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MOLASSES PRODUCTION AND UTILIZATION POTENTIAL IN TANZANIA*

by

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THE SUGAR INDUSTRY IN TANZANIA: The sugar industry in Tanzania is comparatively small; producing only about 0.0015% of total world sugar production. In terms of the popular categorization of the world economic status into developed and developing countries, Tanzania produces 0.005% and 0.0045% of total sugar produced in developed and developing countries respectively.

The global insignificance emerging from above statistics notwithstanding, the sugar industry in Tanzania comprises five sugar factories producing 120,000 metric tons of sugar per annum from four estates. The four factories, with their installed capacities in brackets, are TPC(50,000 tons), Kilombero I(40,000 tons), Kilombero II(45,000 tons), Mtibwa (30,000 tons) and Kagera (8,000 tons)* Current per capita internal consumption stands at 10 kg. registering a healthy increase of 12% over the last 3 years. Growth in per capita consumption is expected to grow at the rate of 1% per annum; an increase primarily associated with positive distributive effects on rural development, positive income distribution policy, steady increases in rural and urban incomes together with a rapidly growing monetarized rural economy.

Tanzania has secured a 10,000 ton quota to the EEC under the Lome Convention and subject to negotiations with the EEC, a proposal is underway to increase this quota to 20,000 tons. To be able to meet the growing internal demand, honour commitment to the EEC and sell small quantities of sugar to neighbouring countries a comprehensive 10 years expansion programme will shortly be endorsed. Under the proposed expansion programme (see Appendix A), Tanzania will produce about half a million tons of sugar and 150,000 tons of molasses in 1990.

Although the trend in internal consumption and export trade noted above is not synonimous with a declaration that Tanzania will be a net exporter of sugar in 1990, it is certainly indicative of fairly attractive market opportunities.

MOLASSES PRODUCTION: Actual molasses production in 1978 was 57,461 tons. Under normal operating conditions average annual molasses production in the existing four factories is 61,000 tons. The difference is largely accounted for by temporary disruption of sugar production in one of our small factories due to an unfortunate force majeure situation.

*See Appendix B for location of factories & proposed projects.

In 1978 43% of the country's molasses was produced at TPC, 44% at Kilombero and the balance of about 7,000 tons was produced at Mtibwa. Production figures for the last 8 years are summarized in Table I below:-

TABLE I:

MOLASSES PRODUCTION (1971-1978)

YEAR	TPC	KILOMBERO	MTIBWA	KAGERA
1971	21,023	13,125	1,261	3,002
1972	20,012	12,252	1,919	-
1973	25,779	14,907	2,475	3,581
1974	20,412	14,399	5,661	3,408
1975	26,350	13,938	10,614	2,615
1976	27,818	24,053	6,691	1,500
1977	25,000	21,000	5,007	500
1978	25,000	25,411	7,050	-

Source: Sugar Development Corporation (SDC).

EXPORT OPPORTUNITIES: Except for molasses produced at Kagera where logistic problems are a significant constraint; making it uneconomic to transport molasses over a distance of 1,000 km. to the ocean outlet in Dar es Salaam where a molass s terminal exists; possibilities exist for the exportation of TPC, Kilombero and Mtibwa molasses through the Dar es Salaam port. Kilombero has been exporting, since 1975, an average of 13,450 tons via this molasses terminal while TPC has been exporting about 21,900 tons annually from 1971 to 1973 and significantly lesser amounts thereafter following the traditional outlet of Mombasa port in Kenya becoming inaccessible due to political reasons.

ZERO VALUE MOLASSES?: Admittedly, a significant amount of molasses is being dumped, primarily due to unsatisfactory logistic problems and under-developed infrastructural facilities; but in purely economic terms, it would be both inappropriate and inaccurate to assign negative or zero value to all the molasses produced in Tanzania. Tanzania has entered into a 7 year international contract with a commitment to supply 140,000 tons of molasses. This contract became effective in 1974 but logistic and transport problems have limited effective exports to an annual average of 13,000 tons only.

There has also been some internal consumption of molasses in the form of local sales, which have however, been fluctuating considerably; 402 tons (1971), 3,301 tons (1975) and 1826 tons in (1976). With this background, we need not over-emphasize the present inadequate and unsatisfactory level of molasses utilization. The export price (see price structure for exported molasses from Kilombero I and II - Table II) is extremely low. This state of affairs would appear to be a pointer to potential favourable comparative advantage situation whereby substantial added value and the attendant import substitution is achievable through biochemical transformation of available molasses to selected products of fermentation alcohol together with production of animal feed.

TABLE II:

PRICE STRUCTURE FOR EXPORTED KILOMBERO MOLASSES

(U.S. $/TON)

F.o.b. Dar es Salaam	38.18
Wharfage	0.16
Handling charges	10.80
Siding charges	0.18
Balance	27.10
Railway transport Kilombero I	10.40
Income Kilombero I	16.70
Railway transport Kilombero II	11.21
Income Kilombero II	15.89

Source: SDC records.

OPTIONS AVAILABLE: The option for biochemical transformation of molasses into fermentation alcohol for use as fuel and chemical feedstock (specifically for production of power alcohol, PVC and polyethylene); in view of low export prices and current surplus molasses situation (see Table III) coupled with even larger projected (1979-1990) surpluses consequent upon the envisaged expansion in sugar production (see Appendix A); appears to be a sound economic proposition and, as will be demonstrated elsewhere in this paper, this option is currently receiving serious attention. We in Tanzania are now irrevocably committed to a programme of action designed to ensure optimal and economic utilization of final local molasses as a feedstock for fermentation industry.

PROJECTED MOLASSES AVAILABILITY & UTILIZATION

('000 TONS

FACTORY/YEAR	1977/78	1979/80	1984/85	1989/90
TPC	28	19	27	27
KILOMBERO	23.9	27	37	43
KAGERA	-	-	8	19
MTIBWA	6.5	9	17	19
TOTAL AVAIL.	58.4	55.0	89.0	108
LESS UTILIZ.	19.8	27	5	-*
SURPLUS AVAIL.	38.6	28.0	84.0	108

*Export commitment ends in 1985.

Source: SDC projections.

Other options that would appear to be economic in the Tanzanian context, are the utilization of molasses for production of brewer's yeast, animal feeds and possibly fertilizers. Positive domestic market potential for most of the fermentation alcohol products is demonstrated by current low or non-utilization of molasses and molasses products. With cattle population of about 12.5 million,*1 for example, direct feeding of molasses would theoretically utilize more than a million tons of molasses[2] a year. However, the high density livestock centres being scattered and far removed from molasses production points, poor transportation system would render such an enterprise uneconomic. Production of molasses-urea-mix in those areas close to sugar factories and where national ranches are located is deemed to be economic, although effective demand is estimated at only 12,000 tons a year.

Another feasible outlet for molasses would be the utilization of molasses by the Tanzania Distillery Limited (TDL) for production of industrial alcohol, potable alcohol and alcohol equivalent by fermentation. A TDL expansion programme now underway envisages a demand for 3,000 tons of molasses from Kilombero and Mtibwa. Tables IV & V depict production of distillery products and estimates of the domestic alcohol market respectively.

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*1 Source: Tanzania Livestock Development Authority.

2 Assuming one kg. of molasses is fed per head per day for a period of four months (dry season) a year.

TABLE IV:

PRODUCTION OF DISTILLERY PRODUCTS

(1000 CASES)

	1976	1977	1978	1979	1980
				Projections	
1.Konyagi	48	52	54	62	65
2.Whisky/Brandy	14.5	20	24	28	32
3.Others	2.25	6	9	10	12
4.Total cases	64.75	78	87	100	109
5.Alcohol equivalent(a)	194.3	260	263	300	327
6.Industrial alcohol(a)	150.0	145	140	100	240

(a) In 1,000 litre. Source: TDL & Vogelbusch study.

TABLE V:

ESTIMATE OF THE DOMESTIC ALCOHOL MARKET

(1,000 LITRES, ROUNDED FIGURES)

	1972	1973	1974	1975	1976	1977
A.DISTILLED BEVERAGES:						
1.Import(consumed in proof litres)	155.5	344.6	n.a.	85.9	57.2	n.a.
2.Import(in litres of alcohol)	88.8	196.8	n.a.	49.0	32.6	n.a.
3.Domestic production	n.a.	n.a.	n.a.	n.a.	187.5	251.9
4.Estimated consumption	?	200(?)	220	220	220.1	270
B.INDUSTRIAL ALCOHOL:						
5.Import(total)	59.3	93.9	95.1	83.5	97.6	-
6.Import(consumed)	50.1	90.1	60.5	18.9	97.6	-
7.Domestic production	-	-	-	-	150	150
8.Estimated consumption	?	90	?	160	247	250
9.Total Demand	-	-	-	-	700	850

Sources: Vogelbusch study and Annual Trade Reports.

It is apparent that domestic demand for industrial alcohol and distilled beverages, given the hitherto under developed state of the domestic chemical industries is still very low.

INVESTMENT PROPOSALS: As has been outlined elsewhere, the low export price (about US $16 f.a.s. Dar es Salaam) for Kilombero molasses and the envisaged cumulative national molasses surpluses calls for a comprehensive programme for the utilization of final local molasses. For Kagera and TPC molasses export price is well below the cost of transport from either sites to the Dar es Salaam terminal. Export from these sites would result in serious material losses. Needless to say, dumping of molasses is not only wasteful but introduces an unacceptable and costly externality-pollution. With the foregoing background, the following alternative uses for molasses are considered for investment:-

a) For sale as a basis for cattle foods.

b) To be distilled into alcohol for sale for blending with petroleum (power alcohol) coupled with the production of baker's yeast.

c) To be distilled into alcohol for sale to the National Development Corporation for production of PVC or Polyethylene (can be undertaken as a joint integrated project).

CATTLE FOODS: Production of cattle foods will inevitably involve development of a market and in view of the probability of a relatively slow growth rate of the use for cattle food, this outlet, attractive as it is, cannot be considered as a means of disposal or as a source of revenue in the immediate future.[1]

POWER ALCOHOL: M/s. Vogelbusch Gesellschaft of Vienna, Austria commissioned by the Government of Tanzania in 1977 to elaborate an economic study on "Utilization of Local Final Molasses in Tanzania," observe that "Latent market for power alcohol (in Tanzania) may be between 4.25 and 7.75 million litres"[2]

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1 Bookers Agricultural & Technical Services Limited - Volume I Kagera Sugar Ltd. Proposed Expansion June, 1975, Page 116.

2 Vogelbusch Report - Page 20.

The option of gasoline substitution by dehydrated alcohol has increasingly become attractive in developing countries, primarily as a result of increase in crude oil prices, the attendant galloping inflation and effects on balance of payment.

Table VI below summarizes the national refinery throughput and oil imports statistics for Tanzania.

TABLE VI:

REFINERY THROUGHPUT & CRUDE OIL IMPORTS

(1,000 metric tons of crude oil, value in million Tanzania Shillings:0.25 T.Shs.=US$1.0)

YEAR	THROUGHPUT		IMPORTS	
	QUANTITY	VALUE	QUANTITY	VALUE
1972	-	-	810.9	103.6
1973	763.3	135.0	1,415.1[a]	237.0
1974	700.0	467.0	1,630.4[a]	927.0
1975	750.0	462.0	720.2	457.9
1976	810.0	699.0	657.2	679.9
1977	693.0	582.0	-	-
1978	690.0	630.0	-	-
Projection				
1979	766.0	743.0	-	-
1980	693.0	704.0	-	-
1982	766.0	850.0	-	-

Source: Quoted from Vogelbusch study which used Annual Trade Report.

a) Re-exports 535.7 (1973) at T.Shs. 91.1 million.
and 835.4 (1974) at T.Shs.142.2 million.

/that It will be seen from Table VI/refinery throughput has remained fairly constant while value per ton of throughput has increased by more than 300% over a period of four years.

Table VII below summarises statistics on gasoline production, imports and consumption.

TABLE VII:

GASOLINE PRODUCTION, IMPORTS & CONSUMPTION
(1,000 METRIC TONS)

YEAR	PRODUCTION	IMPORT	CONSUMPTION (MILLION LITRES)
1972	-	-	114.1
1973	109.7	8.1	140.8
1974	120.0	4.9	148.3
1975	108.0	6.4	140.6
1976	116.6	12.2	-
1977	110.9	4.0	-
1978	100.5	5.5	-
Projections			
1979	112.6	0.5	-
1980	110.9	4.0	-
1981	110.9	4.0	-
1982	122.6	-	-

Source: Tanzania Petroleum Development Corporation (TPDC), Projections: Vogelbusch.

Import projections indicate that 14,000 tons will be imported over a period of five years from 1978 - 1982. According to Vogelbusch, if this gasoline could be substituted by locally produced alcohol, about 2,800 tons of power alcohol a year would be required for import substitution. It is reported that 3% of total gasoline output can be substituted by power alcohol without major technical problems for the refinery. Given an average home consumption of 150 million and average refinery production of 115 million litres, about 3,400 tons of gasoline is replaceable by power alcohol.

Taking into account environmental and geographical conditions for Kagera, experts contend that it is technically possible to substitute 20 to 25 per cent of the 15.8 million litres consumed in West Lake, Mwanza and Mwanza Regions i.e. between 3.2 and 4.0 million litres of power alcohol per annum.

SDC, in consultations with TPDC, is committed to a power alcohol project at Kagera and when export commitment for Kilombero and Mtibwa molasses ends in 1985, another power alcohol project is contemplated. An effluent treatment plant that will convert vinasses into potash fertilizer has been recommended. It is possible to produce 20 tons of potassium sulphate (K_2SO_4) per day. The annual yield of some 5,000 tons of fertilizer at an average selling price of T.Shs.1,820 a tons,* would produce sales revenue of T.Shs. 10.5 million. This assumes that approximately half the production would be used on the estate and would therefore be worth the equivalent cost of muriate of potash and that the remaining half could be sold ex-factory at half the equivalent purchase of muriate of potash. 1,000 tons of baker's yeast will also be produced at Kagera. Actual demand for baker's yeast is estimated at 700 tons per year. It is assumed that the surplus yeast will be exported under bilateral agreements or through contracts with specialized foreign trading companies.

POLYETHYLENE AND/OR POLYVINYLCHLORIDE PROJECT FOR TPC: Like many developing countries, especially those with a rural development emphasis, Tanzania's demand for polymerization products (polyvinylchloride - PVC) and(polyethylene) is high and is expected to increase. One of the fundamental policy objectives in Tanzania is to provide clean water for drinking and also for irrigation to all rural communities. Current demand for irrigation pipes is estimated at more than 12,000 tons. According to Vogelbusch imports of products of polymerization increased from 6,599.2 tons in 1972 to 7,703.5 tons in 1975 and a continuous rate of growth is computed at 4.34 per cent a year. Demand for PVC and polyethylene is reported to be higher than actual rate of growth of imports and consumption. To capitalize on this situation an integrated project that will produce 10,000 tons of polyethylene per annum (and 1,000 tons of baker's yeast) is contemplated. A local consultancy firm is presently elaborating a study on the financial and economic feasibility of this proposal.

An earlier option regarding utilization of TPC molasses was the establishment of an alcohol - baker's yeast complex with a normal capacity of 10 million litres of alcohol and 1,000 tons of active dry baker's yeast per annum at TPC. A feasibility study undertaken by M/s. Vogelbusch indicated that total investment for this complex is about US $ 17,045,000 and that the project shows a net profit after the first year of operation with cumulated retained profits/losses becoming positive in the second year of production.

Having established the economic and financial feasibility of alcohol production at TPC, it would appear that what fermentation alcohol products are finally produced (i.e. the choice between dehydrated alcohol and polyethylene/polyvinylchloride) shall exclusively depend on sound and profitable economic priorities now being sorted out.

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GGM/az

PROJECTED SUGAR[1] & MOLASSES[2] PRODUCTION 1979-1990

APPENDIX A

('000 TONS)

	1979/80		1980/81		1981/82		1982/83		1983/84		1984/85		1985/86		1986/87		1987/88		1988/89		1989/90	
	S	M	S	M	S	M	S	M	S	M	S	M	S	M	S	M	S	M	S	M	S	M
PRODUCTION REQUIREMENT	195	65	215	72	240	80	260	87	285	95	310	103	335	112	360	120	390	130	425	142	470	157
KAGERA	-	-	-	-	-	-	-	-	18	6	23	8	35	12	45	15	52	17	56	19	56	19
MWANZA	29	9	31	10	34	11	43	14	47	16	51	17	55	18	57	19	57	19	57	19	57	19
TPC	56	19	71	24	80	27	80	27	80	27	80	27	80	27	80	27	80	27	80	27	80	27
KILOMBERO	82	27	85	28	87	29	87	29	97	32	112	37	121	40	128	43	128	43	128	43	128	43
RUVUMA[1]	-	-	-	-	-	-	-	-	20	7	40	13	50	17	50	17	50	17	60	20	75	25
MOLANA	-	-	-	-	5	2	10	3	10	3	10	3	10	3	10	3	10	3	10	3	10	3
MKONGO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	7	40	13	60	20
TOTAL PRODUCTION: (M) (S)	167	55	107	62	206	69	220	73	272	91	316	105	351	117	370	124	397	133	431	144	466	150

M = MOLASSES S = SUGAR

Source: 1 Sugar Survey 1977
2 SDC Projections

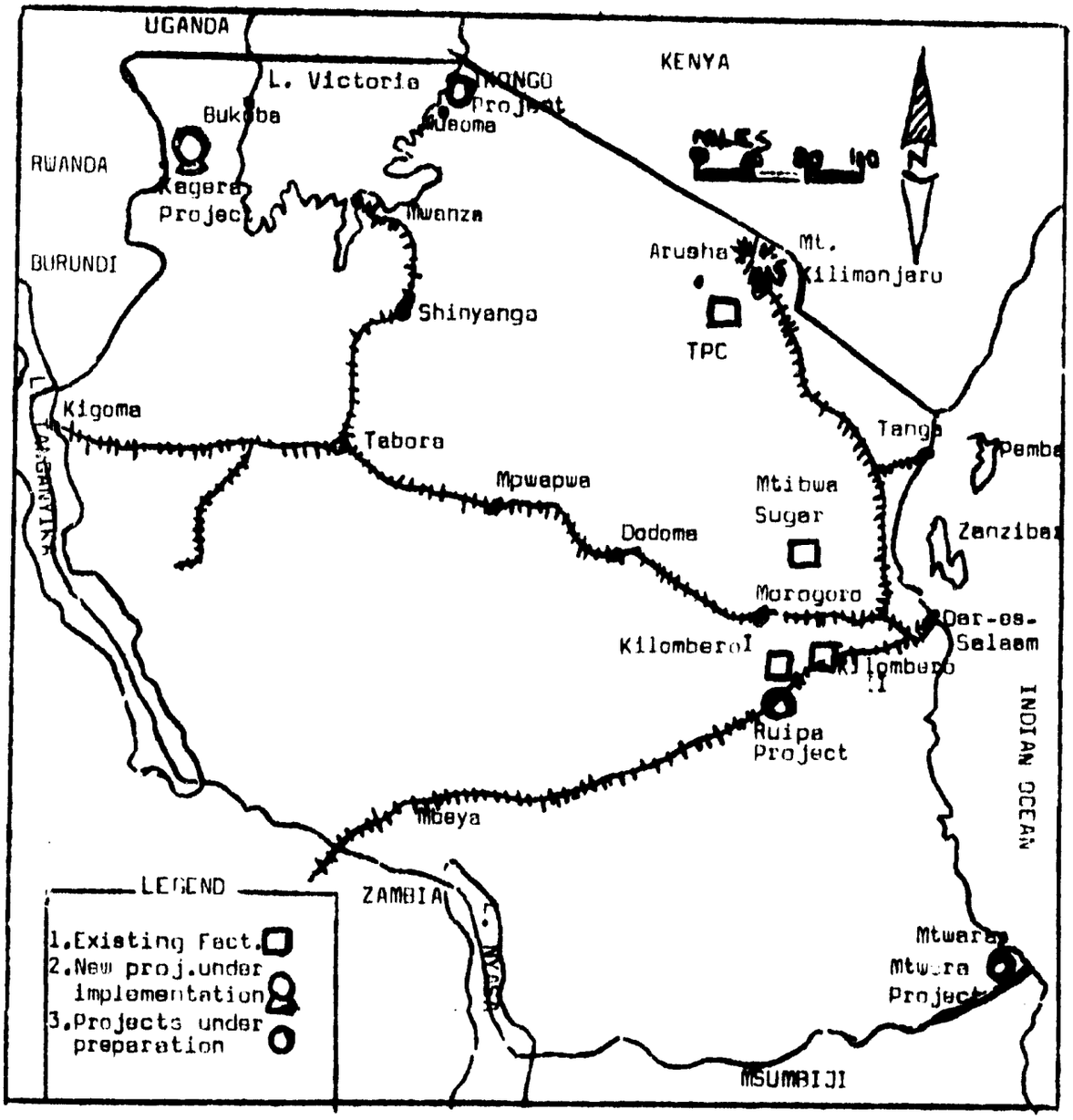
Note: i) For purposes of this paper conversion ratio - sugar:molasses is assumed to be 1:0.3

ii) Sugar production programme recommended by BAI/TLTS (1977) has had to be modified in the light of present developments.

APPENDIX B:

THE UNITED REPUBLIC OF TANZANIA

LOCATION OF SUGAR PROJECTS



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