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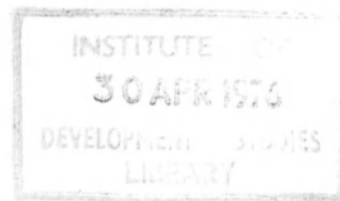
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PROSPECTIVE DEMAND FOR MANUFACTURES

IN EAST-AFRICA

A survey

Introduction

1. Prospects for the sisal industry
  2. Prospects for the sugar industry
  3. Note on the textile and clothing industry
  4. Prospects for the leather-shoes industry
  5. Prospects for the pulp, paper and paperboard industry
  6. Prospects for the cement industry
  7. Prospects for the glass industry
  8. Prospects for the fertiliser industry
  9. Prospects for the pesticides industry
  10. Prospects for the petroleum industry
  11. Prospects for the engineering industries
- Summary table

- o - o - o - o - o -

### Introduction

In this paper we will summarize the information that is available on the future demand of manufactures in East Africa. Reference will be made mainly to work done in this field by the Economic Commission for Africa. In some cases other sources have also been used; a complete list of references is given at the end of the paper.

It was hoped that direct information regarding future demand would be obtained from the planners in the three East African countries. Very little systematic work has been done in this field, however, although it was sometimes stated that the various sector-targets in the development plan had been based on such estimates. The only check, therefore, that can and will be made is a comparison with sector-targets, as given in the plans. For the time being this is possible only in the case of Tanzania, the new Uganda plan and the revised edition of the Kenya plan not being available at the moment this paper was written.

The ECA demand projections are usually based on the following assumptions with respect to growth of GDP.

Table 1 Assumed growth of GDP in ECA projections

	US \$ millions			
	<u>1961/62</u>	<u>1970</u>	<u>1975</u>	<u>1980</u>
Kenya	681	1,020	1,366	1,827
Uganda	446	759	1,097	1,563
Tanzania	516	929	1,286	1,761

In all other cases the assumed growth rates are mentioned in the text.

The projections cover different periods for the various products; usually they are made for 1975.

In general we shall assume that the export possibilities for manufactured products outside East Africa are limited. Only in a few cases it was found justified and desirable to take them into account.

The products dealt with in this paper have been selected with a view to the research programmes on the minimum size of industrial enterprises in East Africa and their location. This led to the following criteria:

- a. The industry should be interesting from the point of view of alternative production techniques.
- b. There are alternative locations.

For practical reasons we add a third criterion:

- c. Only those products and product groups can be included for which a demand study has been carried out.

The sections on each product are divided into four parts. In the first place some general characteristics are given, secondly the present situation in East Africa is described with respect to production, capacities (when available), consumption and foreign trade. Thirdly, the projection of demand is given and fourthly the technical implications of this projection are briefly indicated. It is this last subject which will be elaborated in the case-studies which follow this phase of the study.

At the end of the paper the income-elasticities are presented on which the projections are implicitly or explicitly based. For comparison the findings of others have been mentioned. Only those have there been included which might have some relevance to East Africa.

1. Prospects for sisal products.

General characteristics.

Sisal belongs to the group of hard fibres, together with Manila hemp (produced in the Philippines) and henequene, which is a variant of sisal (mainly produced in Mexico). Jute is to a small extent also a competitor with sisal in the case of the weaker types of twine.

Sisal is used in agriculture as binder and baler twine, and in industry as wrapping twine. It is also used in considerable quantities in automobile and furniture upholstery. A small amount of sisal is used for bagging materials.

New uses of sisal cannot be excluded; in France investigations are being conducted into the possibilities of producing paper products using sisal as the main raw material input.

Present sisal production in East Africa.

Tanzania and Kenya are among the main exporters of sisal, the other two being Brazil and Angola. The production of sisal in East Africa in 1964 is estimated at:

Kenya	70,000 tons
Uganda <sup>1</sup>	-
Tanganyika	230,000 "
	<hr/>
	300,000 tons

The world production of sisal being around 600,000 tons, East Africa produces approximately 50 per cent of the world supply of sisal, and more than 30 per cent of the world supply of all hard fibres.

Until 1964 almost all sisal was exported and no manufacturing of end-products took place in the sisal-producing countries - with the exception of some industry in Kenya. This distinguishes East African sisal sharply from for instance Mexican henequen, which is almost entirely exported in the form of twine, the product of local Mexican industry.

The export prospects for raw sisal are good. Balassa foresees a rise of 50 per cent of total exports of hard fibres between 1960 and 1975, although the largest expansion is to be expected in Mexican henequen and Brazilian sisal. Prices are expected to fall 7 to 8 per cent during the projection period which seems optimistic. Unofficial estimates in Tanzania calculate a fall of 40 to 50 per cent. of 1960 levels.

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<sup>1</sup> Less than 1000 tons a year and included under Kenya.  
Source: E/CN.14/INR/88

<sup>2</sup> Balassa, Bela, Trade Prospects for developing countries.  
The Economic Growth Center, Yale University,  
Homewood (Ill.), 1964.

Un uncertain element in the projection of future sisal prices is the possibility that a quota system is introduced among the sisal producing countries. Preliminary talks between representatives of the sisal producing countries do not indicate very much enthusiasm from the side of the main producers.

Prospects for the manufacturing of sisal products.

In the ECA paper dealing with sisal three main reasons are given for the introduction of the manufacture of sisal products in East Africa being attractive. These are that:

- a) Prices of sisal products tend to be more stable than the prices of raw sisal;
- b) Value added in the manufacture of sisal products seems to be substantial;
- c) The capital-output ratio is relatively low, around 2.5

On the basis of these considerations the manufacture of cordage is especially recommended.

Cordage industries.

The demand within the East African region is small. It did not exceed 1500 tons in 1964, while no clear trend is discernable. Therefore, the main market for the cordage industry based on sisal is almost entirely dependent on exports. Although the export market looks favourable, two points should be taken into account:

- a) Many countries are likely to set up industry of their own.
- b) The development of synthetic cordage, especially in developed countries.

This last possibility deserves careful attention. Raw sisal does not have to overcome tariff barriers in most of the importing countries. Sisal products, however, do and much depends on the willingness of the industrial countries to project their synthetic cordage industries against the undoubtedly cheap East African cordage.

We are not sure that this aspect is taken into consideration in the ECA target value of cordage production in East Africa in 1975, put at 60,000 tons. It was understood to be the main reason for the reluctance of Tanzania to extend the present capacity of cordage production of 12,000 tons.

The implications of a target figure of 60,000 tons in 1975, compared to present capacity, are given in the next table.

Table (See next page)

Table 2 East Africa: Perspective for Cane Industry - - 1975

Country	Existing capacity		Margin of Expansion by existing units	Additional capacity required by 1975	Total capacity by 1975
	No. of units	Capacity (annual)			
Kenya	1	600*	1,000	12,000	13,600
Uganda	-	-	-	4,000	4,000
Tanzania	3	12,000	8,000	18,000	38,000
TOTAL	4	12,600	9,000	34,000	55,600

Source: E/CN.14/INR/88

\* estimated

2. Prospects for the sugar industry.<sup>1 1</sup>

General characteristics.

Usually the production of sugar cane and the manufacture of sugar therefrom are considered as a single process. The main reason is that sugar cane is highly perishable and has to be processed within twenty four hours.

Sugar production has a number of by-products, such as molasses and bagasse. Molasses might be used as cattle feed or to produce a number of chemicals, such as alcohol, acetone etc. Bagasse can be used in the production of pulp and paper (see page 12). At present it is mainly used as fuel.

Present production and demand for sugar.

Sugar produced in East Africa at present is not refined but a mill white sugar. Refined sugar is imported to satisfy a relatively limited demand.

In Uganda three sugar factories and 7 small plants producing jaggery are in operation. Two sugar factories are located near Jinja; they are the largest mills in East Africa. At Sango Bay (Lake Victoria) a third factory is being constructed or has just started operations.

<sup>1</sup> Largely based on C.S. Frank Jr., The Sugar Industry in East Africa, 1965.

Kenya has also three sugar factories, one located near the coast at Ramisi, another one near the shores of Lake Victoria, at Mtwani, and recently one at Muhoroni, near Kisumu.

Tanzania has five sugar factories. Two in the North, one large (at Arusha Chini) and one very small (at Valeska, also in the Arusha-Moshi area. Two factories are located in the Eastern Province, at Kilombero and Turiana. The fifth sugar factory is located near Bukoba.

Production, consumption and trade data are given in the following tables.

Table 3 KENYA: Supply and Consumption of Sugar  
(SITC 061) in 1964

	1,000 tons
1. <u>Domestic production</u>	34.5
2. <u>Interterritorial trade</u>	
Exports	-
Imports	43.6
3. <u>External trade</u>	
Exports	-
Imports	29.0
4. <u>Balance for domestic consumption</u>	103.5 <sup>1</sup>

Source: C.S. Frank, op.cit. p. 12

1) Stock changes taken into account.

TABLE 4 UGANDA: Supply and Consumption of sugar  
(SITC 061) in 1964

	1,000 tons
1. <u>Domestic production</u>	123.5
2. <u>Interterritorial trade</u>	
Exports	43.9
Imports	-
3. <u>External trade</u>	
Exports	0.4
Imports	-
4. <u>Balance for Domestic consumption</u>	83.2

See notes to table 3

Table 5 TANZANIA: Supply and consumption of Sugar  
(SITC 061) in 1964

	1,000 tons
1. <u>Domestic production</u>	60.5
2. <u>Interterritorial trade</u>	
Exports	0.1
Imports	0.4
3. <u>External trade</u>	
Exports	0.4
Imports	-
4. <u>Balance for Domestic consumption</u>	57.8

See notes to table 3

Projection of sugar consumption.

Frank bases his projection of sugar consumption in East Africa in 1970 on the following assumptions:

- (1) GDP will increase either at an annual rate of 6.5 per cent. in terms of current prices, or, alternatively at 4.5 per cent.;
- (2) Population rates of growth per annum will be:
  - (a) 2.5 per cent in Uganda
  - (b) 3.0 per cent in Kenya
  - (c) 2.2 per cent in Tanzania
- (3) The retail price indices will rise with 1 per cent per annum.
- (4) Because of gradual increases in excise taxes, the retail price of sugar will rise at the rate of 2 per cent per annum.
- (5) The sum of export duties, import duties, and direct taxes (x) will rise along with GDP according to the following regression equations:
  - (a)  $x = 17.064 + .804 \text{ GDP for Uganda, and}$
  - (b)  $x = -6.738 + .925 \text{ GDP for Kenya and Tanzania,}$

where all taxes and GDP are measured in £ millions.



Out of a set of 10 regression equations the following three equations were chosen:

$$\text{For Uganda: } X = 10.89885 + .80z_2 - .14z_3 + .024z_4$$

$$\text{For Kenya: } X = 35.39241 + .45z_2 - .46z_3 + .037z_4$$

$$\text{For Tanzania: } X = 110.52862 + .84z_2 - .17z_3 + .037z_4$$

Where: X is sugar consumption,

$z_2$  is disposable incomes,

$z_3$  is the retail price of sugar, and

$z_4$  is a time variable.

The following projections of sugar consumption have been made - the lower estimate on the assumption of 4.5 per cent rate of growth of GDP, the higher estimate on the 6.5 per cent assumption: -

	<u>Lower estimate</u>	<u>Higher estimate</u>
	(1.000 tons)	
Kenya	171.77	181.77
Uganda	110.74	122.20
Tanzania	99.41	112.90
	<hr/>	<hr/>
	381.92	416.27

The figures imply a rate of growth of sugar consumption of 6 - 7 per cent for the lower estimate, of 7 - 8 per cent for the higher estimate. Even apart from export prospects, which are at present restricted to a 10.000 ton quota for East Africa under the Commonwealth Sugar Agreement, the internal consumption estimate suggests a good basis for expansion of the sugar industry. Present capacities are unknown, however, so that it is not possible to specify the technical implications of this expansion.

3. Note on the textile and clothing industry.

a. The textile industry is undoubtedly one of the most important industries in East Africa. For several reasons it could not be included in this survey, although an ECA study has been made for it.

In the first place its extreme heterogeneity makes aggregate projection for the 'textile industry' as such virtually useless for our purpose. One cannot attach much importance to a statement that the income-elasticity of demand for textile products varies from 0.35 - 0.80, for instance.

In the second place, very little can be deduced from the Industrial Censuses of the three East African countries about present production, present capacities etc. Most of the data are given in values, which is, of course one of the direct consequences of heterogeneity in the industry; for our purpose, production and capacity data are required in terms of quantity.

In the third place - and this is the most important reason why it was thought desirable not to pay too much attention to the textile industry in this stage - Mr. Helmschrott of the IFO Institute in Munich starts a research project at EALSIR on the East African textile industry in April, from which, it is hoped, more detailed information will become available.

b. What has been said on the textile industry applies even more to the clothing industry. Apart from the same heterogeneity in type and quality of cloth used, an extra complication arises here in the form of different sizes and shapes etc.

Data collection on the clothing industry is further complicated by the fact that there is a universal tendency for clothing industries to be small, which is also related to the variety of end-products. This results in deficient data on the industry and justifies a careful case-study.

Some of the aspects that will have to be taken into account, and which are important especially for the projection of the demand for clothing are the following:

- Cloth is often used directly as clothing (e.g. sarree and khanga)
- The imports of second-hand clothing are extremely important in East Africa (in 1963 almost 5 million units with a total value of £650,000 - from Foreign Trade Report)

4. Prospects for the leather shoes industry.

In Kenya only is the production of leather shoes well developed, although both Uganda and Tanzania have started their own industry now.

The raw material position in East Africa is excellent. The production of hides and skins is considerable but a large part is exported at low prices, since at present the quality of East African hides and skins is relatively poor. An improvement is noticeable, however, in recent years, especially in the preservation.

An important phenomenon in the leather industry is the possibility to substitute synthetics for leather. In Europe this is one of the main reasons for the stagnation in the industry; there is reason to assume, however, that the trend is changing, especially in the manufacture of shoes.

In this section we will pay attention to the prospects of the East African leather shoes industry only.

Present production and consumption of footwear

The assessment of the production and consumption of footwear in East Africa is complicated by the fact that the Censuses of Industrial Production in the three countries exclude handicrafts and other small producers. In addition to that, the Uganda footwear industry has been combined in the Census report with 'textiles' and 'wearing apparel' and the Tanzania Census does not give any details on domestic production of the footwear industry, total output including an estimate of repair shops, etc. The only Census which gives sufficient detail to estimate domestic consumption of leather shoes is the Kenyan Census though there also small establishments are not included. For Uganda and Tanzania we have, therefore, to rely on the ECA estimate of domestic consumption in 1960. For Kenya we have estimated the domestic consumption, using the Census figures and the Foreign Trade Report. We have used, however, the ECA estimate of small scale production of leather shoes.

TABLE 16 Kenya: Supply and Demand for leather shoes (SITC 851-02). 1963

1. <u>Domestic production</u>	<u>pairs</u>
Large establishments	981.000
Small establishments	400.000
2. <u>Interterritorial trade</u>	
Imports	28.100
Exports	654.600
3. <u>External trade</u>	
Imports	176.000
Exports	64.400
4. <u>Balance for domestic consumption</u>	866.100

Sources: Industrial Census, 1963  
E/CN.14/INR/85  
Foreign Trade Report

The ECA estimate of domestic consumption of leather shoes in 1960 is:

Kenya	749.000	Pairs
Uganda	449.000	"
Tanzania	503.000	"

This would imply that consumption in Kenya has increased by 16 per cent during the period 1960-1963. Assuming the same rate of increase for Uganda and Tanzania, the total consumption of leather shoes in East Africa in 1963 was about 2.000.000 pairs, of which more than 420.000 pairs were imported from outside East Africa. Kenya is by far the largest producer.

Projection of demand for leather shoes.

ECA projects the consumption of leather shoes in 1975 on the basis of an income elasticity of demand of 1.2, which is estimated from a cross-country analysis. This does not compare unfavourably to an estimate of the income-elasticity of the demand for shoes in the Netherlands of 1.3.

The leather shoe consumption in 1975 is thus estimated at:

Kenya	1.700.000	pairs
Uganda	1.300.000	"
Tanzania	1.800.000	"

The per capita consumption will, then, be around 0.14 in 1975.

In addition to this domestic consumption projection ECA has also estimated future export possibilities. This is mainly based on the favourable raw material position and of the relatively low wages, which are of considerable importance in such a typically labour intensive industry.

The export prospects are the following:

Kenya	2.500.000	pairs
Uganda	1.000.000	"
Tanzania	2.500.000	"

Taking into account some import of leather shoes in 1975 the total production capacity in 1975 is estimated at:

Kenya	4.080.000	pairs
Uganda	2.250.000	"
Tanzania	4.220.000	"

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10.550.000 pairs

<sup>1</sup> Demand analysis for shoes 1923-1939, Central Planning Bureau, Netherlands, 1954.

<sup>2</sup> Tanzania has a planned consumption of 1.5 million pairs of leather shoes in 1970. Although ECA considers this target unrealistic, it has adjusted the own estimate somewhat in accordance with this plan target.

Technical implications

The required production capacity in 1975 implies the following in terms of new tanneries and shoe-factories:

	<u>Tanneries</u>	<u>Shoe factories</u>
Kenya	a. 350 th. hides b. 500 th. skins	1.5. mil. pairs
Uganda	a. 300 th. hides b. 500 th. skins	1.5 mil. pairs
Tanzania	a. 650 th. hides b. 900 th. skins	2.5 mil. pairs

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b. Prospects for the Pulp, paper and paperboard industry.

This industry comprises the production of pulp, and paper (newsprint, printing and writing paper and industrial paper) and paperboard. The corresponding SITC groups are 251 (for pulp) and 341 (for paper and paperboard).

a. Production of pulp.

General characteristics

Several raw materials can be used as primary input in pulp production. In the first place wood. These resources in East Africa are abundant: almost 160.000 ha of forest plantations and in addition to that 3.6 million ha of closed, but dispersed forest. However, the location of present plantations is unfavourable for pulp production. They are in too remote areas and many of them are in areas where water supply and effluent disposal present problems to a pulp mill. Another consideration that has to be taken into account in the evaluation of the prospects for an East African pulp industry is that new plantations with better location will mature for pulping only after 1975.<sup>1</sup>

In the second place bagasse - provided by the sugar cane mills - can be used as raw material input in pulp mills. The estimated output of bagasse from sugar cane mills in 1962/63 was around 270.000 tons for the three East African countries together.

Finally a number of other raw material inputs exists, e.g. bamboo, cotton linters, reeds and waste paper. In the section on sisal it has already been mentioned that also this might become a potential raw material input.

Production and demand for pulp.

Both production and demand for pulp have been nil in East Africa. The small paper mill in Kenya uses waste paper as raw material.

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<sup>1</sup> See ECA study on forest industries, E/CN.14/INR/80, Page 29.

### Prospects for the pulp industry

To manufacture a given quantity of paper and paperboard would require about the same quantity of fresh pulp, mixed with waste paper to compensate for fibre losses and the difference in moisture content. The estimated demand for paper and paperboard in 1975 in East Africa is approximately 72.600 tons. (see next page) Consequently the demand for pulp in 1975 would be approximately 72.600 tons.

In this light the existing projects for pulp mills in East Africa seem ambitious. Kenya and Tanzania have announced the construction of a pulp mill. In Kenya the Pulp and Paper Co. of East Africa is constructing a mill near Broderick Falls, with a capacity of 100.000 tons. The target year of completion is 1970.

Tanzania has announced a pulp mill at Mufindi, with an annual capacity of 135.000 tons. Year of completion, 1980. Since the Tanzanian plan indicates a demand for 'sisal, paper and pulp' of only 22,000 tons in 1970, exports prospects must have played an important role in this decision.

#### b. The production of paper and paperboard

##### General characteristics.

The paper and paperboard industry comprises the production of newsprint, printing and writing paper and industrial paper and paperboard, such as packing and wrapping paper, building board of paper or pulp, different types of paperboard, wallpaper, cigarette paper etc.

##### Production and demand for paper and paperboard.

Apart from a small establishment in Kenya (the Kenya Paper Mill at Thika) with an annual capacity of 2.400 tons per annum, no production takes place in the region. The market can, therefore, almost entirely be estimated from trade data (see table 7).

##### Projection of demand for paper and paperboard.

The projection of the demand for paper and paperboard is based on the assumption that 'per capita consumption will increase in accordance with the per capita GDP, but that income elasticity of demand gradually decreases as the per caput GDP increases'.<sup>1</sup>

In this way the requirements of paper and paperboard in 1975 for the whole Eastern African sub-region are estimated at 198.000 tons (lower estimate), 226.000 tons (medium estimate) and 264.000 tons (higher estimate). Given the per capita consumption in 1960 for the three East African countries and assuming equal rates of growth in per capita GDP the requirements -

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<sup>1</sup> See: E/CN.14/INR/80, page 2  
Also: FAO, World Demand for Paper in 1975

medium estimate - by 1975 are:

Kenya	55.900 tons
Uganda	6.700 "
Tanzania	10.000 "
<hr/>	
	72.600 tons

There is almost no information on active paper mill projects in East Africa. It is known that the pulp-mill at Broderick Falls in Kenya is supposed to produce also paper and paperboard, but its capacity is unknown at present. On the whole, however, the economics of paper and paperboard production seem to indicate that only large scale operation is viable, and larger market arrangements will therefore, be necessary. Later case studies might give different results, however.

TABLE 7

EAST AFRICA: Supply and Demand for Paper and Paperboard, (SITC Group 641), in 1963.

	1,000 tons		
	<u>KENYA</u>	<u>UGANDA</u>	<u>TANZANIA</u>
1. <u>Domestic production.</u>			
Newsprint	-	-	-
Printing and writing paper	-	-	-
Other	1.4	-	-
2. <u>Interterritorial trade</u>	..1)	..1)	..1)
3. <u>External trade</u>			
<u>Exports</u>			
N	-	-	-
P	-	-	-
O	..1)	-	-
<u>Imports</u>			
N	2.7	.7	.6
P	5.7	1.0	1.3
O 2)	16.5	.6	.8
4. <u>Balance for domestic consumption.</u>			
N	2.7	.7	.6
P	5.7	1.0	1.3
O	17.9	.6	.8
TOTAL	26 .9	2. 3	2.7

Source: Annual Trade Report, 1963 and Industrial Census.

1) Less than 100 tons.

2) Not including building board of paper and pulp which amounted to the following imports for the three countries in 1963:

Kenya	4.6 million sq. ft.
Uganda	1.7 " "
Tanzania	3.9 " "

6. Prospects for the cement industry.

General characteristics

The most common type of cement produced is Portland cement. Raw material inputs consist mainly of lime (up to 80 per cent of the mixture) and clay (which provides usually the necessary quantities of silica, alumina and iron oxide). Resources of limestone are extensive in Kenya (coastal region, Kunkar deposits, Sultan Hamud) and Tanzania (Waz Hill deposits). Uganda is less fortunate; the deposits at Tororo and Suku Hills are of poor quality. The deposits near Kasese seem to be of better quality.

The attention paid to cement production in developing countries in general is not surprising. The production costs of cement are relatively low in relation to the high transport costs, cement being a heavy and bulky material. Moreover, most countries possess the necessary raw material. Cement production is technically a simple process, although it is more capital-intensive than for instance the light consumer goods industries. The technological aspects of cement production will be dealt with in a later paper, however.

Present situation in East Africa.

The consumption of cement in Kenya and Uganda has declined steadily since 1958/59. This decline is mainly due to a decline in building and construction activities, to which the consumption of cement is, of course, closely correlated. In Tanzania the cement consumption remained fairly stable over the period 1950-1963.

On the whole, however, there are signs of recovery in the building construction sector - in particular because of new investments in the public sector - and consequently an increase in the consumption of cement can be expected. More attention will be paid to these aspects elsewhere in the EDRP; here we will assume that a projection of the cement consumption on the basis of cross-country data is acceptable.

The present production of cement in East Africa is much smaller than the installed capacity, as is shown in the following table.

Table 8 East Africa: Production, Installed Capacity and Consumption of Cement, 1963.

Country	Production	Capacity	Domestic Consumption
Kenya	344	520	118
Uganda	56	200	72
Tanzania	-	-	114
TOTAL	400	720	304

Source: E/CN.14/INR/84



There are three producing plants in Kenya (2 near Nairobi, 1 near Mombasa) and 1 in Uganda (Tororo), a second cement factory is being constructed near Kasese.

No cement is produced in Tanzania. A cement factory is under construction, however, near Dar-es-Salaam.

Kenya is the only country in East Africa exporting cement on a significant scale, mainly to Tanzania and Uganda, but also to a growing market in Mauritius, Reunion, Aden, Persian Gulf countries and Pakistan.

Prospects for the cement industry in East Africa.

A projection of consumption of cement in East Africa cannot very well be based on the consumption figures of the last five years. As has been said above, the decline in building and construction activity during these years caused a serious drop in cement consumption. The expected increase will therefore be based on cross-country data. In the ECA paper, dealing with the cement industry, a good correlation has been found between the ratio of growth of per capita cement consumption and the rate of growth of per capita GDP against per capita GDP. The ratio or income elasticity of per capita cement consumption is based on the data for the period 1950-1960. In other words, the period of declining cement consumption in East Africa has not been taken into account.

The correlation obtained can be described by the formula:

$$e = 126.5/y + 0.3$$

This results in the following average elasticities for the period 1961/1975 for East Africa:

Kenya	2.29 - 2.06
Uganda	2.29
Tanzania	2.12

The annual rate of growth of total cement consumption is then:

Kenya	9.3%
Uganda	12.7%
Tanzania	12.0

Comparing these percentages to the rate of growth observed during the period 1948-1958:

Kenya	9.0%
Uganda	18.6
Tanzania	10.0

one can even qualify these projections as conservative.

On the basis of the ECA growth rates the total cement consumption in East Africa is estimated to be:

Kenya	470.000 tons
Uganda	315.000 "
Tanzania	505.000 "

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1.290.000 tons

In the case of Kenya cement it seems justified to include in the projection favourable export possibilities. Since 1959 exports outside the East African region have been growing fast and steadily, and it is projected that extra-regional exports will amount to 300.000 to 400.000 tons.

The technical implications of these projections are given in the following table:

Table 9 Technical implications of the 1975 projection of cement consumption for East Africa.

Country	Thousand tons				
	Consumption 1975	Export 1975	Total required 1975	Prod.Installed capacity 1963	Short- fall 1975
Kenya	470	410	880	520	300
Uganda	315	-	315	200	115
Tanzania	505	-	505	-	505
TOTAL	1.290	410	1.700	720	920

It should be noted at this moment that the problems arising now are of extreme interest. Given the additional capacity required, the problem is whether to split up over different smaller units - experience in other countries (e.g. Japan) have shown that cement factories can work efficiently on a very small scale, down to 50,000 tons of capacity - or to concentrate extra production in new or already existing plants. Both economies of scale and locational considerations will have to be taken into account. These will be dealt with at a later stage.

7. Prospects for the glass industry

General characteristics.

The main raw materials used in glass production are sand, soda ash, lime, felspar and dolomite. Sand is obviously the most important ingredient.

Most of these raw materials seem to be abundantly available in the East African region. Kenya has large deposits of suitable sand along the coast and also the other ingredients are available, albeit scattered over the country. In Tanzania good sand is available on the shores of Lake Victoria; dolomites and soda ash should be imported, however. In Uganda glass sands are also found on the shores of the Lake, in particular near Entebbe. Soda ash will have to be imported.

Glass products can be classified into two categories, flat glass and glassware. These two categories, corresponding to SITC 664 and 665, will be dealt with separately.

Present production and consumption of glassware,

The present production of glassware in East Africa is mainly concentrated in Kenya. In Uganda only two small establishments produce glassware products.

In Kenya three firms belong to the industry, two producing glass bottles and tableware, and one mirrors. The total capacity of these plants is estimated at some 12,000 tons a year.

In the following tables the supply and consumption of glass ware in the three countries is given.

TABLE 10 KENYA: Supply and Consumption of Glassware (SITC 665) in 1963.

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1. <u>Domestic production</u>	11.264 tons <sup>(1)</sup>
2. <u>Interterritorial trade</u>	
Exports	2.073 "
Imports	28 "
3. <u>External trade</u>	
Exports	1.419 "
Imports	1.639 "
4. <u>Balance for domestic consumption</u>	9.439 tons <sup>(2)</sup>

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Source: Annual trade report, 1963 and Industrial Census, 1963

(1) Estimated from the Industrial Census.

(2) Stock changes are not taken into account.

Table 11 UGANDA: Supply and Consumption of Glassware  
(SITC 665) in 1963

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1. <u>Domestic production</u>	- tons <sup>(1)</sup>
2. <u>Interterritorial trade</u>	
Exports	7 tons
Imports	1.198 "
3. <u>External trade</u>	
Exports	- "
Imports	693 "
4. <u>Balance of Domestic consumption</u>	1.884 tons <sup>(2)</sup>

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Source: Annual trade report, 1963 and Industrial Census, 1963

- (1) In the industrial census aggregated with other sectors; only two small establishments producing specialised products.
- (2) Does not include domestic production; stock changes are not taken into account.

Table 12 TANZANIA: Supply and Consumption of Glassware  
(SITC 665), 1963.

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1. <u>Domestic production</u>	- tons
2. <u>Interterritorial trade</u>	
Exports	26 "
Imports	969 "
3. <u>External trade</u>	
Exports	- "
Imports	1.020 "
4. <u>Balance of domestic consumption</u>	1.963 tons <sup>(1)</sup>

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Source: Annual trade report, 1963 and Industrial Census, 1961.

- (1) Stock changes are not taken into account.

Projection of glassware consumption.

The relevant ECA paper projects the glassware consumption in East Africa on the basis of the per capita income and per capita consumption of glassware relation in 1960, for the countries in the East African region. This relationship was quantified and "after a few corrections" the following consumption of glassware in 1970 and 1975 was projected:

	<u>1970</u>	<u>1975</u>
Kenya	12.990	15.210
Uganda	3.930	5.340
Tanzania <sup>(1)</sup>	4.890	6.390
	<hr/>	<hr/>
	21.810	26.940

Although the basis for this projection is rather weak, we will use it as a rough indication of the future size of the market.

The total shortfall in 1975 in East Africa will be about 15.000 ton. Tanzania has already undertaken the construction of a 4.500 - 6.000 tons plant, which seems adequate for the demand in 1975. Also Uganda is constructing a glass factory - estimated investment of £400.000 - in Kampala, with a capacity that will meet the demand in 1975.

Present production and consumption of flat glass.

There is no production of flat glass - sheet glass and plate glass - in East African at present. Demand can therefore be estimated from trade data. Imports in 1963 were:

Kenya	1.443.000 sq. ft.
Uganda	1.016.000 sq. ft.
Tanzania	1.057.000 sq. ft.
	<hr/>
	3.516.000 sq. ft

Similar to the consumption of cement (see pg. 15 ) there is a close correlation between housing and building activity and

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1

The target output of the glass industry in 1970 in Tanzania is only 3.500 tons. Also this figure is based on a projection of the demand for glass products.

flat glass consumption. The only, remarkable difference is that the peak consumption in the period 1954 - 1962 was around 1956/1957 for flat glass, for cement around 1958/1959.

Recent figures show also here, however, a fast recovery of the demand for flat glass.

Projection of flat glass consumption.

In contrast to the projection of glassware consumption the ECA study gives a very detailed and sophisticated analysis of the prospective consumption of flat glass. Unfortunately, no breakdown per country is given, so that the estimate obtained applies to the whole East African sub-region, comprising 12 countries in the ECA terminology.

In the next table we have calculated the future consumption in Kenya, Uganda and Tanzania, on the same assumptions as the ECA study uses for the larger region. As can be seen, flat glass consumption is directly related to construction activities.

Table 13 Demand for Sheet Glass in 1975

	Kenya	Uganda	Tanzania	
1. Gross Domestic Product	1.37	1.10	1.29	US \$10 <sup>9</sup>
2. Capital formation (20%)	2.74	2.20	2.58	US \$10 <sup>8</sup>
3. Investment on housing and building (45% of 2)	1.23	.99	1.16	US \$10 <sup>8</sup>
4. Deduct 30% for services	.37	.30	.35	US \$10 <sup>8</sup>
5. Investment on housing and building proper	.86	.69	.81	US \$ 10 <sup>8</sup>
6. Conversion of investments into quantity, expressed in total gross floor area, \$45 per m <sup>2</sup> .	1.91	1.53	1.80	m <sup>2</sup> 10 <sup>6</sup>
7. Sheet glass requirements:				
a. 50% of volume of H&B at 0.16 sheet glass conversion co-efficients	.15	.12	.14	m <sup>2</sup> 10 <sup>6</sup>
b. 40% at 0.24	.18	.15	.17	m <sup>2</sup> 10 <sup>6</sup>
c. 10% at 0.40	.08	.06	.07	m <sup>2</sup> 10 <sup>6</sup>
8. Total Sheet Glass requirem.	.41	.33	.38	m <sup>2</sup> 10 <sup>6</sup>
9. Equivalent in sq.ft.	4.42	3.55	4.09	10 <sup>6</sup> sqft
10. Equivalent in tons	2.37	2.31	2.66	10 <sup>3</sup> tons

Although closer attention will be paid to the technical implications of this future demand for flat glass in later case studies, some general points will be mentioned here. The unit cost of production of flat glass vary considerably with the scale of production. The minimum economic plant size seems to be around 6.000 tons a year. This would imply that establishment of one plant in East Africa would be justified around 1970, preferably also serving some of the neighbouring countries.

Recommended locations in the ECA paper are Mombassa and Dar-es-Salaam. With a view at the raw material supply, - particularly sand - Dar-es-Salaam however does not seem to be a very economic location.

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### 3. Prospects for the fertilizer industry.<sup>(1)</sup>

The fertilizer industry comprises the production of nitrogenous fertilizer, potash fertilizer, phosphate fertilizer and their variations. In the ECA study potash fertilizer is not taken into account, on the basis of the argument that Ethiopia is constructing a fertilizer plant which will have an annual capacity of 600.000 - 900.000 tons of potash, and will, consequently be able to serve the whole Eastern African region, as defined by ECA. In the next sections, therefore, figures are only given for nitrogenous fertilizer (denoted by N) and for phosphate fertilizer (denoted by  $P_2O_5$ ). Since both fertilizers have several variations we will indicate the quantities in pure units of these elements.

#### The present production and consumption of fertilizers.

Almost the total demand for fertilizers in Kenya is met from imports. Only soda phosphate (24% of  $P_2O_5$ ) is produced in Kenya, by the East African Fertilizers Co. Ltd at Turbo. In 1962 the production was 4.000 tons but the capacity is estimated at about 8.000.

The imports of chemical fertilizers in Kenya in 1964 were:

	<u>tons</u>
Nitrogenous (various mixtures)	32.170
Phosphates (various mixtures)	12.245
Other, including compost	10.500
	<u>54.915</u>

Converted into pure elements of N and  $P_2O_5$ , trade figures and domestic production indicate a total consumption in 1964 of :

N	8.600 tons
$P_2O_5$	6.000 tons

(1) Largely based on ECA Lusaka Conference working paper, I, E/CN.14/INF/83.

In Uganda single superphosphate is produced in Tororo. The factory has an annual capacity of 25,000 tons per annum. It is envisaged to increase the annual capacity to 100,000 tons by 1970.

Uganda imported in 1964 10,750 tons of chemical fertilizers:

	<u>tons</u>
Nitrogenous	6.250
Phosphate	1.400
Other	3.100

In pure elements the consumption in 1964 in Uganda can thus be estimated to be:

N	2,200 tons
P <sub>2</sub> O <sub>5</sub>	1,200 tons

No production of chemical fertilizers takes place in Tanzania. The domestic consumption is entirely met from imports.

	<u>tons</u>
Nitrogenous	13,200
Phosphate	863
Other	3,700

In pure elements:

N	4,000
P <sub>2</sub> O <sub>5</sub>	600

The total consumption of fertilizers in East Africa in 1964 was, therefore, - pure elements -:

N	14,800
P <sub>2</sub> O <sub>5</sub>	7,800

Projection of fertilizer consumption in East Africa.

The ECA consumption-projection is based on the following considerations:

- the size of the cultivated area and the quantities required as recommended by agricultural research services,
- opinions of importers and agricultural advisers in the region as to which fertilizers will be in demand, and which part of total requirements will be covered in 1970 and 1980

The following estimates have been made:

<u>Kenya.</u>	<u>1964</u>	<u>1970</u>	<u>1980</u>
Pure elements of :			
N	8,600	13,600	26,800
P <sub>2</sub> O <sub>5</sub>	6,000	8,000	19,000



<u>Uganda</u>	<u>1964</u>	<u>1970</u>	<u>1980</u>
	<u>tons</u>		
N	2.200	6.500	27.000
P <sub>2</sub> O <sub>5</sub>	1.260	10.000	16.400
<u>Tanzania</u>			
N	4.000	8.100	21.000
P <sub>2</sub> O <sub>5</sub>	600	10.600	25

The surprisingly high rate of growth of fertilizer consumption in Uganda, relative to Kenya, is due to the expected subsidy of fertilizer consumption there of about 20 per cent.

The Tanzanian plan indicates/target output of superphosphate of 40.000 tons in 1970, which is based on a demand projection. In terms of pure elements this amount to 8.400 tons of P<sub>2</sub>O<sub>5</sub>, 2.200 tons less than the ECA projection for 1970.

#### Technical implications

The fertilizer plant in Tororo (Uganda) will produce 100.000 tons of superphosphate - 21.000 tons in pure elements which seems sufficient for the East African market, certainly when the Kenya sodium phosphate factory is taken into account. Nevertheless, also Tanzania will produce superphosphate in 1970, as mentioned above. An overproduction of superphosphate in 1970 cannot, therefore, be excluded.

The nitrogen industry can not be considered only from the point of view of fertilizer production. Given the minimum economic scale on which nitrogen can be produced, 20.000 to 30.000 tons with natural gas, 10.000 to 15.000 tons using electric energy, there seems technically to be room for nitrogen industry in East Africa. There seem to be three possible locations: Mombassa (refinery), Dar-es-Salaam (refinery) and Jinja (electricity). The Ugandan Ministry of Commerce and Industry reports, however, that a £5.000.000 project is under examination to produce nitrogenous fertilizer (ammonium sulphate) with a capacity of 190.000 tons, which implies in terms of pure elements 40.850 tons of P<sub>2</sub>O<sub>5</sub>.

#### 9. Prospects for the pesticides industry. <sup>(1)</sup>

Out of the wide variety of pesticides available in the market two basic insecticides have been chosen which have favourable prospects in East Africa: DDT and BHC. Both belong to the group of chlorinated hydrocarbons.

The popularity of DDT and BHC, especially in developing countries, is based on three reasons.

- they can be used for both plant and animal protection
- easy to manufacture and apply, and cheaper than many others
- the scope of application is very large

(1) Largely based on E/CN.14/INR/83

Present production and consumption of pesticides.

No production of synthetic pesticides takes place in East Africa. Kenya as well as Tanzania produce a considerable quantity of a plant derivative insecticide, pyrethrum flowers and extract. However we shall deal only with synthetic pesticides here.

Although no production within the region occurs, an estimate of domestic consumption from trade figures is difficult. The figures are combined with related chemicals, and the different concentrations in which the pesticides are imported, are unknown. We will use, therefore, the ECA estimate of present consumption which is based on "secondary statistical material and personal inquiries". Consumption figures for BHC and DDT only are given.

Kenya The consumption of BHC and DDT in 1963 is estimated at 600 tons and 300 tons, respectively. According to the total import figures for pesticides the consumption rises extremely fast in Kenya; it almost doubled during the period 1960-1963.

Uganda. Pesticides are mainly used in the cotton and coffee production. For cotton DDT is used and for coffee 'malathion'. The use of DDT is subsidized by the Government by 50 per cent. Consumption of DDT is rising fast; in 1964 80 tons of DDT were imported, in 1965 200 tons. The total present requirements of DDT in Uganda are estimated at 15.000 tons per annum.

Tanzania. DDT is used in the production of coffee, cotton and tobacco, BHC only in the cotton production. The quantities consumed in 1964, as reported to be estimated by the Ministry of Agriculture are: 210 tons of DDT and 300 tons of BHC. The total requirements of DDT are estimated at 25.000 tons.

Projection of the demand for DDT and BHC.

The projection for Kenya is based on the assumption that the demand for pesticides increases at an annual rate of 15 per cent, which results in a projection of:

	<u>DDT</u>	<u>BHC</u>
1970	1.500	750
1980	5.500	2.750

The projection of Uganda is based on the assumption that in 1970 around 5 per cent of the total requirements will be reached, and in 1980 20 per cent.

	<u>DDT</u>	<u>BHC</u>
1970	800	-
1980	3.000	-

As can be seen, no consumption at all is foreseen of BHC.

The development in Tanzania is expected to be similar to that of Uganda. Of total requirements 5 per cent will be reached in 1970, 20 per cent in 1980. Also here the authorities do not expect a development of BHC consumption.

	<u>DDT</u>	<u>BHC</u>
1970	1.300	-
1980	4.900	-

The total consumption of DDT and BHC in East Africa is, thus, estimated to be:

	<u>DDT</u>	<u>BHC</u>
1970	3.600	750
1980	13.400	2.800

Technical implications.

The c.i.f. prices of DDT and BHC on the Coast of East Africa are about US\$ 610 and 175 per ton, respectively. The ECA analysis makes clear that on the basis of estimated size of the market and the import price economic production within the region can take place by 1975-1980. The implication of their rather detailed cost of estimates in the region is that the production cost of DDT could be around US\$ 240, those of BHC around US\$ 90.

An integrated plant, producing both DDT and BHC, could be located in whether Jinja, or Nairobi, or Dar-es-Salaam. The cost-analysis seems to indicate that for both products Nairobi is the optimal location within the region. It should be noted, however, that two locations outside East Africa, Umtali and Victoria Falls are significantly better in terms of production costs.

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10. Prospects for the petroleum industry

Economic growth is usually accompanied by a fast growth in demand for petroleum products. Its efficiency as a source of power, compared to the traditional sources, its importance in relation to the chemical sector and the production of lubricating oils and greases have given it a unique place in almost all economic sectors.

Present situation in East Africa.

Up to now no crude oil is produced in East Africa. In all three countries explorations have been done, or are underway (Kenya) but so far without success.

Until early 1964 no processing of petroleum took place in East Africa. Since then, an oil refinery has been established at Mombasa, with a capacity of about two million tons per annum.

Consumption up to 1963 can, therefore, conveniently be estimated from trade data. Below, consumption figures are given for the three countries, they include export bunkering for ships and aircraft.

Table 14 Consumption of petroleum products in 1963

	long tons	
	Total	Of which, Lubricating oil and greases.
Kenya	838.100	11.655
Uganda	117.245	4.461
Tanzania	372.500	7.389
	1.327.845 <sup>(1)</sup>	23.505

Source: E/CN.14/INR/79

1) Own estimate for Zanzibar

Projection of demand for petroleum products.

A projection of demand is made in the ECA study, based on the following considerations:

- growth of total GDP during the projection period
- growth rate of petroleum products consumption in the past
- level of consumption compared to other African countries.

This leads to the following results:

Table 15	Petroleum consumption in 1975 (tons)	Growth rate in petr. cons. 1965 - 1975
Kenya	1.450.000	4.5 %
Uganda	350.000	3.0 %
Tanzania	900.000	9.0 %
	2700.000	

These growth rates get some perspective when compared to the income-elasticity of demand for petroleum products estimated over the period of 1950-1960, both for the world as a whole and for the Eastern African countries (in the ECA terminology), which are 1.66 and 1.61 respectively. An annual rate of growth in GDP during the period 1965-1975 of around 6 per cent would give a growth rate of consumption of petroleum products of about 9.5 per cent. In the case of Uganda and Tanzania this is not far off the ECA projection rate. The discrepancy in the Kenyan case might be partly explained by the fact that the present level of consumption in Kenya is comparatively high to the level of GDP.

Also the consumption of lubricating oils and greases has been projected, on the same considerations as for total petroleum products. This resulted in the following quantities:

	Lubricating oils and greases(1975) (tons)	Growth rates 1965-'75
Kenya	18.000	5.0
Uganda	13.000	5.0
Tanzania	7.500	4.5
	<hr/> 38.500	

Technical implications.

The refinery at Mombasa has an annual capacity of 2.000.000 tons; the refinery being constructed at Dar-es-Salaam has a planned capacity of 500,000 tons. The target date of operation is August 1966.

On the basis of the projections given above these two refineries will be able to meet the demand for petroleum products in 1975.

It should be mentioned at this point that the two refineries will produce only common petroleum products. Lubricating oils and greases do not belong to this category and are treated separately above. It is not produced mainly for two reasons:

- a) The specific installations required are very expensive compared to the total investments required for the refinery;
- b) The minimum economic size to produce lubricating oils and greases seems to be around 75.000 tons per year.

As can be seen from the projection above, domestic consumption in East Africa does not justify the establishment of such a plant unless an agreement can be reached with neighbouring countries. (Note: none of the African countries possesses at present a lubricating oils and greases plant).

### 11. Prospects for the engineering industries

The engineering industries, which exclude the basic metal industries in the SITC classification, comprise the mechanical and electrotechnical engineering industries. We shall only deal with the mechanical engineering industries, since no spectacular development of the electrotechnical industries is expected within the next 10 - 15 years.

Virtually no production of electrical machinery, apparatus and appliances is taking place in East Africa at present; the Industrial Censuses mention only some repair work done. The development plans in the region pay little attention to the industry, apart from such quantitatively minor developments as the dry cell factory in Uganda, the electric bulb - and electric wire plants in Kenya. The only exception is probably the radio assembly plant in Tanzania, which would be an important development.

On the whole, however, there is no indication of a major development of the electrotechnical sector.

#### The mechanical engineering industries

To this group belongs the production of metal products such as building components and household equipment (SITC 699), the production of machinery (SITC 71) and the manufacturing of transport equipment (SITC 73). We shall deal with these three sub-groups only, although this implies a level of aggregation which is, admittedly, hardly acceptable.

#### Present situation in East Africa.

The most developed sector in East Africa is the manufacturing of transport equipment. The least developed is the fabrication of machinery.

Figures for domestic production, capacities, international trade are in an important number of cases not available in the required form, i.e. in quantities. We shall, therefore, give the figures collected by ECA on the basis of questionnaires to the countries in the larger East African sub-region. Unfortunately, the total consumption estimate only is given without a breakdown of domestic production and imports.

TABLE 16 Average annual 1961/63 consumption of mechanical engineering products in East Africa.

<u>Product group</u>	<u>'000 tons</u>		
	<u>Kenya</u>	<u>Uganda</u>	<u>Tanzania</u>
Metal products (SITC 69)	13.4	3.5	6.8
Machinery (SITC 71)	10.5	4.0	5.3
Transport equipment (SITC 73)	24.9	5.4	9.3

Source: ECA doc. E/CN.14/INR/90

Demand projection for mechanical engineering products

The ECA projection for this category is based on the relation between GDP per capita and consumption of mechanical engineering products, for the countries in the sub-region. This relation has the following form:

$$\log y = 1.545 \log x - 1.99$$

where y is consumption of mechanical engineering products and x is per capita GDP's.

Table 17 Demand for metal engineering products in East Africa in 1980.

	'000 tons		
	<u>SITC 699</u>	<u>SITC 71</u>	<u>SITC 72<sup>3</sup></u>
Kenya	51.4	49.8	105.4
Uganda	12.8	15.4	17.3
Tanzania	29.7	29.2	48.2
TOTAL	93.9	94.4	170.9

Source: ECA op.cit.

In the summary table the 'implicit income elasticities of demand' are given.

Technical implications

The ECA devotes the larger part of the analysis to the implications of the projection. It gives a wealth of information on minimum sizes of plants for almost all relevant products in the industry and a possible location, taking into account domestic market, raw material supply and transport facilities. For several reasons we have not included this material in our survey. First of all because it is outside the scope of the present paper, but also because we hope to pay more attention to this important sector in later case-studies.

Summary table of income elasticities of demand.

The demand for the products dealt with so far has been projected mainly on the basis of cross-country analysis and time-series, sometimes including only the countries in the East African sub-region (ECA terminology), sometimes other countries outside East Africa. Although often other considerations than growth in GDP have been taken into account the relation between per capita income and consumption of the specific commodity was always the most important factor in the projection. We will generalize this statement by comparing the growth rate of consumption projected with the growth rate of GDP and call this 'implicit income-elasticity of demand'. This procedure is followed both for the ECA projections and the sector targets in the Tanzania plan, where the targets are reported to have been estimated on the basis of income-elasticities of demand.

These two series form in fact all 'official' information that is at present available on the subject in East Africa. In addition to that some elasticities have been added that might be of relevance to East Africa. This is however, by no means a complete summary of available information outside the region; lack of time made it impossible to carry out a thorough survey.



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