	Foreign Exchange Amount	Foreign Exchange %
Compensation on Land	2,000	2,000	-	-	-	-	2,000	-	-
Land Clearing and Preparation Operating Costs	Tsh 1,080/acre	-	2,925	4,190	2,614	1,339	11,068	5,866	53
Road and Bridge Construction	Tsh 25,260/km	-	729	1,417	640	283	3,069	184	6
Drainage	Tsh 162/acre	-	350	629	392	201	1,572	692	44
Irrigation Equipment		-	-	13,879	-	-	13,879	12,491	90
Vehicles and Equipment 2/		-	12,992	13,691	5,830	2,392	34,905	33,159	95
Total		2,000	16,996	33,806	9,476	4,215	66,493	52,392	79

1/ Apart from the estimated cost of compensation for crops and buildings on land acquired, all unit costs were originally calculated by HVA, based on experience with KI and were later verified and up-dated at appraisal.

2/ Land clearance and preparation equipment and vehicles and equipment required to handle the project's annual harvest in year of 200 working days, plus 10% for spares.

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Non-Factory Development Expenditure
(TSh '000)

Project Year		1	2	3	4	5	Total	Foreign Exchange %	Foreign Exchange Amount
Housing	1/	230	4,254	6,390	1,678	-	12,552	25	3,138
Water and Electricity Supplies	2/	140	1,270	700	350	-	2,460	65	1,599
Community Facilities	3/	-	920	1,080	300	-	2,300	25	575
Access Railway and Road	4/	1,130	2,821	482	-	-	4,433	60	2,660
Office Furniture and Equipment		-	360	670	420	-	1,450	90	1,305
		1,500	9,625	9,322	2,748	-	23,195	40	9,277

1/ Permanent housing requirements for 47 senior staff, 120 junior staff, 665 other permanent workers and 296 seasonal workers, and temporary buildings for all grades of staff.

2/ Civil engineering and other capital expenditure connected with supply of water and electricity.

3/ Include a guest house, a community centre, a primary school, police station, shopping centre and sports facilities.

4/ Includes civil works on access road, rail line and bridges.

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ANNEX 13
Table 3

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KILOMBERO SUGAR PROJECT

Research and Training Costs
(Tsh '000)

Project Year	1 1973/74	2 1974/75	3 1975/76	4 1976/77	5 1977/78	Total	Foreign Exchange Amount	Foreign Exchange %
Research								
Agriculturalists	-	90	180	180	130 1/	580	435	75
Assistants	-	35	70	70	70	245	-	-
Equipment	-	155	30	30	30	245	125	51
		280	280	280	230	1,070	560	52
Training								
Training Supervisor 2/	-	50	100	100	100	350	280	80
Equipment and Materials	-	-	300	50	50	400	300	75
Local and Overseas fellowships (Junior staff) 3/	-	-	800	600	600	2,000	1,100	55
Senior Staff Fellowships 4/	-	-	340	500	-	840	798	95
Junior Trainee Wages 3/								
- Factory	-	-	300	750	250	1,300	130	10
- Estate	-	-	400	300	150	850	85	10
Senior Staff Trainee Salaries 4/	-	-	30	45	-	75	4	5
	-	50	2,270	2,345	1,150	5,815	2,697	46
Sub-total	-	330	2,550	2,625	1,380	6,885	3,257	47
Less: Included in Turnkey Contract	-	-	(359)	(539)	-	(898)	(299)	33
Research and Training Salaries and Equipment	-	330	2,191	2,086	1,380	5,987	2,958	49
Housing 6/	-	110	-	-	-	110	28	25
Total Research and Training	-	440	2,191	2,086	1,380	6,097	2,986	49

1/ One post localized in 1977/78
2/ Expatriate, in post January 1975. Housing (Tsh 110,000 included in Annex 13 , Table 5).
3/ Annex 8. Fifteen man-years of overseas and sixty man-years of local fellowships.
4/ HVA estimates: total 5 man-years of training in the Netherlands.
5/ One senior staff house costing Tsh 110,000.

June 12, 1974

ANNEX 13
Table 4

TANZANIA

KILOMBERO SUGAR PROJECT

Estimated Disbursement Schedule
(US$ '000)

Bank Group Financial Year and Quarter Ending	IDA Quarterly Disbursement	IDA Cumulative Total	Bank Quarterly Disbursement	Bank Cumulative Total
1974/75				
December 31	450	450	-	-
March 31	1,250	1,700	-	-
June 30	1,250	2,950	-	-
1975/76				
September 30	1,300	4,250	-	-
December 31	1,300	5,550	-	-
March 31	2,300	7,850	-	-
June 30	1,150	9,000	1,150	1,150
1976/77				
September 30	-	-	2,050	3,200
December 31	-	-	1,900	5,100
March 31	-	-	500	5,600
June 30			500	6,100
1977/78				
September 30	-	-	500	6,600
December 31	-	-	500	7,100
March 31	-	-	400	7,500
June 30	-	-	300	7,800
1978/79				
September 30	-	-	300	8,100
December 31	-	-	300	8,400
March 31			300	8,700
June 30			300	9,000

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ANNEX 14

TANZANIA

KILOMBERO SUGAR PROJECT

Kilombero II: Organization

1. The following three charts show the organization and senior and supervisory staffing of the Project factory and estate as projected for the 1976 season. The assumptions on expatriate staffing are based on expected availability of trained Tanzanians at that date and the presumption that K I would be localized first. The position of Chief Accountant shown on Chart 1 is expected to be filled by a Financial Controller, probably an expatriate.

2. Expatriate posts are marked * on all charts. Positions with responsibilities in both K I and K II are shown in heavier outline on all charts.

Chart 1: Senior Staff

Chart 2: Factory Staff

Chart 3: Agricultural Services

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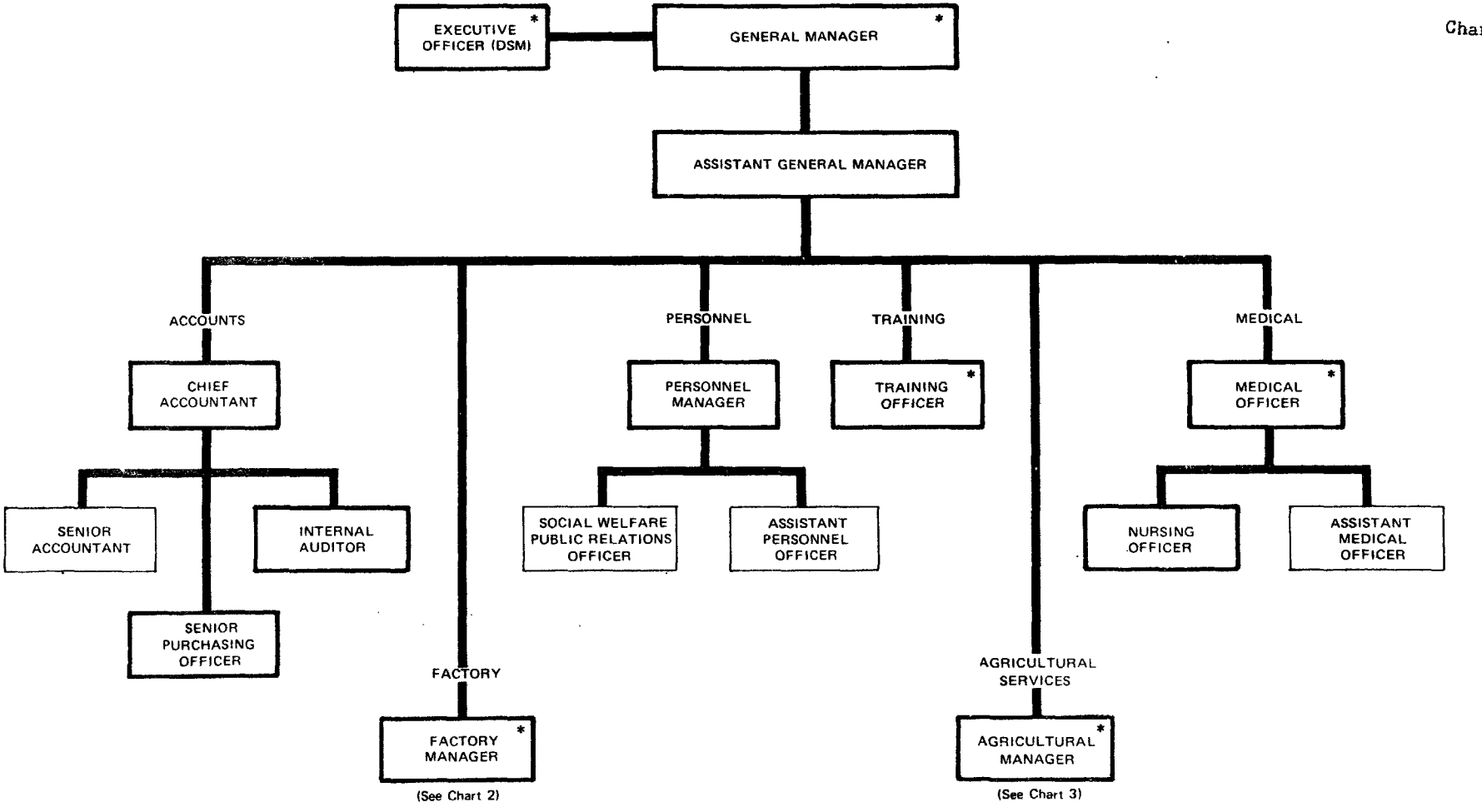
Chart 1

TANZANIA
KILOMBERO SUGAR PROJECT
KILOMBERO II ORGANIZATION: SENIOR STAFF



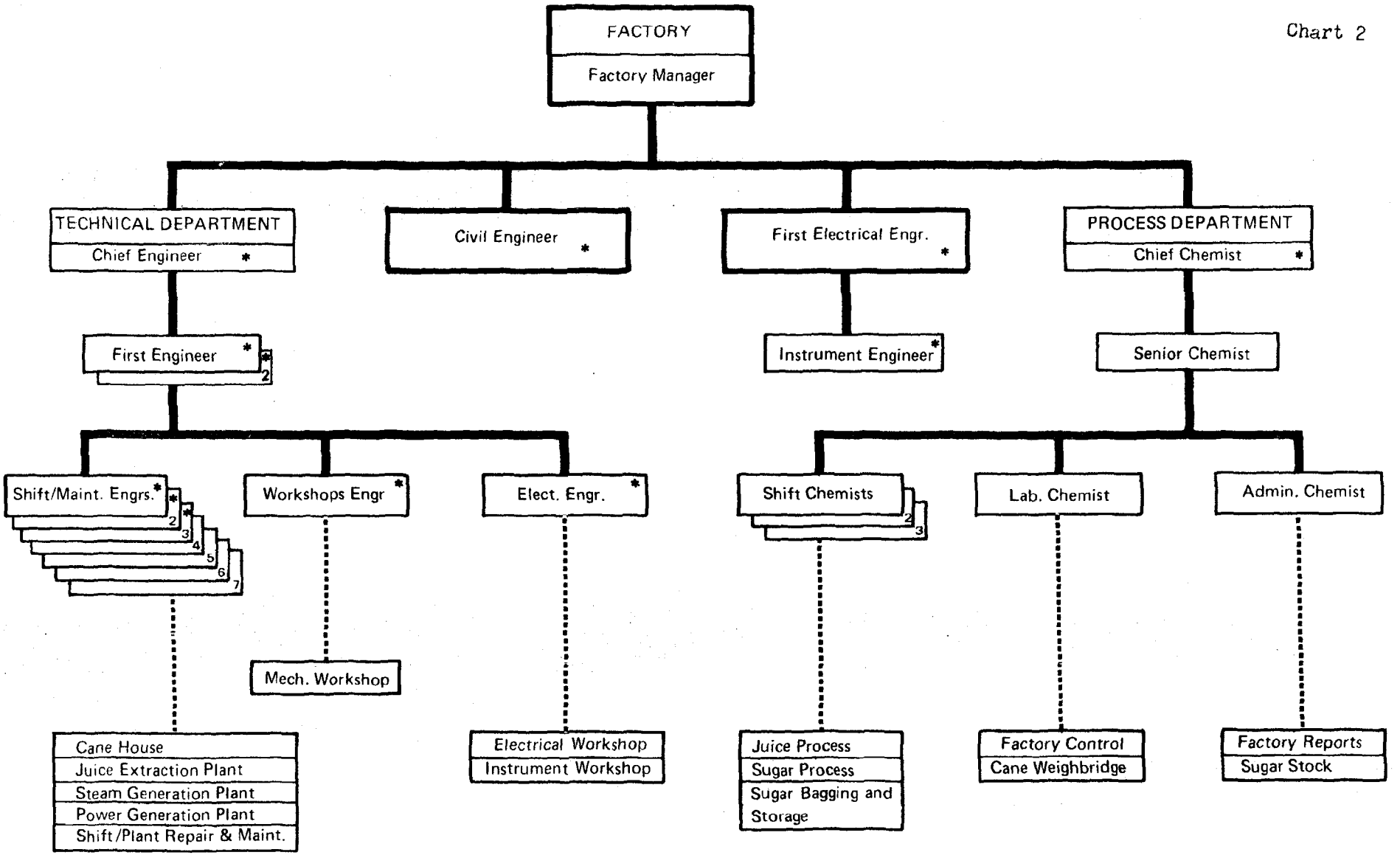
= Joint posts shared by K I and K II

* Expatriate in posts at start-up (1976)

World Bank-8715

TANZANIA
KILOMBERO SUGAR PROJECT
KILOMBERO II ORGANIZATION: FACTORY STAFF

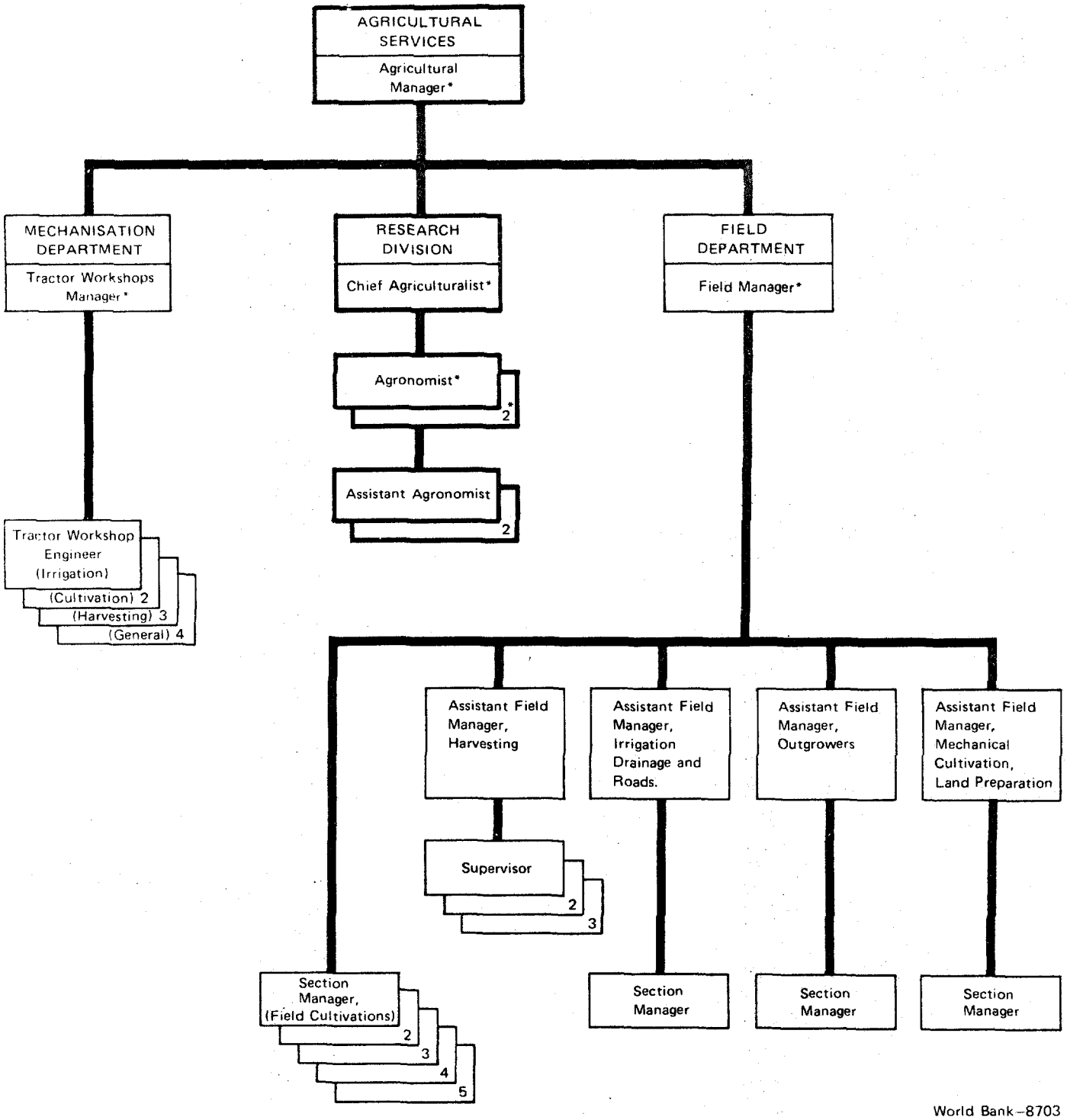
Chart 2



World Bank—8702

TANZANIA
KILOMBERO SUGAR PROJECT
KILOMBERO II ORGANIZATION: AGRICULTURAL SERVICES

Chart 3



World Bank–8703

TANZANIA

KILOMBERO SUGAR PROJECT

Project Development: Organization

The Chart shows the role, under the direction of the Kilombero Sugar Company advised by HVA, of Departments of the existing plant (K I); of the newly created Departments of K II; and of HVA and others in the development of the Project. The composition of the consortium supplying the turnkey factory package is also displayed.

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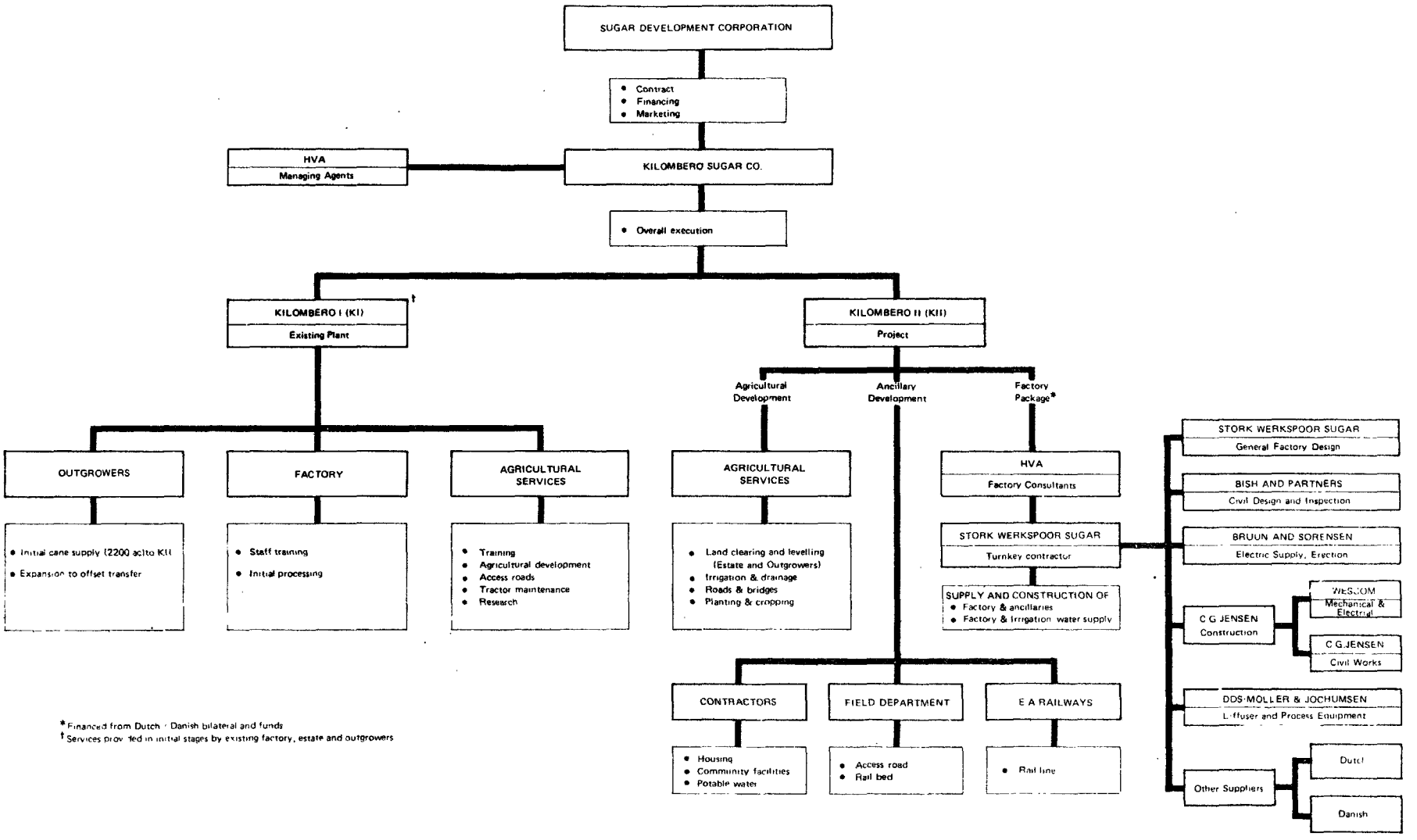
TANZANIA
KILOMBERO SUGAR PROJECT
PROJECT DEVELOPMENT: ORGANIZATION



* Financed from Dutch / Danish bilateral and funds
† Services provided in initial stages by existing factory, estate and outgrowers

World Bank 8704

TANZANIA

KILOMBERO SUGAR PROJECT

World Sugar Situation and Price Projection for 1980

Present Situation

1. For the fifth consecutive year sugar prices in the world market known as the "free market" have increased, and the average price for 1973 was about 5 times higher than that for 1968. Prices in the preferential markets of the United States and the United Kingdom have also risen but not as fast as in the world market (Table 1).

Table 1: Sugar Prices in the World Markets (f.o.b. Caribbean) and Indices of Food and Sugar Prices

Year	Primary Commodity Food Index	Sugar Price in the Free Market/1 ¢/lb.	Index	Sugar Price in the US /1 ¢/lb.	Index	Commonwealth Sugar Agreement Price /2 ¢/lb.	Index
1965	100	2.02	100	5.80	100	5.82	100
1966	102	1.81	90	6.04	104	5.94	102
1967	101	1.92	95	6.32	109	5.94	102
1968	97	1.90	94	6.54	113	5.10	88
1969	101	3.20	158	6.75	116	5.10	88
1970	108	3.69	183	6.94	120	5.10	88
1971	114	4.50	223	7.39	127	5.10	88
1972	128	7.27	360	7.99	138	6.60	102
1973	140 (est)	9.49	470	8.91	148	5.56	96
1974 (1st qtr.)	n.a.	19.32	956	15.99	276	6.45	111

Source: For primary commodities food index: United Nations, Monthly Bulletin of Statistics.

For sugar prices: International Sugar Organization, Sugar Year Books, various issues; U. S. D. A., Sugar Reports, various issues.

/1 Price for export under U. S. Sugar Act.

/2 The decline in 1968 reflects devaluation of the pound in 1967. The exchange rate used for 1972 was £1 = $2.50 and for 1973: £1 = $2.42.

Since the last quarter of 1973 sugar prices in the world market have continued to climb and in March 1974 reached an all time high level of 21¢ lb. (f.o.b. Caribbean, raw value). The price spiral is the result of a variety of factors, including lagging production. Since 1964/1965 world consumption has increased by more than 19.5 million tons: in the same period production rose by only 10.5 million tons. Stocks as proportion of consumption have declined since 1970/71, indicative of this tightening supply situation (Table 2).

Table 2: World Production, Consumption and Stocks of Sugar (Raw): 1964/65 to 1972/73/1
(million metric tons)

Year	World Sugar Consumption	World Sugar Production	World Sugar Stocks at the end of the Season (8/31)	Stocks as % of Consumption
1964/1965	59.3	66.8	18.9	31.9
1965/1966	62.8	63.1	19.2	30.6
1966/1967	65.5	65.6	19.3	29.5
1967/1968	65.6	66.4	20.1	30.6
1968/1969	68.2	67.8	19.7	28.9
1969/1970	72.2	74.3	21.8	30.2
1970/1971	74.6	72.8	20.0	26.8
1971/1972	76.2	73.2	17.0	22.3
1972/1973	78.8	77.3	15.5	19.7

/1 The statistics are for a campaign year, September to September.

Source: F. O. Licht, International Sugar Report, various issues.

2. What distinguishes the past three years shortage is its longevity. Periods when high sugar prices have ruled in the past tended to be of short duration as they encouraged an immediate substantial expansion in output. For example, the high prices of sugar in 1963 (averaging about 8.7 US cents/lb.) were followed by a large expansion in production the following two years in the order of 7.5 and 5 million tons respectively. Numerous factors explain the marginal increase in output despite the increasing sugar prices of the past 3 years. In the beet sugar sector most of the countries concerned are either highly developed or centrally planned and land in these is generally at a premium. Sugar is only one of several commodities presently in high demand and is therefore competing for the existing areas cultivated. In the cane sugar producing countries, land is also relatively scarce but in addition the high and increasing cost of establishing new factories and the difficulty of securing financing, pose major obstacles to rapid expansion. Most developing countries do not have sufficient funds of their own to establish new industries, private outside finance is often not available, and their recourse to international public sources has proved to be insufficient.

3. Other important reasons which contributed to the shortage of sugar in the past 2 years other than the rapid increase in demand, include the drought in the USSR during the past two years, and in Cuba during 1972. The USSR became a large importer of sugar from the free market, in addition to imports from Cuba, increasing competition for the reduced available exports. Information received from the Soviet Union indicates that imports will no longer be needed from the world market in 1974 but on the other hand Cuban sugar may not be as abundant for exports to the world market either. Cuba negotiated trade agreements with some of her socialist partners early in 1973: under these her sugar now fetches 11 US¢ per lb. compared with 6 US¢ per lb. under previous agreements. This will presumably lead to a greater emphasis on shipments to East Europe than to other destinations.

Medium Range Changes in the World Market

4. Production expansion is projected in several countries: Brazil has plans for continued growth, the proposed five-year plan in India envisages renewed development, and several of the smaller cane producers are hoping to take steps toward self sufficiency. However, there are major obstacles to recovery of the supply situation in the next year or two. First, the effects of the severe drought in Northeast Brazil and some other Latin American countries, which occurred in 1973. Second, toward the end of 1973 the EEC revised its sugar export estimates to about half of the original figure of approximately 800,000 tons, following a new export levy on sugar. Since the world market prices for sugar have already exceeded the EEC prices for some time, any strong incentive to expand exports was in a conflict with the EEC policy of holding its member countries' prices stable. Third, the U. S. will probably encounter a drop in output of sugar produced from sugar beets, and unless there is a change in the relative returns to farm commodities it is unlikely that this situation will be rapidly reversed. As a result the U.S. is expected to increase significantly its import demand for sugar. Its cane sugar production is not likely to make up the shortfalls in beet sugar.

5. At the end of 1973 negotiations to renew the International Sugar Agreement failed and the Agreement expired. The old Agreement, which had been in force since 1968, provided price and quota regulation systems in which participants to the agreement were bound to operate and exporting countries received a fixed price set by the Agreement (the supply committment price). However, at present, with restrictions lifted, sugar prices have soared upward and are not likely to fall until the supply situation improves.

A Longer Range Forecast

6. One important factor which will dominate the long run sugar situation is the energy crisis, with its impact on transportation costs. Until 1973, cost of sugar transportation was a minor factor and ranged between 15 and 25 dollars per ton for the most important routes of destination. However, early in 1974 freight rates were at least three times as high as they were a year

previously. These very large increases have been maintained through all sections of the market, from short sea trades to large bulk carriers and time charter. An indication of the phenomenal increase in rates is provided by the nominal Caribbean/UK freight rate, which, commencing at £6.00, rose constantly throughout 1973, particularly during the last six months, to the year-end level of £18.00 per ton. Representative rates paid for sugar freight during 1973 were: (US$ton):

	High	Low
Philippines - U.S. Atlantic/Gulf	$25.00	$14.00
Brazil - Arabian Gulf	$55.00	$18.50
Poland - East Africa	$51.50	$32.00
Dunkirk - Red Sea	$60.00	$18.00

It is likely that firm conditions will continue and that the rates will not fall even when the supply of oil from the Arab states improves.

7. The main implication of the rise in freight rates is the increased incentive to achieve self-sufficiency in sugar production by countries which have the natural conditions to do so. It is estimated that the cost of sugar production at the farm gate in the Caribbean area is approximately US$100.00 per ton, compared with about US$150.00 per ton in the old EEC (when it comprised the six members). Even if a country could not produce sugar before the hike in freight rates at a cost significantly below the old EEC, and therefore imported, an increase of US$30 to US$40 per ton in the transportation rate, obviously makes self-sufficiency much more attractive. There are other costs changes resulting from the energy crisis which will affect particularly the cost of industrial production. Therefore, also the cost of refining and processing of sugar is likely to rise. It is projected that the price of sugar in the world market by 1980 will be 13.5¢/lb. in current terms (f.o.b. Caribbean, raw value), equivalent to 8.7¢/lb. in 1974 constant prices. Forecasts for 1974 through 1980 are shown in Table 3.

Table 3: Sugar Price Forecast for 1974-1980
(US¢/lb., raw, f.o.b. Caribbean)

	1974	1975	1976	1977	1978	1979	1980
Sugar (World) (Current)	18.0	15.0	12.0	12.0	11.5	12.4	13.5
Index 1967-69 = 100	783	652	522	522	500	539	587
Sugar (World) (Constant 1974 prices)	18.0	13.5	10.1	9.4	8.5	8.4	8.5
Sugar (U.S. Preferential) (Current)	16.0	15.0	16.0	17.0	18.5	20.0	21.5
Index 1967-69 = 100	246	231	246	262	285	308	331
Sugar (U.S. Preferential) (Constant 1974 price)	16.0	13.5	13.4	13.3	13.4	13.5	13.5

8. Approximate equivalent semi-refined c.i.f. Dar-es-Salaam prices for the same period would be:

Table 4: (a) Forecast Semi-Refined Sugar Price, c.i.f. Dar-es-Salaam, Current Terms

	1974	1975	1976	1977	1978	1979	1980
US¢/lb.	21.1	18.0	15.0	15.2	14.8	15.9	17.3
Tsh/m ton	3,330	2,830	2,365	2,390	2,330	2,510	2,725

(b) Forecast Semi-Refined Sugar Price, c.i.f. Dar-es-Salaam, Constant (1974) Terms

	1974	1975	1976	1977	1978	1979	1980
US¢/lb	21.1	16.4	12.7	12.0	11.0	10.9	11.2
Tsh/m ton	3,330	2,575	2,000	1,885	1,735	1,715	1,765

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TANZANIA

KILOMBERO SUGAR PROJECT

Kilombero Sugar Company Limited: Projected Cash Flow Statement
(Tsh' Million)

Project Year	1 1973/74	2 1974/75	3 1975/76	4 1976/77	5 1977/78	6 1978/79	7 1979/80	8 1980/81	9 1981/82	10 1982/83	11 1983/84	12 1984/85	13 1985/86
Sugar Sales at 1450 ⁄ per ton	63	63	76	108	124	130	128	127	127	127	127	127	127
Molasses sales at 150 ⁄ per ton	-	1	2	4	4	4	4	5	4	4	5	4	4
Total Sales	63	64	78	112	128	134	132	132	131	131	132	131	131
Operating Costs Including Depreciation	46	50	59	85	84	101	99	99	100	100	100	100	100
Interest on Government Loan	-	7	13	15	15	15	15	14	13	13	12	11	10
Total Costs	46	57	72	100	99	116	114	113	113	113	112	111	110
Net Profit before Tax	17	6	6	12	29	18	18	19	18	18	20	20	21
Company Tax at 40% 1/2/	-	7	2	2	5	12	7	7	8	7	7	8	8
Net Profit after Tax	17	(1)	4	10	24	6	11	12	10	11	13	12	13
Depreciation	9	12	13	28	30	30	30	30	31	31	31	31	31
Government Equity for K II 3/	2	100	98	22	6	-	-	-	-	-	-	-	-
Government Loan for K II 3/	2	76	64	21	5	-	-	-	-	-	-	-	-
Total Cash Inflow	30	187	179	81	65	36	41	42	41	42	44	43	44
Capital Expenditure													
Development Costs	4	176	162	43	11	-	-	-	-	-	-	-	-
Asset Replacements	7	7	8	8	9	13	15	14	15	15	15	15	15
Repayment of Government Loan - Principal only 4/	-	-	-	-	-	6	6	7	8	8	9	10	11
Incremental Working Capital 5/	15	-	5	7	-	6	-	-	-	-	-	-	-
Total Cash Outflow	26	183	175	58	20	25	21	21	23	23	24	25	26
Net Cash Inflow	4	4	4	23	45	11	20	21	18	19	20	18	18
Cumulative	4	8	12	35	80	91	111	132	150	169	189	207	225

1/ Assessed and paid on profit of the previous year. As a loss of Tsh 1.4 million was sustained in 1972/73, no tax is payable in 1973/74, and taxable profit for 1974/75 is reduced by Tsh 1.4 million.
2/ Depreciation is assumed to equal capital allowances.
3/ 50% of all project costs incurred by KSC.
4/ Five years of grace followed by 15 yearly instalments.
5/ Based on 4 months' operating costs.

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TANZANIA

KILOMBERO SUGAR PROJECT

Pricing Between KSC and Outgrowers

1. This annex outlines the considerations affecting the determination of the price to be paid for outgrowers cane for the purpose of preparing projections of the separate operating units in the Project. While it is not the intention to pre-determine such price or the repayment rates by outgrowers of KSC's development and recurrent expenditures, the price should ensure the maintenance of outgrowers' production incentives and their repayments reflect a full recovery of KSC costs.

Land Clearing and Development

2. Machine and implement costs per acre have been computed as in the estate development: they include KSC plantation and transport department overheads. Depreciation and interest have been added. KSC overheads for joint services and administration have been ommitted; they present allocation problems and do not significantly increase the per acre charge, and they will necessarily be incurred in order to develop the K II estate. Pro-rata charges have also been included for roads, bridges and culverts, and for in-field drainage.

Field Operating Costs

3. Operation to be carried out by KSC on behalf of outgrowers (ujamaa villages and KDDC) are as follows:

Plant cane:	Seedcane supply Planting by machine
Replanting:	Land preparation Seedcane supply Planting by machine

In addition all up-hilling operations in cane fields of ujamaa villages would be performed by KSC. The costs have been calculated similarly to those for land clearing and development (para. 2).

Transport

4. The cost per ton of transporting cane to the factory has been calculated as cost per tractor/trailer hour (which includes KSC transport department overheads) times the weighted average distance of the entire cane

development from the factory. It has been assumed that all outgrowers will be charged equally for each ton collected rather than by the ton-mile driven, the latter being disadvantageous to growers allocated land more than the average distance from the factory.

Depreciation and Interest

5. Depreciation per machine-hour has been calculated on the understanding that crawlers and their implements would last 12,000 hours and tractors and implements would last 8,000 hours, with zero scrap value. Interest has been allocated on the assumption that these working lives would cover four years.

Cane Price

6. The price to be paid for outgrowers' cane delivered to the factory weighbridge must provide a cash flow to cover the outgoings, including loan servicing and machinery replacements, and must further provide a net return to farmers sufficient to give them an incentive to grow cane rather than an alternative crop. The price used in the projections is equivalent to Tsh 50.00 per m ton at 10.5% sugar in 1973-74. This compares with the current price of Tsh 42.50 per m ton. Advances of Tsh 30 are currently paid to outgrowers at the time of delivery, and the balance is paid at the end of the season. A similar arrangement is assumed for K II; it is assumed the advance would be set at 85% of the final price at 10.5% sugar. Amounts charged in respect of the operations described above would be deducted from the cane price advances; the remainder of the price would be paid monthly after analysis and processing. Deductions in respect of initial land clearing and development costs would be applied to cane deliveries and recovered over 6 years for ujamaa villages and over 11 years for KDDC, in each case at 9% interest annually; this enables a constant figure to be established and known in advance. The longer loan repayment period for KDDC reflects the higher development costs, including paid labor.

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KILOMBERO SUGAR COMPANY

Government Cash Flow From the Project
(T.Sh. '000)

Project Year	1 1973/74	2 1974/75	3 1975/76	4 1976/77	5 1977/78	6 1978/79	7 1979/80	8 1980/81	9 1981/82	10 1982/83	11 1983/84	12 1984/85	13 1985/86
Cash Inflow													
Turnkey Contract - Dutch Loan	22777	40055	14923	785	-	-	-	-	-	-	-	-	-
- Danish Loan	40750	51570	31017	185	-	-	-	-	-	-	-	-	-
Bank Fund	-	-	8211	35343	12138	8586	-	-	-	-	-	-	-
IDA Fund	-	21063	43197	-	-	-	-	-	-	-	-	-	-
Excise on Sugar	-	-	-	14549	17722	18984	18307	18004	18122	18122	18122	18122	18122
Loan Service from KSC	180	7200	12780	14670	15120	20842	20842	20842	20842	20842	20842	20842	20842
Company Tax from KSC (K II)	-	-	-	-	-	1200	7200	6800	6400	6800	6800	6800	6800
Total Cash Inflow	63707	119888	110128	65532	44266	44980	46349	45646	45346	45764	45764	45764	45764
Cash Outflow													
Servicing of Dutch Loan	28	471	583	589	589	589	589	589	589	589	583	577	571
Repayment of Loans - Dutch	-	-	-	-	-	-	-	-	-	-	785	785	785
- Danish	-	-	-	-	-	-	4941	4941	4941	4941	4941	4941	4941
Interest and Repayment of	-	482	421	3639	4519	5412	5412	6547	6547	6547	6547	6547	6547
Servicing of IDA Credit	-	158	482	482	482	482	482	482	482	482	1120	1115	1110
Investment in KSC - Equity	2000	100000	98000	22000	6000	-	-	-	-	-	-	-	-
Loan to KSC	2000	76000	64000	21000	5000	-	-	-	-	-	-	-	-
Other Project Expenditure	404	684	483	205	242	-	-	-	-	-	-	-	-
Total Cash Outflow	4432	177795	163969	47915	16832	6483	11424	12559	12559	12559	13976	13965	13954
Net Annual Inflow (Outflow)	59275	(57907)	(53841)	17617	27434	38497	34925	33087	32787	33205	31788	31799	31810
Cumulative Inflow (Outflow)	59275	1368	(52473)	(34856)	(7422)	31075	66000	99087	131874	165079	196867	228666	260476

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ANNEX 20
Table 1

TANZANIA

KILOMBERO SUGAR PROJECT

Foreign Exchange - Receipts or Savings and Payments
(Tsh million)

Project Year	1 1973/74	2 1974/75	3 1975/76	4 1976/77	5 1977/78	6 1978/79	7 1979/80	8 1980/81	9 - 20 1981 through 1993
Kilombero Sugar Company									
Receipts									
K II Sales proceeds	-	-	-	86.9	103.3	119.3	119.4	120.3	120.3
K I Sales proceeds from K II cane	-	-	14.0	-	-	-	-	-	-
Total Receipts	-	-	14.0	86.9	103.3	119.3	119.4	120.3	120.3
Payments									
K II: Operating costs	-	0.5	3.7	7.8	10.3	11.2	10.9	10.9	10.9
Overheads	-	0.4	0.7	3.3	4.7	4.7	4.7	4.7	4.7
Estate development	-	2.4	25.7	4.0	1.8	-	-	-	-
Property Plant and Equipment	1.6	125.1	73.6	13.7	2.7	-	-	-	-
Plant and Equipment Replacement	-	-	-	-	-	4.3	6.2	5.4	6.4
Research, Survey and Training	-	0.6	1.9	1.1	0.8	0.3	0.3	0.3	0.3
Working Capital	1.4	0.6	0.3	0.3	-	-	-	-	-
K I : Processing cost (K II cane)	-	-	1.2	-	-	-	-	-	-
Existing Outgrowers:									
Reduction in Sale	-	-	-	5.6	2.1	-	-	-	-
Cane Transport Saving	-	-	-	(1.1)	(1.1)	(1.1)	(1.1)	(1.1)	(1.1)
Total Payments	3.0	129.6	107.1	34.7	21.3	19.4	21.0	20.2	21.2
Net Foreign Exchange Saving or Receipts	(3.0)	(129.6)	(93.1)	52.2	82.0	99.9	98.4	100.1	99.1

ANNEX 20
Table 2

June 12, 1974

TANZANIA

KILOMBERO SUGAR PROJECT

Rate of Return and Sensitivity Analysis

A. Rate of Return

1. The internal economic rate of return (IER) of the Project over a twenty-year period is estimated to be 13%. The costs and benefits used in this calculation are set out in Table 1. In calculating the rate of return it is assumed that all sugar production would be consumed in Tanzania in substitution for imports from the world market and that molasses production would be exported. The sugar prices used are projections for Gulf/Caribbean, raw (converted to semi-refined at 93%) plus bagging, and freight and insurance, to Dar-es-Salaam at US$42 m ton in 1974 prices (Annex 20, Table 4). Molasses has been valued at a net US$21 f.o.b. Dar-es-Salaam price for 1974. The returns have been shadow-priced at US$1.00 = Tsh 10.00 (140% of the official exchange rate) to reflect the economic value to Tanzania of foreign exchange.

2. All incremental cost elements have been charged including some items such as training and the survey for future developments the benefits of which are only partially attributable to the Project. These have minor impact on the IER. Imported items have been shadow-priced at US$1.00 = Tsh 10.00 but no other shadow prices have been introduced: cane cutters are skilled workers whose marginal return may be assumed to be reflected in their pay, and any adjustments in rates for unskilled labor, certainly nationally in plentiful supply, would not make significant impact on results. Locally there would be little surplus unskilled labor. No costs are attributed to ujamaa family labor which will continue its present subsistence cultivation.

3. Physical contingencies of 10% are allowed on all investment costs except the factory turnkey package for which a fixed price has been negotiated. Costs have been taken as constant at estimated 1974 levels.

B. Sensitivity Analysis

4. The sensitivity of the IER of the Project to changes in cost and benefit streams are shown below: they should be compared with a computed Project return of 13%.

Variation	Rate of Return
a. Import Substitution Price of Sugar	
(i) consistently 20% lower than estimate	7%
(ii) consistently 20% higher than estimate	18%

b.	Cane Yields	
	(i) consistently 20% lower	9%
	(ii) consistently 20% higher	17%
c.	All operating costs	
	(i) 20% higher throughout	11%
	(ii) 20% lower throughout	14%
d.	Estate Development Costs	
	(i) 20% above estimates	12%
	(ii) 20% below estimates	13%
e.	Factory has first season in 1977 (loss of 2/3 of 1976 sales)	11%
f.	Estate development delayed one year (factory ready but no throughput)	10%
g.	Estate development delayed one year, and development and operating costs up 20%	9%

5. As might be expected the Project is sensitive to sugar prices: roughly a 3% change in average import substitution price results in a 1% change in the return to the Project. Because variable costs change in the same direction, cane production variations, which could result from a combination of different yields per acre or area under cane, have a considerably smaller impact on the Project. Failure of the factory to meet the 1976 season deadline results in only a small reduction in returns--as was anticipated at appraisal. Delay in estate development which leaves the factory ready but idle is more serious, reducing the return by 2.5%, or one-fifth.

6. Given reasonable accuracy in price forecasts, it seems likely that the IER would be within the range 10-15%.

June 12, 1974

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Economic Cost and Benefit
(Tsh Million)

	1 1973/74	2 1974/75	3 1975/76	4 1976/77	5 1977/78	6 1978/79	7 1979/80	8 1980/81	9 - 20 1981 through 1993
Kilombero Sugar Company									
Benefits									
K II Sales Proceeds 1/	-	-	-	94.4	106.4	112.8	112.1	110.3	111.1
K I - K II Cane - Sugar Sales Proceeds	-	-	23.4	-	-	-	-	-	-
Total KSC Benefits	-	-	23.4	94.4	106.4	112.8	112.1	110.3	111.1
Costs									
K II: Operating Costs	-	1.5	7.6	21.6	27.8	31.1	30.1	30.3	30.3
Overhead	-	0.7	1.1	5.1	6.6	6.6	6.6	6.6	6.6
Estate Development	2.0	6.8	38.8	9.7	4.0	-	-	-	-
Property Plant and Equipment	2.4	193.0	115.6	23.6	3.0	-	-	-	-
Non-Factory Building	2.1	12.9	11.5	3.6	-	-	-	-	-
Plant and Equipment Replacement	-	-	-	-	-	5.0	7.3	6.4	7.5
Research, Survey and Training	-	1.5	4.4	2.6	1.7	0.8	0.8	0.8	0.8
Working Capital	3.7	1.2	0.4	0.4	-	-	-	-	-
K I: Processing Cost	-	-	2.9	-	-	-	-	-	-
Reduction in Sales Proceeds due to transfer of Outgrowers	-	-	-	6.2	1.9	-	-	-	-
KDDC Labor	-	-	0.2	0.4	0.5	0.5	0.5	0.5	0.5
KDDC Other Costs	-	-	0.4	0.2	0.1	-	-	-	-
Existing Outgrowers Cane Transport Cost Saving	-	-	-	(2.4)	(2.4)	(2.4)	(2.4)	(2.4)	(2.4)
Total KSC Costs	10.2	217.6	182.9	71.0	43.2	41.6	42.9	42.2	43.3
KSC Net Benefit	(10.2)	(217.6)	(159.5)	23.4	63.2	71.2	69.2	68.1	67.8

Economic Rate of Return : 12.94

1/ Prices used in economic evaluation are: Sugar: 1976 : Tsh 2000 per m ton
1977 : 1885 " "
1978 : 1735 " "
1979 : 1715 " "
1980 on: 1765 " "

Molasses: Tsh 150 per m ton throughout.

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ANNEX 21
Table 1

IBRD 10889
APRIL 1974

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