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E/CN.14/INR/205
22 May 1973

Original: ENGLISH

UNITED NATIONS

ECONOMIC AND SOCIAL COUNCIL

ECONOMIC COMMISSION FOR AFRICA

REPORT

ON

ENGINEERING INDUSTRIES IN EAST AFRICA (MECHANICAL AND ELECTRICAL INDUSTRIES)

This report was

prepared by GOPA – Gesellschaft für Organisation,
Planung und Ausbildung m.b.H., Bad Homburg v.d.H.

for Economic Commission for Africa, Addis Ababa

commissioned by Federal Ministry for Economic Cooperation,
Bonn,

represented by

Federal Agency for
Economic Cooperation, Frankfurt/Main,
Federal Republic of Germany

GOPA - GESELLSCHAFT FÜR ORGANISATION, PLANUNG UND AUSBILDUNG MBH

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Abbreviations and Terms

E.I.	Engineering Industry
EG	Engineering Goods
EGI	Engineering Goods Imports
EGC	Engineering Goods Consumption
p. c.	per capita
GDP	Gross Domestic Products
GFCF	Gross Fixed Capital Formation
ISIC	International Standard Industrial Classification
SITC	Standard International Trade Classification

Subregion: The ECA (Economic Commission for Africa) divides the African continent into four zones which are described as subregions (see chart p. 15)

Region: includes a few countries of the subregion but not all;

Note: Throughout this report decimal units have been used unless otherwise stated. 'Tons' therefore refers to metric tons.

'Dollars' refers to United States Dollars throughout unless otherwise stated.

Introduction

1. Background

This study is one of a series initiated by the United Nations Economic Commission for Africa (ECA) to investigate the potential for industrial development in the East African subregion. It was financed by the Ministry for Economic Co-operation of the Federal Republic of Germany within the framework of its Technical Assistance Programme. It was commissioned by Bundesstelle für Entwicklungshilfe, Frankfurt/Main, on 20 July, 1971 to be carried out by GOPA - Gesellschaft für Organisation, Planung und Ausbildung mbH., Bad Homburg, Germany.

GOPA engaged its consultants

Dipl.-Ing. M. Müller (project leader)
and
Dipl.-Ing. G. Sieke

with the execution of the project.

The investigations in East Africa were taken up on 21 July, 1971, and ended on 6 November, 1971. The draft version of the study was completed in English in March 1972 and submitted to the German commissioning party in March, 1972.

The team of experts was, in the best possible way assisted by staff members of the ECA, the UN agencies in the East African countries, the national planning and development institutions, the German diplomatic representations and a number of experts and organizations being engaged in East Africa.

At this stage GOPA and its experts would like to make acknowledgement to all those who did their best to help the team in its mission.

The Federal Authorities financing this study do not take any responsibility for the study and the recommendations put forward in the same, but the responsibility for the conduction of the survey as well as of the field survey and the preparation of this study is on GOPA's side only.

2. Aims

The aim of the study is to investigate and identify possibilities of developing a viable Engineering Industry (mechanical and electrical) in the East African subregion. Its findings will be integrated with those of other sectoral studies to provide the framework of a subregional development plan to be drawn up by the ECA. The necessity of such an approach is based on the realization that the scope for industrial development of each individual country is limited as markets are generally too small to allow national industries to benefit from economies of scale. Other obstacles, of which lack of skilled labour and of managerial experience are the most serious ones, add to the problem. Consequently, the most obvious way to accelerate the process of industrialization and to reach a point at which self-sustained growth will become possible, is the establishment of industries with either the whole subregion or parts of it as their market.

With this perspective, the Terms of Reference were, as specified in the contract, concluded between Bundesstelle für Entwicklungshilfe and GOPA consultants, dated 20 of July, 1971. The principal objects of the study were summarized as follows:

With respect to the East African countries

Ethiopia	Rwanda
Somalia	Burundi
Kenya	Zambia
Uganda	Malawi
Tanzania	Madagascar and Mauritius

recommendations are to be given on:

- inter-country specialization and trade
- location of new plants
- re-organization of existing plants
- expansion of existing plants, or establishment of new plants, to promote exports of engineering goods to overseas countries (if this would be possible).

In addition the study is designed to:

- investigate the economic and technical possibilities of Engineering Industries in the individual countries and in the subregion, giving existing capacities, future demand and general underlying conditions of national and subregional economic development;

- provide a framework for a programme of coordinated industrial development in the East African subregion;

- look into the possibilities of establishing subregional enterprises,whose minimum capacities and investments involved are above the national level of demand and could, therefore, not be justified on a merely national basis;

- give detailed indications to the respective countries on the question of type and size of new plants, and extension and improvement of already existing industries;

- look into the aspects of foreign trade in mechanical and electrical engineering goods, both in respect of inter-regional trade and trade with other countries;

- provide any information on the limits of developments on the two sectors, in the period under review, in order to enable the respective countries to avoid uneconomic investments, idle capacities and thus a structurally undesirable use of capital;

- provide the national governments with specific basic information, upon which they can rely on more detailed planning of the economic development of the two sectors.

3. Method

To collect the information and materials required for this study, a team of two industrial engineers

- worked with the industrial section of the ECA headquarters in Addis Ababa for abt. 4 weeks;

- visited the eleven countries covered by the study over a period of two months;

- returned to Addis Ababa for another two weeks' work with ECA.

During the first phase a study was made of all available information published by United Nations agencies and the countries themselves on the subject. The purpose of the field work was to gather first-hand information through talks with governmental authorities and other institutions as well as visits to a number of engineering establishments in each country. The concluding period spent in Addis Ababa was designed to elaborate and coordinate with ECA a draft layout of the study.

According to this layout, the study is divided into three parts:

- Part I gives background information on Engineering Industries, using figures from industrialized countries

- Part II summarizes the present position of Engineering Industries in the East African subregion, and

- Part III analyses the possibilities of future development as set out in the terms of reference.

Finally, as far as time permitted, fact sheets were worked out for some of the identified industries, which are supposed to give a rough idea of the costs of investment and operation likely to be incurred, as well as of the employment figures. This was done in accordance with a wish expressed by the ECA during the concluding talks in Addis Ababa. The compilation of additional fact sheets required would be the subject of a supplementary study.

This study contains a considerable number of tables and graphs which, unless they constitute an integral part of the text have been collected in the annex of the respective part in order to achieve a clear layout. Descriptions of the same are not included in the text, if the tables and graphs speak for themselves.

4. Constraints

A number of difficulties were encountered, in particular those arising from unavailability, incompleteness, incompatibility and unreliability of data. Quite frequently, even very basic figures had to be sorted out from contradictory information, which not only added to the constraint of time, limited as it was, but also increased the margin of error of the results obtained.

Furthermore, it has to be kept in mind, that Engineering Industries cover an extremely wide range of products, involving different technologies, raw materials, cost and distribution patterns, etc. Talking about the industry as a whole, therefore necessarily calls for generalizing and abstracting. One departure from the provisions of the terms of reference that was found advisable, regards the choice of the basic year. Instead of 1963 this study takes 1964 as its starting point for two reasons: firstly, because a significant improvement can be observed for a number of statistics from that year onwards, and secondly, because an earlier report on Engineering Industries (ECA documents E/CN/14/INR 89/90) already uses 1963 as cross section year for the period up to 1964.

Summary of Findings and Recommendations:

The present situation of East African Engineering Industries is characterized, with few exceptions, by the dominance of the metal products sector (ISIC 381 and SITC 69, respectively). Activities in the field of non-electrical machinery (ISIC 382, SITC 71) are rudimentary, unless geared towards a particularly highly developed branch of industry as in the case of Zambia and Mauritius. Establishments in the field of electrical machinery, apparatus and appliances (ISIC 383,SITC 72)are frequently of the assembly or of the repair and service-type but fabrication of some simple commodities is undertaken in most of the countries. Transport equipment (ISIC 384, SITC 73)generally is second in importance to metal products,most notably being establishments for the assembly of trucks, buses and trailers.

Principal constraints to Engineering Industries arise from:

- small size of the markets, often resulting in uneconomic proliferation of production programmes
- existence, even in the face of limited markets, of harmful competition
- high cost of investment and operation
- shortage of skilled labour.

As most of these difficulties are not specific to engineering and originate from factors outside the sector, little can be done by the industry's own efforts to overcome them.

The following recommendations are put forward:

1. Co-operation between the countries with regard to existing industries should be more firmly integrated into national planning. When decisions about creating or expanding indus-

trial facilities are made, the situation, planning and the developments in other countries of the subregion are often not sufficiently considered. This practice has frequently resulted in duplication of investments.

2. Stricter standards should be applied in granting licences to new ventures, if production facilities are already existing in the East African region. If demand exceeds the installed capacity, existing plants should be given the chance to expand, before new ones are allowed to come into existence. If necessary, adequate controls of pricing policies must be introduced in order to avoid monopolistic abuses.

3. The principle, in some countries of the subregion, of state participation in all major enterprises should be handled more flexibly, particularly in the case of joint-ventures with foreign partners. Even if state participation gives greater security to investments, the effects it may have on the flexibility of business operations, should be fully considered.

4. Employment of expatriates, though usually costly, is still advisable. Africanization programmes should be carried ahead only by adequately considering the utmost possible efficiency of the enterprises.

5. One factor contributing to the increased cost of operation are comparatively high expenses for imported raw materials and their transportation and storage, due to the small scale of orders. Improvement could be achieved by creating institutions open to all industries to pool orders in an attempt to obtain more favourable terms. The Import and Export Co. of Malawi, a subsidiary of the Malawi Development Corpn. is an example in this respect. Pertinent efforts are, however, only justifiable if existing currents of exchange are given full consideration to.

6. A large part of the now existing Engineering Industries have started from small beginnings, and gradually grown without a corresponding development of their organizational and managerial structure. Such establishments could significantly improve their performance by adapting their organization to the new scope of their activities. They could be helped in this process, if suitable training courses were made available.

7. Many engineering establishments, particularly small- and medium-sized ones, use antiquated machinery, which further reduces their efficiency and quality of their products. Information should be made available to them on the possibilities of acquiring used machinery from industrialized countries, as such machinery would be well suited for their purposes as regards price and capacity.

Institutional Requirements

The project of multinational engineering industries in the subregion raises a number of issues, which must receive immediate attention.

Among these, the problem of standardization must be considered the most important one. Though it is a common problem to all branches of industry, it is particularly vital for engineering industries, whose products go into practically any branch of the industrial and private sectors. At present, the countries of the subregion are divided among those using the metric system of measures and weights and the standards derived from it and those using the British system. Furthermore, the lack of comprehensive legislation has given rise to a multitude of standards of only local importance or even to a complete absence of any standards. Consequently, a multinational engineering industry, in order to supply its goods to the whole subregion, would either have to produce a more or less large number of variations of its product - and thereby increase production cost - or else limit itself to a smaller number of the most common types, and thereby reduce its market.

Some countries of the subregion have already taken measures to cope with the problem of standardization by creating organizations which are in some cases associated to international bodies. Similar action would have to be taken by those countries which, so far, have not done this. The activity of the national organizations would have to be coordinated from the beginning on a subregional scale. The governments should declare their willingness to enforce those standards, on which agreement has been reached, in their respective countries.

Within each national organization and on a subregional level there should exist a special sub-committee dealing with the problems of engineering industries. We insist again that

immediate action is absolutely necessary. The second issue that should receive the attention of a committee on subregional level is that of customs tariffs. It should be considered under two aspects:

- firstly, tariffs for goods produced in the subregion by the proposed multinational industries should be brought to a common level,

- secondly, tariffs for goods produced by these industries should allow for some degree of protection against impacts from other countries over an appropriate period.

A somewhat similar problem is that of freight rates. Here, it is suggested that a system of preferential rates for goods produced by subregional industries should be worked out. At the same time an attempt could be made at changing the present system of freight rates with a view to simplifying it and coordinating the individual countries' pricing policies.

Basic Information on the East African Subregion

The East African Subregion is one out of four on the continent by the definition of the Economic Commission for Africa. For the purpose of this study it comprises eleven countries: Kenya, Uganda and the United Republic of Tanzania, which form the East African Community, Ethiopia, Somalia, Rwanda, Burundi and Zambia, who are considering membership of or association with the Community Malawi, which formerly was part of the Federation of Rhodesia and Njassaland, and the two island states of Madagascar and Mauritius. Together, they cover an area of abt. 5,1 million square kilometres, which is abt. 1/5 of the continent and roughly equivalent Europe minus the USSR and Turkey. Their combined population in 1969 was abt. 82,5 million, i.e. an average of 16 persons/sqkm (land area), increasing at a rate of abt. 2,7 % p.a. Population density ranges from less than 10/sqkm in Zambia (6) and Somalia (4) to more than 100 in Rwanda (139) and Burundi (125) and a peak of 430 in Mauritius. The age distribution of the population with 80-90 % under 45 reflects the poor state of health common to all African countries. Educational facilities, with the exception of Mauritius, are on an average not fully sufficient under African conditions.

Per capita GDP significantly exceeds 100 US$ only in Zambia and Mauritius, averages around that figure in Kenya, Madagascar and Uganda, and is well below for the other countries. Growth over the past decade has been unbalanced for any given country as well as between the countries of the subregion. In some of them hardly any increase has been achieved at all, due to the high population growth rates.

Growth rates of total GDP, too, have been uneven, and, on the subregional average, below 5 %. In addition, close to half of it originates in the non-monetary sector of the economy in

most countries and only very little and gradual change can be observed in that structure. The contribution of the primary sector to the GDP is close to or well above 50 % for all countries of the subregion, except Mauritius and Zambia, but even these figures understate the fact that throughout the subregion between 90 to 95 % of the population depend on this sector for their living.

The foreign trade structure of the subregion is characterized by a very high share of agricultural products in exports and almost equally high share of manufactures in imports. This unfavourable situation is compounded by the fact that exports are in turn made up of a limited number of products and that these are largely non-complementary for the subregion. The only exception in this respect is Zambia, but in principle the situation is similar with copper accounting for abt. 95 % of total exports. Trade within the subregion is quite limited because of the economically similar structure of the individual countries.

Natural resources are known to exist in the subregion, but so far they have hardly been tapped or even fully explored. In some cases the concentration of ores has been found too low, or their location too unfavourable for mining under the present circumstances. Mining of copper in Zambia and Uganda and tin in Rwanda are the most important activities in this field now. One of the subregion's largest potentials is its wealth of hydroelectric resources, which to some degree compensates for the lack of mineral oil.

Summing up, the present situation of the subregion and its records of development over the past decade is far from being satisfactory. To some extent, this may be explained by the still recent event of independence, and the difficulties

arising along with it. The experience gained since then and the more realistic outlook prevailing now might help to achieve a better performance of the individual countries and the subregion as a whole during the present decade, but no dramatic changes should be expected.

Projected consumption of engineering goods in 1980 is checked, by SITC - subdivisions, for items which could provide a basis for viable Engineering Industries, either on a national or on a (sub)regional basis. The results are presented in the table overleaf; more details are given in the corresponding sections of part III. Industries are proposed to be established on a national basis if it is expected that demand for their products will allow for a minimum economic production in most of the countries of the subregion sooner or later during the projection period. This is above all the case for a number of industries in the field of metal products. Regional or subregional production is proposed where no or only very few of the countries in the subregion can hope to pass that threshold even in the long run.

No special study has been made of the possibility to export engineering goods produced in the subregion to overseas countries. Such possibilities are considered extremely limited, at least, until the industries proposed have consolidated their status by a sound penetration of the home market, where they enjoy a competitive advantage on the strength of geographical and possibly administrative factors. Under the present circumstances it would be unrealistic to export to the highly competitive markets outside the developing countries, an element in the planning of the capacities to be established. On the other hand, a fair amount of trade within the subregion will be generated by the exchange of products of the proposed industries, both as finished goods and as components for further processing. For some of the proposed industries,

fact sheets have been worked out, which give the principal features of the projects as regards cost of investment and operation. They are based on information obtained from European manufacturers of the equipment and the product itself and have been adapted to East African conditions as far as possible. They should be regarded as a first estimate of the orders of magnitude involved.

Potential Additional Capacities in Industry

Division 69		
691	heavy struct. parts	10.000 t
692	gas cylinders	3.000 t
693	wire ropes	6-8000 t 6-8000 t
695	hand and machine tools	3000 t
697	gas stoves and cookers	3000/3000 3000/3000

Industries proposed on (sub)regional scale

Industries proposed on national scale

691	light structural parts metal furniture
692	large tanks metal boxes and tins
693	wire drawing wire gauze and netting
694	nails, screws, bolts, nuts, rivets, washers
695	agricultural hand tools
696	knives, forks, spoons, scissors
697	enamel hollow-ware
698	building hardware

Division 71		
711	diesel engines	35.000- 40.000
711	steam generating boilers	2.000 t
714	typewriters	60.000
714	calculating machines	55.000
714	duplicating machines	20.000
715	sheet metal working mach.	500 t
715	drill.,mill. sawing mach.	1000/2000 /1000
715	lathes and planing mach.	400/200
717	domestic sewing mach.	30.000- 35.000
718	food process. machines	2.000 t
719	air-condition. machines	8.000
719	non-electric refrigerators	5.000
719	pumps for liquids	15.000 15.000
719	belt conveyors	500/500 500/500
719	weighing machines	6.000- 8.000
719	valves	1.500 t

718	mining machinery

Division 72		
722	electric motors	10.000 6.000
722	generating sets	3.000
722	transformers	40.000kVA
723	high tension insulators	2.000 t
723	electric wire and cable	3.500 t 1.500 t
724	radio sets	400.000 500.000
725	refrigerators	20.000 10.000
725	fans	15.000 10.000
725	boilers	10.000
725	flat irons	20.000
729	cases for car batteries	300.000
729	starters and generators	35.000 35.000
729	electric bulbs	10.000.000
729	electric and water meters	-
729	radio components	-

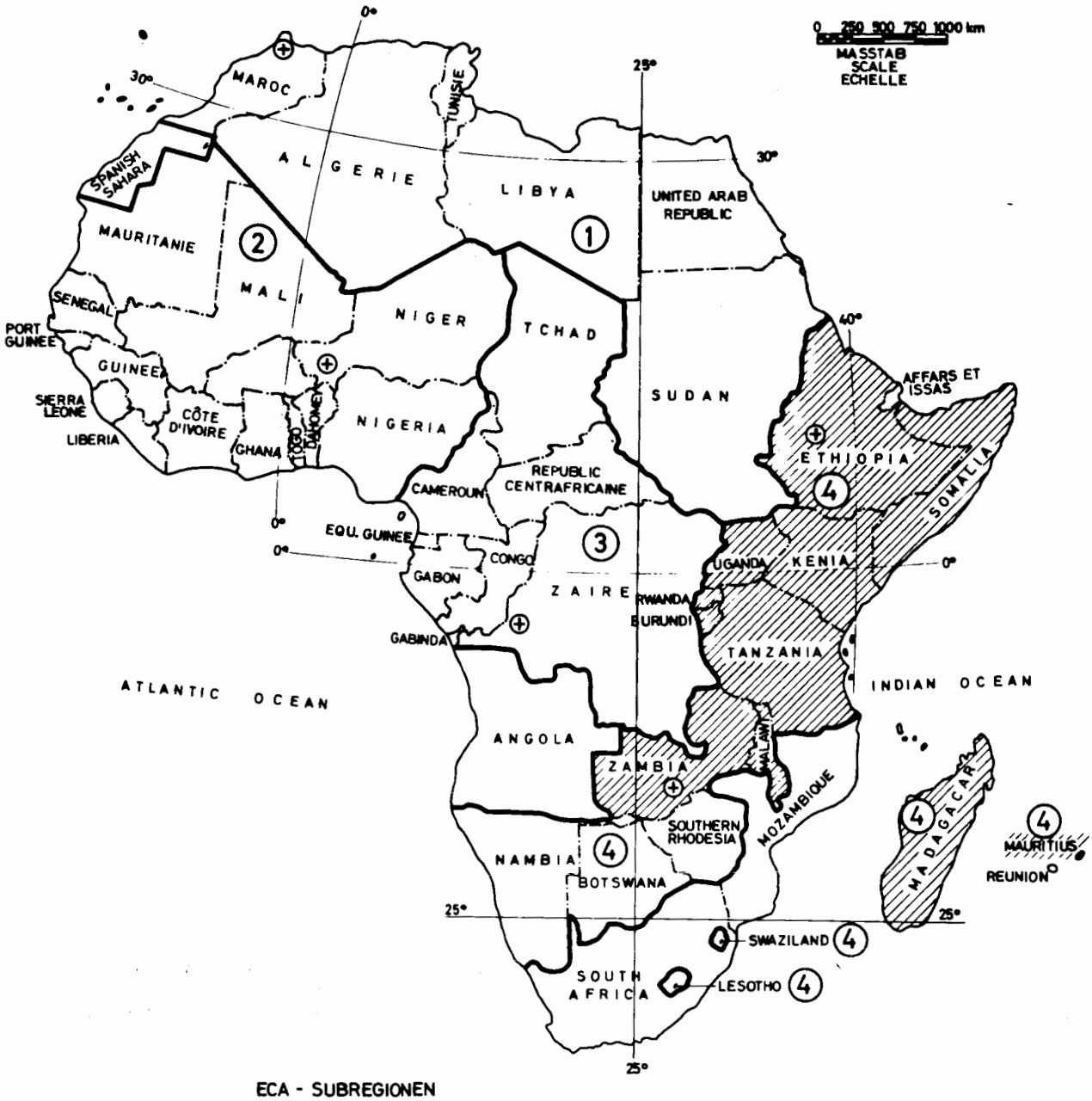
723	housewire
726	some items as sideline to other productions
729	car and dry cell batt.

Division 73		
731	railway freight cars	300 300
732	trucks, buses	30.000
733	trailers	1.000
735	lake fishing boats	-
735	inshore fish. boats	-

Note: capacity in units unless otherwise stated

733	bicycles small trailers

AFRIKA AFRICA AFRIQUE



ECA - SUBREGIONEN
ECA SUB - REGIONS
SOUS - REGIONS DE LA CEA

	DEUTSCH	ENGLISH	FRANÇAIS
①	NORDAFRIKA	NORTH AFRICA	AFRIQUE DU NORD
②	WESTAFRIKA	WEST AFRICA	AFRIQUE DE L'OUEST
③	ZENTRALAFRIKA	CENTRAL AFRICA	AFRIQUE CENTRALE
④	OSTAFRIKA	EAST AFRICA	AFRIQUE DE L'EST
⊕	SITZ DER ECA	ECA HEADQUARTER	SIEGE DE LA CEA
	UNTERSUCHUNGS-GEBIET	AREA COVERED BY THIS STUDY	REGION ETUDIEE

IN MANCHEN FÄLLEN SIND DIE AUF DER KARTE EINGEZEICHNETEN GRENZEN NICHT ENDGÜLTIG FESTGELEGT. IHRE EINTRAGUNG BESAGT NICHT, DASS SIE VON DEN VEREINTEN NATIONEN ANERKANNT ODER OFFIZIELL GEBILLIGT WERDEN.

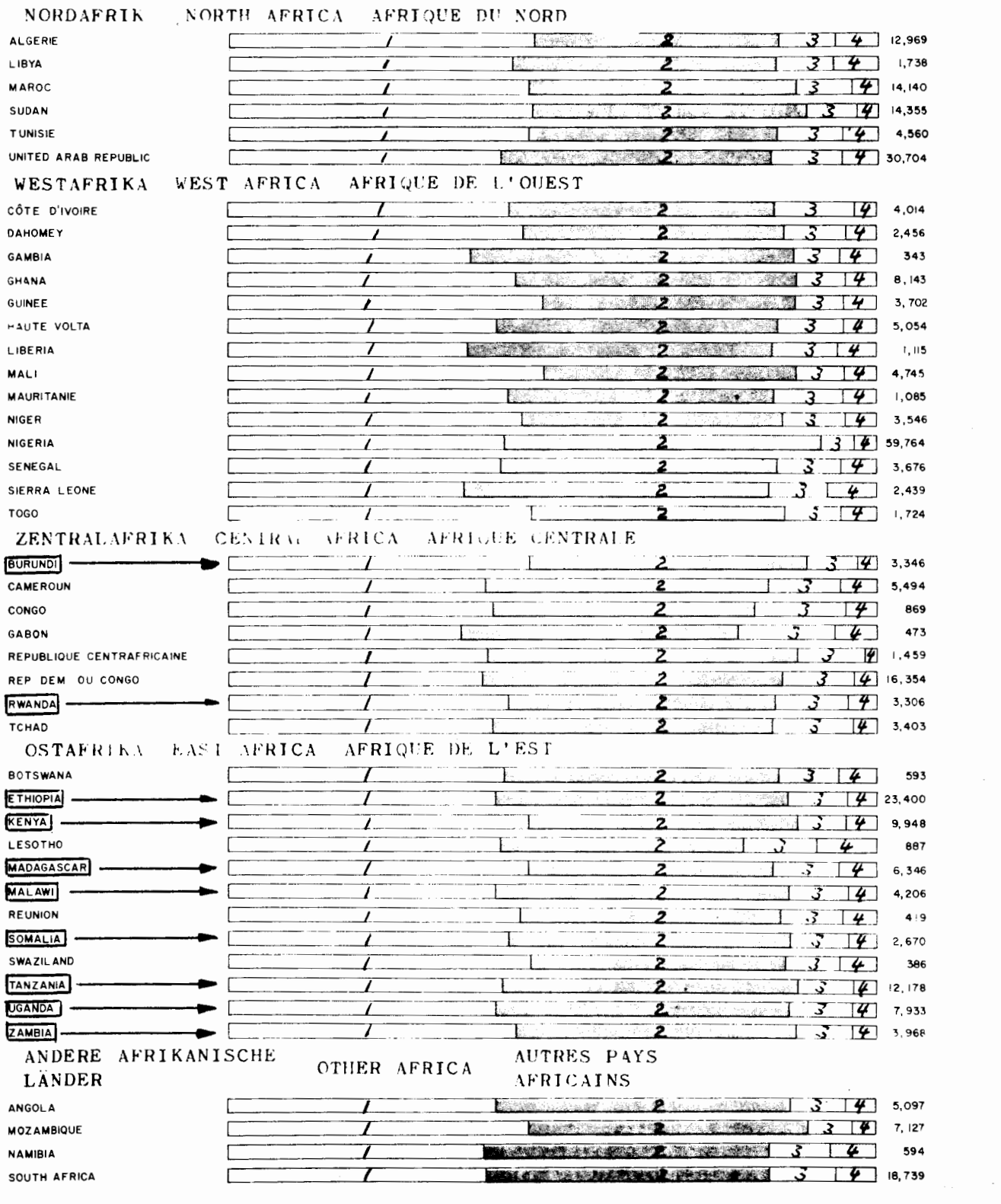
THE BOUNDARIES SHOWN ON THIS MAP ARE NOT, IN SOME INSTANCES, FINALLY DETERMINED AND THEIR REPRODUCTION DOES NOT IMPLY OFFICIAL ENDORSEMENT OR ACCEPTANCE BY THE UNITED NATIONS.

DANS CERTAINS CAS, LES FRONTIERES INDIQUEES SUR LA PRESENTE CARTE NE SONT PAS DEFINITIVEMENT FIXEES, LE FAIT QU'ELLES SONT INDIQUEES NE SIGNIFIE PAS QUE L'ORGANISATION DES NATIONS UNIES LES RECONNAIT OU LES APPROUVE OFFICIELLEMENT.

PROZENTUALE VERTEILUNG DER BEVÖLKERUNG NACH ALTERSGRUPPEN
PERCENTAGE DISTRIBUTION OF POPULATION BY AGE—GROUPS
REPARTITION DE LA POPULATION PAR GROUPES D'AGE (POURCENTAGE)

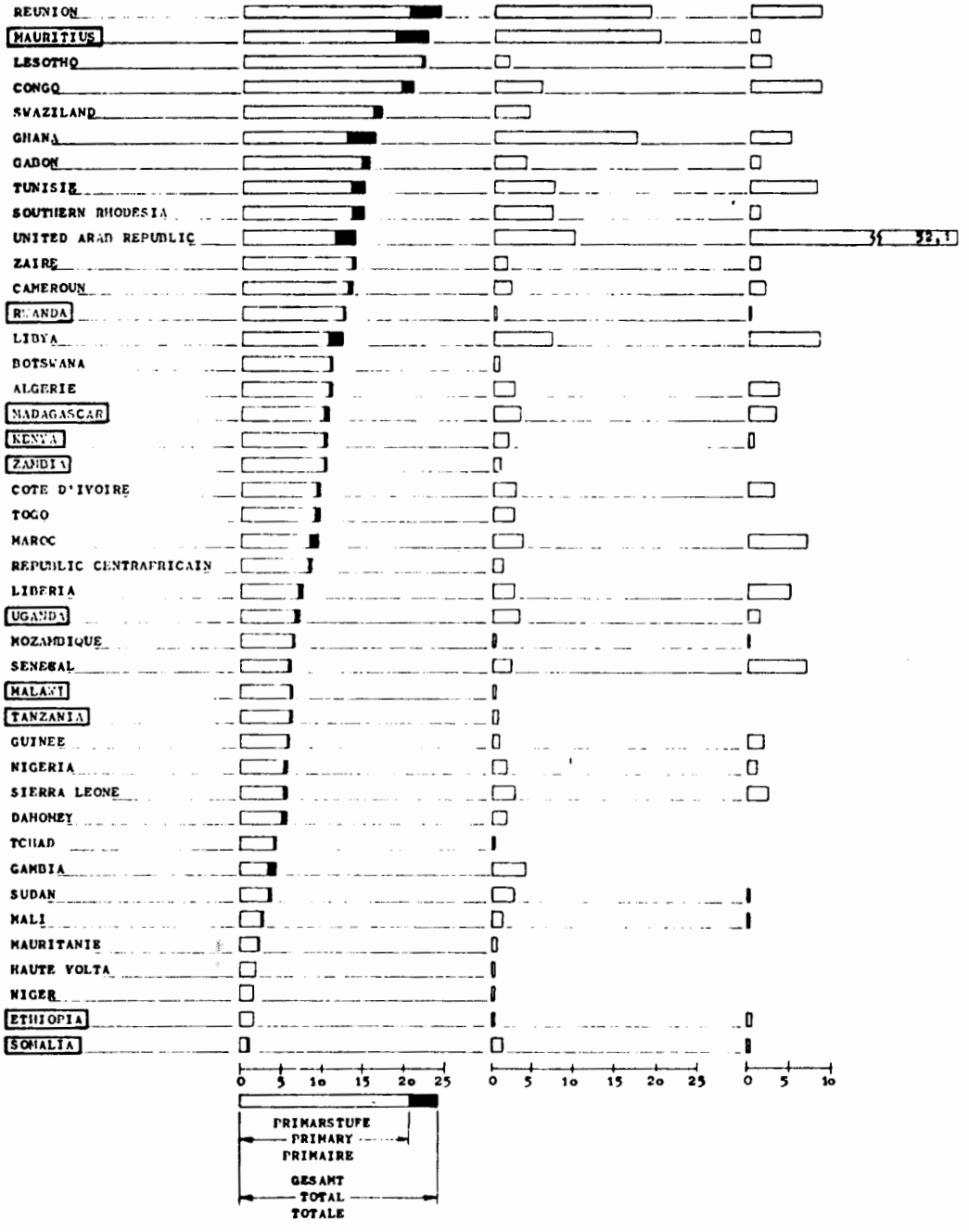
1. JULI 1967
1 JULY 1967
1 JUILLET 1967

GESAMTBEVÖLKERUNG
TOTAL POPULATION
POPULATION TOTALE
(-000)

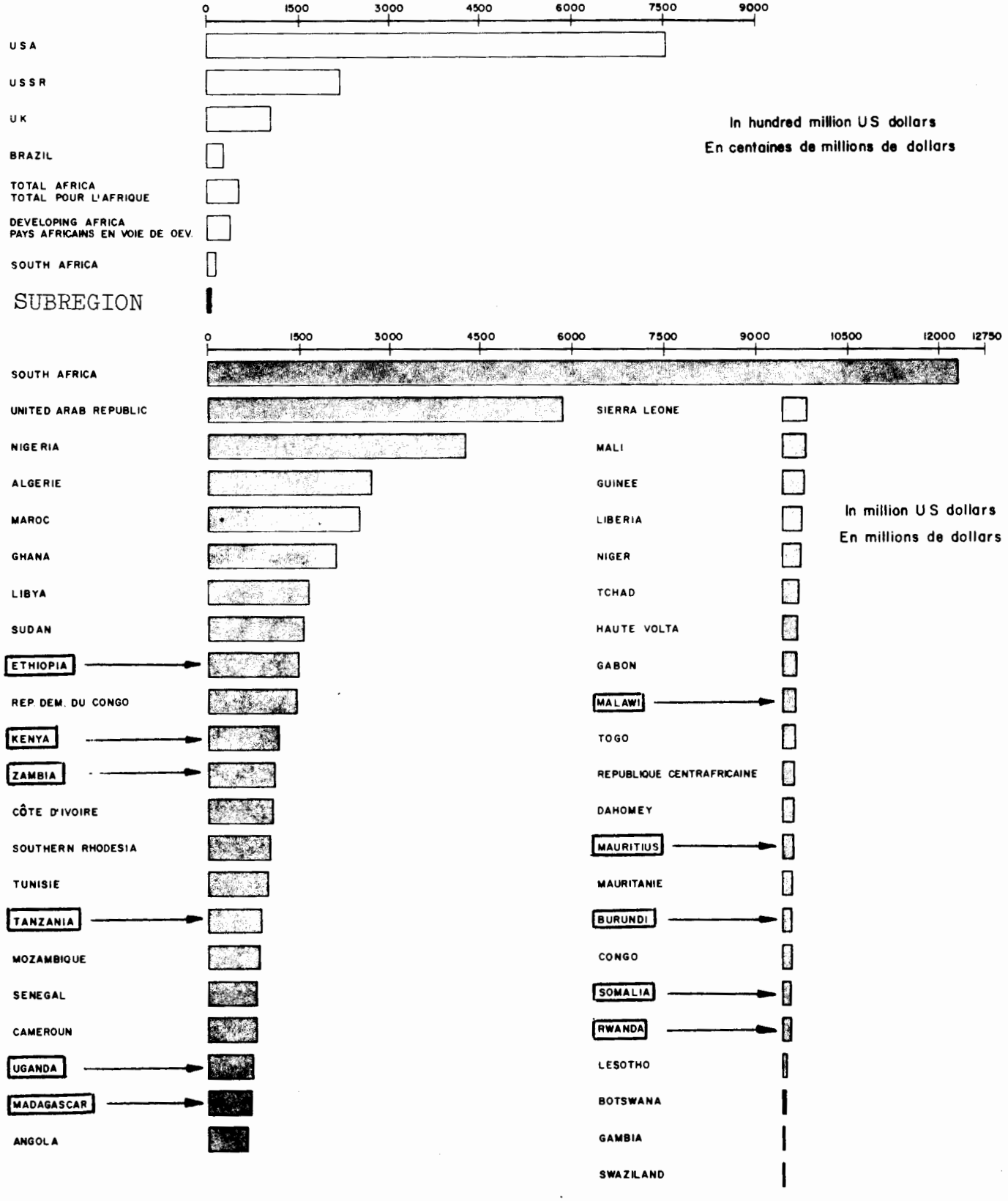


SCHULBESUCH
ENROLMENT IN EDUCATIONAL INSTITUTIONS
SCOLARISATION DANS LES ESTABLISSEMENS D'ENSEIGNEMENT

PRIMARSTUFE UND GESAMTER BILDUNGSBEREICH Zahl der eingeschriebenen auf 100 Personen der Gesamtbevölkerung	SEKUNDARSTUFE Zahl der eingeschriebenen auf 500 Personen der Gesamtbevölkerung	HOCHSCHULSTUFE Zahl der eingeschriebenen auf 10.000 Personen Gesamtbevölkerung
PRIMARY AND TOTAL Persons enrolled per 100 total population	SECONDARY Persons enrolled per 500 total population	HIGHER Persons enrolled per 10.000 total population
PRIMAIRE ET TOTALE Nombre d'inscrits par 100 habitants (Population totale)	SECONDAIRE Nombre d'inscrits par 500 habitants (Population totale)	SUPERIEUR Nombre d'inscrits par 10.000 habitants (Population totale)



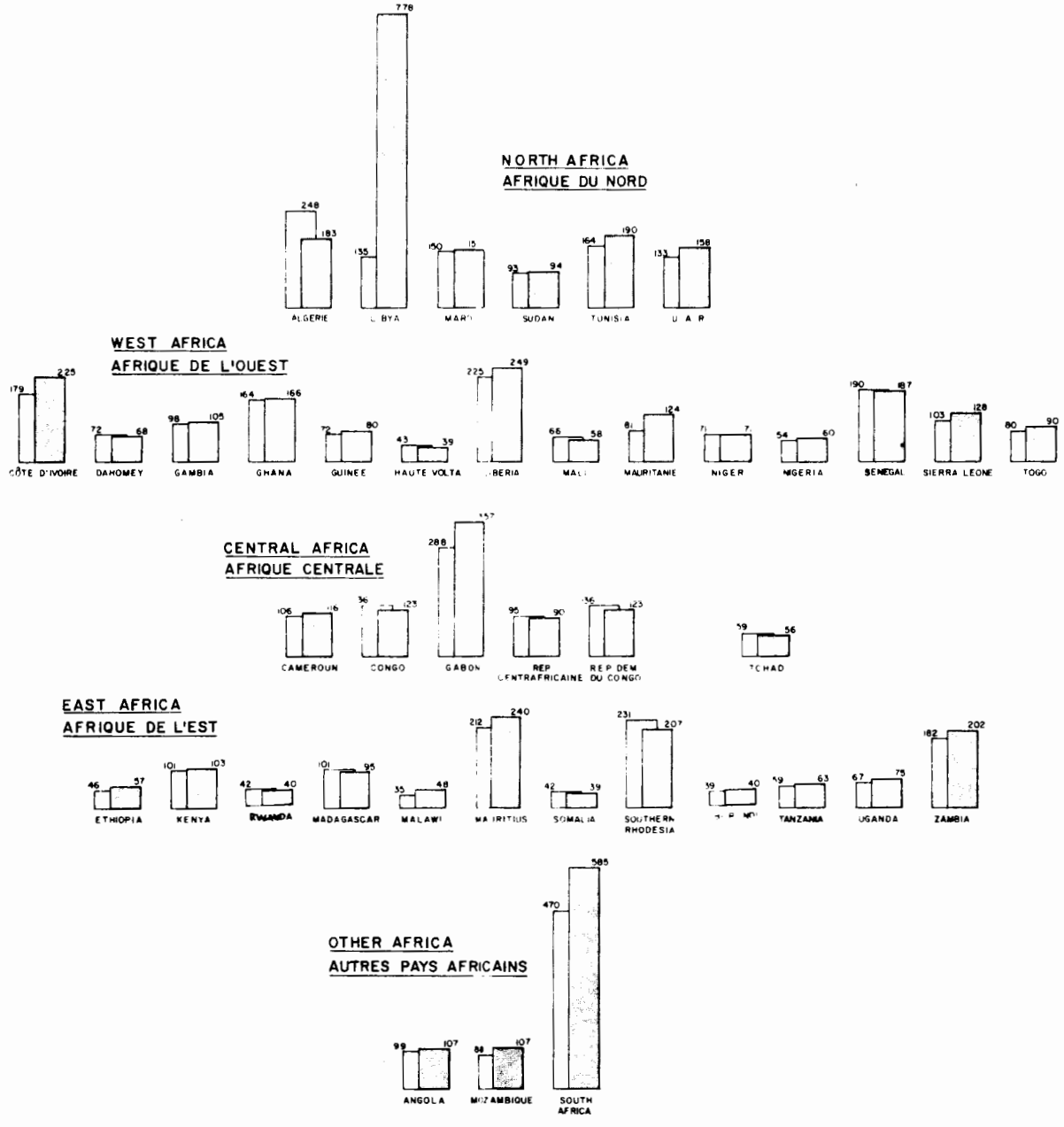
GESCHÄTZTES BRUTTOINLANDSPRODUKT ZU LAUFENDEN MARKTPREISEN, 1966
ESTIMATED GROSS DOMESTIC PRODUCT AT CURRENT MARKET PRICES, 1966
PRODUIT INTERIEUR BRUT ESTIME AUX PRIX COURANTS DU MARCHE, 1966



BRUTTOINLANDSPRODUKT PRO KOPF ZU DEN PREISEN VON 1960 IN US DOLLARS FÜR 1960 UND 1966

GROSS DOMESTIC PRODUCT PER CAPITA AT 1960 PRICES IN U.S DOLLARS FOR 1960 AND 1966

PRODUITS INTERIEUR BRUTS PAR HABITANT AUX PRIX DE 1960 EN DOLLARS DES E.U. POUR 1960 ET 1966



Structure of GDP (1960 Prices) in 1966

Country and region	Total (millions of dollars)	Sectoral shares		
		Primary	Secondary[b]	Tertiary[c]
Mauritius	195	24	25	51
Zambia	689	10	56	34
Madagascar	614	35	22	43
Kenya	853	40	14	46
Uganda	575	58	14	28
United Republic of Tanzania	667	54	12	35
Ethiopia	1,290	68	8	24
Rwanda	160	69	12	19
Malawi	174	51	13	36
Somalia	104	65	8	27
Burundi	130	73	7	20
Eastern Africa	5,631	46	20	34
Eastern Africa (excluding Zambia)	...	51	15	34

a) Countries are arranged in descending order of per capita gross domestic product.

b) Mining, manufacturing and construction

c) Power, transport and communications, other services.

Structure of Population in 1965

Country	Population			Economically active population		
	Total ('000)	In agriculture [a]		Total ('000)	In agriculture [a]	
		Number ('000)	Percentage		Number ('000)	Percentage
Burundi	3,210	3,050	95	1,225	1,170	95
Ethiopia	22,600	20,120	89	8,480	7,460	88
Kenya	9,365	7,821	84	3,510	3,090	88
Madagascar	6,420	5,310	83	3,225	2,710	84
Malawi	3,940	3,158	80	1,235	1,000	81
Rwanda	3,110	2,948	95	1,235	1,175	95
Somalia	2,500	2,224	89	900	800	89
Uganda	7,551	6,870	91	2,795	2,490	89
United Republic of Tanzania	11,502	10,932	95	4,225	4,015	95
Zambia	3,710	3,005	81	1,150	930	81
Total above countries	73,908	65,438	89	27,980	24,840	89

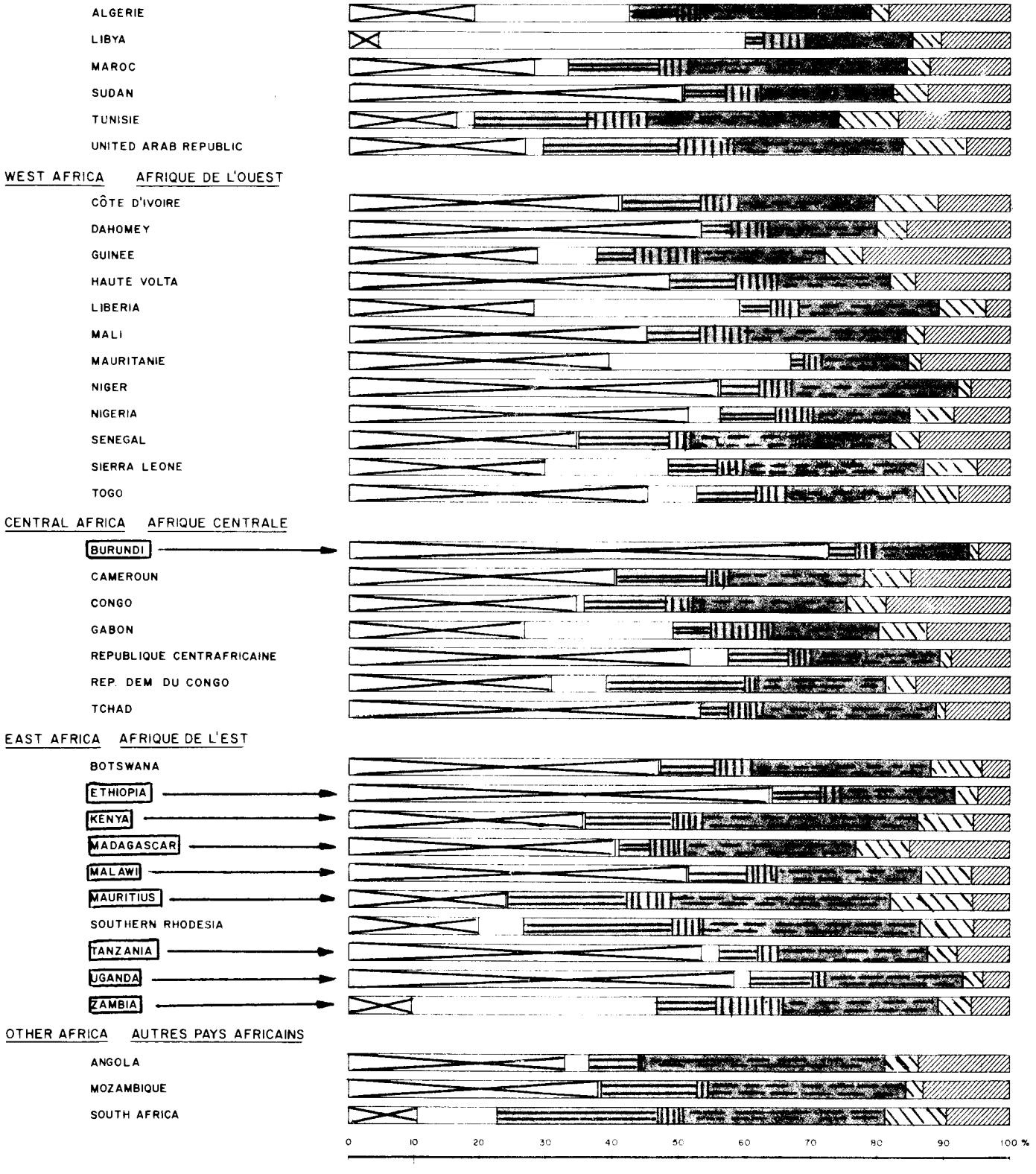
Source: Food and Agriculture Organization of the United Nations, Production Yearbook, vol. 21 (Rome, 1967); United Nations, Demographic Yearbook, various issues.

a) Agricultural population includes persons actively engaged in SITC Division 0, which includes forestry, hunting and fishing, and their non-working dependents.

BRUTTINLANDSPRODUKT NACH SEINER ENTSTEHUNG ZU LAUFENDEN FAKTORKOSTEN, 1966 (IN PROZENT)

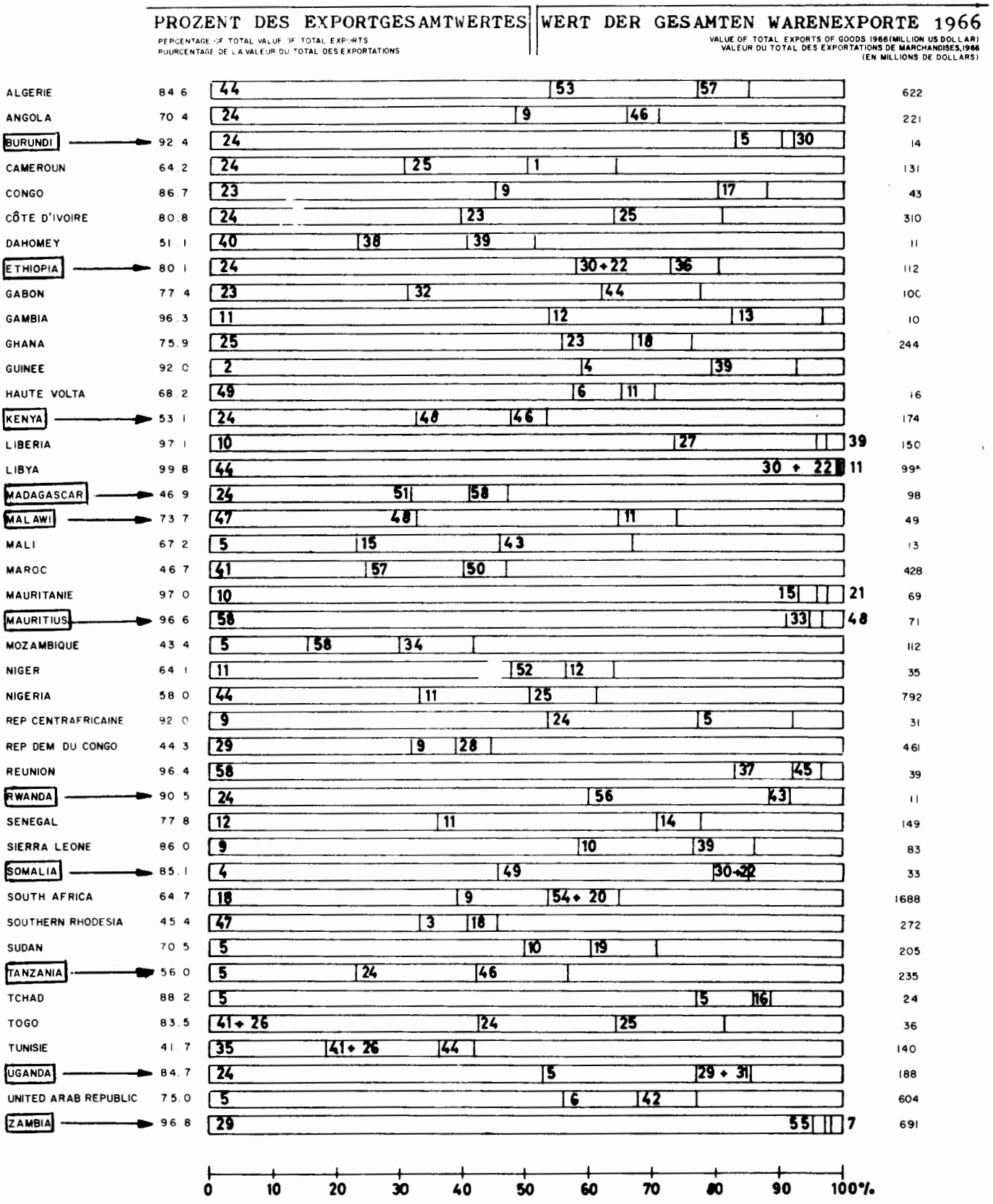
GROSS DOMESTIC PRODUCT BY INDUSTRIAL ORIGIN AT CURRENT FACTOR COST, 1966 (PERCENTAGES)

PRODUIT INTERIEUR BRUT PAR BRANCHE D'ACTIVITE ECONOMIQUE AUX PRIX COURANTS DES FACTEURS, 1966 (POURCENTAGE)



LANDWIRTSCHAFT	BERGBAU	INDUSTRIE UND STROMERZEUGUNG	BAUGEWERBE	HANDEL UND ANDERE DIENSTLEISTUNGEN	TRANSPORT UND VERKEHR	OFFENTLICHE VERWALTUNG UND VERTEIDIGUNG
AGRICULTURE	MINING	MANUFACTURING AND ELECTRICITY	CONSTRUCTION	COMMERCE AND OTHER SERVICES	TRANSPORT AND COMMUNICATIONS	PUBLIC ADMINISTRATION AND DEFENSE
AGRICULTURE	INDUSTRIES EXTRACTIVES	INDUSTRIES MANUFACTURIERES ET ELECTRICITE	CONSTRUCTION	COMMERCE ET AUTRES SERVICES	TRANSPORTS ET COMMUNICATIONS	ADMINISTRATION PUBLIQUE ET DEFENSE

RELATIVE BEDEUTUNG DER JEWEILIGEN DREI HAUPTEXPORTPRODUKTE, 1966
RELATIVE IMPORTANCE OF THREE PRINCIPAL EXPORT COMMODITIES, 1966
IMPORTANCE RELATIVE DE TROIS PRODUITS D'EXPORTATIONS PRINCIPAUX, 1966

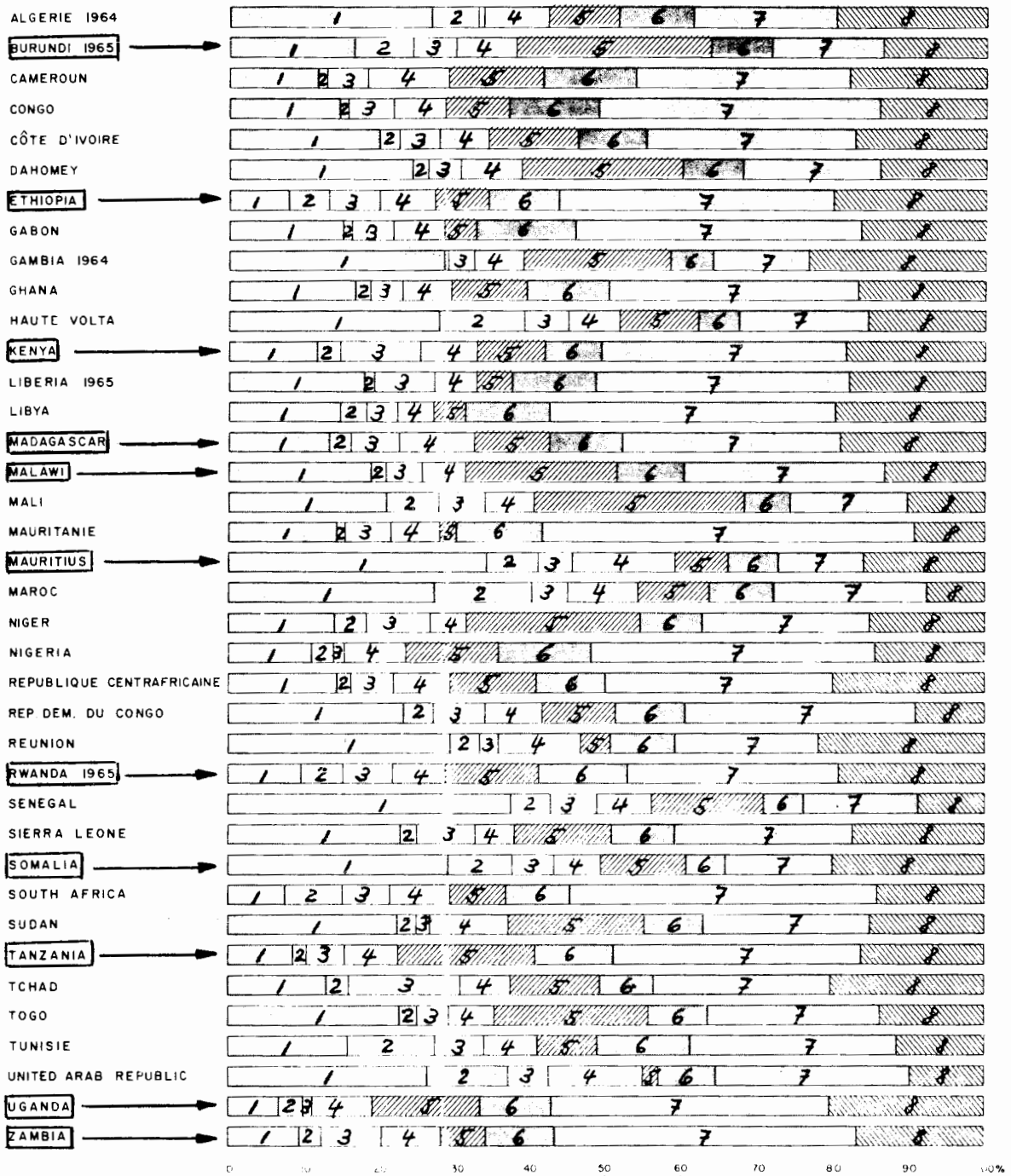


	DEUTSCH	ENGLISH	FRANCAIS
1	ALUMINIUM	ALUMINIUM	ALUMINIUM
2	ALUMINIUMOXYD	ALUMINIA	ALUMINE
3	ASBEST	ASBESTOS	ASBESTE
4	BANANEN	BANANAS	BANANES
5	BAUMWOLLE	COTTON	COTON
6	entkernte BAUMWOLLE	COTTON ginned	COTON egrene
7	BLEI	LEAD	PLOMB
8	BOHNEN	BEANS	HARICOTS
9	DIA[illegible]	DIAMONDS	DIAMANTS
1o	EISENERZ	IRON ORE	MINERAI DE FER
11	ERDNÜSSE	GROUNDNUTS	ARACHIDES
12	ERDNUSSÖL	GROUNDNUT OIL	HUILE D'ARACHIDES
13	ERDNUSSMEHL	GROUNDNUT MEAL	SEMOULE D'ARACHIDES
14	ERDNUSSKUCHEN	GROUNDNUT CAKE	TOURTEAUX D'ARACHIDES
15	FISCH	FISH	PECHE
16	FLEISCH	MEAT	VIANDE
17	FURNIER-UND SPERRHOLZ	PLY+VENEER WOOD	BOIS ET CONTRE PLAQUE
18	GOLD	GOLD	OR
19	GUMMI ARABICUM	GUM ARABIC	GOMME ARABIQUE
2o	HAAR	HAIR	POILS
21	HARZ	RESIN	RESINE
22	HÄUTE	SKINS	PEAUX
23	HOLZ	WOOD	BOIS
24	KAFFEE	COFFEE	CAFE
25	KAKAO	COCOA	CACAO
26	KALZIUM	CALCIUM	CALCIUM
27	KAUTSCHUK	RUBBER	CAOUTCHOUC
28	KOBALT	COBALT	COBALT
29	KUPFER	COPPER	CUIVRE
3o	LEDER	HIDES	CUIRS
31	LEGIERUNGEN	ALLOY	ALLIAGES
32	MANGAN	MANGANESE	MANGANESE
33	MELASSE	MOLASSES	MELASSES
34	ceshew NUSSE	cashew NUTS	NOIX de cajou
35	OLIVENÖL	OLIVE OIL	HUILE D'OLIVE
36	ÖLSAMEN	OIL SEEDS	GRAINES OLEAGINEUSES
37	ätherische ÖLE	essential OIL	HUILES essentielles
38	PALMÖL	PALM OIL	HUILE DE PALMISTE
39	PALMKERNE	PALM KERNELS	AMANDES DE PALMISTE
4o	PALMKERNÖL	PALM KERNEL OIL	HUILE DE PALMISTE
41	PHOSPHATE	PHOSPHATES	PHOSPHATES
42	REIS	RICE	RIZ
43	RINDER	BOVINE	BOVINS
44	ROHÖL	PETROLEUM CRUDE	PETROLE BRUT
45	RUM	RUM	RHUM
46	SISAL	SISAL	SISAL
47	TABAK	TABACCO	TABAC
48	TEE	TEA	THE
49	lebende TIERE	live ANIMALS	ANIMAUX vivant
5o	TOMATEN	TOMATOES	TOMATES
51	VANILLE	VANILLA	VANILLE
52	VIEH	CATTLE	BETAIL
53	WEINE	WINES	VINS
54	WOLLE	WOOL	LAINE
55	ZINK	ZINC	ZINC
56	ZINNERZ	TIN ORE	MINERAI D'ETAIN
57	ZITRUSFRÜCHTE	CITRUS FRUITS	AGRUMES
58	ZUCKER	SUGAR	SUCRE

IMPORTE NACH PRODUKTGRUPPEN, 1966 (IN PROZENTEN)

IMPORTS BY COMMODITY GROUPS, 1966 (PERCENTAGES)

IMPORTATIONS PAR GROUPES DE PRODUITS, 1966 (POURCENTAGE)

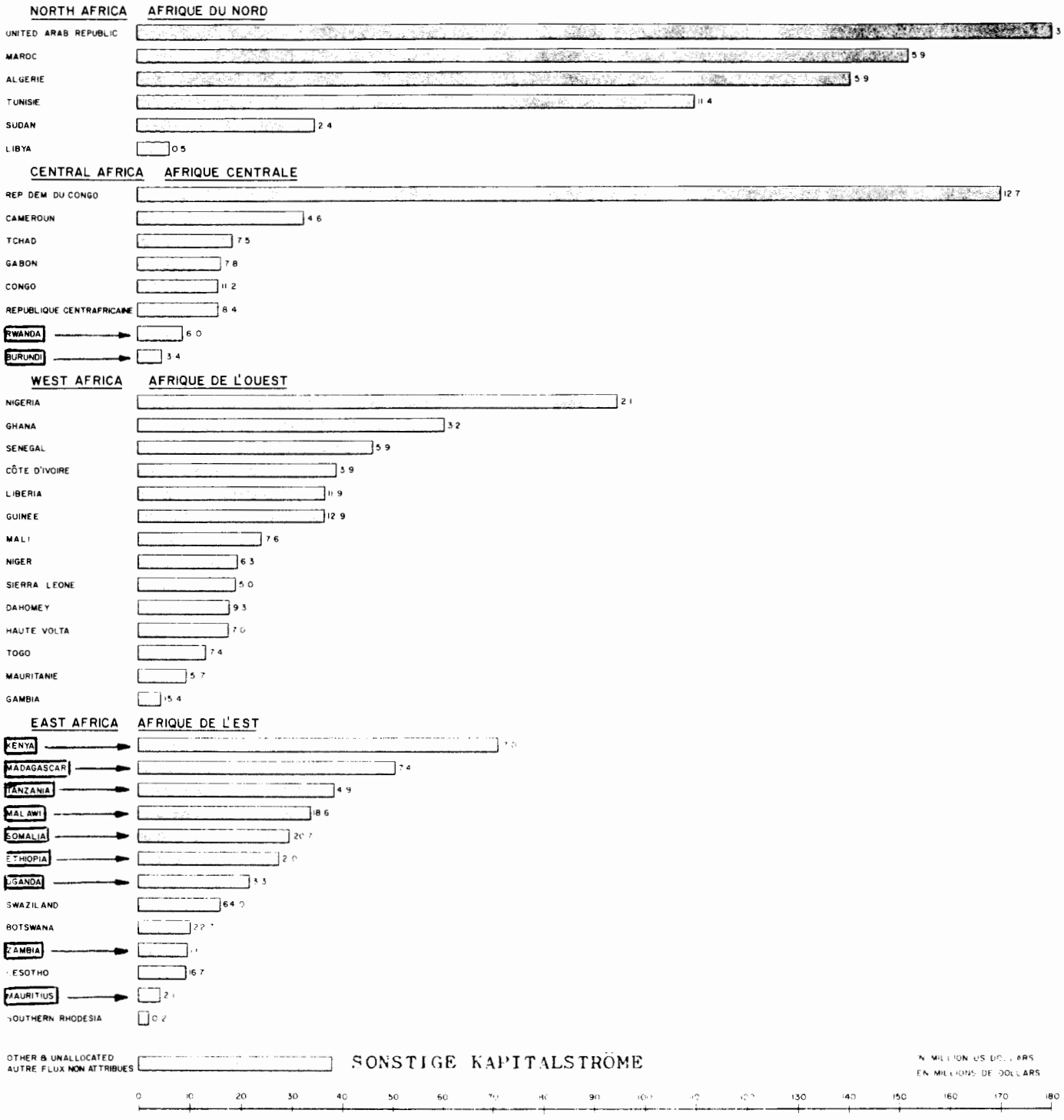


1	2	3	4
NAHRUNGSMITTEL, GETRANKE UND TABAK	ROHSTOFFE	MINERALISCHE BRENNSTOFFE	CHEMIKALIEN
FOOD, BEVERAGES AND TOBACCO	ROW MATERIALS	MINERAL FUELS	CHEMICALS
PRODUITS ALIMENTAIRES BOISSONS ET TABACS	MATIERES PREMIERES	COMBUSTIBLES MINERAUX	PRODUITS CHIMIQUES

5	6	7	8
TEXTILIEN	METALLE	MASCHINEN UND TRANSPORTEINRICHTUNGEN	ANDERE ERZEUGNISSE
TEXTILES	METALS	MACHINERY AND TRANSPORT EQUIPMENT	OTHER MANUFACTURES
TEXTILES	METAUX	MACHINES ET MATERIEL DE TRANSPORT	AUTRES ARTICLES MANUFACTIRES

GOPA - GESELLSCHAFT FÜR ORGANISATION, PLANUNG UND AUSBILDUNG MBH

GEOGRAPHISCHE VERTEILUNG DER KAPITALSTRÖME IN AFRIKANISCHE LÄNDER, 1965
GEOGRAPHICAL DISTRIBUTION OF FINANCIAL FLOWS TO AFRICAN COUNTRIES, 1965
REPARTITION GEOGRAPHIQUE DES FLUX DE CAPITAUX VERS LES PAYS AFRICAINS, 1965



BILATERALE STRÖME DES OECD-AUSSCHUSSES FÜR ENTWICKLUNGSHILFE
MULTILATERALE STRÖME DER IBRD-IFC-IDA-IDB-EWG-UNO

DIE AM ENDE DES BALKENS GENANNTE ZAHL GIBT DEN PROZENTUALEN ANTEIL DER KAPITALSTRÖME AM BIP ZU LAUFENDEN MARKTPREISEN FÜR 1965 AN

BILATERAL FLOWS FROM OECD DEVELOPMENT ASSISTENCE COMMITTEE
MULTILATERAL FLOWS FROM IBRD-IFC-IDA-EEC-UN

THE FIGURE AFTER EACH BAR REPRESENTS THE FINANCIAL FLOWS AS A PERCENTAGE OF GDP AT CURRENT MARKET PRICES FOR 1965

FLUX BILATERAUX DU COMITE D'AIDE AU DEVELOPMENT - OCDE
FLUX MULTILATERAUX DE LA BIRD-SFI-AID-BID-CEE-ONU

LE CHIFFRE APRES CHAQUE BARRE REPRESENTE LES FLUX FINANCIERS EN TANT QUE POURCENTAGE DU PIB AUX PRIX COURANTS DU MARCHE EN 1965

PART I

THE BACKGROUND

1. Definition of Engineering Industry

Engineering Industries, for the purpose of this study, are defined to comprise the following classes of the International Standard Industrial Classification (ISIC).

ISIC 381: Manufacture of fabricated metal products, except machinery and equipment
ISIC 382: Manufacture of machinery, except electrical
ISIC 383: Manufacture of electrical machinery, apparatus, appliances and supplies
ISIC 384: Manufacture of transport equipment

On the trade side, the corresponding classes of the Standard International Trade Classification (SITC) are:

SITC 69: Manufactures of metal, n.e.s.
SITC 71: Machinery, other than electric
SITC 72: Electrical machinery, apparatus and appliances
SITC 73: Transport equipment.

Classes 385 ISIC (manufacture of professional, scientific measuring and controlling instruments) and 86 SITC respectively (professional, scientific and controlling instruments, photographic and optical goods, watches and clocks), which generally are summarized under the heading "Engineering Industries" are not considered in this study.[1)]

1) For subdivisions of ISIC and SITC-classes treated in this study see annex tables I/1 and I/2

2. The Role of Engineering Industries in Industrial Development

Taking its percentage share in the total industrial labour force and its contribution to total industrial output as indicative of the relative importance of an industrial branch, Engineering Industries can easily be identified as one of the key sectors of developed economies.[1] The reasons for this central role are numerous: Engineering Industries not only supply a wide range of non-productive goods for final consumption, but also the larger part of the machinery and equipment that constitute the productive assets of all other industries. Thus, engineering products, to a large degree, take part in the goods production process primarily as tools of production. As such, they are an essential component of the community's fixed capital and therefore one of the main forms of fixed capital formation. i.e. of expansion of the productive mechanism.[2] It can be shown that the countries with high rates of investment in machinery and equipment are at the same time those, which produce high rates of growth of their national products.[3]

Furthermore, by constantly absorbing new technical and scientific knowledge, Engineering Industries create improved machinery to produce technological transformations and at the same time raise the level of production in other respects: quality and performance of the goods produced, skill and professional qualification of the labour force, increased application of scientific production management methods etc. Considering that technological progress is assuming an ever more important place in developed economies, it is essential for developing countries to keep up in this field, if ever they hope to emerge from a state of technological dependence.

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1) annex, table I/3
2) ECE, 'The Engineering Industry and Industrialization", N.Y. 1968, p.9 (document ST/ECE/ENG/6)
3) annex, table I/4

In that respect, Engineering Industries provide a measure of technological progress and the extent of their presence indicates the stage reached in a country's development.

3. Characteristics of Engineering Industries in Developed Economies

In the following, some aspects of developed Engineering Industries are briefly described. This is to supply a basis for comparison of the specific conditions of East Africa's Engineering Industries, which will be discussed in part II of this study.

3.1 Distribution and Production Pattern

Though strongly connected with heavy industries, the wide range and variety of their products and their economic distribution pattern bring Engineering Industries closer to light industries. As can be seen from the data of table I/5, an average of 80% of engineering production goes into final consumption; out of this figure about half is absorbed by fixed capital formation. Non-productive consumption describes the share of consumer goods which is taken up by the privat sector, government, public agencies etc. It will be shown lateron that this part is significantly smaller in the East African countries. While the figures of table I/5 refer to the branch as a whole, a breakdown into its principal products reveals some deviations from this average distribution pattern. Thus, electric engineering products, especially for industrial use, to a high percentage go into productive and non-productive consumption at the expense of fixed capital formation, whereas e.g. agricultural machines and some other products show the opposite pattern.[1)]

Another aspect of Engineering Industries concerns the pattern of production. Concentrating on machinery only, it seems that one characteristic feature of a high degree of industrialization is the larger share of non-electric machinery with a ratio of about 65:35 against electrical machinery. In contrast,

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1) annex, table I/6

Table I/5

Use of Engineering Products in Selected Countries
(in percentages; total production = 1oo%)

Country	Engineering production used for:			
	Productive consumption	Fixed capital formation	Non-Productive consumption	Miscellaneous uses
France (1959)	22,o	38,8	23,4	15,8
Italy (1959)	2o,7	44,7	15,3	19,3
Western Germany (196o)	22,1	34,o	14,2	29,7
Yugoslavia (1962) a)	35,4	33,9	12,3	18,4
Malta (1963)	31,8	44,5	-	23,7

Sources: For France, Italy and Western Germany - Tableaux Entrées-Sorties pour les pays de la Communauté économique européenne (second version), Brussels, 1965.

For Yugoslavia - Inter-industry Relations of the Yugoslav Economy in 1962, Belgrade, 1966

For Malta - National Accounts of the Maltese Islands, Valetta, 1964

a) Engineering and metal transforming industries.

the emergence of Engineering Industries in developing countries is characterized by an almost exactly shift towards the figures for developed economies as industrialization progresses.[2)]

2) annex, table I/7

3.2 Cost Structure and Inputs

Costs of industrial production can be classified under three headings: direct cost of labour and material, overhead charges, and amortization of capital equipment. The latter, which reflects the investment required for setting up an enterprise is not considered here, as it is affected by too many factors, which makes it extremely difficult to arrive at comparable figures even for different developed countries.

For the remaining two cost elements, too, it has to be kept in mind, that level and pattern of expenditure in Engineering Industries depend on a whole series of factors, the most important of which are: equipment and production technique employed, production volume, physical form of the products, degree of specialization of and co-operation between enterprises, quality of available labour and location of the enterprises. Still, some features can be pointed out, which set Engineering Industries apart from other branches. One distinctive element is, that expenditure on material goods in Engineering Industries is generally lower, proportionately, than in manufacturing industries as a whole, while expenditure on labour is higher, which ranks Engineering Industries relatively as a labour-intensive type of production. Even in quite highly automated industries the proportion representing labour and related expenditures other than raw materials, rarely drops below 40%[1)]. A larger production volume, which generally will be accompanied by a higher degree of mechanization and automatization, tends to reduce the share of labour cost in favour of raw materials cost[2)].

Other cost elements, which characterize an industrial branch, are expenditure on fuel and power. For the first, Engineering

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1) annex, table I/8
2) annex, table I/9

Industries remain below the total industrial average, whereas the index of power cost is close to the average of all industries, i.e. between the figures for light and heavy industries. As for the other cost elements, there is considerable divergence from the average index for different lines of engineering production [3].

Turning to the inputs of the different raw materials, iron and steel in their various forms obviously account for by far the largest part. Within this group, again, pig-iron, steel-plates and bars together make up for more than 50%. For this reason branches with a particularly high metal content of their products will tend to locate themselves in regions where such metal is produced. Next to iron and steel, other inputs such as plastics, wood, glass, rubber, and the various non-ferrous metals take a relatively minor share, except for special types of Engineering Industries, such as electric wire and cable industries, for which copper or aluminium are the principal input materials [4].

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3) annex, table I/10
4) annex, table I/11 and I/12

3.3 Capital Efficiency

One index of production efficiency, that can be used for inter-industrial comparisons, is the product/capital ratio of a sector which puts production results in terms of value against the capital invested. It shows that the ratio is higher for Engineering Industries than for the average of all manufacturing industries[1]. However, one factor which strongly influences this ratio is capacity utilization. Even for very specialized engineering enterprises in developed countries, optimum utilization of capacity presents one of the principal difficulties. Discontinuity of the technological process, sequence of many production stages, complexity of preparatory operations, diversity of products etc. all add up to make engineering one of the most complicated types of production for technological reasons alone. For developing countries, this is compounded by the problem of markets insufficient to justify long production runs. Taking the product/capital ratio an index again, it can be shown that Engineering Industries suffer from low capacity utilization more than other types of production, or looking at it from the other side, that the efficiency of the capital invested will increase more in engineering than in other industries as capacity is more fully utilized[2].

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1) annex, table I/13
2) annex, table I/14

3.4 Minimum and Maximum Size

Since the considerations of this part are supposed to supply a yardstick against which lateron the East African Engineering Industries can be measured, it might appear sufficient to confine the discussion of size of engineering establishments to the question of minimal size. However, for a number of engineering productions the optimal maximum size - as far as it can be defined at all - is fairly small and therefore worthwhile considering even under the market conditions prevailing in East Africa, particularly so, if longterm prospects for regional industries are to be taken into account.

Without enlarging on the problems of the various economies of scale[1] it can be said that independent of local conditions, minimum size will be strongly influenced by the choice of equipment: the more sophisticated it is, the more it will tend to push the lower limit of production volume upwards because of the heavy depreciation charges it entails. Simple equipment, on the other hand, may allow for a fairly small minimum. This shows that with production method being one of the deciding factors, and the method in turn largely depending on the product to be manufactured, the question of optimal size lends itself even less to an answer which applies to all Engineering Industries than other subjects discussed before. Therefore, some indication can be derived only from empirical figures as those given in table I/15. They show, for a number of branches in one particular country the variations in numbers of establishments and employees over several years. With all reservations, these figures allow for some conclusions to be drawn: First, the dropout rate is highest in the small-scale brackets unless the establishments in these expand along with and the rate of the sector as a whole, second, the minimum rises to the degree at which heavy machinery and mass production is

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1) This will be discussed in some more detail in connection with the specific conditions of Engineering Industry in East Africa.

Table I/15

France: Change Between 1954 and 1962 in the Numbers of Establishments in the Various Size Classes of a Classification by Numbers Employed, and in the Numbers of of Employees in Each Size Class (Percentages)

Sectors	SITC, Revised Code	Percentage Change	Employment brackets							
			Total	0 to 10	11 to 20	21 to 50	51 to 100	101 to 200	201 to 500	500 or more
Heating and cooling equipment	719.1 except 719.15	a	+ 70	+ 74	+ 94	+100	+ 55	+200	+ 78	+ 50
		b	+102	+ 55	+ 97	+104	+100	+230	+ 95	+ 69
Refrigerators	719.15 725.01	a	- 2	- 1	+ 11	+ 29	+ 23	+ 22	+ 50	+ 50
		b	+ 32	- 15	+ 4	+ 42	+ 27	+ 43	+ 53	+ 53
Mechanical handling equipment	719.3	a	+ 57	+ 78	+ 29	+ 60	+ 78	+137	+ 63	0
		b	+ 77	+ 81	+ 41	+ 85	+ 93	+108	+ 80	+ 93
Agricultural machinery	712.1; 712.2; 712.5; 712.9;	a	- 5	- 5	- 19	0	+ 40	+ 7	+ 47	- 10
		b	+ 26	+ 2	- 14	+ 12	+ 27	+ 17	+ 48	+ 40
Food-processing machines	718.3	a	+ 79	+103	+118	+126	+ 58	+ 31	+ 86	- 50
		b	+ 61	+ 81	+133	+144	+101	+ 31	+ 64	- 53
Sewing machines and mach.f.footwear ind.	717.3	a	- 38	- 43	- 40	- 12	+100	0	0	0
		b	- 8	- 75	- 50	- 9	+247	- 56	- 18	+ 28
Textile industry	717.1	a	- 4	- 5	- 15	+ 7	+ 50	+ 56	0	- 20
		b	+ 20	- 8	- 10	+ 5	+ 32	+ 55	0	+ 29
Machinery for the paper industry	718.1; 718.2;	a	+ 22	+ 12	+ 33	+ 33	+145	+ 28	+ 25	+100
		b	+ 66	+ 18	+ 60	+ 49	+135	+ 65	+ 23	+103
General engineering		a	+ 39	+ 45	+ 25	+ 7	+ 80	+ 25	+ 28	0
		b	- 7	- 11	+ 6	+ 2	+ 29	- 12	+ 2	- 78
Precision engineering		a	- 8	- 10	+ 8	+ 30	+ 26	+ 14	- 23	
		b	+ 20	- 6	+ 13	+ 45	+ 42	- 3	+ 18	
Electrical apparatus	722.2	a	+122	+120	+170	+185	+160	+270	+100	0
		b	+ 75	+ 29	+ 72	+ 84	+150	+130	+ 52	+ 70
Batteries and accumulators	729.1	a	- 35	- 35	- 65	- 20	- 11	+ 60	- 25	+100
		b	+ 34	- 47	- 56	- 14	- 26	+ 94	- 26	+150

Note: (a) Number of establishments
(b) Number of wage-earners

involved and third, the minimum is low in those sectors, where subcontracting is common practice. Though these might be obvious conclusions, they still offer some explanation, even under East African conditions, why Engineering Industries develop along the lines they do and give some indication in which fields to look first for scope for new industries.

Turning to maximum size it would seem that there is no immediate reason, why there should be any upper limit to an individual establishment at all. However, as experience from the developed countries shows, Engineering Industries, more than other industrial branches, are characterized not only by sub-contracting, but also by a tendency, even in the case of mass production towards splintering as firms develop into separate and more or less autonomous establishments. Thus, instead of talking about maximum size, it might be more correct to apply the term optimal size which is closely connected with the problem of specialization. Some figures compiled by the Economic Commission for Africa[1] show the degree of specialization in certain Japanese Engineering Industries as reflected in the percentage of end-product costs accounted for by items supplied by sub-contractors:

	Percentages
Sewing machines	40
Bicycles	31
Looms	28
Motor cars	28
Optical and precision instruments	26
Motor cycles	25
Other industrial machinery	21
Electric motors	17
Electrical equipment	11

1) Document E/CN 14/AS/III/25

This trend towards specialization is in part explained by the fact that, as engineering enterprises grow, so does the range, diversity and sophistication of their products. A large enterprise, therefore, will face the same problems relating to length of production runs and depreciation of equipment as a small one, only at a different scale, and will naturally develop towards disintegration. This argument, however, is necessarily based on the assumption, that the market is able to support at least one large enterprise. It might be said at this point already, that under the conditions in developing countries, where normally there is only a very limited market for any given product, there will, on the contrary, be rather a trend towards integration, so as to enable an entreprise to reach an economic size in the first place[1)].

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1) Some more empirical figures on size distribution in Engineering Industries are presented in annex, tables I/16 and I/17

3.5 Manpower Requirements

As has been pointed out before, labour accounts for a large share in the cost of engineering production. This is a consequence not only of a comparatively large number of labour employed in Engineering Industries, but also of the composition of that labour force. Though, again, the skill requirements vary widely for individual products, for the branch as a whole they are more stringent than for almost any other type of industry[1)]. This is true for the levels requiring higher (i.e. university) training as well as for those with intermediate (i.e. vocational) training. On-the-job training and learning-by-doing can to some degree replace the latter - and of necessity often has to in developing countries - but with the rapid pace of technological change the emphasis shifts from a workers possession of a specific skill to the ability to adapt to changing job requirements. This adaptability, however, depends primarily on the level of formal and technical education received prior to job entry. In the industrialized countries, even now a shift towards higher qualification levels can still be observed, as is borne out by the following figures.

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1) annex, tables I/18 and I/19

Table I/20

Distribution by Broad Skill Levels of Salary and Wage Earners in the Metal Trades, 1957 and 1962 (Belgium) (in percentages)

	1957	1962
University trained	1.7	2.0
Technicians	5.0	7.3
Other salary earners	12.3	12.0
Skilled workers	25.2	25.6
Semi-skilled workers	31.6	28.3
Unskilled workers	24.2	24.8
	100.0	100.0

Source: Evolution de la structure de l'emploi dans d'echantillon comparable du secteur des fabrications métalliques (Résultats de 1962) by C. d'Hoogh, Bruxelles, Centre d'étude des problèmes sociaux et professionnels de la technique, 1962,

3.6 Linkage effects

Every branch of industry is linked with all other branches through its purchases from and sales to them. The existence and extent of such linkages not only shows the importance one branch has for others as purchaser and supplier but at the same time gives an indication of how the branches can be expected to stimulate the growth of each other. Table I/21 shows that the engineering sector is its own best consumer, where sales on current account are concerned. For sales on capital account, which represent the equipment component of investment of the purchasing sector, linkages exist with all other branches.

Table I/22 shows purchases (on current account only) from other sectors by the Engineering Industries. It reflects the importance of the iron and steel sector as supplier of raw materials with a figure more than three times that of non-ferrous metals.

By way of contrast, the input-output table for the Zambian Industry[1)] shows that, at least for the domestic production, there is practically no linkage within the engineering sector and only little with other sectors which clearly indicates the infant status of engineering in that country[2)].

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1) annex, tables I/23 and I/24
2) And its strong dependence on Zambia's principal industrial activity, copper mining and refining.

Table I/21

Purchases from the Engineering Sector by Industrial Sectors
($ per '000 $ of output of purchasing sector)

	Assuming 1 % annual growth in per capita income					Assuming 4 % annual growth in per capita income				
	Value of purchases from eng. sector					Value of purchases from eng. sector				
	Current account	Capital account			Total	Current account	Capital account			Total
		total	for expansion	for replacement			total	for expansion	for replacement	
1. Engineering industries	167	30	14	25	206	167	53	23	25	220
2. Basic metals	6	58	22	36	64	6	88	44	36	86
3. Paper and products	1	42	14	28	43	1	59	31	28	60
4. Printing and publishing	3	38	12	26	41	3	51	25	26	54
5. Chemicals, petroleum and coal products	0	41	14	27	41	0	53	26	27	53
6. Textiles	2	35	11	24	37	2	44	20	24	46
7. Wood products	2	32	9	23	34	2	43	20	23	45
8. Rubber products	0	33	11	22	33	0	43	21	22	43
9. Food, beverages and tobacco	0	15	4	11	15	0	18	7	11	18
10. Clothing and footwear	1	12	3	9	13	1	16	7	11	18
11. Leather products	1	11	3	8	12	1	13	5	8	14
Assumptions made: population growth 2.5 % p. a. 10-year life period of equipment										

Source: UNIDO Monographs on Industrial Development, No. 4, p. 17

Table I/22

Purchases by the Engineering Sector on Current Account from other Industrial Sectors
($ per '000 $ of output of engineering sector)

Supplying industry	Dollars
Iron and steel	168
Machinery	111
Non-ferrous metals	52
Transport equipment	46
Trade	18
Lumber and wood products	15
Services	14
Rubber products	13
Chemicals	12
Non-metallic mineral products	10
Shipbuilding	10
Industry n.e.s	9
Coal products	8
Electric power	7
Petroleum products	6
Textilien	5
Paper and products	4
Coal mining	4
Leather and products	1

Averages for Italy, Japan, Norway and USA

Source: UNIDO Monographs on Industrial Development, No. 4, p. 18

4. Stages and Pattern of Development of Engineering Industries

In the development of Engineering Industries, four fairly distinct stages can be pointed out with regard to the level reached by a country, namely:

Stage I: Engineering Industries are just beginning to emerge; their activity is restricted to simple metal manufactures and repair work.

Stage II: Engineering Industries are still in their initial phase, but some manufacture of machinery and apparatus is introduced.

Stage III: The manufacture of industrial machinery diversifies while it expands, skill requirements are high and an indigenous technology develops.

Stage VI : This describes the level reached by Engineering Industries in industrial countries.

A number of indicators can be used to determine the position of a country within this succession of stages:

1) Number of persons employed and value added in the Engineering Industries to characterize the size of the industry.
2) Value added in all manufacturing and steel consumption to characterize the size of the industry.
3) The share of Engineering Industries in all manufacturing to characterize the relative importance of the first.
4) The percentage of imports in domestic consumption and of exports in domestic production of engineering goods.

In Table I/25, some orders of magnitude are given for these indicators in the successive stages.

Table I/25

Economic Indicators at Successive Stages in the Development of Engineering Industries

	All manufacturing		Steel	Engineering Industries					
				Production			Trade		Sub-sectors
	Value added in production (mio $)	Number engaged ('000)	Annual consumption ('000t)	Value added (mio$)	Number engaged ('000)	% in all manufacturing	% imports in domestic consumpt.	% exports in domestic production	% of simple metal prod. in output
Stage 1 Simple engineering repairs and manufactures	400 or less	a	400 or less	50 or less	20 or less	8 or less	85-100	-	50 or more
Stage 2 Engineering production at initial stage	400 - 1000	200 - 500	400 - 800	50 - 100	20 - 50	8 - 12	80- 90	-	35-40
Stage 3 Developing countries with developed and diversified engineering production	2000 - 5000	1000 or more	1000 or more	400 - 800	200 or more	15 - 20	50- 75	b	20-30
Stage 4 Industrialized countries	a	a	1000 or more	a	200 or more	25 or more	10- 50	20-50	b

a) not estimated
b) negligible

Source: UNIDO Monographs on Industrial Development, No. 4, p. 46

As regards their Engineering Industries, all the East African countries covered by this study are still in stage I or II of their development, though it is less easy to draw a line between the two than against the following ones.

This general pattern of development of the Engineering Industries, which, of course, is part of the overall process of a country's industrialization, can roughly be explained as follows: The two major factors influencing the development of Engineering Industries are volume of demand (for D.C's demand being normally identical with demand of the local market) and supply of raw materials, i.e. mainly iron and steel. Development invariably starts as a process of substitution, both of imports and of products locally manufactured by handicraft or cottage-type establishments, concentrating on simple manufactures of metal. As during this stage skill requirements are low and production techniques fundamental, economies of scale enjoyed by larger units in industrialized countries are not so important as to offset the advantages accrueing to local production, often combined with some form of protection. This stage, by developing basic skills and familiarizing with industrial production techniques provides the basis for the subsequent manufacture of more complicated machinery which becomes viable as the economy of the country and along with it demand for consumer and capital goods grows. From here to stage III the development of Engineering Industries is characterized not only by a growth of volume and diversity, but at the same time, as was mentioned earlier, by a shift towards predominance of non-electric machinery and apparatus and an accompanying relative decline of simple metal manufactures in total output. However, even at that stage, imports of raw materials and finished

engineering goods are still important, whereas exports are negligible. A breakthrough in that respect is only achieved as a country reaches stage IV of engineering development[1)].

1) A classification of developing countries according to the above mentioned stages and indications is given in annex, table I/26

5. Some Aspects of Industrialization in East Africa

Quite a number of publications are available, which follow the overall economic development or that of specific sectors of the countries considered in this study. Therefore, only some aspects of industrialization will be briefly mentioned, because of the bearing they have on the development of Engineering Industries[1)].

5.1 National Priorities

All developing countries, and some of the East African ones belong to the poorest among them, are faced with the dilemma of how to allocate their scarce financial resources between the different sectors of the economy as well as within a given sector, such as manufacturing industries. It was mentioned, that development of Engineering Industries starts, where import substitution is fairly easy and economically justified. Soon, however, a point is reached where less benefits (in terms of value added, foreign exchange savings, employment etc.) can be derived from new import-substituting Engineering Industries than from other manufacturing industries and this will be reflected in the priority attributed to the individual branches in a country's development planning. The priority attached to Engineering Industries is even less, where export-orientation is concerned (at least, export to the industrialized countries), the main reason being the difficulty to compete qualitywise in overseas markets. With very few exceptions, industries such as processing of agricultural products, chemicals, pulp and paper or foodstuffs rank above the Engineering Industries both for import-substitution and for export-

1) A compilation of the economic data on the subregion and the individual countries is contained in the annex.

oriented industries. A list of the principal industrial projects in the East African subregion, which either have recently been or are being implemented or are under consideration contains not more than six engineering projects in a total of 88[1)]. Though this does not mean that Engineering Industries are disregarded altogether in the national development plans, and certainly not that there is no scope for them, it is still indicative of the priority attributed to them.

Particularly for developing countries the question of priorities at the same time touches on the problem of labour-intensive versus capital-intensive industries. It has been said that Engineering Industries are basically labour-intensive and at the same time flexible, in that frequently a choice of different degrees of mechanization is possible. However, labour can substitute capital only to some extent and unfortunately it can do so least, where quality and uniformity of the product are decisive, i.e. in those cases, where export to discriminative markets is anticipated. Here, on the contrary, production will have to be on a technological level comparative to that of industrialized countries. The decision, if there is any alternative at all, of what degree of capital-intensiveness should be chosen in a particular case, may therefore be in favour of different technologies, depending on what markets the products are supposed to serve.

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1) Document E/CN 14/INR189, April 1971. In Part III of this study another list is compiled of engineering projects mentioned in various sources of the East African countries, which is far more extensive. However, the projects mentioned there are long-term perspectives rather than tangible possibilities.

5.2 Industrial Promotion Programmes

All of the East African countries offer incentives and privileges to new industries or for expansion of existing ones. They usually involve waiving of tariffs and duties on imports of capital goods, and sometimes raw materials, tax holidays, protection against domestic and foreign competition etc. There are no fundamental differences and though most prospective investors would consider the existence of such programmes a precondition, none of the countries can hope to gain a significant advantage over the others on the strength of investment promotion alone. The most liberal privileges can be no substitute for lack of market. Still, all other things being equal, the administrative efficiency, with which the provisions are put into effect, can make a difference.

For Engineering Industries, with their usually heavy reliance on imported raw materials, and often only a marginal cost advantage of the finished products over imports (which makes them extremely vulnerable to dumping policies of foreign suppliers), it is more vital than for most other types of industries, to take advantage of the full range of incentives offered by promotion programmes. This, on the other hand, makes them expensive for countries which, like the East African ones, rely on import and excise duties for a high percentage of their revenue. If duty-free import of raw materials is granted, the government of the respective country will lose this source of income without (at least for some time) compensation, as tax holidays are almost invariably requested by and granted to new industries. Therefore, in general, unless they can make use of locally available raw materials - as for example the copper wire and cable industry in Zambia - the main contribution to their country's economy by new Engineering Industries in their initial phase will be the employment effect.

5.3 State Participation and Private Investment

The East African countries, in the question of state participation in industrial activity, follow different policies, the attitudes ranging from basically non-interference to taking an interest (minority or majority) in all major industries. There are various reasons advanced for these attitudes which are well-known. There is, however, no reason for discussing their viability in this context.

For Engineering Industries with the possible exception of those concerning simple metal manufactures, know-how is essential, and this cannot be acquired by simply choosing an experienced supplier of machinery and equipment, but only over an extended period of operation. Thus, for Engineering Industries joint ventures seem indicated, and at this point some reservations might be made by the foreign investor if he is asked to accept the government as one of his local partners. The decision whether or not to invest, for the foreign investor, is identical with the decision of whether or not to take the risk of losing the money involved, and if it is decided to take the risk, it is in the expectation of the monetary return, the size of which will vary with the risk. Obviously, no quantitative norm can be established for that and this easily might (and, in fact, in some cases did) lead to differences of opinion on what can be considered reasonable profits and rates of re-investment in a given case. Where foreign participation does cause an unnecessary outflow of foreign exchange and is not associated with a contribution above that which a country could itself make at the same cost, governments will find themselves induced to impose certain restrictions, but these must not impede the efficient operation of the establishment. For example, taking distribution and marke-

ting of its products out of a company's hands, and leaving a statal body in charge of it might be welcome in some cases, but might deprive a company of one of its most competitive instruments in others.

5.4 Regional Co-operation in Industrialization

The arguments in favour of regional co-operation are strong and their validity is generally accepted[1]. Unfortunately, the past development has been characterized by very little progress in this field; in fact, it might seem that industrialization in East Africa has been, and still is, a process of disintegration rather than of integration. To a considerable extent, this is the result of divergent political interests on the part of the individual countries, which can be no subject for discussion here, but which have frequently been overriding economic considerations in the past.

For Engineering Industries co-operation as a result of agreements between the countries concerned exists only within the framework of the East African Community, and this co-operation leaves much to be desired. There have been several instances of duplication of investments and all efforts to streamline the functioning of the agreements can be pursued only within the narrow limits set by the competing national interests and priorities of the individual countries.

Outside the community there is some interchange of engineering products between the East African countries, but this is on an import-export basis and cannot be regarded as co-operation in its proper meaning. The case for co-operation in the field of Engineering Industries is particularly strong given the wide range and diversity of products. Still, what makes any attempt at regional planning of Engineering Industries difficult is the fact, as has been pointed out, that this sector has very strong linkage effects within itself. Once it gets off the ground in one country, it will largely take care of its

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1) A quantitative assessment for the East African countries is given in document ST/ECA/140/Part III

own development. Hence the fear of the smaller and economically weaker East African countries, that by opening up to regional development they would place themselves in a poor starting position, and their understandable insistence on tangible guarantees of getting a sizable share of the cake.

GOPA – GESELLSCHAFT FÜR ORGANISATION, PLANUNG UND AUSBILDUNG MBH

A N N E X I

(Tables I/1 - I/26)

GOPA – GESELLSCHAFT FÜR ORGANISATION, PLANUNG UND AUSBILDUNG MBH

Table I/1

International Standard Industrial Classification (ISIC)

Details of Divisions 381 - 384

3811	Manufacture of cutlery, hand tools and general hardware
3812	Manufacture of furniture and fixtures primarily of metal
3813	Manufacture of structural metal products
3819	Manufacture of fabricated metal products except machinery and equipment not elsewhere classified
3821	Manufacture of engines and turbines
3822	Manufacture of agricultural machinery and equipment
3823	Manufacture of metal and wood working machinery
3824	Manufacture of special industrial machinery and equipment except metal and wood working machinery
3825	Manufacture of office, computing and accounting machinery
3829	Machinery and equipment except electrical not elsewhere classified
3831	Manufacture of electrical industrial machinery and apparatus
3832	Manufacture of radio, television and communication equipment and apparatus
3833	Manufacture of electrical appliances and housewares
3839	Manufacture of electrical apparatus and supplies not elsewhere classified
3841	Ship building and repairing
3842	Manufacture of railroad equipment
3843	Manufacture of motor vehicles
3844	Manufacture of motorcycles and bicycles
3845	Manufacture of aircraft
3849	Manufacture of transport equipment not elsewhere classified

Table I/2

Standard International Trade Classification (SITC)
Details of Divisions 69 - 73

Group	Subgroup	Item		
			DIVISION 69. MANUFACTURES OF METAL, N.E.S.	
691			Finished structural parts and structures, n.e.s.	
	691.1		Finished structural parts and structures of iron or steel	73.21
	691.2		Finished structural parts and structures of aluminium	76.08
	691.3		Finished structural parts of zinc	79.05
692			Metal containers for storage and transport	
	692.1		Tanks, vats and reservoirs for storage or manufacturing use	
		692.1(1)	Tanks, etc. for storage or manufacturing use of iron or steel	73.22
		692.1(2)	Tanks, etc. for storage or manufacturing use of copper	74.09
		692.1(3)	Tanks, etc. for storage or manufacturing use of aluminium	76.09
	692.2		Casks, drums, boxes, cans and similar commercial containers used for transport of goods	
		692.2(1)	Casks, drums, etc. used for transport of goods of iron or steel	73.23
		692.2(2)	Casks, drums, etc. used for transport of goods of aluminium	76.10
	692.3		Compressed gas cylinders	
		692.3(1)	Compressed gas cylinders of iron or steel	73.24
		692.3(2)	Compressed gas cylinders of aluminium	76.11
693			Wire products (excluding electric) and fencing grills	
	693.1		Wire cables, ropes, plaited bands, slings and similar articles, not insulated	
		693.1(1)	- of iron or steel	73.25
		693.1(2)	- of copper	74.10
		693.1(3)	- of aluminium	76.12
	693.2		Wire of iron or steel, of types used for fencing	73.26
	693.3		Gauze, netting, grill, fencing, etc. of wire	
		693.3(1)	- of iron or steel	73.27
		693.3(2)	- of copper	74.11
		693.3(3)	- of aluminium	76.13

Cont.

Group	Subgroup	Item		
	693.4		Expanded metal	
		693.4(1)	- of iron or steel	73.28
		693.4(2)	- of copper	74.12
		693.4(3)	- of aluminium	76.14
694			Nails, screws, nuts, bolts, rivets and similar articles of iron, steel or of copper	
	694.1		Nails, tacks, staples, spikes, etc.	
		694.1(1)	- of iron or steel	73.31
		694.1(2)	- of copper	74.14
	694.2		Nuts, bolts, screws, rivets, washers, etc.	
		694.2(1)	- of iron or steel	73.32
		694.2(2)	- of copper	74.15
695			Tools for use in the hand or in machines	
	695.1		Hand tools of a kind mainly used in agriculture and forestry	82.01
	695.2		Other tools for use in the hand or in machines	
		695.2(1)	Hand saws and saw blades	82.02
		695.2(2)	Pliers, pincers, spanners, wrenches, metal cutting shears, files, rasps, etc.	82.03
		695.2(3)	Hand tools, etc. n.e.s.	82.04
		695.2(4)	Interchangeable tools for hand or machine tools	82.05
		695.2(5)	Cutting blades for machines	82.06
		695.2(6)	Tool tips, etc., unmounted, of sintered metal carbides	82.07
696			Cutlery	
	696.0		Cutlery	
		696.0(1)	Knives	82.09
		696.0(2)	Knife blades	82.10
		696.0(3)	Razors and razor blades	82.11
		696.0(4)	Scissors and their blades	82.12
		696.0(5)	Other articles of cutlery (clippers, cleavers, etc.)	82.13
		696.0(6)	Spoons, forks and similar tableware	82.14
		696.0(7)	Handles for cutlery of base metal	82.15
697			Household equipment of base metals	
	697.1		Domestic stoves, boilers, cookers, ovens, space heaters, n.c.s.	
		697.1(1)	- of iron or steel	73.36
		697.1(2)	- of copper	74.17
	697.2		Domestic utensils of base metals	
		697.2(1)	- of iron or steel	73.38A
		697.2(2)	- of copper	74.18
		697.2(3)	- of aluminium	76.15
	697.9		Other household equipment of base metals	
		697.9(1)	Steel wool, pot scourers and polishing pads of iron or steel	73.39
		697.9(2)	Indoor ornaments of base metals, n.e.s.	83.06
		697.9(3)	Picture frames and mirrors of base metals	83.12

Cont. Group	Subgroup	Item		
698			Manufactures of metal, n.e.s.	
	698.1		Locksmiths' wares	
		698.1(1)	Locks, padlocks and keys therefor of basemetal	83.01
		698.1(2)	Base metal fittings and mountings of types largely used on furniture, doors, etc. (e.g. hinges, catches)	83.02
	698.2		Safes, strong-rooms, strong room fittings and strong boxes of base metal	83.03
	698.3		Chain and parts thereof of iron or steel	73.29
	698.4		Anchors, grapnels and parts thereof of iron or steel	73.30
	698.5		Pins and needles of iron or steel and base metal fittings of a kind commonly used for articles of apparel, travel goods,etc.	
		698.5(1)	Needles for hand sewing, knitting, netting, etc. of iron or steel	73.33
		698.5(2)	Pins, hairpins and curling grips of iron or steel	73.34
		698.5(3)	Clasps, hooks, eyes, buckles, etc. of base metal	83.09
	698.6		Springs and leaves for springs of iron, steel or copper	
		698.6(1)	- of iron or steel	73.35
		698.6(2)	- of copper	74.16
	698.8		Miscellaneous articles of base metal	
		698.8(1)	Chain and parts thereof of copper	74.13
		698.8(2)	Flexible tubing and piping of base metal	83.08
		698.8(3)	Beads and spangles of base metal	83.10
		698.8(4)	Bells (non-electric), of base metal	83.11
		698.8(5)	Stoppers, crown corks, bottle caps, etc. of base metal	83.13
		698.8(6)	Name plates, sign plates, etc. of base metal	83.14
		698.8(7)	Soldering and welding rods, etc. of base metal or of metal carbides	83.15
	698.9		Articles of base metals, n.e.s.	
		698.9(1)	Articles of iron or steel (excluding castings and forgings in the rough state), n.e.s.	73.40D
		698.9(2)	Articles of copper, n.e.s.	74.19
		698.9(3)	Articles of nickel, n.e.s.	75.06
		698.9(4)	Articles of aluminium, n.e.s.	76.16
		698.9(5)	Articles of magnesium, n.e.s.	77.03
		698.9(6)	Articles of lead, n.e.s.	78.06
		698.9(7)	Articles of zinc, n.e.s.	79,06
		698.9(8)	Articles of tin, n.e.s.	80,06

Cont.

SECTION 7. MACHINERY AND TRANSPORT EQUIPMENT

Group	Subgroup	Item		
			DIVISION 71. MACHINERY, OTHER THAN ELECTRIC	
711			Power generating machinery, other than electric	
	711.1		Steam generating boilers	84.01
	711.2		Boiler house plant (including economizers, superheaters, condensers, soot removers, gas recoverers and related items)	84.02
	711.3		Steam engines (including stationary steam engines with self-contained boilers (generally known as locomobiles) and steam turbines)	
		711.3(1)	Steam engines incorporating boilers	84.04
		711.3(2)	Steam engines not incorporating boilers	84.05
	711.4		Aircraft engines (including jet propulsion engines)	
		711.4(1)	Internal combustion engines for aircraft	84.06A
		711.4(2)	Jet and gas turbines for aircraft	84.08A
	711.5		Internal combustion engines, other than for aircraft	84.06B
	711.6		Gas turbines, other than for aircraft	84.08B
	711.7		Nuclear reactors	84.59A
	711.8		Engines, n.e.s. (wind engines, hot air engines, water wheels and water turbines)	
		711.8(1)	Water turbines and other water engines	84.07
		711.8(9)	Other engines, n.e.s.	84.08C
712			Agricultural machinery and implements	
	712.1		Agricultural machinery and appliances for preparing and cultivating the soil	84.24
	712.2		Agricultural machinery and appliances for harvesting, threshing and sorting	84.25
	712.3		Milking machines, cream separators and other dairy-farm equipment	
		712.3(1)	Cream separators	84.18A
		712.3(9)	Other dairy machinery	84.26
	712.5		Tractors, other than road tractors for tractor-trailer combination	87.01A
	712.9		Agricultural machinery and appliances, n.e.s.	
		712.9(1)	Presses for wine-making, etc.	84.27
		712.9(9)	Other agricultural machinery	84.28

Cont.

Group	Subgroup	Item		
714			Office machines	
	714.1		Typewriters and cheque-writing machines	84.51
	714.2		Calculating machines, accounting machines and similar machines incorporating a calculating device (including electronic computers)	84.52
	714.3		Statistical machines, e.g., calculating from punched cards or tape	84.53
	714.9		Office machines, n.e.s.	
		714.9(1)	Duplicating, adressing, etc. mach.	84.54
		714.9(2)	Parts of office machinery, n.e.s.	84.55
715			Metalworking machinery	
	715.1		Machine-tools for working metals	84.45
	715.2		Metalworking machinery, other than machine-tools	
		715.2(1)	Converters, ladles, ingot moulds and casting machines	84.43
		715.2(2)	Rolling mills and rolls therefor	84.44
		715.2(3)	Gas operated welding, cutting, etc. appliances	84.50
717			Textile and leather machinery	
	717.1		Textile machinery	
		717.1(1)	Spinning, extruding, etc. machines	84.36
		717.1(2)	Weaving, knitting, etc. machines	84.37
		717.1(3)	Machines auxiliary to those of heading 717.1(2)	84.38
		717.1(4)	Machinery for the manufacture of finishing of felt	84.39
		717.1(5)	Textile bleaching, washing, dressing, coating, printing, etc. machinery (excluding domestic washing machines)	84.40A
	717.2		Machinery (excluding sewing machines) for preparing, tanning or working hides, skins or leather	84.42
	717.3		Sewing machines	84.41
718			Machines for special industries	
	718.1		Paper mill and pulp mill machinery, paper cutting machinery and other machinery for the manufacture of paper articles	
		718.1(1)	Machinery for making or finishing cellulosic pulp, paper or paperboard	84.31
		718.1(2)	Paper cutting machines and other machinery for the manufacture of articles of paper pulp, paper or paperboard	84.33
		718.2(1)	Bookbinding machinery	84.32
		718.2(2)	Type making and setting machinery etc.	84.34
		718.2(9)	Other printing machinery, n.e.s.	84.35

Cont.

Group	Subgroup	Item		
	718.3		Food-processing machines (excluding domestic)	
		718.3(1)	Machinery for milling grain, etc.	84.29
		718.3(9)	Other food-processing machines (excluding domestic)	84.30
	718.4		Construction and mining machinery, n.e.s.	
		718.4(1)	Road rollers, mechanically propelled	84.09
		718.4(2)	Excavating, levelling, boring, etc. machinery	84.23
	718.5		Mineral crushing, sorting and moulding machinery; glassworking machinery	
		718.5(1)	Mineral crushing, sorting, etc. machinery	84.56
		718.5(2)	Glass-working machinery	84.57
719			Machinery and appliances (other than electrical) and machine parts, n.e.s.	
	719.1		Heating and cooling equipment	
		719.1(1)	Gas generators	84.03
		719.1(2)	Air-conditioning machines	84.12
		719.1(3)	Furnace burners, mechanical stokers, etc.	84.13
		719.1(4)	Industrial and laboratory furnaces and ovens, non-electric	84.14
		719.1(5)	Refrigerators (other than domestic) and other refrigerating equipment, whether or not electrical	84.15A
		719.1(9)	Other apparatus for treating materials with heat or cold (excluding domestic equipment)	84.17A
	719.2		Pumps and centrifuges	
		719.2(1)	Pumps for liquids	84.10
		719.2(2)	Pumps for gases, etc.	84.11
		719.2(3)	Centrifuges (other than cream separators) and filtering and purifying machinery for liquids and gases	84.18B
	719.3		Mechanical handling equipment	
		719.3(1)	Lifting and loading machinery	84.22
		719.3(2)	Fork lift trucks and other industrial trucks of a kind used for moving goods within a plant	
	719.4		Domestic appliances, non-electrical	
		719.4(1)	Domestic food-processing appliances, non-electrical	82.08
		719.4(2)	Domestic refrigerators, non-electrical	84.15B
		719.4(3)	Domestic water heaters, non-electrical	84.17B

Cont.

Group	Subgroup	Item		
	719.5		Powered-tools, n.e.s.	
		719.5(1)	Machine-tools for working minerals	84.46
		719.5(2)	Machine-tools for working wood, plastics, etc.	84.47
		719.5(3)	Motorised hand-tools, non-electrical	84.49
		719.5(4)	Parts and accessories of machine-tools	84.48
	719.6		Other non-electrical machines	
		719.6(1)	Calendering machines and similar rolling machines, n.e.s. and cylinders therefor	84.16
		719.6(2)	Machines for cleaning or filling bottles or other containers, packaging machinery, etc.	84.19
		719.6(3)	Weighing machinery and weights therefor	84.20
		719.6(4)	Spraying machinery	84.21
		719.6(5)	Automatic vending machines	84.58
		719.6(6)	Railway and tramway track fixtures and fittings, etc.	86.10
	719.7		Ball, roller or needle-roller bearings	84.62
	719.8		Machinery and mechanical appliances, n.e.s.	84.59B
	719.9		Parts and accessories of machinery, n.e.s.	
		719.9(1)	Moulding boxes for metal foundry and moulds, other than ingot moulds	84.60
		719.9(2)	Taps, cocks, valves and similar appliances, n.e.s.	84.61
		719.9(3)	Transmission shafts and cranks, pulleys, etc.	84.63
		719.9(4)	Metal-plastic joints (gaskets)	84.64
		719.9(9)	Machinery parts, non-electrical, n.e.s.	84.65

DIVISION 72. ELECTRICAL MACHINERY, APPARATUS AND APPLIANCES

722			Electric power machinery and switchgear	
	722.1		Electric power machinery	85.01
	722.2		Electrical apparatus for making and breaking or for protecting electrical circuits (switchgear etc.)	85.19
723			Equipment for distributing electricity	
	723.1		Insulated wire and cable	85.23
	723.2		Electrical insulating equipment	

Cont.

Group	Subgroup	Item		
		723.2(1)	Electrical insulators	85.25
		723.2(2)	Other insulating fittings for electrical equipment	85.26
		723.2(3)	Electrical conduit tubing and joints therefor, of base metal lined with insulating material	85.27
724			Telecommunications apparatus	
	724.1		Television broadcast receivers, whether or not combined with gramophone or radio	85.15A
	724.2		Radio broadcast receivers, whether or not combined with gramophone	85.15B
	724.9		Telecommunications equipment,n.e.s.	
		724.9(1)	Electrical line telephone and telegraph equipment	85.13
		724.9(2)	Microphones loudspeakers and amplifiers	85.14
		724.9(9)	Other telecommunications equipment	85.15C
725			Domestic electrical equipment	
	725.0		Domestic electrical equipment	
		725.0(1)	Domestic refrigerators, electrical	85.15C
		725.0(2)	Domestic washing machines, whether or not electrical	84.40B
		725.0(3)	Electro-mechanical domestic appliances, n.e.s.	85.06
		725.0(4)	Electric shavers and hair clippers	85.07
		725.0(5)	Electric space heating equipment, etc.	85.12
726			Electric apparatus for medical purposes and radiological apparatus	
	726.1		Electro-medical apparatus	90.17A
	726.2		X-ray apparatus	90.20
729			Other electrical machinery and apparatus	
	729.1		Batteries and accumulators	
		729.1(1)	Primary batteries and cells	85.03
		729.1(2)	Electric accumulators (storage batteries)	85.04
	729.2		Electric lamps	85.20
	729.3		Thermionic, etc. valves and tubes, photocells, transistors, etc.	85.21
	729.4		Automotive electrical equipment	
		729.4(1)	Electrical starting and ignition equipment for internal combustion engines	85.08
		729.4(2)	Electrical lighting, etc.equipment for vehicles	85.09
	729.5		Electrical measuring and controlling instruments and apparatus	
		729.5(1)	Electricity supply meters	90.26A
		729.5(2)	Other electrical measuring and controlling instruments and apparatus	90.28

Cont.

Group	Subgroup	Item		
	729.6		Electro-mechanical hand tools	85.05
	729.7		Electron and proton accelerators	85.22A
	729.9	729.7	Electrical machinery and apparatus, n.e.s.	
		729.9(1)	Electro-magnets, permanent magnets and electromagnetic appliances	85.02
		729.9(2)	Electric furnaces, electric welding and cutting apparatus	85.11
		729.9(3)	Electric traffic control equipment	85.16
		729.9(4)	Electric sound or visual signalling apparatus, n.e.s.	85.17
		729.9(5)	Electrical condensers (capacitors)	85.18
		729.9(6)	Electrical carbons	85.24
		729.9(8)	Electrical parts of machinery and appliances, n.e.s.	85.28
		729.9(9)	Other electrical goods and apparatus, n.e.s.	85.22B
			DIVISION 73. TRANSPORT EQUIPMENT	
731			Railway vehicles	
	731.1		Railway locomotives, steam, and tenders therefor	86.01
	731.2		Railway locomotives, electric, other than self-generating	86.02
	731.3		Railway locomotives, other than steam or electric	86.03
	731.4		Mechanically-propelled railway and tramway cars, passenger, freight or maintenance	86.04
	731.5		Railway and tramway passenger cars (coaches) not mechanically propelled (including special purpose coaches for passenger service such as luggage vans, travelling post offices, etc.)	86.05
	731.6		Railway and tramway freight and maintenance cars, not mechanically propelled	
		731.6(1)	Railway and tramway service vehicles	86.06
		731.6(2)	Railway and tramway goods wagons (freight cars)	86.07
		731.6(3)	Road-rail and similar containers	86.08
	731.7		Parts of railway locomotives and rolling-stock, n.e.s.	86.09
732			Road motor vehicles	
	732.1		Passenger motor cars (other than buses or special vehicles), whether or not assembled	

Cont.

Group	Subgroup	Item		
	732.2		Buses (including trolleybuses), whether or not assembled	87.02B
	732.3		Lorries and trucks (including ambulances, etc.), whether or not assembled	87.02C
	732.4		Special purpose lorries, trucks and vans, whether or not assembled	87.03
	732.5		Road tractors for tractor-trailer combinations	87.01B
	732.6		Chassis with engines mounted of a kind used for vehicles of heading 732.1	87.04A
	732.7		Other chassis with engines mounted	87.04B
	732.8		Bodies, chassis, frames and other parts of motor vehicles other than motorcycles (not including rubber tyres, engines, chassis with engines mounted, electrical parts)	
		732.8(1)	Bodies for motor vehicles other than for motorcycles	87.05
		732.8(9)	Other parts for motor vehicles other than for motorcycles	87.06
	732.9		Motorcycles, motorized cycles and their parts	
		732.9(1)	Motorcycles, auto-cycles, etc. and side-cars	87.09
		732.9(2)	Parts solely for use of vehicles of heading 732.9(1)	87.12A
733			Road vehicles other than motor vehicles	
	733.1		bicycles and other cycles, not motorized, and their parts	
		733.1(1)	Cycles, not motorized	87.10
		733.1(2)	Parts of vehicles of headings 733.1(1) and 733.4	87.12B
	733.3		Trailers and other vehicles, not motorized, and their parts	87.14
	733.4		Invalid carriages, fitted with means of mechanical propulsion	87.11
734			Aircraft	
	734.1		Aircraft, heavier-than air	88.02
	734.9		Airships, balloons and parts of aircraft, airships and balloons (not including rubber tyres, engines or electrical parts)	
		734.9(1)	Airships and balloons	88.01
		734.9(2)	Parts of aircraft, airships and balloons (not including rubber tyres, engines or electrical parts)	88.03

Cont.

Group	Subgroup	Item		
735			Ships and boats	
	735.1		Warships of all kinds	89.01A
	735.3		Ships and boats, other than warships	89.01B
	735.8		Ships, boats and other vessels for breaking up	89.04
	735.9		Ships and boats, n.e.s.	
		735.9(1)	Tugs	89.02
		735.9(2)	Special purpose vessels (e.g., light-vessels, dredgers, etc.)	89.03
		735.9(3)	Floating structures, other than vessels (e.g. coffer-dams, buoys, landing stages, etc.)	89.05

Table I/3

The Position of Engineering Goods in the Industries[a] of Selected Countries, 1950 and 1960, in percentages

Country	Share of mechanical and electrical engineering goods in:		Share of engineering goods[b] in:			
	Industrial employment[a]		Industrial employment[a]		Industrial output[a]	
	1950	1960	1950	1960	1950	1960
Austria	12.0 (c)	13.7	17.9 (c)	19.9		16.8
Belgium	6.9	9.1	12.0	13.8	26.6	27.7
Bulgaria			14.9	16.9	9.3	16.8
Canada					27.0	24.8
Czechoslovakia			24.8	32.4	20.8	33.7
Denmark	17.6	22.8	28.2	33.8	28.8	36.8
Finland	11.9	12.4	22.2	25.8	23.8	25.8
France	11.5	14.1	22.5	26.4	31.9	37.9
Eastern Germany			33.3	36.4	25.7	33.1
Hungary			28.5	28.3	19.5	24.2
Italy	14.5	17.5	25.0	29.0	23.0	24.3
Japan					22.1	42.8
Netherlands	12.1	14.6	20.2	22.8	24.6	33.2
Norway	6.5	8.7	20.3	24.3	19.4	22.6
Poland			17.8	24.9	9.2	22.3
Rumania			20.5	22.2 (d)	13.3	24.0
Sweden	24.3	27.9 (d)	34.0	38.9 (d)	33.9	32.9
USSR			28.7	30.4 (d)	15.3	21.9
United Kingdom	16.7	19.5 (d)	30.1	35.1 (d)	37.3	40.5
United States	14.5	18.0	30.7	36.7	30.2	34.2
Western Germany	14.0	21.0	22.0	30.5	30.0	38.6
Yugoslavia			18.7	23.4	14.8	23.4
Argentina					12.0 (e)	
Brazil					6.0 (f)	
Burma					2.0 (e)	
Chile					5.0 (g)	
Colombia					2.0 (e)	
Ecuador					1.0 (h)	
India					8.0 (c)	
Iraq					3.0 (e)	
Israel					8.0 (i)	
Lebanon					1.0 (h)	
Mexico					11.0 (e)	
Pakistan					3.0 (j)	
Peru					1.0 (k)	
Philippines					4.0 (h)	
Rhodesia and Nyasaland					2.0	
United Arab Republic					6.0 (j)	
Venezuela					1.0 (e)	

Sources: National statistics; World Economic Survey, 1961, Part I, Industrialization and Economic Development; United Nations Publications, Sales No. 62. II. C. 1 (in particular tables 1 - 11, 2 - 3, 3 - 13 and 3 - 14);
Yearbook of Labour statistics, 1957 and 1961, ILO, Geneva; The Engineering Industries, 1961, OECD, Paris.

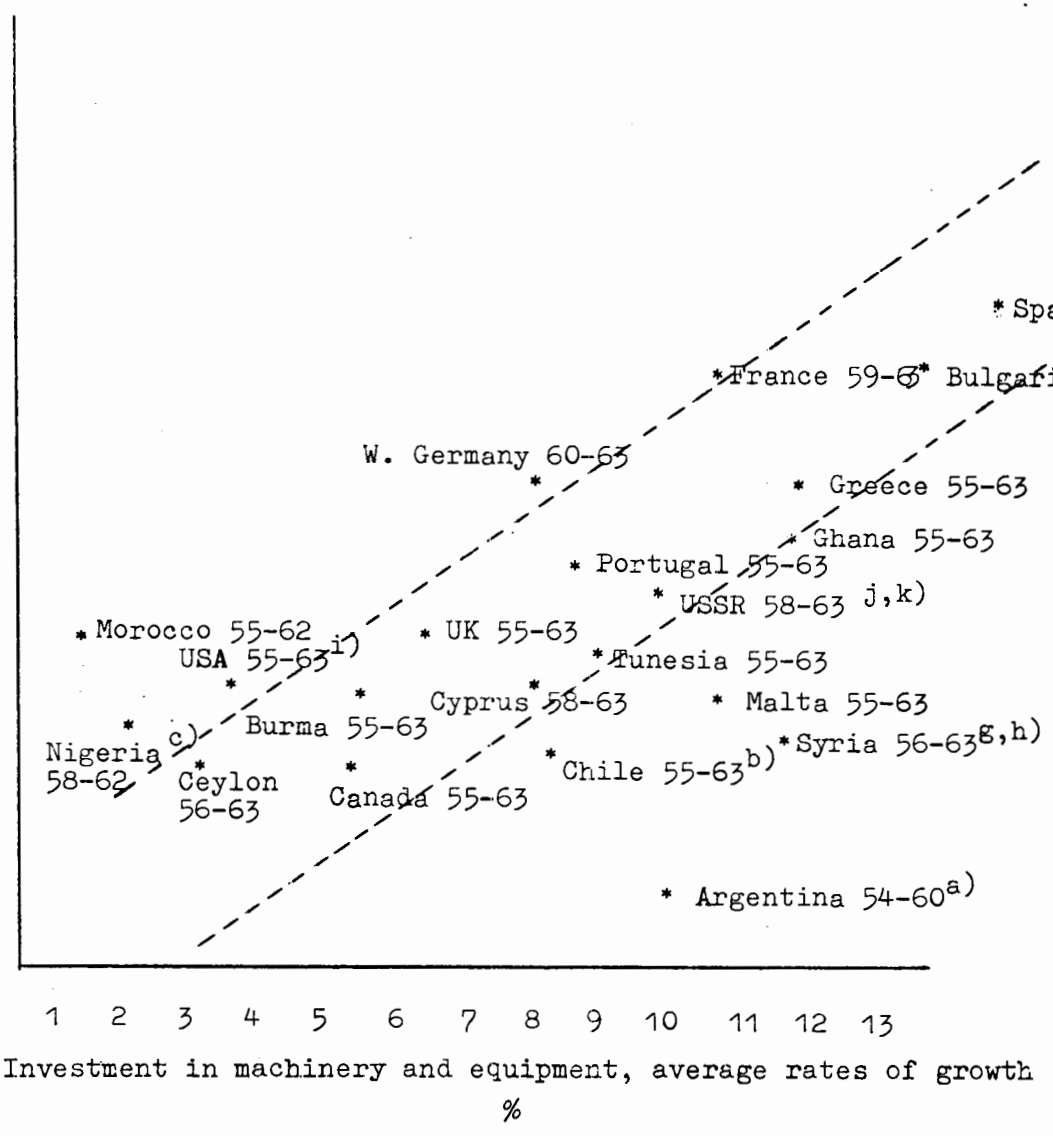
Note: The statistical definitions vary somewhat from country to country. This applies in particular to the calculation of industrial output in Eastern European countries and in Western European countries. However, since percentages are given, the data in this table provide a useful indication of the proportions involved.

(a) Excluding mining and construction

(b) Engineering goods represent in terms of the International Standard Industrial Classification (ISIC) Major Groups 35 to 38, i. e. in addition to mechanical and electrical engineering goods they include transport equipment and certain products of the metal-transforming industries.

(c) 1951
(d) 1959
(e) 1953
(f) 1949
(g) 1957
(h) 1955
(i) Average 1951/1952
(j) 1954
(k) 1956

Correlation Between the Rates of Growth of National Product and of Investment in Machinery and Equipment



Source: Document ST/ECE/ENG/6 p. 13/248/249 from: Yearbook of National Accounts Statistics
Notes: a) in 1950 prices b) 1961, prices, c) in 1957 prices, d) in 1955 prices, e) 1955 to 1960, f) from: La Contabilidad de España, Madrid 1964, g) in 1965 prices, h) changes in national income, i) excluding public investment, j) in constant prices, k) public investment and investment by co-operative bodies only. All other figures in current prices.

Table I/5

Use of Engineering Products in Selected Countries
(in percentages; total production = 100%)

Country	Engineering production used for:			
	Productive consumption	Fixed capital formation	Non-Productive consumption	Miscellaneous uses
France (1959)	22,0	38,8	23,4	15,8
Italy (1959)	20,7	44,7	15,3	19,3
Western Germany (1960)	22,1	34,0	14,2	29,7
Yugoslavia (1962) a)	35,4	33,9	12,3	18,4
Malta (1963)	31,8	44,5	-	23,7

Sources: For France, Italy and Western Germany - Tableaux Entrées-Sorties pour les pays de la Communauté économique européenne (second version), Brussels, 1965.
For Yugoslavia - Inter-industry Relations of the Yugoslav Economy in 1962, Belgrade, 1966
For Malta - National Accounts of the Maltese Islands, Valetta, 1964

a) Engineering and metal transforming industries.

Table I/6

Distribution Pattern for Selected Engineering Products

Producing branches \ Use in	pro-duction	con-sumption	formation of fixed capital	ex-port	mis-cell-aneous
United States (1958)					
Engines and turbines	31.5	16.6	26.1	9.6	11.2
Agicultural machinery	17.2	1.2	65.1	7.3	9.2
Mining and petroleum industry equipment	22.2	3.3	42.8	23.0	8.7
Handling equipment	34.5	16.9	32.1	7.0	9.5
Metal-working machinery	48.4	5.6	31.5	9.0	5.5
Special machinery and equipment	17.1	3.2	57.8	14.6	7.3
General engineering	51.2	5.4	28.0	7.3	8.1
Office and calculating machines	14.2	9.8	45.0	6.0	25.0
Machinery and equipment for the service branch	13.4	14.8	42.4	6.0	23.4
Industrial electrical equipment	48.5	3.9	31.3	5.4	10.3
Electrical household appliances	12.5	67.8	2.6	4.5	12.6
Electrical machinery and cables	70.9	14.8	1.1	2.8	10.4
Radio and television receivers and tele-communications equipment	19.5	46.6	16.7	3.3	13.9
Electronic industry	71.0	14.4	1.0	3.4	10.2
Miscellaneous electrical equipment	54.1	24.6	5.4	4.6	11.3
Motor vehicle industry	35.8	42.4	15.2	3.9	2.7
Aircraft industry	25.1	51.1	2.8	4.4	16.5
Miscellaneous transport equipment	18.0	37.5	31.2	7.9	5.4

Source: Document ST/ECE/ENG/6 p. 247 Note: In the case of the US, the ECE secretariat obtained the figures under 'production' by taking the difference between the gross production of the various branches and the total final demand. The figures in the 'miscell.' column include changes in stock and, in the case of the US, transfers to other branches as well.

Table I/7

Share of Electrical and Non-Electrical Machinery in Total Production of Both, in Selected Countries, 1958

(percentages)

Country	Machinery other than electric (SITC div. 71)	Electrical machinery (SITC div. 72)
France	60	40
Italy	60	40
Schweden	73	27
UK	62	38
W. Germany	58	42
Australia	55	45
New Zealand	70	30
South Africa	52	48
Brazil	37	63
Argentina	38	62
India	44	56

Source: Document ST/ECE/ENG/1. tables 10 and 15, condensed

Table I/8

Share of the Cost of Raw Materials and of Labour and Expenditure Proportional to Labour, in a Number of Engineering Electrical Industries

Sector	Share of raw materials	Share of labour and related costs
Machine-tools and machinery:		
- simple machines	60 - 40	30 - 40
- complicated machines	25	65
Motor-car and heavy-vehicle bodies	40	50
Office machines	25 - 15	65 - 75
Bearings	25	65
Sewing machines	25	65
Household refrigerators	35	55
Pumps and compressors	30	60
Cable-making equipment	40	50
Railway wagons	55	35
Textile equipment	30	60
Electric turning lathes	45	45
Railway safety equipment	20	70
Radio-electric instruments and supplies	30	60

Source: Document, ST/ECE/ENG/6, p. 37

Table I/9

Western Germany: Cost Structure of the Engineering Industry

Enterprises grouped by value of output in millions of DM / Cost structure	0.05 to 1	1 to 2	2 to 5	5 to 10	10 to 25	25 to 50	50 and over
Raw materials	35.3	37.5	39.9	41.4	41.5	41.8	49.4
Energy	1.9	1.9	1.8	1.7	1.7	1.8	1.9
Wages and social security charges	32.9	33.1	31.4	29.7	28.9	30.8	26.3
General expenditure, financial charges and miscellaneous	15.3	14.0	14.1	13.8	13.9	12.9	10.9

Source: Document ST/ECE/ENG/6 p. 38

Table I/10

Sectors and Products of the Engineering Industry, Grouped According to their Rates of Energy and Electricity Consumption per Ton of Finished Products (in kWh)

Sectors / Indices of consumption per ton of finished products	Metal transforming			Manufacture of agricultural machinery			Manufact of machine tool	Manufacture of heavy machines			Manufacture of tools and apparatus		
	Repair work (excluding major repairs)	Manufacture of welded goods	Manufacture of heating equipment	Combine-harvester factory	Factory produc. standard motors for tractors and combine harvesters	Factory prod. forged parts and units for motor cars, tractors and motors	Factory prod. milling machines	Factory prod. equipm. for cement works	Factory produc. road graders	Factory produc. equipm. for the metallurgical industry, heavy cranes, etc.	Tool factory produc. dies	Factory produc. dry straighteners	Diamond tool factory
Electricity consumption													
Minimal (less than 400 kWh)	up to 180	up to 250	306	290	-	-	-	-	-	-	-	-	-
Low (400-800 kWh)	-	-	-	-	402	780	-	-	-	-	-	-	-
Medium (800-1500 kWh)	-	-	-	-	-	-	860	930	1360	-	-	-	-
High (1500-4500 kWh)	-	-	-	-	-	-	-	-	-	1832	-	-	-
Exceptionally high (over 4500 kWh)	-	-	-	-	-	-	-	-	-	-	5602	89341	62700
Energy consumption													
Minimal (less than 6500 kWh)	from 2300	from 6400	-	-	-	-	-	-	-	-	-	-	-
Low (6500-9000 kWh)	to 7600	-	6850	-	-	-	-	8637	8243	-	-	-	-
Medium (9000-20000 kWh)	-	-	-	13540	-	12154	10820	-	-	13454	-	-	-
High (20000-50000 kWh)	-	-	-	-	22534	-	-	-	-	-	44342	-	-
Exceptionally high (over 50000 kWh)	-	-	-	-	-	-	-	-	-	-	-	124702	84251

Source: Document ST/ECE/EWG/6 page 91

Table I/11

Principal Raw Materials in Engineering Industries

	Percentages
Miscellaneous steel semis (rounds, wire etc.)	8.8
Hot or cold-rolled bars	19.1
Hot or cold-rolled strip	2.3
Steel plates	17.5
Rolled or drawn sheets	4.3
Steel tubes	4.5
Pig-iron	27.2
Cast steel	7.3
Forged pieces	7.0
Miscellaneous pieces	2.0
	100.0

Source: Document ST/ECE/ENG/6 p. 39

Table I/12

Tons of Basic and Auxiliary Material Consumed per Ton of Finished Product in the Engineering Industry

Nature of products consumed	Manufacture of machine-tools	Manufacture of tools	Manufacture of motor cars	Manufacture of tractors	Manufacture of road construction machinery	Construction machinery industry	Manufacture of mining equipment	Manufacture of agricultural machinery
Raw materials, basic materials and semi-finished products	1.35-1.7	1.6-2.5	1.2-1.6	1.4-1.6	1.3-1.6	1.3-1.	1.4-1.9	1.14-1.5
Auxiliary materials	0.5-1.5	0.6-1.84	0.5-0.9	0.19-0.4	0.4-1.4	0.5-0.73	0.6-1.1	0.04-0.5
Wood	0.13-0.27	0.25-0.7	0.18-0.27	0.01-0.09	0.08-0.09	0.13-0.25	0.12-0.2	0.15-0.5
Fuel	1.8-3.9	2.3-7.4	1.3-3.6	1.7-3.5	0.8-1.2	1.1-1.9	1.4-2.9	0.45-0.53
Total	3.78-7.37	4.75-12.44	3.18-6.37	3.18-5.59	2.58-4.29	3.03-4.23	3.52-6.10	1.78-3.03

Source: Document ST/ECE/ENG/6 p. 88

Table I/13

Efficiency of Capital in the Manufacturing Industries of Selected Developing Countries ("product/capital" ratios)

ISIC Headings	Manufacturing branch \ Country	Argentina (1955)	Columbia (1958)	Chile (1957)	Ecuador (1961)	Peru (1960)	Venezuela (1961)	Pakistan (1959/60)	Philippines (1960)	India (1962)
20	Food manufacturing industries	0.78	0.37	3.12	0.23	1.56	0.58	0.36	1.56	2.35
23	Manufacture of textiles	0.40	0.22	1.12	0.28	1.81	0.91	0.51	0.54	2.16
24	Manufacture of wearing apparel	1.44	0.43	2.66	0.39	4.09	3.22	0.98	1.63	..
25	Manufacture of wood	0.61	0.37	1.55	0.67	2.61	1.29	..	0.77	..
27	Manufacture of paper and cardboard	0.68	0.30	0.93	0.39	3.13	0.90	..	0.66	0.89
31	Manufacture of chemicals and chemical products	0.53	0.65	1.67	0.82	1.43	0.67	0.52	1.65	1.14
33	Manufacture of non-metallic mineral products	0.64	0.30	0.73	0.25	0.81	0.74	..	0.70	..
34	Basic metal industries	)	0.07	0.49	)	1.35	0.03	0.34	0.77	0.57
35	Metal transforming industries	)	)	1.35	)	3.07	1.38	..	0.85	)
36	Manufacture of machinery, except electrical machinery	)0.70	)0.35	1.54	)0.35	1.93	2.52	)	1.54	)1.32
37	Manufacture of electrical machinery, apparatus, appliances, and supplies	)	)	1.61	)	2.80	0.87	)0.37	1.54	)
38	Manufacture of transport equipm.	)	)	1.76	)	2.78	1.88	)	1.02	)
2 a.3	Total manufacturing industries	0.68	0.35	1.39	0.32	1.69	0.63	0.48	1.26	1.29

Sources and notes: The data for Argentina, Columbia, Chile, Ecuador, Peru and Venezuela are from document ST/ECLA/Conf.23/L.2/Add.2-E/CN.12/716/Add.2. The data concerning Pakistan are from the Pakistan Statistical Yearbook 1962, Karachi, 1962; those concerning the Philippines, from the Annual Survey of Manufactures 1960, Vol. V, Manila, 1962; those concerning India from the report of the Export Working Group on Engineering Industries, ECAFE, 1965. The "product/capital" ratio means: in the case of Argentina, Columbia, and Ecuador, the "gross production/fixed capital" ratio; in the case of Chile, the "gross production/total capital" ratio (excluding land); in the case of Peru and India the "gross production/total capital" ratio; in the case of Venezuela and the Philippines, the "value added/fixed capital" ratio; in the case of Pakistan, the "value added/total capital" ratio.

Table I/14

Chile: Actual Value of the "Product/Capital" Ratio in the Branches of Industry and its Theoretical Value assuming Full Utilization of Capacity, 1957

ISIC code	Branches of manufacturing industry	Actual value of the 'prod./ capital' ratio	Hypothetical value assuming full utilization of capacity	
			Full utilization accord. to entrepreneurs' estimate	Calculated maximum theoretical capacity
20	Food	5.27	8.37	10.76
21	Beverages	4.12	6.20	6.33
22	Tobacco	10.68	10.75	31.40
23	Textiles	2.03	3.10	4.40
24	Wearing apparel and footwear	7.03	12.53	20.14
25	Wood and cork	3.77	7.94	14.68
26	Furniture	3.75	6.57	8.25
27	Paper	1.18	1.43	1.48
28	Printing	3.37	5.40	7.40
29	Leather	4.10	5.37	9.67
30	Rubber	3.53	5.51	6.67
31	Chemicals	3.41	6.97	9.58
32	Petroleum and coal products	1.61	1.74	2.02
33	Non-metallic mineral products	0.91	1.51	1.68
34	Basic metal industry	0.64	0.95	1.11
35	Manufacture of metal products	2.20	3.96	7.33
36,37,38	Engineering Industry of which:	3.06	5.22	8.95
36	Manufacture of machinery, except electrical machinery	2.79	4.56	7.02
37	Manufacture of electrical machinery, apparatus, appliances and supplies	3.98	7.08	15.02
38	Manufacture of transport equipment	2.81	4.86	8.35
2 and 3	Manufacturing	2.18	3.37	4.78

Source: ECE secretariat from: "The Process of Industrialization in Latin America, Statistical Annex" (document ST/ECLA/Conf.23 12/Add.-E/CN.12/716/Add.2)

Table I/15

France: Change Between 1954 and 1962 in the Numbers of Establishments in the Various Size Classes of a Classifcation by Numbers Employed, and in the Numbers of Employees in Each Size Class (percentages)

Sectors	SITC, Revised Code	Percentage Change	Employment brackets							
			Total	0 to 10	11 to 20	21 to 50	51 to 100	101 to 200	201 to 500	500 or more
Heating and cooling equipment	719.1 except 719.15	a	+ 70	+ 74	+ 94	+100	+ 55	+200	+ 78	+ 50
		b	+102	+ 55	+ 97	+104	+100	+230	+ 95	+ 69
Refrigerators	719.15 725.01	a	- 2	- 1	+ 11	+ 29	+ 23	+ 22	+ 50	+ 50
		b	+ 32	- 15	+ 4	+ 42	+ 27	+ 43	+ 53	+ 53
Mechanical handling equipment	719.3	a	+ 57	+ 78	+ 29	+ 60	+ 78	+137	+ 63	0
		b	+ 77	+ 81	+ 41	+ 85	+ 93	+108	+ 80	+ 93
Agricultural machinery	712.1; 712.2; 712.5; 712.9;	a	- 5	- 5	- 19	0	+ 40	+ 7	+ 47	- 10
		b	+ 26	+ 2	- 14	+ 12	+ 27	+ 17	+ 48	+ 40
Food-processing machines	718.3	a	+ 79	+103	+118	+126	+ 58	+ 31	+ 86	- 50
		b	+ 61	+ 81	+133	+144	+101	+ 31	+ 64	- 53
Sewing machines and mach.f.footwear ind.	717.3	a	- 38	- 43	- 40	- 12	+100	0	0	0
		b	- 8	- 75	- 50	- 9	+247	- 56	- 18	+ 28
Textile industry	717.1	a	- 4	- 5	- 15	+ 7	+ 50	+ 56	0	- 20
		b	+ 20	- 8	- 10	+ 5	+ 32	+ 55	0	+ 29
Machinery for the paper industry	718.1; 718.2;	a	+ 22	+ 12	+ 33	+ 33	+145	+ 28	+ 25	+100
		b	+ 66	+ 18	+ 60	+ 49	+135	+ 65	+ 23	+103
General engineering		a	+ 39	+ 45	+ 25	+ 7	+ 80	+ 25	+ 28	0
		b	- 7	- 11	+ 6	+ 2	+ 29	- 12	+ 2	- 78
Precision engineering		a	- 8	- 10	+ 8	+ 30	+ 26	+ 14	- 23	
		b	+ 20	- 6	+ 13	+ 45	+ 42	- 3	+ 18	
Electrical apparatus	722.2	a	+122	+120	+170	+185	+160	+270	+100	0
		b	+ 75	+ 29	+ 72	+ 84	+150	+130	+ 52	+ 70
Batteries and accumulators	729.1	a	- 35	- 35	- 65	- 20	- 11	+ 60	- 25	+100
		b	+ 34	- 47	- 56	- 14	- 26	+ 94	- 26	+150

Note: (a) Number of establishments
(b) Number of wage-earners

Table I/16

Western Germany: Size-distribution of Machine-building enterprises (1962)

(Numbers and Percentages)

Number of Wage-earners	Enterprises		Wage-earners		Turnover	
	Number	Percentage	Number	Percentage	Value (in 1000 DM)	Percentage
10 - 19	708	14.7	10162	1.0	256,110	0.8
20 - 49	1264	26.2	40720	3.8	1,033,863	3.3
50 - 99	1015	21.0	72177	6.8	1,940,296	6.1
100 - 199	770	15.9	107205	10.1	2,937,732	9.3
200 - 299	323	6.7	79968	7.5	2,254,388	7.1
300 - 499	329	6.8	128031	12.1	3,718,354	11.7
500 - 999	227	4.7	154009	14.5	5,077,999	16.0
1000 - 4999	180	3.7	344118	32.4	10,588,470	33.5
5000 or more	14	0.3	125687	11.8	3,856,453	12.2
	4830	100.0	1062077	100.0	31,663,665	100.0

Table I/17

France: Screw-cutting Industry - Ratios and Economic-indicator Values per Person Employed, according to Size of Enterprise (1964)

Ratios and Economic-indicator values / Enterprises according to size (in numbers employed)	Ratio: Value added to Gross fixed capital formation	Ratio: Turnover to stocks	Turnover per person employed (francs)	Value added per person employed (francs)	Gross investment per person employed (francs)	Net investment per person employed (francs)
0 to 5	0.807	0.043	48 010	27 357	28 224	5 880
6 to 10	0.794	0.131	45 055	20 925	6 512	2 325
11 to 20	0.656	0.115	44 321	18 578	6 376	2 980
21 to 30	0.731	0.095	33 865	15 758	5 191	2 373
31 to 40	0.525	0.096	37 731	16 626	6 239	2 586
41 to 60	0.647	0.087	49 877	19 712	5 823	2 558
61 to 95	0.642	0.057	34 350	17 878	3 442	2 773
95 or more	0.578	0.062	32 215	17 656	4 704	2 376

Table I/18

Yugoslavia: Employment Pattern According to Level of Vocational Training (total labour force in each branch = 100 per cent)

Branch of Industry	Universities and higher education establishments	Secondary education establishments	Primary schools	Highly skilled workers	Skilled workers	Semi-skilled workers	Auxiliary personnel and unskilled workers
Manufacturing and mining industries	1.8	5.6	6.8	6.4	28.7	19.2	31.5
Electric power	2.0	14.7	13.3	13.6	32.1	13.1	11.2
Iron and steel	1.7	5.6	5.0	8.1	32.7	17.1	29.8
Metal-transforming and mechanical engineering industries	2.8	7.7	8.0	7.7	30.8	14.1	28.9
Chemical industry	4.8	10.5	6.9	6.3	23.7	19.7	28.1
Textile industry	0.6	3.4	4.6	3.6	24.9	28.1	34.8
Food industries	1.8	5.6	8.2	6.2	22.8	14.4	41.0

Source: SFRY Statistical Yearbook, Belgrade, 1965

Table I/19

USSR: Number of Specialists with Higher or Intermediate Level Vocational Training Employed in Industry as Production Personnel According to Branches (per 1000 Workers)

Branch of industry	Specialists (1964)		
	Higher training	Intermediate level training	Total
Total number of specialists employed as production personnel in industry as a whole,	28	70	98
of which:			
in the coal industry	22	72	94
in the steel industry	37	80	117
in the engineering and metal-processing industries	40	92	132
in light industry	9	38	47
in the food industries	23	59	82

Source: ECE secretariat from: Narodnoie khozialistvo SSSR 1964 (Godou, Moscow, 1965)

Table I/20

Distribution by Broad Skill Levels of Salary and Wage Earners in the Metal Trades, 1957 and 1962 (Belgium) (in percentages)

	1957	1962
University trained	1.7	2.0
Technicians	5.0	7.3
Other salary earners	12.3	12.0
Skilled workers	25.2	25.6
Semi-skilled workers	31.6	28.3
Unskilled workers	24.2	24.8
	100.0	100.0

Source: Evolution de la structure de l'emploi dans d'echantillon comparable du secteur des fabrications métalliques (Résultats de 1962) by C. d'Hoogh, Bruxelles, Centre d'étude des problèmes sociaux et professionnels de la technique, 1962,

Table I/21

Purchases from the Engineering Sector by Industrial Sectors

($ per '000 $ of output of purchasing sector)

	Assuming 1 % annual growth in per capita income					Assuming 4 % annual growth in per capita income				
	Value of purchases from eng. sector					Value of purchases from eng. sector				
	Current account	Capital account			Total	Current account	Capital account			Total
		total	for expansion	for replacement			total	for expansion	for replacement	
1. Engineering industries	167	30	14	25	206	167	53	23	25	220
2. Basic metals	6	58	22	36	64	6	88	44	36	86
3. Paper and products	1	42	14	28	43	1	59	31	28	60
4. Printing and publishing	3	38	12	26	41	3	51	25	26	54
5. Chemicals, petroleum and coal products	0	41	14	27	41	0	53	26	27	53
6. Textiles	2	35	11	24	37	2	44	20	24	46
7. Wood products	2	32	9	23	34	2	43	20	23	45
8. Rubber products	0	33	11	22	33	0	43	21	22	43
9. Food, beverages and tobacco	0	15	4	11	15	0	18	7	11	18
10. Clothing and footwear	1	12	3	9	13	1	16	7	11	18
11. Leather products	1	11	3	8	12	1	13	5	8	14

Assumptions made: population growth 2.5 % p. a. 10-year life period of equipment

Source: UNIDO Monographs on Industrial Development, No. 4, p. 17

Table I/22

Purchases by the Engineering Sector on Current Account from other Industrial Sectors
($ per '000 $ of output of engineering sector)

Supplying industry	Dollars
Iron and steel	168
Machinery	111
Non-ferrous metals	52
Transport equipment	46
Trade	18
Lumber and wood products	15
Services	14
Rubber products	13
Chemicals	12
Non-metallic mineral products	10
Shipbuilding	10
Industry n.e.s	9
Coal products	8
Electric power	7
Petroleum products	6
Textilien	5
Paper and products	4
Coal mining	4
Leather and products	1

Averages for Italy, Japan, Norway and USA

Source: UNIDO Monographs on Industrial Development, No. 4, p. 18

Table I/23

ZAMBIA: INPUT-OUTPUT TABLE 1967 A: Domestic Production and Primary Inputs at Current Producers' Prices (K'000)	Farming, Forestry and Fishing (1)	Metal Mining (2)	Other Mining and Quarrying (3)	Slaughteries (4)	Dairies (5)	Grain Mills (6)	Bakeries (7)	Other Food Industries (8)	Breweries and Tobacco Manufact. (9)	Textile and Wearing Apparel (10)	Sawmills, Joineries, etc. (11)	Paper Products, Printing & Publish. (12)	Rubber Products (13)	Chemicals (14)	Bricks and Other Clay Products (15)	Cement, Cement Products, etc. (16)	Foundries and Metal Products (17)	Machinery (18)	Electrical Equips. (19)	Transport Equips. (20)	Other Manufactures (21)	Construction (22)	Electricity & Water (23)	Distribution (24)	Banks etc. and Insurance (25)
1. Farming, Forestry and Fishing	-	270	-	1204	1932	6587	-	-	622	-	-	-	-	617	6	-	6	-	-	-		-	-	-	-
2. Metal Mining	-	13507	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14435	-	-
3. Other Mining &Quarry.	-	877	-	-	-	-	-	-	-	-	-	-	-	-	-	431	-	-	-	-	-	927	-	8	-
4. Slaughtering and Meat Processing	-	-	-	-	-	-	-	-	-	-	-	-	-	395	-	-	-	-	-	-	-	-	-	236	-
5. Dairies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	156	-
6. Grain Mills	210	-	-	-	-	2	1526	-	820	-	-	-	-	-	-	-	-	-	-	-	-	-	-	376	-
7. Bakeries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	140	-
8. Other Food	-	-	-	-	10	70	36	20	2210	-	-	-	-	-	-	-	-	-	-	-	-	-	-	136	-
9. Breweries and Tobacco Manufactures	-	-	-	-	-	-	-	-	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	138	-
10. Textiles and Wearing Apparel	170	112	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	257	-
11. Sawmills, Joineries etc.	42	513	-	-	-	-	-	-	14	-	18	-	-	-	-	-	-	-	83	-	-	496	-	48	-
12. Paper Products, Painting & Publish.	22	288	-	-	-	-	4	-	228	-	-	947	-	218	-	-	-	-	-	-	-	-	-	606	182
13. Rubber Products	-	-	-	-	-	-	-	-	-	-	-	-	186	-	-	-	-	-	-	-	-	-	-	476	-
14. Chemicals and Petroleum Products	210	2434	-	-	-	-	153	-	-	-	13	-	-	-	-	-	75	37	34	-	-	1730	-	1623	-
15. Bricks and other Clay Products	-	53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1445	-	-	-
16. Cement and Cement Products etc.	210	725	-	-	-	-	-	-	-	-	-	-	-	-	15	391	-	-	-	-	-	6457	45	-	-
17. Foundries, Met. Prod.	75	12567	-	-	-	-	-	-	-	-	-	-	-	-	-	-	206	-	-	-	-	2340	-	158	-
18. Machinery	210	3800	-	-	-	-	-	-	-	-	-	-	-	-	-	30	-	-	-	-	-	-	-	139	-
19. Electrical Equipm.	-	800	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1162	-	537	-
20. Transport Equipment	55	773	4	2	10	12	21	1	46	3	2	2	2	7	10	25	23	8	48	-	4	300	-	4327	18
21. Other Manufactures	-	189	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	313	-
22. Construction	210	16322	448	-	22	-	-	4	148	3	11	28	8	22	8	38	-	-	-	-	-	5607	74	2221	118
23. Electricity&Water	-	15325	21	51	42	98	36	15	210	47	23	56	20	102	45	204	476	57	30	102	12	191	3134	434	-
24. Distribution	1476	10125	53	540	93	3186	928	64	1607	843	640	538	92	986	112	227	1587	534	936	1035	213	10745	128	8119	325
25. Banks etc. & Insur.	44	5672	35	27	5	6	11	4	223	45	254	34	18	20	6	61	137	57	32	65	-	523	18	2425	4195
26. Real Estate	-	815	-	6	3	42	90	7	278	113	21	316	42	49	9	19	137	48	137	514	36	561	56	5036	358
27. Railway Transport	210	3650	-	-	-	-	-	-	-	-	-	-	-	-	-	493	-	-	-	-	-	-	-	7950	-
28. Road Transport	17	1250	-	109	-	-	-	-	298	-	534	-	-	-	-	159	-	-	-	-	-	-	-	7300	
29. Other Transport	-	459	-	2	2	2	-	4	78	11	4	21	4	22	3	16	24	37	-	18	4	170	3	2752	
30. Posts and Telecommunications	2	1213	20	6	25	34	20	15	176	47	17	45	11	25	5	12	75	42	165	101	4	36	18	1164	84
31. Government Administration	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32. Education	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33. Health	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34. Busin.Services	-	3422	28	26	38	136	41	55	662	136	67	138	46	106	13	90	208	127	106	58	36	821	61	2046	-
35. Recreational & Non-Busin.Services	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1432	-
36. Hotels & Restaur.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2120	-
37. Other Personal Services	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-
38. Unspecified	6	3234	3	191	-	695	-	183	827	248	87	246	38	136	-	154	509	187	312	82	294	1298	56	440	760
TOTAL from Domestic Production	3169	98395	612	2164	2182	10870	2866	372	8537	1496	1698	2371	467	2705	232	2350	3553	1134	1883	1975	603	34809	5028	63121	6045
TOT.from Import CIF	10339	37893	406	1809	429	3862	1059	3596	6990	8025	2413	1936	710	7955	278	2382	7675	4690	898	210	359	29136	15910	13989	2170
Depreciation	4000	15754	86	152	92	161	73	189	571	379	157	366	64	551	114	696	342	271	61	175	56	5284	2417	2952	876
Wages and Salaries	10497	91910	664	513	733	1173	857	491	3787	3182	1550	2709	628	2249	706	2130	4074	1781	865	3714	284	32760	3269	37543	6178
Custom duties	7	54	19	-	8	-	1	2	146	158	18	5	27	29	-	1	8	-	52	4	3	902	1	1848	30
Royalties and other Indirect Taxes	-	105055	56	-	-	10	4	2	12688	8	113	3	1	16	9	31	15	5	2	1	13	142	339	10611	36
Subsidies	1744	-	-	23	500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4978	-
Operation Surplus	51843	145797	379	520	628	1095	1275	969	8580	4542	1003	484	718	3211	355	2983	4256	2057	867	4685	135	17829	2425	55542	8783
TOTAL	78111	494858	2222	4095	3572	17171	6135	5621	41299	17790	6952	7874	2615	16716	1694	10573	19923	9938	4628	16664	1453	120862	29389	170610	24118
GDP Market Prices	64603	358570	1204	122	961	2439	2210	1653	25772	8269	2841	3567	1438	6056	1184	5841	8695	4114	1847	8479	491	56917	8451	103500	15903
GDP Factor Cost	66340	253461	1129	145	1453	2429	2205	1649	12938	8103	2710	3559	1410	6011	1175	5809	8672	4109	1793	8474	475	55873	8111	96019	15837

Table I/24

ZAMBIA: Input-Output Table 1967 B. Imports at current cif-prices Zambian borders (K'000)	Farming, Forestry and Fishing (1)	Metal Mining (2)	Other Mining and Quarrying (3)	Slaughteries (4)	Dairies (5)	Grain Mills (6)	Bakeries (7)	Other Food Industries (8)	Breweries and Tobacco Manufactures (9)	Textiles and Wearing Apparel (10)	Sawmills, Joineries, etc. (11)	Paper Products, Printing and Publish (12)	Rubber Products (13)	Chemicals (14)	Bricks and other Clay Products (15)	Cement, Cement Products, etc. (16)	Foundries and Metal Products (17)	Machinery (18)	Electrical Equipment (19)	Transport Equipment (20)	Other Manufactures (21)	Construction (22)	Electricity and Water (23)
1. Farming, Forestry, Fishing	544	158	-	1436	-	2144	-	5	188	61	79	-	160	21	-	-	-	-	-	-	20	-	-
2. Metal Mining	-	36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	24	-	-	-	-	-
3. Other Mining and Quarrying	17	3428	15	24	-	-	-	-	-	-	-	-	16	-	174	432	226	18	-	-	10	41	-
4. Slaught. & Meat Processing	-	-	-	-	-	97	-	-	-	-	-	-	-	368	-	-	-	-	-	-	9	-	-
5. Dairies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6. Grain Mills	86	-	-	-	-	-	776	20	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7. Bakeries	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8. Other Food	-	180	-	-	-	710	96	1864	1001	-	-	-	-	48	-	-	-	-	-	-	-	-	-
9. Breweries and Tobacco Manufactures	-	-	-	-	-	-	56	-	2550	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10. Textiles and Wearing Apparel	424	454	-	-	53	811	-	-	-	7016	253	36	-	25	-	-	130	-	-	142	-	81	-
11. Sawmills, Joineries, etc.	-	270	-	154	-	-	-	-	5	-	742	-	-	-	-	-	242	-	-	-	-	3025	-
12. Paper products, printing and publishing	23	505	-	16	96	25	-	316	1081	20	-	1622	-	307	-	386	30	-	24	-	1	115	-
13. Rubber products	594	887	-	-	-	-	-	-	-	-	3	-	215	-	-	-	-	-	-	-	-	45	-
14. Chemicals and Petroleum Products	6558	7467	159	134	48	45	96	1100	748	82	269	192	300	6790	56	157	536	35	25	188	236	2867	353
15. Bricks & oth. clay products	-	1195	-	-	-	-	-	-	-	-	-	-	-	-	-	60	-	-	-	-	-	1298	-
16. Cement, Cement Products, etc.	-	138	-	-	90	-	-	-	708	-	31	-	-	14	-	600	56	52	-	98	-	3000	3
17. Foundries & Metal Products	518	5704	210	-	43	-	-	210	350	16	771	6	-	235	-	500	5532	349	10	6	10	11042	200
18. Machinery	161	6983	-	20	60	-	-	-	108	149	206	20	7	35	29	190	720	4000	-	293	-	1597	60
19. Electrical Equipment	40	4248	-	-	-	-	-	-	-	-	-	-	-	-	-	-	110	126	839	431	-	4403	1340
20. Transport Equipment	1256	2191	22	-	-	-	-	-	-	-	-	-	-	-	15	-	2	-	-	4985	-	525	-
21. Other Manufactures	78	500	-	-	19	-	30	-	-	547	19	6	-	33	-	-	-	2	-	-	69	343	-
22. Construction	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23. Electricity and Water	-	1517	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13932
24. Distribution	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25. Banks etc. and Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	-
26. Real Estate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27. Railway Transport	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-
28. Road Transport	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29. Other Transport	-	500	-	25	20	30	5	81	250	54	40	54	12	79	4	57	77	84	-	67	4	651	22
30. Posts and Telecommunications	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31. Government Administration	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32. Education	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33. Health	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34. Business Services	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35. Recreational and Non-Business Services	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-
36. Hotels & Restaurants	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37. Other Personal Services	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38. Unspecified	-	1532	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL from Imports cif	10339	37893	406	1809	429	3862	1059	3596	6990	8025	12413	1936	710	7955	278	2832	7675	4690	898	6210	359	29156	15910

Table I/25

Economic Indicators at Successive Stages in the Development of Engineering Industries

	All manufacturing		Steel	Engineering Industries					
				Production			Trade		Sub-sectors
	Value added in production (mio $)	Number engaged ('000)	Annual consumption ('000t)	Value added (mio$)	Number engaged ('000)	% in all manufacturing	% imports in domestic consumpt.	% exports in domestic production	% of simple metal prod. in output
Stage 1 Simple engineering repairs and manufactures	400 or less	a	400 or less	50 or less	20 or less	8 or less	85-100	-	50 or more
Stage 2 Engineering production at initial stage	400 - 1000	200 - 500	400 - 800	50 - 100	20 - 50	8 - 12	80- 90	-	35-40
Stage 3 Developing countries with developed and diversified engineering production	2000 - 5000	1000 or more	1000 or more	400 - 800	200 or more	15 - 20	50- 75	b	20-30
Stage 4 Industrialized countries	a	a	1000 or more	a	200 or more	25 or more	10- 50	20-50	b

a) not estimated
b) negligible

Source: UNIDO Monographs on Industrial Development, No. 4, p. 46

Selected Indicators of Industrial Development in Developing Countries

Country	Value added in million U.S. dollars		Share of metal products in total manufacturing (per cent.)		Steel		No. of persons engaged in total manufacturing
					Production	Consumption	
	All manufacturing ISIC 2-3 (a)	Metal products ISIC 35-38 (a)	Value added (b)	No. engaged (b)	Thousand metric tons (c)	(c)	In thousands (d)
			Group III				
India	4701.8	753.3	14.5	12.9	4071	5154	1870.5
Brazil	3643.3	654.2	14.3	11.5	1843	2701	1547.0
Mexico	2999.4	557.0	14.3	13.8	1728	1840	1978.0
Argentina	2412.7	480.0	20.7	25.3	441	2379	1411.0
			Group II				
Turkey	1012.6	100.1	7.4	10.9	282	549	295.3
Venezuela	886.6	85.9	6.1	6.0	-	448	137.8
Pakistan	803.1	101.6	8.6	11.6	9	192	397.8
Colombia	658.2	70.8	8.0	12.6	176	405	236.8
Chile	643.4	71.1	9.7	13.3	363	506	206.6
S.Korea	571.6	58.5	9.9	10.3	61	-	260.6
U.A.R.	497.6	44.6	6.0	7.0	-	373	260.8
Philippines	447.6	53.3	10.7	11.2	-	504	228.4
Indonesia	-	-	10.9	11.6	-	439	334.5
Iran	-	-	-	-	-	351	-
			Group I				
Peru	367.6	28.4	6.1	7.8	-	246	116.3
Fed. of Rhodesia and Nyasaland 1)	356.4	57.4	24.6	22.4	60	244	109.6
Cuba	351.8	-	-	-	277	-	-
Algeria	341.4	66.1	22.0	20.2	-	402	146.7
Uruguay	313.7	57.6	-	18.9	-	86	191.4
Morocco	303.1	50.8	19.0	-	-	152	-
Thailand	253.5	-	-	10.3	-	257	189.8
China (Taiwan)	253.1	39.7	6.1	8.2	198	287	173.0
Burma	181.8	-	2.8	3.6	-	-	120.9
Ceylon	180.6	32.2	23.6	36.0	-	89	49.9
Ecuador	121.2	-	1.5	1.7	-	-	30.4
Guatemala	71.7	-	3.9	6.9	-	-	27.6
El Salvador	48.3	-	4.1	3.8	-	-	60.3
Honduras	41.1	-	2.6	3.0	-	-	20.1
Nicaragua	31.1	-	1.3	2.1	-	-	18.9
Paraguay	24.2	0.3	3.7	5.3	-	-	34.3
Ethiopia	23.2	-	-	-	-	-	20.2
Nigeria	-	-	5.4	-	-	182	-
Tunisia	-	-	-	-	-	79	12.9
Ghana	-	9.3	13.8	-	-	67	21.7

1) Now: Malawi, Zambia and Southern Rhodesia.

Sources: (a) Non-published estimates by the Statistical Office of the United Nations
(b) United Nations, The Growth of World Industry, 1938-1961 (New York, 1964)
(c) United Nations, Statistical Yearbook, 1962 (New York, 1963)
(d) United Nations, The Growth of World Industry, 1938-1961 (New York, 1964.

PART II

THE PRESENT SITUATION OF THE ENGINEERING INDUSTRY IN EAST AFRICA

1. Imports

All countries of the subregion rely heavily on imports for their supply of engineering products. The only field where local production has substituted imports to some extent is that of simple metal manufactures (ISIC 381 or SITC group 69 respectively). The import situation is illustrated by the tables and graphs presented in the annex[1].

1.1 Volume of Imports

In terms of value, imports of engineering products account for between 30 and 40% of total imports for most of the countries; the higher percentages are on the whole produced by those with a higher overall degree of industrialization. Over the period 1964-1968 this share has increased for all countries except Zambia and Mauritius, with an elasticity coefficient ranging between 1.195 (Tanzania) and 1.81 (Ethiopia)[2]. Comparison of the increase in volume (t) with the increase in value ($) for the individual countries shows that value indices more or less exceed the corresponding volume indices. Since the composition of engineering goods imports has not undergone significant changes (see 1.2) this should reflect the rise of prices for these goods.

Even with the considerable increases in imports, per capita consumption of engineering goods[3] remains low in the subregion. The only country where consumption exceeds 10kg/capita is Zambia, while the others remain well below that figure, with Burundi and Ethiopia in the bottom places with a statistical consumption around 1kg/capita[4]. This compares

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1) annex, tables II/1-II/10 and graphs II/11-II/19
2) annex, table II/20
3) Imports only
4) no reliable figures can be calculated for Rwanda.

to an average figure of abt. 10 kg/capita in the West African subregion in 1963[5] and a figure of abt. 500 kg capita in the developed countries.

5) Document E/CN 14/INR 126, p.4

1.2 Pattern of Imports

Graph II/21 shows the share in engineering goods imports of the four SITC-divisions for nine countries of the sub-region over the period 1964-1969[1]. Disregarding some discrepancies the picture is fairly consistent. Groups 71 and 73 between themselves account for more than two thirds of the total, with group 73 in most cases slightly larger. Group 72 is in third place with a percentage between 10 and 20, while the rest - around 10% - is taken up by group 69. The variations for some of the countries in 1968 and 1969 are probably due rather to the provisional nature of the statistical figures than to a change in the pattern of demand. As it was mentioned before, local production generally starts with products of groups 69 and 72. The graph shows that even a complete coverage of these groups by local enterprises would not reduce imports of engineering goods by more than 20-30% at best. Table II/22 gives figures for the consumption of engineering consumer goods in 1965 and 1968. With the exception of Mauritius, the share of these goods has dropped steeply to between 8 and 15% of total engineering goods imports (as compared to a share of abt.20% in developed countries) for all countries[2]. This decrease in imports, however, is the result in some instances of local production of such goods as household equipment of base metals, non-electric domestic appliances, insulated wires, and assembly of radios and bicycles. Within the group of consumer goods, passenger motor cars are by far and large the most important single item, accounting for abt. 60% of the total for the countries covered. About 10% is taken up by domestic electrical equipment, which includes products such as refrigerators and air-conditioners.

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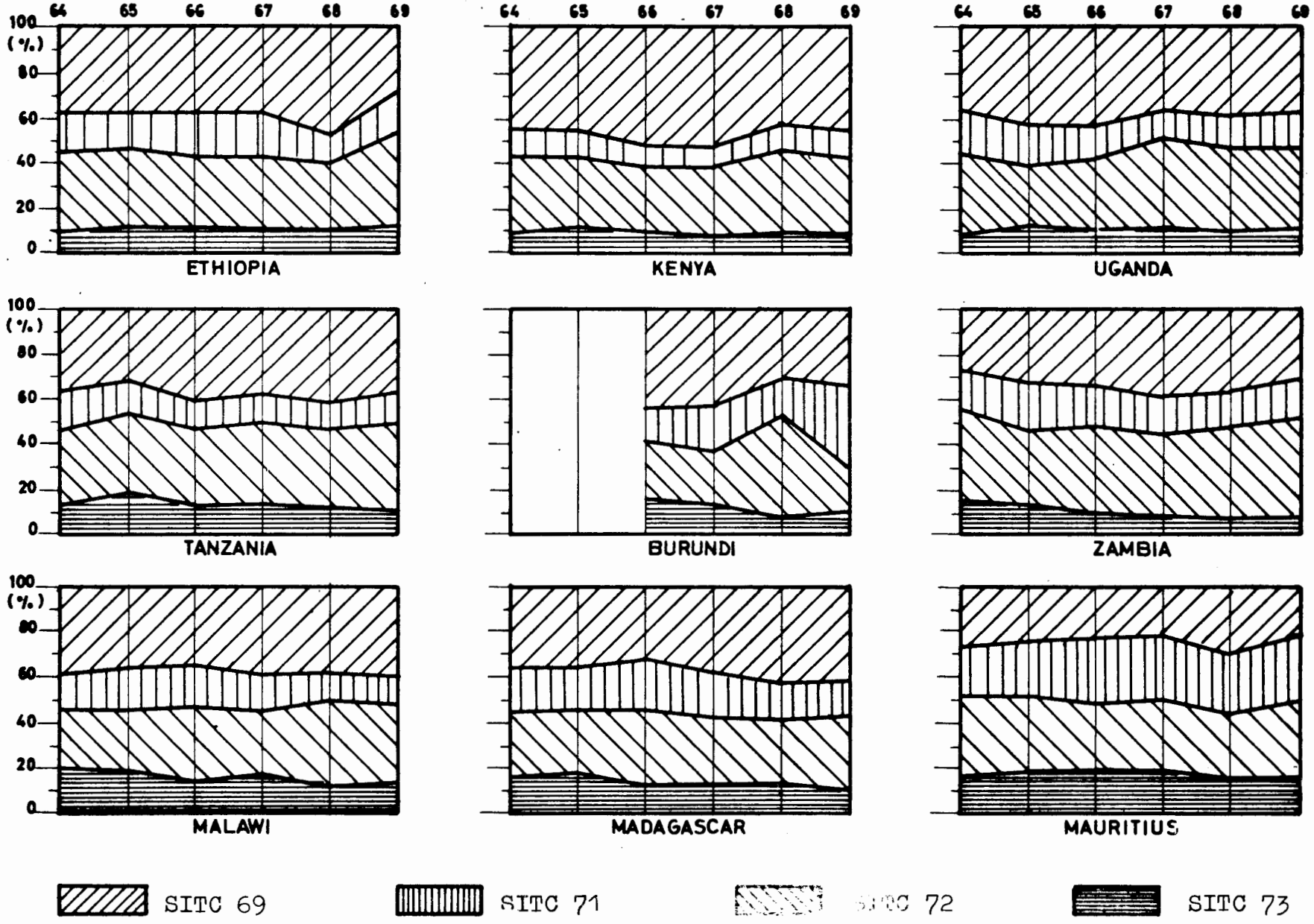
1) Figures for Rwanda and Somalia unreliable.
2) annex, table II/22. No reliable figures are available for Somalia, Rwanda and Burundi.

PATTERN OF ENGINEERING GOODS IMPORTS INTO EAST AFRICAN COUNTRIES



1.3 Origin of Imports

With trade in engineering products among the countries of the subregion and among developing countries in general non-existent or restricted to a limited range of products[1], a small number of industrialized countries supplies the major part of the subregion's requirements in this field. Though decreasing in importance, the influence of former colonial ties is still apparent in the origin of imports for two reasons: trade preferences and well-established connections make it cheaper and easier to order from the former mother-countries, and, on the other hand, many of the larger establishments are owned or run by expatriates from these countries, who will look there first when orders are placed. However, this pattern is changing and e.g. Japan and the socialist countries have strongly increased their position as suppliers.

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1) annex, tables II/23-II/25

2. Local Production

In the following the existing Engineering Industries in the subregion are briefly described on a country-by-country basis. Unfortunately the information available is of very different quality, and not always detailed and up-to-date.

Summarily, it can be said that the most developed sector in all countries is that of metal products (ISIC 381). Fabrication of structural parts is undertaken in all countries and, in fact, capacity generally exceeds demand. It is this sector which accounts for the greater part of steel consumption of Engineering Industries as a whole. The production program of such establishments usually includes steel structures - sometimes quite heavy door and window frames, tanks - stationary or to be mounted on trucks - and metal furniture. The latter is quite often produced in specialized shops. Most such establishments do a fair amount of occasional jobbing work as well. Manufacture of hollow-ware for domestic use is done in a number of countries. Other more generally developed fields include tools (mainly agricultural), wire products, metal containers and cutlery.

Non-electrical machinery and apparatus (ISIC 382) is certainly the least developed sector of the Engineering Industries in the subregion. It is virtually confined to repair work and overhaul of imported machinery, often done in the workshops of the industries using these machines. Notable exceptions are Uganda and Mauritius, where some quite heavy parts of sugar machinery are fabricated. Some more activity can be found in the sector of electrical machinery, apparatus and appliances (ISIC 383). Radio assembly, dry cell batteries, car accumulators, wire and cables, are all produced in several countries. Besides, there is a large number of establishments, whose main activity is repair work, but which can do some fabrication as well.

Second in importance to the metal products sector is that of transport equipment. Assembly of c.k.d. trucks and buses is done in most countries of the subregion, in connection with building of bodies and trailers. Passenger cars are or will soon be assembled in three countries. A vast number of repairing and servicing shops, many of which are equipped with specialized machinery, have come up with the growth of the vehicle fleet. Their importance lies not only in the considerable amount of engineering work they do, but also in the training they provide to a large number of persons. This is true, too, for the railway workshops, which are usually the largest engineering establishments of their respective countries. Apart form regular production of wear-and-tear-parts such as brake blocks and axle boxes they are equipped to do overhaul and repair work which comes close to production of complete bodies of carriages and waggons. Bicycle assembly with a fair amount of fabrication is done in some of the countries. Ship and boat building on a small scale exists in those countries bordering on one of the great lakes, while only Tanzania and Mauritius offer facilities for larger, i.e. ocean-going boats, which are, however, mainly used for repair work.

2.1 Ethiopia

The Ethiopian industry is almost exclusively centered in the areas of the two biggest towns, Addis Ababa and Asmara.

According to the normal industrial structure in the countries of the subregion the production of structural parts such as window and door frames etc. is predominant. Half of the total number of 48 firms of the Engineering Industry are working in this line of production (ISIC 3181). The majority of these firms are entreprises with up to 20 employees. Three enterprises of a bigger type have in addition taken up the production of tanks and containers. A factory with 105 employees in Asmara manufactures structural parts for the building industry as well as the following products: conveyor belts, quay cranes, structural parts for bridges, funnels, machine parts (especially mills for the manufacture of coffee and cotton factories), scales, hulls, large volume conveying plants for salt-works, tanks for trucks and trailers as well as ploughs for agricultural use.

The factories manufacturing household appliances form the second-largest line of production (ISIC 3819). In this case eight factories with up to 50 employees are concerned, in which dishes, pans, pails, pots und kettles are made by means of simple machines. It is only in Asmara that a larger factory exists with 332 employees, which manufactures enamelled table-plates and plastic shoes. Aluminium imported from Asia is the basic material for the production of household appliances.

In several units the production of metal furniture such as beds, chairs, shelves etc. runs parallel to the production

of structural parts (windows etc). Springs for beds are manufactured by one unit in Addis Ababa which also manufactures meshed wire.

Tins for the Ethiopian food industry are supplied by one factory (110 employees) in Asmara, which in addition supplies tins for dye works and pharmaceutical units as well as for the Ethiopian oil mills. As there is a seasonal fluctuation in the demand for oil tins (peak demand after the cotton crop), this unit has to carry large quantities on stock.

Agricultural tools such as hoes, shovels, sickles, ploughs, tools of a simple kind as well as hammers and tongs are manufactured by one factory in Addis Ababa. It is of a more modern type and employs 42 workers. Bottle stoppers for the inland beverage industry are supplied by a crown-cork factory in Addis Ababa which also manufactures tin cans.

Galvanized corrugated sheets are supplied by one unit in Addis Ababa and one in Asmara respectively. Aluminium and steel sheets are the basic materials for the production.

At present two small firms (25 and 17 employees) exist for the manufacture of car batteries in the electrical equipment branch. The production of a large manufacturing unit with 200 employees for dry batteries is in the preliminary stages. Furthermore workshop-like enterprises for the assembly of electrical household appliances are engaged in this field.

The above-mentioned production of springs and meshed wire in Addis Ababa is included in a steel works, the production of which is based on scrap iron from local resources. A semi-automatic rolling mill processes the material into rods and

bars for the construction industry and at the same time supplies the material for a wire drawing mill. The production of nails ranges from all sizes and staples.

Manufacturing and assembling units for transport equipment are non-existent with the exception of repair shops for bicycles, motor vehicles and railways, the latter working merely for its own purposes.

The statistics for the industry at hand for the year 1969 show that 26 firms with a total of 1154 employees were working in the Engineering Industry. Their gross output amounted to US$ 2,491 million, the output of the whole manufacturing industry being US$ 186,8 million. The Engineering Industry contributed 1,3% of the total manufacturing industry.

2.2 Somalia

The processing industry of Somalia has, in comparison to that of other East African countries, developed to only a limited extent and is almost restricted to the processing of agricultural products. In 1969 134 enterprises with 4556 employees and a gross output of US$ 16,959 million were registered.

The share of production of the Engineering Industry in the total manufacturing industry is very low. In 1969 only six metal works with more than five employees existed. Their gross output amounted to US$ 0,273 million.

The range of production comprises simple structural parts such as windows, doors, roofing constructions and others. Larger enterprises are non-existent in the sector of manufacture of machinery and electrical appliances. In the field of transport equipment the Fiat workshop in Mogadishu is an exception as regards size and technical equipment. Apart from repair works the assembly of lorries and cars is carried out.

Comparing the Engineering Industry to the whole manufacturing industry, the former accounts for only 1,6% of the total gross output of the latter.

2.3 Kenya

The Kenian Engineering Industry is well advanced compared to that of other East African countries. Common metal products (structural parts for the building industry, household appliances, metal furniture, agricultural tools) are manufactured as well as industrial machinery, electrical appliances, and transport equipment.

In this country, too, the manufacture of metal products is, dominant. 104 firms were working in this field in 1969, 41 of which concentrate on the production of structural parts such as doors, windows, tanks.

The second-largest group of firms with 38 enterprises is classified unter ISIC 3819. Basic household appliances such as pails, pots, cans, as well as barbed wire, wire-fences, nails and other hardware are manufactured in this group.

15 enterprises are engaged in the manufacture of metal furniture, such as chairs, tables, shelves and cabinets.

Three firms manufacture agricultural tools, i.e. tools of a simple type such as hoes, shovels and other, as well as ploughs.

Half of the firms working in the field of metal processing (ISIC 381) are small enterprises with less than five employees (49 firms). They contribute approximately 0,47% of the total metal production output. As regards turnover only those firms with more than 50 employees are of any importance. The total output of ISIC group 381 amounted to US$ 26,325 million in 1969, the largest part of US$ 21,956 million being contributed by the last.

Firms manufacturing machinery (ISIC 382) mainly concentrate on the production of spare parts and the assembly of machines for units such as breweries, sugar and tea factories, mills, sawmills etc. The total output of this industrial group amounted to US$ 5,083 in 1969, of which US$ 2,268 million were contributed by enterprises with 5 to 49 employees. Enterprises with more than 50 employees contributed US$ 2,054 to the total turnover.

With 93 enterprises the electrical industry plays a decisive rôle in Kenya. The total turnover amounted to US$ 17,334 million in 1969. US$ 14,628 million are attributed to those enterprises with more than 50 employees, US$ 2,545 million to those with 5 to 49. The range of manufactures comprises, among others, bulbs, equipment for air conditioning, insulated cables and wires, switch-boards and accessories, starter contacts, assembled wireless sets and tape recorders.

The section transport equipment (ISIC group 384) in Kenya includes enterprises for ship-building and repairing as well as enterprises for the assembly of vehicles and construction of car bodies. The airplane service and railway repair shops of the East African Common Service Organization should also be mentioned. The total output in 1969 was US$ 22,223 million in this section. 13 enterprises with more than 50 employees had the main share with US$ 20.842 million. The share of the enterprises with less than 5 employees is insignificant, amounting to only US$ 0.076 million. Car repair shops have not been considered in this calculation, as they are included in the ISIC group 9513.

In 1969 the Engineering Industry contributed 13,9% of the output value of the Kenian manufacturing industry.

2.4 Uganda

The metal processing industry of Uganda has also a dominant position within the Engineering Industry. Of a total of 27 firms with more than 10 employees 19 are working in this field:

The following products are manufactured:

ISIC 3811 hoes, shovels, picks
(2 firms)
ISIC 3812 steel furniture for households, offices, hospitals, etc.
(3 firms)
ISIC 3813 construction materials, tanks, etc.
(2 firms)
ISIC 3819 household appliances (pots, pails, cans, etc.), tin boxes, battery cups, enamel ware, nails, mattress springs, fencing wire
(12 firms)

The production of windows, doors, railing, fencing, gates and burglar bars is mainly carried out by a smaller type of factory with less than 10 employees.

Two firms for the manufacture of machinery are of importance (ISIC 382), the first concentrating on the manufacture of drying appliances, peeling and washing machines, the second on the manufacture of rolling mills for sugar factories, the latter manufacturing also agricultural tools and moulds.

The electric industry (ISIC 383) is represented by five firms (10 employees and more). Two therof are engaged in

the assembly of transistor radios and record players (ISIC 3832), and one in the assembly of refrigerators (ISIC 3833). In addition, a company producing electric cables and a factory for car batteries exist in this sector.

Besides a number of small firms, four larger enterprises (ISIC 3843) are working in the production and assembly of transport equipment. One enterprise in this group manufactures trailers and lorry bodies, two firms bodies for commercial vehicles, and one factory is specialized in the manufacture of brakes.

The 1969 output of all firms with more than 10 employees amounted to US$ 11,98 million which is equivalent to 7,5% of the total output of US$ 160,4 million of the manufacturing industry.

2.5 Tanzania

The Engineering Industry of Tanzania is almost exclusively centered in the area of Dar-es-Salaam and is, like that of all other East African countries, in the first place a metal processing industry. Of the total of 64 firms working in the Engineering Industry in 1970, 31 are engaged in the manufacture of metal products (ISIC 381).

The manufacture of structural parts (ISIC 3813) which is carried out by 14 firms ranks first within the group of metal processing. Door frames, windows, roofing constructions, gates, tanks, etc. are manufactured by this group.

The second-largest line of production is ISIC group 3819, which comprises 12 firms, four of which concentrate on the manufacture of household appliances (pails, pots, cans etc.), two on the production of tin boxes and containers, two on nail production and another one factory on the manufacture of screws. The remaining four firms manufacture wire, meshed wire, nails and springs.

Metal furniture (ISIC 3812) for household use such as beds, chairs and tables, and furniture for offices such as writing tables and filing cabinets are manufactured by four firms.

There is one manufacturer of razor blades (3811) in Dar-es-Salaam producing high-quality products, which are also exported to European countries.

In 1967 the total output of the metal processing industry (ISIC 381) was US$ 4,903 million.

18 firms are working in the field of non-electrical machinery (ISIC 382). In contrast to the group of metal processing this

group is spread all over the country with establishments in Tanga (5 enterprises), Arusha (2 enterprises), Mwanza (1 enterprise), Moshu (4 enterprises), and Dar-es-Salaam (6 enterprises).

The production programme comprises agricultural and industrial machinery as well as parts for spinning machines, paper working machines and structural parts for mills. The firms concentrate, however, only on repairs.

The output of this industrial group (ISIC 382) amounted to US$ 1,072 million in 1967.

The electrical industry (ISIC 383) consists of four firms. Philips in Arusha (assembly of wireless sets) and Matshushita-National in Dar-es-Salaam (manufacture of dry cell batteries) contribute the main part to the output. The two other enterprises are of a smaller type and concentrate on the installation of electric equipment.

The total output of this group (ISIC 383) was US$ 0,948 million in 1967.

The firms in the field of transport equipment (ISIC 384) have their main activity in the assembly of motor vehicles and the manufacture of car bodies. Nine firms are working in this line and are, with the exception of two, situated in the Dar-es-Salaam area. Two other firms classified under the group ISIC 384 concentrate on the assembly and partial manufacture of bicycles.

The total output of this group was US$ 1,635 million in 1967, equivalent to 20% of the total turnover of the

Engineering Industry, which amounted to US$ 8,558 million in that year.

The output of the whole manufacturing industry was US$ 184,144 million, 4,6% being contributed by the Engineering Industry.

2.6 Rwanda

After the split of the territory of Burundi and Rwanda the latter was left practically without any industry. Even today there are only a few industrial enterprises which are mainly situated in the capital of Kigali.

For the Engineering Industry only three enterprises are of importance:

1) a radio factory manufacturing transistors

2) a metal processing unit, a subsidiary of the works in Bujumbura, manufacturing window and door frames, roofing constructions and tanks

3) a factory for metal furnitures producing all types of furniture for households (bed frames, chairs and tables) and offices (writing tables, filing cabinets, shelves, etc.).

Enterprises in the section of machine manufacture and transport equipment are non-existent. The radio factory in addition carries out the assembly of bicycles and motor cycles, on a very small scale. Apart from these only small repair shops for motor vehicles exist.

There are only a few statistical data available for 1968, according to which the contribution to the GDP at factor cost of the processing industry merely amounts to US$ 5 million. The total GDP for 1968 is US$ 154,4 million. More special date on Engineering Industry cannot be submitted.

2.7 Burundi

Until 1962 Burundi and Rwanda were united. Industry was centered in Bujumbura, with sales markets all over the territory and the East Congo. A large part of the original market was lost after the territory was split into the two states of Burundi and Rwanda, so that even now industry in Burundi is working at a very reduced capacity utilization.

Today's metal processing industry concentrates exclusively on the manufacture of structural parts such as window frames, doors for the construction industry, and on the manufacture of metal furniture such as cupboards, shelves, bed frames, chairs, tables etc. In two other firms hulls for fishing boats are additionally manufactured as well as tanks and simple wheelbarrows.

Whilst in other countries the above-mentioned production is spread over several small enterprises, in Bujumbura only three enterprises exist, which despite the wide range of production, are only working at a very low capacity. At present 425 persons are employed in these firms.

Furthermore an enterprise with 25 employees concentrates on the manufacture of nails. The output amounts to 250 t/a. Only a limited number of types of nails is manufactured, the quality of which is mediocre. Another enterprise, at present concentrating on the production of cans and containers, also intends taking up the manufacture of nails.

Other metal processing units manufacture hoes for agricultural use as well as galvanized corrugated sheet iron for the construction industry.

Firms in the sector of non-electrical and electrical machinery and equipment are non-existent. The same can be said of the sector for transport equipment, where only small repair shops exist, especially for bicycles and motor vehicles.

The Engineering Industry has only an insignificant share in the whole manufacturing industry, the latter being in its turn of no real importance compared with agriculture, forestry and fishing. The only statistical data at hand for 1965 show that the GDP at factor cost for agriculture, forestry and fishing was US$ 104,48 million in comparison to US$ 6,25 million in the manufacturing industry. The total GDP was US$ 144,06 in 1965.

2.8 Zambia

In Zambia, the share of the Engineering Industry in the whole manufacturing industry is significant compared to other East African countries.

The main manufacturing groups within the Engineering Industry are the metal processing factories (ISIC 381). 88 enterprises were working in this field in 1970. The following products were offered:

ISIC 3811 precision tools, door locks, head rails, wedges, tools such as hammers, chisels, crow-bars, tongs, etc.
(3 firms)

ISIC 3812 metal furniture such as cupboards, chairs, beds, mattresses, furniture for offices (filing cabinets, writing tables, typewriter tables etc.), garden furniture (chairs, tables), flower stands etc.
(15 firms)

ISIC 3813 metal constructions, window and door frames, tipping and sliding gates, garden gates, wire mesh, garages of corrugated metal, roofing constructions, boilers, tanks for lorries and other large volume containers (41 firms)

ISIC 3819 dustbins, water tanks, metal containers, tins, srews, nails, steel ropes, rope pulleys, block- and pulley, barbed wire, crown-corks, bottle cases, sack-barrows, casings for airconditioners, vent pipes for mines
(28 firms).

The output of this group of industry amounted to US$ 25,806 million in 1969.

16 firms were working in the field of non-electrical machinery (ISIC 832) in 1970.

ISIC 3822 maize hammer mills, machines for the processing of tobacco, other agricultural machinery (2 firms)

ISIC 3823 machine tools, extrusion dies etc. (1 firm)

ISIC 3825 weighing-machines for households, laboratories and industry (1 firm)

ISIC 3829 assembly and repair of pumps, manufacture of refrigerators and deep-freezing boxes (2 firms)

ISIC 3829 machines for mining, pneumatic tools, etc., compressors (manufacture and repair) (10 firms)

The output of the industrial group amounted to US$ 13,523 million in 1969.

The electrical industry (ISIC 383) has a strong hold in Zambia, especially through the close connection with the copper mines which are supplied with electrical machinery, tools and plants as well as installation material and through the fact that copper from local resources is processed.

In 1970 production was divided as follows:

ISIC 3831 repairing of engines, generators, transformers, control panels and stations, assembly and repairing of special apparatures and plants for mines (spark-protected, waterproof)
(12 firms)

ISIC 3832 manufacture of hi-fi amplifiers and accessories, assembly of wireless and TV-sets, manufacture or portable transistor radios and record players
(2 firms)

ISIC 3833 manufacture of hot water supply tanks and bathing stoves
(1 firm)

ISIC 3839 manufacture of batteries, accumulators, fluorescent lighting, manufacture of all types of electric wires and cables, bare and insulated.

The output of this group of industry reached US$ 6,534 million in 1969.

The firms in the transport equipment section are primarily engaged in building motor vehicles. Production in 1970 can be divided as follows:

ISIC 3843 manufacture of bodies, trailers, superstructures for special vehicles (ambulances, derrick cars, tank lorries, removal vans etc.), assembly of commercial vehicles
(16 firms)

ISIC 3849 manufacture of special vehicles for agricultural use (special trailers, donkey-drawn carts etc.) (2firms)

The output of this group amounted to US$ 14,437 million in 1969, i.e. 20% of the whole Engineering Industry.

In 1969 the total production of Engineering Industry reached US$ 60,300 million, the production of the whole manufacturing industry was US$ 379,94 million. That means a share of 15,9% for the Engineering Industry.

2.9 Malawi

The structure of Engineering Industry is similar to that of the other East African countries. Production of metal products is well to the fore with a total of 15 firms (1970). The group non-electrical machinery (ISIC 382) is only represented by two firms (1970), the electrical industry by 6 firms (1970), the section transport equipment (ISIC 383) by 4 firms (1970).

The production of the individual industrial groups is spread out as follows:

Metal processing:

ISIC 3811 hoes, ploughs
(1 firm)

ISIC 3812 metal furniture
(3 firms)

ISIC 3813 structural parts, window and door frames, large containers, structural parts for bridges, bus bodies
(6 firms)

ISIC 3819 household appliances, enamel ware, hardware, metal cases, nails
(4 firms)

Non-electrical machinery:

ISIC 3824 assembly and repair earth-moving machines
(1 firm)

ISIC 3829 manufacture of refrigerators and cooling plants (absorber system) on the basis of liquefied gas
(1 firm)

Electrical machines and appliances:

ISIC 3831 assembly and repairing of electrical appliances and apparatus
(1 firm)

ISIC 3832 assembly of transistor radios
(1 firm)

ISIC 3833 heating devices, cooling plants
(2 firms)

ISIC 3838 switch-boards and distribution boxes
(1 firm)
accumulators
(1 firm)

Transport equipment:

ISIC 3842 railway shop (rebuilding and repairing)
(1 firm)

ISIC 3843 assembly of motor vehicles
(buses and lorries)
(3 firms)

ISIC 3844 assembly of bicycles
(1 firm)

ISIC 3849 manufacture and assembly of trailers and agricultural vehicles
(1 firm)

In 1969 the total output of the Engineering Industry was US$ 4,799 million, which is equivalent to 6,3% of that of the whole manufacturing industry (US$ 76,1 million).

M a l a w i

Industrial Census of 1970

(Firms licensed per December 31, 1970)

ISIC	Production	Number of Units
3811	hoes, ploughs	1
3812	steel furniture	3
3813	construction material	6
3819	manufacture of metal products	4
3822	agricultural equipment	1
3829	refrigerators (gas absorber)	1
3831	electrical machinery and apparatus	1
3832	wireless and record players	1
3833	electrical household appliances	2
3839	switch-boards	1
3839	batteries	1
3842	railway repair shops	1
3843	car assembly	3
3844	bicycle assembly	1
3849	vehicle construction (not including motor vehicles	1
38	Total	27
9513	Repair and service for motor vehicles	27
	Total manufacturing industry	176

Source: Ministry of Trade and Industry, Blantyre

2.10 Madagascar

In Madagascar, too, the metal processing industry is leading with a share of 2/3 in the total Engineering Industry.

The production programme comprises structural parts such as doors, windows etc., metal furniture, nails, household appliances, tools for agricultural use such as ploughs (ISIC 3811).

Manufacturers of non-electrical machinery (ISIC 382) are lacking except for repair shops.

The electrical industry is represented by manufacturers of car batteries (ISIC 3839) and factories for the assembly of wireless sets (ISIC 3832) and installation works.

Firms of the transport equipment (ISIC 384) group concentrate on the assembly of vehicles, that is to say cars and lorries. Bodies for vehicles are partly manufactured by the local industry. In addition units for the assembly of bicycles should be noted.

In 1968, 19 firms were working in metal processing (ISIC 3812, 3813, 3819) with an output of US$ 5,478 million. The electrical industry (ISIC 3832 and 3839) though represented by 11 firms, has only a very low turnover with US$ 1,113 million.

The industry for transport equipment has a greater share in the Engineering Industry. The 15 firms working in this field had a turnover of US$ 6.652 million.

In 1968 the total output of the Engineering Industry was US$ 13,243 million which is 10,3% of the total output of US$ 128,773 (estimated) of the whole manufacturing industry.

2.11 Mauritius

The Mauritian Engineering Industry is different from that of the other East African countries. Whereas the metal processing industry (ISIC 381) is normally dominant, it is only of secondary importance in Mauritius, its output representing only 1/5 of the total output of the Engineering Industry. The industry for transport equipment ranks first (ISIC 384) followed by that of the manufacture of non-electrical machinery.

Being an island Mauritius depends on shipping, which requires enterprises for ship-building and repairing. Besides shipping the cultivation of cane and sugar extraction plays a vital part. 65% of the total output of the manufacturing industry is contributed by the 21 sugar factories, which have a constant demand for machinery, accessories and spare parts. This accounts for the specially high output of the sector non-electrical machinery.

In 1969 13 firms with more than 10 employees each were engaged in the metal processing industry (ISIC 381). The total production of these enterprises amounted to 0.578 million US$ considering a total number of 347 employees.

The following products were manufactured:

1) window and door frames, blinds	(7 firms)
2) steel drums	(1 firm)
3) barbed wire	(1 firm)
4) wire for fences and meshed wire	(3 firms)
5) nails	(3 firms)
6) domestic utensils of aluminium	(1 firm)
7) steel wool and pot scourers	(2 firms)
8) crown corks	(1 firm)
9) name plates	(1 firm)
10) construction material	(1 firm)
11) steel tubes	(1 firm)

In addition a newly started production of razor blades has to be mentioned which is, however, only utilized at 20%.

Manufacture of non-electrical machinery (ISIC 382) nearly concentrated on the production of machines and accessories for the sugar industry as well as on the supply of corresponding spare parts. This group of firms consists of 10 enterprises with more than 10 employees each. As regards turnover machine manufacture ranks second. The output amounted to US$ 1.278 million in 1969.

The electrical industry (ISIC 383) is mainly formed by small enterprises, but only the four larger enterprises with more than 10 employees are of importance. Main field of production of three enterprises are accumulators. The production of dry cell batteries is planned.

The group of firms for transport equipment (ISIC 384) have the greatest share in the output of the Engineering Industry. The existence of four shipbuilding firms (one of which being very big) accounts for this fact. Of the total of 371 firms of the industrial group ISIC 384 only 36 firms with more than 10 employees each are of importance as regards turnover. Two firms are engaged in the manufacture of bus bodies, four in shipbuilding as well as in the execution of repair work. One firm mainly concentrates on the manufacture of exhaust systems. The other firms are predominantly engaged in assembly work und repairs. The output of these firms amounted to US$ 3,065 million in 1969.

The total production of all firms of the Engineering Industry with more than 10 employees each reached US$ 5,358 million in 1969.

The total production of the processing industry amounted to US$ 87.290 million in 1969. 3/5 were contributed by the sugar factories.

Accordingly the share of the Engineering Industry in the total manufacturing industry was 6,1% in 1969.

3. Specific Conditions of East African Engineering Industries

In the following, some aspects of the Engineering Industries in the subregion are pointed out, which have been found, on the basis of talks with the persons directly involved, to be more or less generally valid. Even where no reference is made, this should be seen against the background of what has been said in Part I on characteristics of Engineering Industries.

3.1 Cost of Investment

Cost of industrial investment, in a number of developing countries is lower than in developed countries. In East Africa, on the contrary, cost of investment tends to be quite high for a number of reasons.

Cost of land, though rising in many places, is not the important element. New industries will generally move into existing industrial areas with a developed infrastructure. Cost of buildings, on the other hand, are quite high, mainly for two reasons: Firstly, materials and labour-cost in the construction industry are substantial and often enough compounded by delays and secondly, the physical volume of industrial buildings must be larger than elsewhere because of the necessity to have large storerooms and workshop facilities. In many cases housing for the (expatriate) staff must be provided as well. Furthermore, there are no specialized constructors for industrial buildings which results in a lack both of standardization and feedback of experience.

Cost of machinery and equipment, too, is generally on the high side, sometimes simply out of ignorance of the most favourable sources of supply, sometimes because these sources cannot be tapped, if the funds come out of tied loans. Frequently, the machinery in the market is unsuitable - mainly under the capacity aspect - and has to be adapted (to what are antiquated standards from the suppliers point of view) with increased costs resulting. Purchase of second-hand machinery usually does not solve the problem, if costs of reconditioning and operation, and the quality of the finished product are taken into account. Quite often the most damaging - as least foreseeable - cost increases are those resulting from transportation, charges in connection with entry and, in particular, installation. The absence of experienced local

labour makes it necessary to employ expatriates at extremely high salaries and ancillary expenses over the erection and start-up period, which is often quite extended[1].

A final point concerns working capital, which was frequently mentioned as one of the most serious problems of engineering establishments. Due to the long delivery periods of imported materials (and the uncertainties connected with entry formalities), the Engineering Industries in the whole subregion are forced to carry heavy stocks of these goods, the average being about 4-6 months' supplies[2]. As terms of payment are almost invariably irrevocable L/C with the order, this alone requires substantial amounts of working capital. At the same time, unfavourable terms of payment and unbalanced stock position are characteristic on the finished products side as well. The latter is particularly marked in those Engineering Industries, whose products are subject to seasonal demand, as for example are agricultural tools. These industries experience one or two short periods of high demand - and then large stocks must be immediately available - and extended stretches of very reduced demand in between[3].

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1) A summary of the factors contributing to investment cost increases is given in annex, table II/38

2) The same goes for spare parts.

3) To some degree, all consumer-oriented Engineering Industries are subject to seasonal demand, as in predominantly agricultural economies periods of liquidity (and demand) of the consumers coincide with the harvest seasons.

3.2 Cost of Operation

If cost of investment is high in East African Engineering Industries, so is cost of operation.

The argument usually advanced in favour of the developing countries, that cost of labour is low compared to industrialized countries is not as strong at a second glance. As was pointed out (see 3.5 Part I) skill requirements are rather high for most types of Engineering Industries and skilled labour, if available at all, in relation to cost of unskilled labour, is more expensive than in developed countries. Wage levels, furthermore, have been rising steadily in the past. Though it can be argued that even with equal percentagewise increases in labour cost, the gap in absolute terms between developing countries and developed countries will widen rather than narrow and there increase the cost advantage of the former, for industries operating in East Africa such rises are a significant factor. The cost advantage diminishes further, when salaries are taken into account. Not only is the overall level of salaries high in relation to that of wages, but the considerable number of expatriates employed in all countries of the subregion, with their salaries again a multiple of that of nationals adds to the problem[1]. Finally, labour productivity has to be considered. Though varying from country to country and with the type of work it is with few exceptions well below that of a European or American worker, sometimes as low as 30% of it[2].

The second factor that contributes to the high cost of operation is that of raw materials, a large part of which have to be imported. Depending on their origin, this will add the more or less high cost of transportation, normally by

1) East Africa has the highest share of expatriates in industrial employment of all African subregions. See document ST/ECA/40/ Part VI/page 11.
2) According to the management of the engineering establishments visited.

sea to the nearest port, and the subsequent cost of entry and inland transportation which is quite considerable for the landlocked countries of the subregion. Due to their limited output, the East African Engineering Industries consume quantities of raw materials, which are rather small fish to the producers of such goods. For this reason, they will in most cases neither benefit from the directly material advantages, which are granted to large-scale consumers by way of rebates and discounts, nor from the immaterial ones, such as speedier and more reliable deliveries, which quite often results in increased costs again.

Cost of electricity and fuel takes only a minor share in total cost (see 3.2, Part I) particularly for those types of productions which form the larger part of East Africa's Engineering Industries. Preferential tariffs are granted in all countries of the subregion for electric power, though these are often considerably higher than comparable tariffs in industrialized countries[1)].

Another element of high cost is that of repair and maintenance of machinery and equipment. Quite often, repair facilities for the more specialized types of machines are not available in the country at all and parts have to be sent back to the country of origin for overhaul. This procedure is expensive and time-consuming but sometimes preferable even if repairs of the particular kind are done locally, but are of poor quality (e.g. if heat treatment is required) and thereby shorten the productive life of the equipment.

A final factor to be mentioned is that of idle capacities, from which the larger part of East Africa's Engineering Industries suffers. This, of course, is a result of both lack of market and technological aspects (see 3.6, Part II) but adds to the high cost of operation.

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1) annex, table "Electricity tariffs" (Part III)

3.3 Market

The most obvious constraint to industrialization in the subregion is the lack of sufficient markets. For Engineering Industries market means both, the market of the private consumers and that of other industrial establishments (see I/3.1). Turning to the former, of the total population, low in itself for most of the countries, only a fraction is endowed with sufficient purchasing power, while the larger part either lives entirely outside the monetary economy, or belongs to low-income groups. The high-income groups, which to a large part consist of expatriates, will often drop out as a market for different reasons: they can and will afford to buy imported goods despite the availability of locally produced ones. In 1976, only about 3,5% of the total population of the subregion were wage earners; this figure is expected to rise to abt. 4,5% in 1980[1]. Thus, markets for engineering consumer goods generally consist of little more than the economically active urban population. With the exception of Zambia and Mauritius (which both have larger numbers of high-density areas, though for different reasons), population of the larger cities ranges between 2,1% of total population for Burundi and abt. 6,1% for Kenya[2].

Turning to other industries as potential markets for Engineering Industries, their demand can be for two types of products: (see I/3.1) those which go into productive consumption and those which serve for fixed capital formation, i.e. machinery and equipment. For the latter, again, the existing industries in the subregion are either too limited altogether, or else their demand goes for very specialized, large-scale equipment.

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1) estimates by ECA, Statistics Division
2) See, annex, table II/39

This is particularly true for the two countries which are industrially most advanced in the subregion[1]- Zambia and Mauritius - and whose industries are at the same time geared to practically one single product, copper and sugar respectively. These industries, therefore, have given rise mainly to engineering establishments of the servicing and repairing type and, in the case of Mauritius, to manufacture of those parts of machinery, which are subject to frequent replacement.

Similarly engineering products, which serve as inputs for other industries, in most cases hit against the barrier of restricted outlets, unless they can be used for different types of industries without significant modifications. This is the case, for example, for metal containers, which can be supplied to meat, fruit, and juice canning, oil extraction and paint factories and at the same time serve a number of general purposes.

Summing up, unless regionalization is envisaged, restricted markets are probably the most serious single obstacle for most Engineering Industries in the subregion. This is particularly so, as it is one obstacle which cannot be overcome by the industry's own efforts, but only in the course of long-term overall development of the individual countries.

1) Basing on the ratio of share in subregional value added to share in subregion population.See annex, table II/40.

3.4 Manpower

The manpower situation in East African Engineering Industries may be briefly described as follows: in none of the countries Engineering Industries are among the largest manufacturing establishments, which absorb the greater part of graduates from whatever technical or vocational training institutions exist. Within the Engineering Industries again, it is the larger and better equipped ones that attract workers and managerial staff, who have received some formal training. On-the-job or sometimes even classroom-type-training after job entry are common practice. On the whole, foremen and high level technical and managerial staff are able to carry out the same operations, and use the same equipment as their counterparts in industrialized countries. One significant difference is, however, that the number of engineers and technicians is small in relation to the number of operatives and here, again, the number of supervisors and foremen is small in relation to that of workmen. Research and development staff as specialized functions are non-existent but designing and product control departments are sometimes fairly well equipped.

The situation is less favourable in the medium and small-scale class of companies, to which most engineering establishments belong (see country reports of existing industries). They are usually less well equipped both with machinery and skilled labour. They are frequently owner-operated, with the owner himself taking care of the management side, the training of the workers and the more complicated operations. The supervisors rarely have received any formal training,

but have come up from the ranks of the workers and picked up their skills on the job.

As was mentioned before, productivity varies not only with the type of work but also from country to country. It seems that in some of the countries the impact of industrialization is still too recent for the workers to develop a sort of 'industrial mentality' which would allow them to work at a sustained level of productivity over a stretch of several hours in surroundings, which are often characterized by noisy and monotonous mechanical operations. Many engineering establishments, therefore, suffer from increased fluctuation of workers, particularly unskilled ones, who find the stress too great. Monetary incentive systems are rarely employed and have been found to be only moderately successful.

Supply of skilled labour, which is a serious problem now, will be a more serious one in future as Engineering Industries with stringent skill requirements move into the subregion and at the same time demand for skilled labour by other industries increases. An estimate of industrial staff requirements by ECA puts the net increase in 1980 at 587.000 over the 1963 figure of 266.000 for all industries. The estimated share of Engineering Industries in this total is comparatively modest with abt. 36.000, but considering the skill distribution in this branch (see 3.5, Part I), this means that abt. 50% will have to be skilled or semi-skilled workers[1)].

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1) annex, table II/41

3.5 Size and Location

As can be seen from the country tables the bulk of East African Engineering Industries, if classified by employment, is in the small- and medium-scale brackets, i.e. up to 50 persons engaged. This classification does not take into account the workshop-type establishments with less than 5 employees, which by mere number form the largest group in all countries. Most of them are of the general service and repair type with a degree of mechanization which put them halfway between artisan and industrial production. In most cases, these shops will be operated by family members, and use scrap for raw materials, thus keeping cost of production at a very low level. Despite the very poor quality of their products, such small establishments therefore provide a competition for the larger ones to be reckoned with, particularly in the rural areas, where purchasing power is low.

Concerning their location, the East African Engineering Industries follow the pattern that can be found in all developing countries, i.e. concentration together with most other industries, in a very limited number of places. In the case of the least industrialized countries of the subregion - Somalia, Rwanda, Burundi and Malawi - practically all engineering establishments are within or next to the capital city. In choosing this location they follow the principle of lowest total cost for raw materials, manufacturing and distribution of their products. In general, for Engineering Industries, transportation of the finished products is more expensive than transportation of raw materials and as processing losses are small, minimization of distribution costs figures higher in the calculation than that of raw material transportation to the factory location. The cities, with their concentration of purchasing power, the agglomeration of other industries and as centers

of the country's construction activity are therefore the obvious location to choose for Engineering Industries under the distribution point of view.

At the same time the cities are connected with the hinterland by a long-established network of business connections, that take care of moving the industry's products to wherever there is a demand for them. As for manufacturing costs, quite often there is no real alternative for industries to staying close to the cities, when it comes to the availability of power and water, skilled labour and service facilities. To all this, a number of less tangible reasons must be added, e.g. proximity to authorities of the government.

3.6 Economies of Scale

Economies of scale, as in all industrial production, enter into Engineering Industries in several respects. The first is derived from the volume of output of a plant: production on a large scale will allow for the use of machinery superior with regard to accuracy, working speed, power und degree of mechanization and automation. The increased cost of such machinery is generally not proportionate to its higher productivity. At the same time, this will allow to make better use of the machinery by cutting down on idle time. The second kind of economies of scale is connected with the first: large-scale production will go together with specialization, i.e. reduction of the number of products and or operations. This means longer production runs which will reduce costs for two reasons: more devices, such as chucks and dies, can be used, and, as operatives become familiar with the process, working time/unit will go down.

For the existing East African Engineering Industries these two types of economies of scale are pratically out of reach because of the lack of their precondition, namely sufficiently large markets. On the contrary, their absence in many cases forces these industries to adopt policies detrimental to such economies. This is particularly true for Engineering Industries in the field of metal products (ISIC 381): in order to fill their capacity they will take on in addition to their primary production program a wide variety of jobs and consequently equip themselves with general-purpose machinery. This will deprive them of the above mentioned economies arising from use of specialized equipment. At the same time they turn the advantage arising from specialisation into the disadvantages connected with heterogenity of production: frequent changes of tools and raw materials, unbalanced utili-

zation of equipment and comparatively low productivity of the workers as little familiarization due to frequent repetition of the same operations takes place. This, in turn, reduces the profitablility of these establishments and is one of the reasons for the fact that many of them are equipped with antiquated machinery.

A final type of economies of scale are those arising from division of labour, which is a function both of the size and the homogenity of its production. It can indeed be found that wherever possible, division of labour is being extensively used in East African Engineering Industries as on the one hand it reduces skill requirements and on the other hand it seems that efficiency of African labour is much higher on repetitive work.

3.7 The Case for Co-operation

Without desregarding the beneficial effects of competition, it seems obvious, after what has been said before, that the East African Engineering Industries are in a situation in which the emphasis must be on co-operation and co-ordination, if significant improvements are to be achieved. Such co-ordination with respect to new investments must take place both within the individual countries of the subregion, where conditions justify production on a national scale, as well as between the countries, where only regional markets can create these conditions. As it is now, neither the former nor the latter is satisfactory. With Engineering Industries in the subregion now crowding mainly into the field of metal products (ISIC 381) even such modest economies of scale, as might be possible are often sacrified by allowing a number of factories to be established where there is room only for one or two. The result is that capacities remain idle and none of the establishments can achieve satisfactory expansion. Quite often, when the decision of granting a licence to a new company has to be taken, the aspect of the new employment created is given priority over such considerations.

The case for co-operation is even stronger in the multinational field. It is set out in some detail in a study by the Economic Commission for Africa concerned with precisely the question[1)]. For Engineering Industries it can be summed up as follow; Unless co-operation among the countries of the subregion is achieved, there will be no basis for a number of such industries for a long time to come, or, if some countries go ahead despite this, this implies the danger that in the long run the optimum pattern of industrial development for the subregion as a whole cannot be attained. "Maximization of the rate of growth for the sub-

1) ECA document ST/ECA/4o Parts 1-9

region as a whole can be achieved only if the course of industrial development in each country supports and is supported by that of every other country. This implies the promotion of economic complementarily among the countries of the subregion.....The danger of misallocation of resources is much greater and the penalties are much higher for such countries than for those where change is less rapid and the economic base is broader".[1)]

1) Document ST/ECA/40/ Part VI, page 16

A N N E X I I

(Tables II/1 - II/54)

GOPA - GESELLSCHAFT FÜR ORGANISATION, PLANUNG UND AUSBILDUNG MBH

Tables II/1 - II/10: general remarks

1) All figures from national import statistics and United Nations publications unless marked "estimate"

2) All weight figures in metric tons. Where no weight figures were available, they were calculated on the basis of average value/weight ratios for the respective subdivision.

3) All value figures in '000 US $. If converted from national currencies, exchange rates from "International Financial Statistics" April 1971 issue, were applied.

4) Blank spaces indicate that no or only unreliable figures were available.

5) Weight indices to be read horizontally, i. e. for a given division over the period covered.

6) Value percentages to be read vertically, i. e. for a given year the four division add up to 100 %.

7) Per capita figures for Engineering Goods Consumption (EGC) in kgs. 1969 figures are probably too low in most cases because of the provisional nature of the statistical figures.

Table II/1

Imports of Engineering Products into Ethiopia

	1964		1965		1966		1967		1968		1969 1)	
	t	$	t	$	t	$	t	$	t	$	t	$
691	437	293	1.460	944	1.758	1.300	1.877	1.388	3.372	1.405	3.118	1.444
692	500	146	550	158	921	195	789	243	732	308	730	376
693	869	255	777	244	2.066	409	1.182	417	2.006	734	615	302
694	1.150	254	766	229	481	162	362	167	724	309	358	193
695	910	883	1.100	1.130	1.461	1.370	1.053	1.220	928	1.067	498	948
696	151	226	404	406	362	422	133	228	166	296	80	290
697	860	433	730	380	988	809	1.578	855	1.912	1.320	1.237	1.400 2)
698	2.135	1.408	2.925	1.560	1.732	1.322	2.387	1.369	3.572	1.981	1.343	1.405
sub-total	7.012	3.898	8.712	5.051	9.769	5.989	9.361	5.887	13.352	7.420	7.979	6.358
index(t)/%($)	100	9,1	124	8,6	139	11,2	133	11,2	190	9,5	114	12,5
711	700	544	541	1.077	384	697	561	859	543	856	922	3.024
712	1.950	3.109	2.400	3.467	2.909	4.333	2.330	3.192	2.561	3.388	2.792	3.267
714	73	880	52	395	51	565	63	666	184	772	61	703
715	-	-	7	12	19	41	-	-	194	214	280	550
717	880	1.636	2.680	3.522	1.946	3.013	1.230	2.715	1.929	4.161	1.327	3.355
718	5.000	6.412	4.700	6.200	3.737	3.922	3.656	5.412	5.821	9.978	2.437	4.363
719	2.850	3.086	5.050	6.419	5.132	5.982	3.039	4.017	3.727	4.561	2.557	5.846
sub-total	11.453	15.667	15.350	21.092	14.178	18.553	10.879	16.861	14.959	23.930	10.376	21.108
index(t)/%($)	100	36,8	134	35,8	124	34,7	95	32,1	127	30,5	91	41,2
722	1.950	1.768	2.620	4.014	1.730	2.298	2.627	3.055	1.241	2.346	798	2.199
723	217	126	515	459	502	699	318	521	307	479	526	611
724	2.907	3.513	940	3.702	870	2.940	1.901	4.083	1.996	3.346	374	3.419
725	274	455	606	910	708	1.422	627	1.017	453	695	237	388
726	7	-	2	17	-	2	-	-	5	26	10	129
729	1.344	910	1.330	927	1.593	1.047	1.509	1.152	2.292	2.190	973	1.903
sub-total	6.699	6.772	6.013	10.029	5.403	8.408	6.982	9.828	6.294	9.082	2.581	8.649
index(t)/%($)	100	15,3	90	17,0	81	15,7	104	18,8	94	11,6	39	16,8
731	800	432	700	1.018	1.221	1.014	1.995	687	591	1.724	46	39
732	8.700	13.876	10.300	15.330	11.170	16.487	9.793	16.188	10.043	15.875	7.244	11.547
733	400	440	310	305	1.034	572	619	623	984	913	1.113	1.024
734	270	1.216	320	5.920	364	2.237	362	2.230	402	18.551	25	2.094
735	95	312	32	102	108	204	37	160	1.178	775	888	392
sub-total	10.265	16.273	11.375	22.675	13.987	20.634	12.806	19.853	13.198	37.838	9.316	15.096
index(t)/%($)	100	38,2	113	38,6	135	38,4	125	37,8	128	48,3	91	29,5
grand total	35.427	42.615	41.737	58.847	43.247	53.584	40.038	52.[illegible]4	47.813	78.270	30.522	51.211
p.c. EGC (kg)	1,59		1,84		1,87		1,69		1,98		1,23	

Remarks: 1)1969 figures are provisional and probably too low throughout. 2)estimate

Table II/2

Imports of Engineering Products into Somalia

	1964		1965		1966		1967		1968		1969	
	t	$	t	$	t	$	t	$	t	$	t	$
691	114	53			12o	56	3o4	141			714	331
692	844	435			122	63	52	27			813	419
693					59	29	61	3o			14o	69
694					459	247	174	94			146	79
695					66	127	37	71			117	224
696					15	55	8	32			1o	38
697			88	1oo	135	119	16o	135	194	22o	72	82
698			548	574	64o	67o	698	731	435	456	3o2	316
Sub-total	1.8oo	1.3oo[1]	2.24o	1.647	1.616	1.366	1.494	1.261	1.815	1.339	2.314	1.558
Index ($)	1oo	9,9	124	12,3	9o	18,9	83	15,6	1o1	12,8	129	(8,3)[2]
711	66	217	676	2.216	261	564	222	427	48o	913	115	379
712	2.485	2.9o8	1.651	1.932	41o	569	595	697	539	726	4o4	473
714	5	65			5	55	7	81			16	15o
715	7	14				1	1	2			21	42
717	4	9			2	6	32	82			89	227
718	21o	377	668	1.197	88	158	58	127	135	254	739	1.324
719	32o	734			254	584	624	1.432			633	1.452
Sub-total	3.o97	4.324	3.13o	3.554	.o2o	1.937	1.539	2.848	1.54o	3.233	2.o17	4.o47
Index ($)	1oo	32,8	1o1	48,9	33	26,9	5o	35,2	5o	31,o	65	(21,6)[2]
722	9	26			67	166	63	176			1o3	284
723	76	89			253	294	3o6	355			147	171
724	58	536	14	132	74	3o4	39	163	143	458	38	354
725	15	25			63	1o3	81	133			9o	147
726	2	25			1	11	2	23			-	-
729	523	997			139	273	14o	275			157	3o7
Sub-total	683	1.698	573	1.3o7	597	1.171	631	1.125	638	1.453	535	1.263
Index ($)	1oo	12,9	84	9,8	87	16,2	92	13,9	92	13,9	78	(6,7)[2]
731	-	-	-	-	-	-	-	-			12o	1o2
732	3.445	5.492	2.279	3.633	2.13o	2.533	1.638	2.611	2.944	4.311	2.912	4.643
733	184	17o			36	24	21	2o			245	226
734	2	141	15	126	2	124	3	2oo	7	52	9	78o
735	2o8	48			131	58	56	29	86	4o	13.934	6.145
Sub-total	3.739	5.851	2.35o	3.9oo	2.289	2.739	1.718	2.856	3.o37	4.4o3	17.22o	11.896
Index ($)	1oo	44,4		29,o	61	38,o	46	35,3	81	42,2	461	(63,9)[2]
Grand-total	9.319	13.173	8.293	13.4o8	5.522	7.213	5.382	8.o9o	7.o3o	1o.428	22.o86	18.764
p.c.EGG(kg)	3,8o		3,32		2,16		2,o5		2,63		3,o1	
Remarks	1) estimate 2) distorted, because of exceptionally high figure for division 73											

Table II/3

Imports of Engineering Products into Kenya

	1964		1965		1966		1967		1968		1969	
	t	$	t	$	t	$	t	$	t	$	t	$
691	164	76	1.237	581	2.607	1.266	4.453	2.062	3.438	1.592	4.598	2.129
692	624	535	1.234	818	1.073	886	1.404	718	1.157	642	1.040	858
693	3.872	1.050	4.277	1.218	4.331	1.325	4.409	1.331	3.718	1.093	3.849	1.353
694	804	395	970	544	1.131	703	1.146	617	1.128	607	700	511
695	514	979	694	1.321	847	1.612	904	1.721	1.016	1.935	1.137	2.165
696	114	414	132	477	134	484	186	673	230	832	255	922
697	399	717	358	705	332	788	401	697	306	840	705	798
698	1.753	1.834	2.047	2.142	2.869	3.002	2.903	3.037	3.330	3.484	3.375	3.531
Sub-total	8.244	6.000	10.947	7.806	13.324	10.066	11.397	10.856	14.323	11.025	15.659	12.267
Index ($)	100	9,3	133	11,0	162	9,2	138	6,8	174	9,0	190	9,2
711	524	1.718	965	3.164	1.402	4.597	2.695	8.834	2.052	6.727	2.735	8.963
712	3.441	4.026	4.067	4.759	4.857	5.683	6.412	7.503	5.613	6.568	5.102	5.970
714	150	1.732	120	1.387	171	1.967	229	2.634	282	3.236	210	3.017
715	486	1.744	404	724	664	1.239	503	1.348	494	1.417	320	927
717	437	1.106	908	2.296	1.020	2.579	977	2.470	1.169	2.956	1.089	2.753
718	3.916	7.011	2.058	4.023	1.834	4.451	6.417	11.488	5.735	10.266	4.935	8.835
719	1.887	4.329	1.713	5.779	4.660	11.254	6.932	15.897	5.959	13.666	5.700	14.900
Sub-total	10.841	21.666	10.235	22.132	14.608	31.770	24.165	50.174	21.304	44.836	20.091	45.365
Index ($)	100	33,6	94	31,0	135	29,0	223	31,2	197	36,8	185	33,9
722	447	1.103	701	1.626	723	1.607	1.267	4.056	424	2.436	1.087	2.996
723	664	694	871	129	977	1.242	794	1.120	931	1.257	1.267	1.495
724	341	3.114	586	4.182	445	4.070	580	5.296	615	5.619	620	5.660
725	561	916	481	785	732	1.195	744	1.214	836	1.365	973	1.588
726	4	59	4	57	12	167	3	49	16	210	8	111
729	871	1.702	996	1.947	1.179	2.304	1.717	3.356	2.334	4.562	1.908	3.729
Sub-total	2.888	7.588	3.639	8.726	4.068	10.585	5.105	15.091	5.156	15.449	5.813	15.579
Index ($)	100	11,7	128	12,2	141	9,7	177	9,4	179	12,6	201	11,6
731	8.011	6.754	3.102	2.615	644	5.453	21.296	17.953	11.448	8.651	2.198	1.982
732	11.015	17.559	14.764	23.534	17.376	27.896	22.892	36.491	19.853	31.647	23.474	37.419
733	839	772	943	868	1.427	1.313	2.359	2.171	2.152	1.980	1.023	942
734	29	2.433	64	5.288	275	22.785	319	26.485	93	7.763	212	17.567
735	4.108	1.812	562	248	238	105	4.224	1.863	1.156	510	6.678	2.945
Sub-total	24.002	29.330	19.435	32.553	19.960	57.552	51.090	84.963	34.702	50.551	33.585	60.855
Index ($)	100	45,4	81	45,8	83	52,3	213	52,7	145	41,5	140	44,8
Grand-total	45.975	64.584	44.265	71.217	51.960	109.973	91.748	161.084	75.485	121.862	75.148	134.066
p.c. EGC (kg)	5,04		4,73		5,41		9,27		7.40		7,16	

Table II/4

Imports of Engineering Products into Uganda

	1964		1965		1966		1967		1968		1969	
	t	$	t	$	t	$	t	$	t	$	t	$
691	460	213	1.408	652	963	446			1.393	645	3.747	1.735
692	271	140	542	280	299	154			485	250	236	122
693	883	434	1.185	582	1.089	535	957	470	1.083	532	1.246	612
694	265	143	421	227	447	241			620	334	431	232
695	504	960	665	1.266	420	801	502	955	548	1.044	384	732
696	77	280	83	300	94	339			90	325	42	154
697	295	334	356	403	359	406			309	350	130	148
698	109	115	1.638	1.714	1.662	1.739			1.040	1.088	1.379	1.443
Sub-total	2.864	2.619	6.298	5.424	5.333	4.661	7.220	5.690	5.568	4.568	7.595	5.178
Index ($)	100	7,8	220	12,3	186	8,6	270	10,6	194	9,4	265	11,3
711	112	369	260	854	188	618	329	1.081	273	896	260	855
712	1.676	1.961	1.211	1.417	2.168	2.537	2.479	2.901	1.445	1.691	1.444	1.690
714	36	423	49	568	39	457	27	311	55	636	30	349
715	323	633	261	512	259	509	513	1.005	357	700	245	481
717	951	2.405	1.058	2.677	561	1.420	1.836	4.642	905	2.290	988	2.500
718	1.944	3.480	1.426	2.554	3.009	5.387	3.976	7.118	3.951	7.073	3.436	6.200
719	1.151	2.640	1.434	3.290	2.053	4.708	2.194	5.031	2.235	5.127	1.937	4.443
Sub-total	6.193	11.911	5.699	11.872	8.277	15.636	11.354	22.089	9.221	18.413	8.340	16.518
Index ($)	100	35,6	92	27,1	134	32,7	183	41,1	149	37,5	135	35,8
722	327	902	646	1.781	429	1.182	592	1.632	643	1.770	535	1.475
723	482	560	545	633	630	731	466	538	564	655	448	520
724	345	3.156	289	2.646	255	2.330	180	1.646	218	1.999	328	3.002
725	278	454	535	874	651	899	358	585	496	809	278	454
726	2	31	4	48	2	31	3	35	3	40	-	-
729	677	1.324	878	1.716	882	1.725	776	1.517	849	1.660	864	1.689
Sub-total	2.111	6.427	2.897	7.698	2.849	6.898	2.375	5.953	2.773	6.933	2.353	7.140
Index ($)	100	19,2	137	17,5	135	14,5	113	11,2	131	14,0	111	15,4
731	189	160	306	258	289	244	255	215	385	327	134	113
732	6.826	10.881	10.306	16.428	11.667	18.598	10.481	16.708	10.227	16.302	10.251	16.341
733	1.418	1.305	1.552	1.428	2.221	2.044	1.914	1.761	1.575	1.449	852	784
734	1	42	9	762	2	159	15	1.288	12	991	1	68
735	95	42	63	28	5	2	-	-	321	142	-	-
Sub-total	8.529	12.430	12.236	18.904	14.184	21.047	12.665	19.972	12.520	19.211	11.238	17.306
Index ($)	100	37,1	143	43,1	166	44,0	148	37,2	147	39,1	132	37,5
Grand-total	19.697	33.387	27.130	43.898	30.643	48.242	34.114	53.704	30.082	49.125	29.526	46.142
p.c. EGC (kg)	2,40		3,20		3,51		3,80		3,26		3,10	

Table II/5

Imports of Engineering Products into Tanzania

	1964		1965		1966		1967		1968 1)		1969 1)2)	
	t	$	t	$	t	$	t	$	t	$	t	$
691	2.691	1.246	6.140	2.834	5.701	2.640	6.252	2.895	3.611	1.672	2.766	1.281
692	233	120	4.458 4)	2.296 4)	483	249	679	350 3)	947	488	510	263
693	1.026	504	1.134	557	1.083	532	1.755	862	1.599	756	932	458
694	457	246	544	293	572	308	557	300 3)	555	299	613	330
695	585	1.114	644	1.226	928	1.767	1.094	2.083	1.081	2.050	889	1.693
696	104	378	114	414	121	437	122	440 3)	127	460	135	488
697	573	649	551	624	656	742	665	750	1.046	1.184	435	492
698	1.244	1.302	1.630	1.705	1.908	1.996	2.044	2.139	2.095	2.192	1.595	1.669
sub-total	6.913	5.559	15.215	9.949	11.452	8.671	13.168	9.819	11.001	9.101	7.875	6.674
index(t)/%($)	100	13,5	220	18,3	166	13,2	190	12,9	159	11,4	114	11,3
711	341	1.120	504	1.652	667	2.187	676	2.218	760	2.493	813	2.665
712	3.373	3.947	2.877	3.367	2.386	2.792	3.003	3.514	2.913	3.409	2.768	3.239
714	42	482	67	770	62	717	53	610	63	727	53	616
715	214	420	357	700	324	636	250	490	200	392	204	400
717	513	1.299	859	2.173	1.230	3.111	2.722	6.882	2.324	5.877	1.173	2.967
718	1.421	2.545	2.008	3.595	2.957	5.294	3.439	6.157	2.973	5.323	2.548	4.561
719	1.622	3.721	3.028	6.944	3.301	7.571	3.218	7.381	4.235	9.712	3.583	8.216
sub-total	7.526	13.534	9.700	19.201	10.927	22.308	13.361	27.252	13.468	27.933	11.142	22.664
index(t)/%($)	100	32,5	129	35,6	145	33,9	178	36,0	179	34,9	148	38,2
722	548	1.512	629	1.734	611	1.686	1.028	2.834	683	1.882	820	2.260
723	427	496	702	815	584	678	453	526	638	741	525	610
724	275	2.514	252	2.302	266	2.436	306	2.800	350	3.199	234	2.145
725	491	801	585	955	624	1.019	456	745	600	980	544	888
726	2	28	3	39	8	107	10	125	12	145	6	72
729	839	1.641	908	1.775	1.100	2.150	1.110	2.171	1.055	2.062	962	1.880
sub-total	2.582	6.992	3.079	7.620	3.193	8.076	3.363	9.201	3.338	9.009	3.091	7.855
index(t)/%($)	100	16,9	119	14,1	124	12,3	130	12,1	129	11,3	120	13,0
731	584	493	339	286	179	151	405	342	418	353	298	252
732	8.267	13.178	9.687	15.442	14.979	23.878	13.977	22.820	18.296	29.165	11.750	18.730
733	1.814	1.669	1.442	1.327	2.078	1.912	2.654	2.442	2.632	2.422	1.240	1.141
734	-	14	-	22	6	535	43	3.632	3	221	1	119
735	165	73	349	154	501	221	1.832	808	3.834	1.691	4.439	1.958
sub-total	10.830	15.427	11.817	17.231	17.743	26.697	18.911	29.504	25.183	33.852	17.728	22.200
index(t)/%($)	100	37,1	109	31,9	164	40,6	175	38,9	233	42,4	164	37,7
grand total	27.851	41.512	39.811	54.001	43.315	65.752	48.803	75.776	52.990	79.895	39.836	59.393
p.c. EGC (kg)	2,43		3,39		3,61		3,97		4,18		3,05	

Remarks: 1) includes Zanzibar 2) 24 main exporters only 3) estimate 4) unreliable

Table II/6

Imports of Engineering Products into Burundi

	1964		1965		1966		1967		1968		1969	
	t	$	t	$	t	$	t	$	t	$	t	$
691					95	44	2oo	93			123	57
692					1o1	41	92	35				
693					5o	35					75	37
694					13o	7o	118	64	54	29		
695									31	59	33	63
696							14	51				
697					38	43	45	51	28	32	38	43
698					164	172	165	181	234	244	181	19o
Sub-total					578	446	634	477	565	416	45o	39o
Index ($)					1oo	15,5	11o	13,6	98	6,9	78	1o,1
711					24	81	33	111	5o	165	26	87
712											24	29
714					3	36	6	69	3	4o	8	96
715							14	29				
717					15o	219	28o	3o4	68	171	14	37
718					29	52	18	34	1o3	184	66	119
719					136	312	75	251	93o	2.123	156	358
Sub-total					342	751	426	8o7	1.3o4	2.715	294	726
Index ($)					1oo	25,9	125	23,1	381	45,o	86	18,7
722					44	123	7o	299	69	189	111	3o6
723					27	36	25	31	55	64	8o	93
724					4	37	18	165	16	162	22	2o7
725							22	37	27	44	28	47
726					-	-	-	-	-	-	-	-
729					68	134	71	14o	97	189	374	732
Sub-total					143	385	2o6	719	426	972	615	1.385
Index ($)					1oo	13,3	165	2o,5	298	16,1	43o	35,7
731					-	-	77	67	-	-	-	-
732					6o2	1.193	644	1.o27	1.18o	1.88o	776	1.237
733							39	36	43	4o	47	44
734					2	55	3	4o2	-	-	1	93
735					-	-	-	-	-	-	-	-
Sub-total					6o4	1.292	736	1.535	1.53o	1.94o	824	1.374
Index ($)					1oo	44,6	122	43,9	253	32,1	136	35,4
Grand-total					1.667	2.874	2.oo2	3.538	3.825	6.o43	2.138	3.875
p.c. EGC (kg)					o,51		o,59		1,12		o,62	

Table II/7
Imports of Engineering Products into Zambia

	1964		1965		1966		1967		1968		1969	
	t	$	t	$	t	$	t	$	t	$	t	$
691	6.000	2.778	5.775	2.674	5.708	2.149	4.402	1.869	4.002	1.853	4.731	2.190
692	805	415	1.671	861	2.386	1.229	3.559	1.730	778	401	833	429
693	3.729	1.931	5.162	2.535	7.391	3.401	8.678	2.906	2.130	1.046	1.858	912
694	2.022	1.088	2.574	1.385	3.011	1.499	2.799	1.706	1.141	614	1.130	608
695	502	956	811	1.545	1.093	2.081	1.523	2.900	1.179	2.244	1.859	3.538
696	119	431	182	658	134	483	202	729	135	488	127	457
697	1.197	1.354	1.339	1.515	1.305	1.477	1.754	1.984	312	354	308	348
698	2.310	2.417	3.633	3.801	3.030	3.170	3.565	3.730	2.140	2.239	1.936	2.025
sub-total	16.684	11.370	21.147	14.974	24.058	15.489	26.482	17.554	11.817	9.239	12.782	10.502
index(t)/%($)	100	14,5	127	12,5	144	9,1	159	8,1	71	6,3	77	7,5
711	809	2.654	1.330	4.359	1.570	5.145	2.117	6.940	1.609	5.273	1.799	5.896
712	2.771	3.243	4.158	4.866	10.572	11.902	7.446	8.712	3.187	3.729	3.024	3.539
714	88	1.012	108	1.246	216	2.485	302	3.470	188	2.168	151	1.736
715	227	446	337	661	357	550	159	420	472	925	746	1.461
717	221	560	422	1.069	466	1.180	530	1.342	1.352	3.419	1.206	3.051
718	5.684	10.176	9.230	16.683	14.326	25.644	18.718	33.506	7.234	12.949	8.783	15.723
719	5.759	13.206	4.640	10.640	7.501	17.201	10.505	24.090	13.767	31.570	13.083	30.000
sub-total	15.559	31.297	20.315	39.542	34.608	64.107	39.777	78.480	27.809	60.033	28.792	61.406
index(t)/%($)	100	39,8	131	33,1	222	37,7	257	36,2	179	41,0	185	44,1
722	1.363	3.756	1.528	4.212	2.684	7.396	2.796	7.703	2.830	7.799	2.531	6.975
723	1.980	2.297	4.465	5.180	5.531	6.083	6.270	6.243	4.662	5.408	5.522	6.406
724	305	2.791	404	3.693	581	5.304	755	6.892	390	3.566	470	4.299
725	968	1.579	1.530	2.496	1.647	2.687	1.902	3.103	800	1.306	731	1.193
726	-	-	-	-	9	113	23	293	12	155	8	99
729	1.787	3.492	5.156	10.075	4.887	9.550	4.619	9.207	1.976	3.862	2.295	4.486
sub-total	6.403	13.915	13.083	25.656	15.339	31.133	16.365	33.441	10.670	22.086	11.557	23.458
index(t)/%($)	100	17,7	204	21,6	240	18,3	256	15,4	167	15,1	180	16,9
731	641	541	1.797	1.515	1.935	1.887	14.580	12.291	2.112	1.781	7.040	5.935
732	12.241	19.513	20.303	32.364	23.079	36.789	33.969	54.148	29.516	47.050	21.397	34.108
733	1.689	1.551	2.978	2.740	4.281	3.939	10.178	9.364	2.728	2.510	2.269	2.088
734	3	237	28	2.370	198	16.429	138	11.500	34	2.854	15	1.322
735	278	123	199	88	385	170	-	-	1.485	655	861	380
sub-total	14.852	21.968	25.305	39.077	29.878	59.214	58.865	87.303	35.875	54.850	31.582	43.833
index(t)/%($)	100	27,9	170	32,8	201	34,8	396	40,3	242	37,6	213	31,5
grand total	53.498	78.550	79.850	119.231	103.883	169.943	141.489	216.778	86.171	146.208	84.713	139.199
p.c. EGC (kg)	14,98		21,82		27,70		36,75		21,82		20,92	
Remarks:	estimate[1)]											

Table II/8

Imports of Engineering Products into Malawi

	1964		1965		1966		1967		1968		1969	
	t	$	t	$	t	$	t	$	t	$	t	$
691	1.145	532	1.596	642	1.47o	68o	1.o63	541	1.3o9	585	1.446	6o4
692	291	15o	297	155	65o	325	638	329	848	437	565	291
693	3oo	119	471	175	476	234	658	219	596	196	723	277
694	531	195	371	2oo[1]	41o	221	452	198	625	243	732	32o
695	187	357	245	467	382	727	367	7oo	299	569	271	577
696	28	1o3	36	118	75	271	37	126	37	128	39	14o
697	325	368	433	49o	5o9	576	523	592	439	33o	5oo	36o
698	398	417	5o5	529	634	664	74o	773	319	375	1.ooo	1.o46
sub-total	3.2o5	2.241	3.954	2.776	4.6o6	3.698	4.478	3.478	4.472	2.863	5.276	3.555
index (t)/%($)	1oo	19,5	123	19,o	144	14,2	14o	16,7	14o	11,6	165	14,2
711	196	643	169	556	361	1.185	429	1.o9o	5o2	996	342	783
712	396	464	676	791	732	857	538	63o	695	814	769	9oo
714	11	134	19	221	38	446	5o	579	31	362	31	363
715	14	43	24	4o	53	1o4	62	122	144	236	171	26o
717	46	118	147	372	518	1.312	193	488	221	56o	424	1.o72
718	176	316	6o3	1.o81	1.458	2.611	939	1.152	2.923	3.726	1.821	2.665
719	55o	1.263	39o	895	892	2.o46	814	1.94o	1.263	2.897	1.217	2.791
sub-total	1.389	2.981	2.o28	3.956	4.o52	8.561	3.o25	6.ooo	5.779	9.59o	4.775	8.833
index (t)/%($)	1oo	25,7	146	27,2	292	33,o	218	28,7	416	38,4	344	34,8
722	83	229	1oo	277	483	1.331	343	945	268	74o	268	741
723	127	148	266	3o9	569	661	526	5o5	423	391	484	422
724	79	725	86	787	15o	1.372	1o3	942	98	9o2	8o	729
725	6o	99	1o8	177	2o7	338	172	282	161	264	166	275
726	4	55	-	8	-	-	-	-	-	-	-	-
729	246	481	595	1.163	567	1.1o8	313	613	3o9	6o4	38o	743
sub-total	599	1.737	1.155	2.721	1.976	4.81o	1.457	3.332	1.259	2.958	1.378	2.956
index (t)/%($)	1oo	15,o	193	18,4	33o	18,4	243	15,8	21o	12,o	23o	11,8
731	71	1o8	453	177	911	768	622	525	1.967	1.659	1.277	1.o77
732	2.3oo	3.667	2.477	3.949	4.174	6.654	3.8o4	6.o65	3.983	6.349	3.898	6.215
733	546	5o3	1.129	1.o39	1.429	1.315	1.234	1.136	1.1o2	1.o14	1.o8o	994
734	-	2o	-	16	2	247	4	4o8	5	48o	18	1.566
735	38	17	4o	18	2o1	89	-	-	-	-	-	-
sub-total	2.955	4.315	4.o99	5.199	6.717	9.o73	5.664	8.134	7.o37	9.555	6.273	9.937
index(t)/%($)	1oo	38,o	139	35,4	227	34,9	192	38,8	239	38,1	212	39,1
grand total	8.142	11.274	11.236	14.652	17.351	26.142	14.624	2o.944	18.567	24.966	17.7o2	25.281
p.c. EGC	2,12		2,86		4,3o		3,54		4,37		4,o6	
remarks	[1] estimate											

Table II/9

Imports of Engineering Products into Madagascar

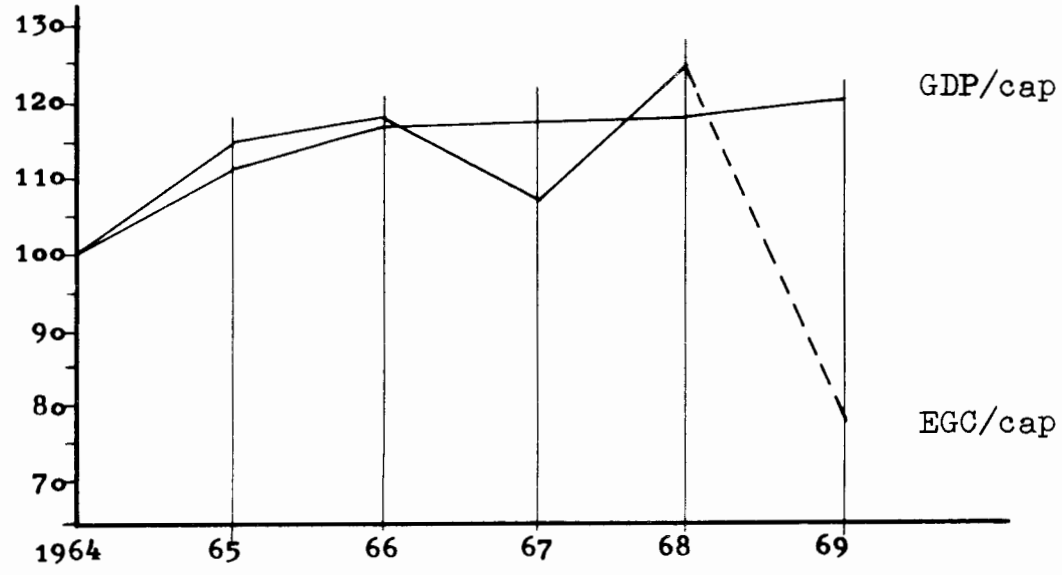
	1964		1965		1966		1967		1968		1969	
	t	$	t	$	t	$	t	$	t	$	t	$
691			983	358	971	525	575	398	2.917	1.351		
692	53o	283	2.6o4	1.373	44o	422	1.oo7	58o	52o	368		
693			681	353	812	399	7o9	4o3	1.226	772		
694	1.65o	633	1.589	633	1.53o	6o4	948	519	89o	444		
695	73o	958	1.oo3	1.121	8oo	1.o56	731	1.o45	845	1.269		
696			143	386	172	51o	214	534	225	745		
697	1.69o	1.18o	1.489	1.1o9	1.11o	954	1.oo8	858	55o	583		
698			2.971	2.217	1.542	1.342	3.o39	2.583	2.o4o	2.oo7		
Sub-total	1o.o9o	6.83o	11.463	7.55o	7.377	5.812	8.226	6.92o	9.213	7.539	9.5oo	8.ooo
Index ($)	1oo	16,o	114	17,8	73	12,8	81	13,2	91	12,9	94	1o,2
711	669	2.578	389	1.8o1	69o	2.163	368	1.637	754	2.526	852	2.793
712	423	452	382	613	482	5o4	1.362	1.881	766	749	2.983	3.491
714	7o	7o4	5o	51o	43	461	51	552	68	772	53	741
715	87	218	14o	3o1	149	342	78	214	1o9	24o	115	316
717	535	1.346	647	1.394	1.o44	2.o23	975	2.o28	639	1.663	627	1.9o2
718	1.69o	2.43o	1.483	2.364	1.42o	3.o6o	1.677	2.949	1.353	1.848	3.193	5.716
719	1.9oo	4.512	2.135	5.166	2.289	6.337	2.1o2	5.731	3.546	8.3o3	4.754	1o.9o2
Sub-total	5.274	12.24o	5.226	12.149	6.117	14.89o	6.613	14.992	7.235	16.1o1	12.4o9	25.861
Index ($)	1oo	28,7	99	28,3	116	33,o	125	28,7	137	27,8	235	33,o
722	31o	8o8	5o2	1.774	342	89o	457	1.o53	46o	1.187	821	3.2o9
723	652	1.138	453	634	1.o26	2.o5o	547	718	614	1.513	1.11o	1.9o7
724	421	3.861	215	2.785	541	4.833	249	4.963	259	3.674	37o	3.375
725	58	95	73	169	19	7o	99	245	25	1o5	274	51o
726	-	-	24	234	-	-	-	-	-	-	5	155
729	1.411	2.258	1.2o6	2.223	1.449	2.312	1.3o3	2.69o	1.854	3.151	1.81o	3.537
Sub-total	2.86o	8.16o	2.473	7.819	3.377	1o.161	2.655	1o.469	3.135	9.63o	4.39o	12.773
Index ($)	1oo	19,3	86	18,3	118	22,3	93	2o,1	1o9	16,6	154	16,3
731	1.784	1.537	633	936	641	661	981	1.5o7	1.323	2.o25	894	2.o7o
732	7.498	11.76o	6.496	11.927	6.155	11.392	7.8o5	14.o29	1o.133	18.899	13.936	22.215
733	7o2	557	695	5o6	653	517	764	679	816	612	1.23o	1.458
734	11c	1.o29	1o4	1.o95	181	1.12o	2o4	2.924	197	2.919	46	3.834
735	942	342	929	693	375	646	326	633	778	25o	5.247	2.314
Sub-total	11.o36	15.225	8.857	15.157	8.oo5	14.336	1o.o8o	19.772	13.247	24.7o5	21.353	31.891
Index ($)	1oo	35,7	8o	35,6	73	31,6	91	37,9	12o	42,6	194	4o,6
Grand-total	29.26o	42.455	28.o19	42.675	24.876	45.199	27.574	52.153	32.83o	57.975	47.652	78.525
p.c. EGC (kg)	4,88		4,27		3,67		3,93		4,59		6,53	

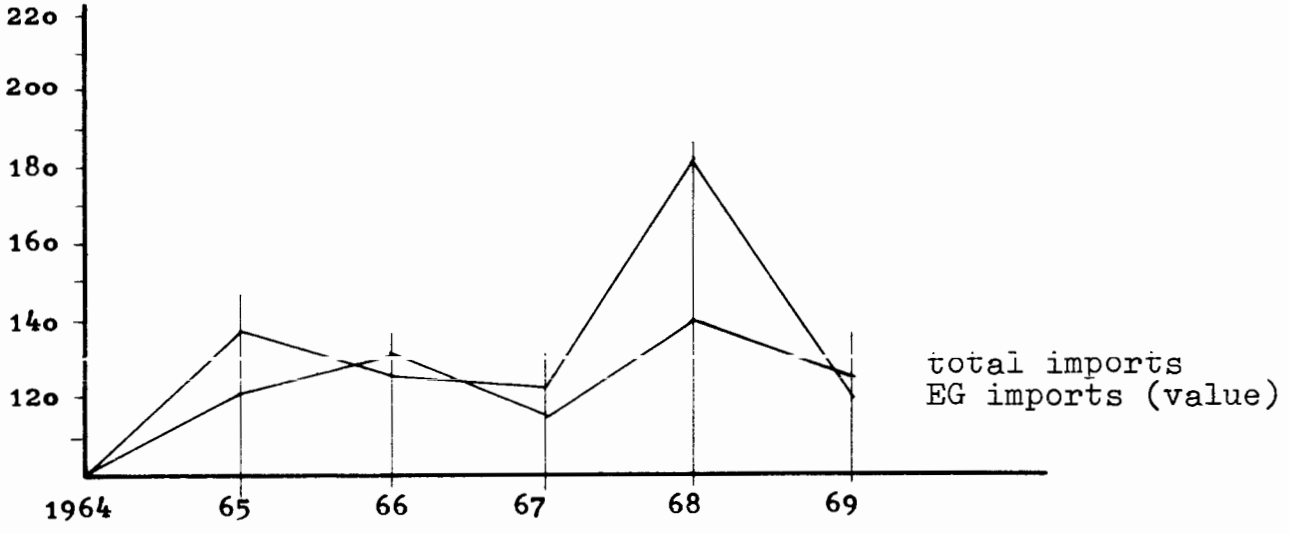
Table II/10

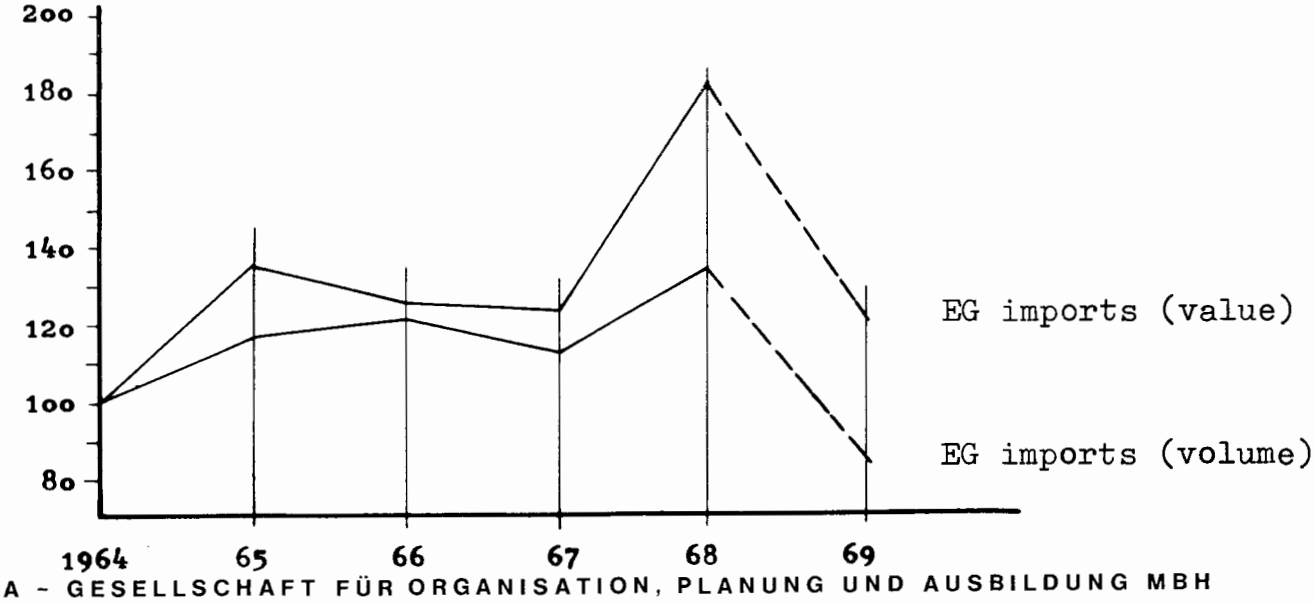
Imports of Engineering Products into Mauritius

	1964		1965		1966		1967		1968		1969	
	t	$	t	$	t	$	t	$	t	$	t	$
691	1.437	772	860	772	270	214	327	309	114	53	267	124
692	72	52	217	112	42	35	71	55	196	108	168	87
693	398	150	269	119	244	111	286	115	134	66	224	110
694	598	188	434	169	312	143	404	170	251	111	167	90
695	144	214	93	158	84	151	97	197	100	237	66	127
696	36	132	42	153	32	117	39	142	51	185	45	165
697	193	219	217	192	203	175	196	214	177	201	167	190
698	1.027	1.075	1.016	947	784	794	780	965	711	809	860	900
sub-total	3.905	2.802	3.148	2.622	1.971	1.740	2.200	2.167	1.734	1.770	1.964	1.793
index(t)/% ($)	100	16,0	81	17,9	51	18,9	56	19,4	44	14,9	50	16,4
711	565	824	222	729	142	260	170	347	107	351	132	435
712	1.040	1.217	630	738	133	478	617	722	608	712	641	750
714	28	332	28	337	18	215	23	265	13	156	33	384
715	31	48	55	123	26	51	20	45	55	121	98	192
717	72	184	70	179	62	157	48	122	42	107	39	101
718	287	514	191	343	176	316	299	536	297	528	274	492
719	1.393	3.195	1.055	2.420	536	1.230	633	1.452	676	1.551	582	1.336
sub-total	3.416	6.314	2.251	4.869	1.093	2.707	1.810	3.489	1.798	3.526	1.799	3.690
index(t)/%($)	100	36,0	66	33,8	32	29,5	53	31,0	53	29,4	53	33,6
722	226	441	185	490	94	193	108	240	113	280	160	443
723	501	474	446	437	310	298	448	525	254	289	125	172
724	141	1.292	152	1.393	99	911	102	940	101	931	98	899
725	84	200	79	195	81	182	37	260	82	216	187	306
726	4	45	-	6	6	67	13	166	6	42	-	-
729	649	1.269	490	958	456	892	600	1.174	707	1.383	716	1.400
sub-total	1.605	3.721	1.352	3.479	1.046	2.543	1.308	3.305	1.263	3.141	1.286	3.220
index(t)/%($)	100	21,1	84	24,1	65	27,1	82	29,2	79	26,4	80	29,3
731	56	48	21	17	23	20	7	6	27	23	-	-
732	2.627	4.189	2.014	3.211	1.239	1.976	1.373	2.189	1.709	2.725	620	1.946
733	356	328	255	235	196	181	183	169	130	120	93	86
734	1	50	1	48	-	4	-	-	-	-	-	-
735	17	8	17	8	9	4	4	2	1.421	627	693	306
sub-total	3.057	4.623	2.308	3.519	1.467	2.185	1.567	2.366	3.287	3.495	1.406	2.338
index(t)/%($)	100	26,3	76	24,1	48	23,8	51	21,2	108	29,4	46	21,3
grand-total	11.983	17.460	9.059	14.489	5.577	9.175	6.885	11.327	8.073	11.932	6.455	11.041
p.c.EGC	16,76		12,36		7,44		8,94		10,15		8,00	
Remarks	1) estimate											

II/11 Ethiopia: Indices

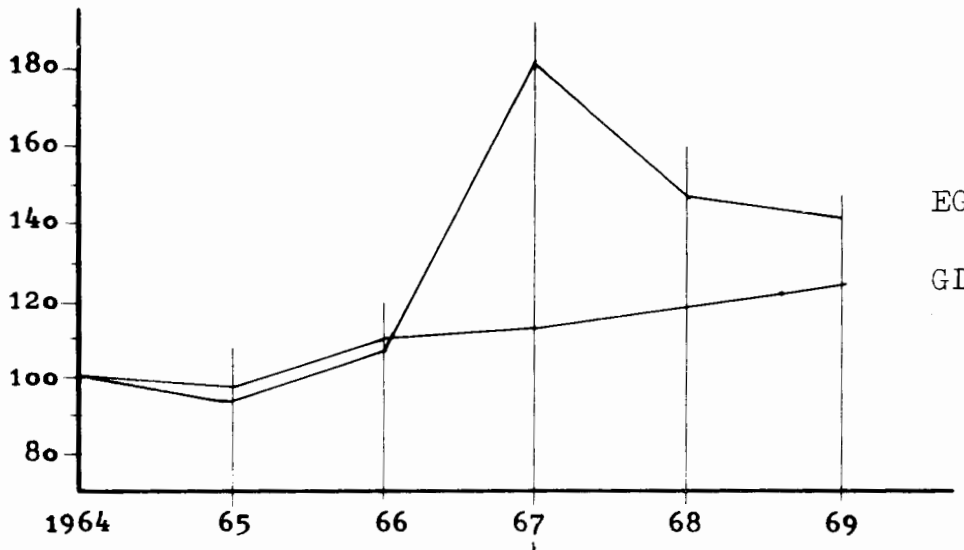






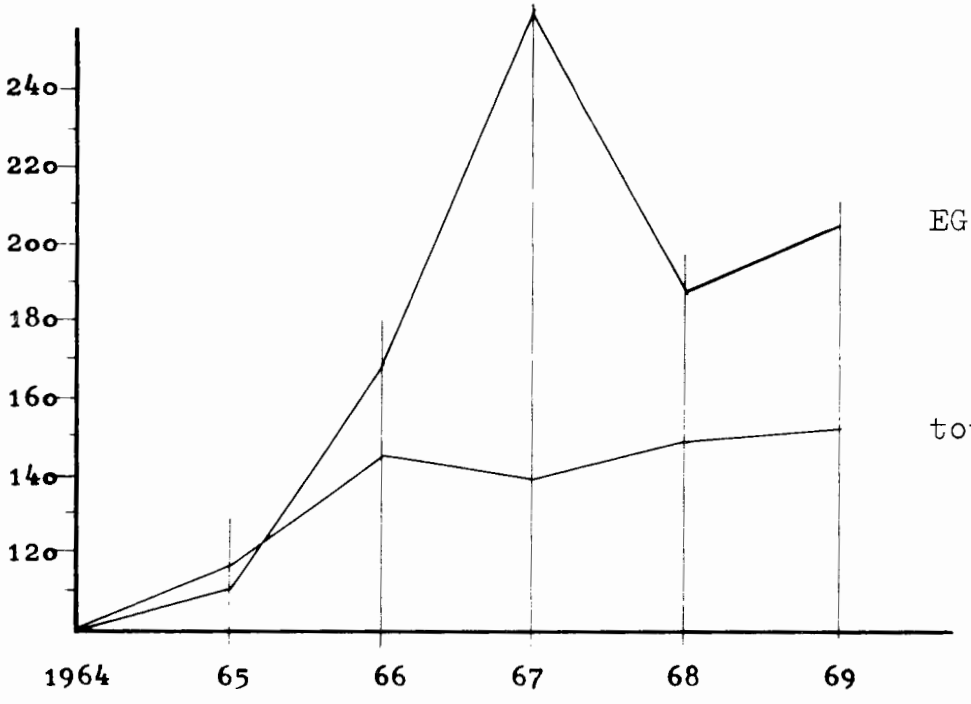
II/12

Kenya: Indices



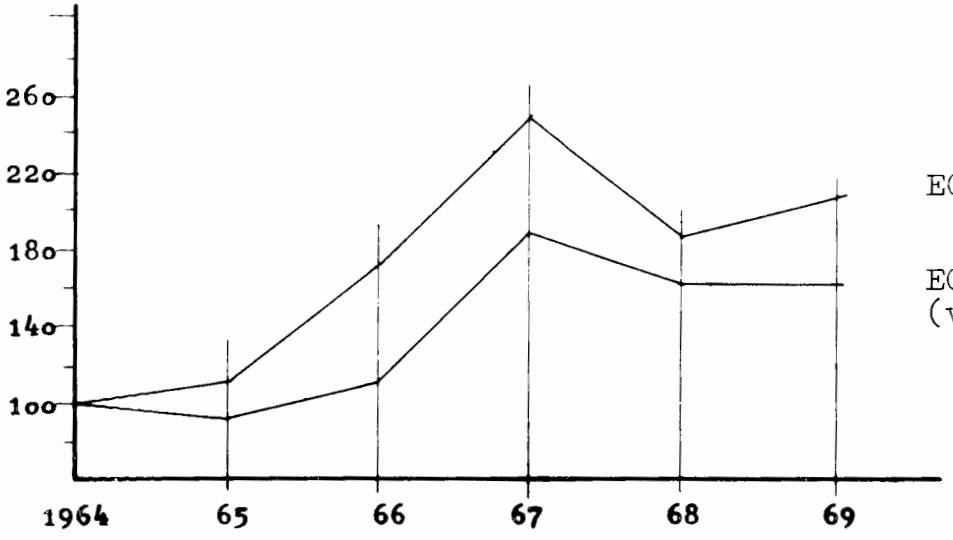
EGC/cap

GDP/cap



EG imports (value)

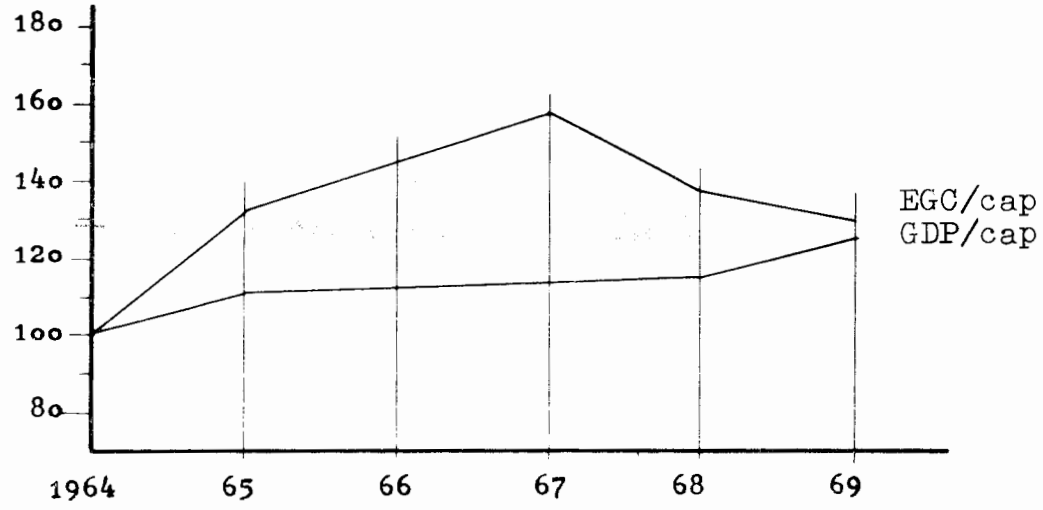
total imports

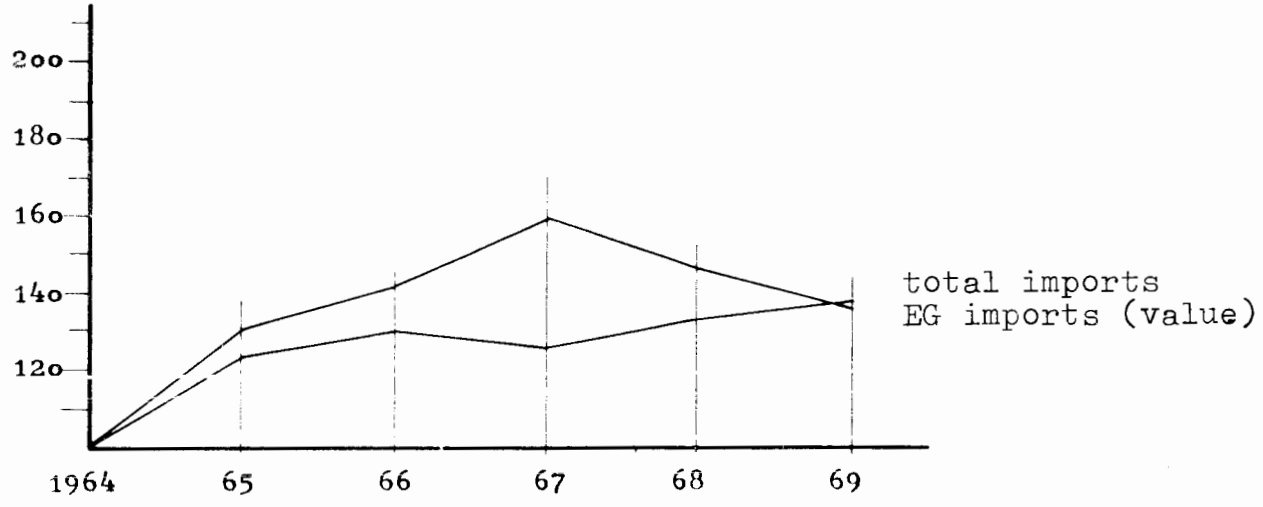


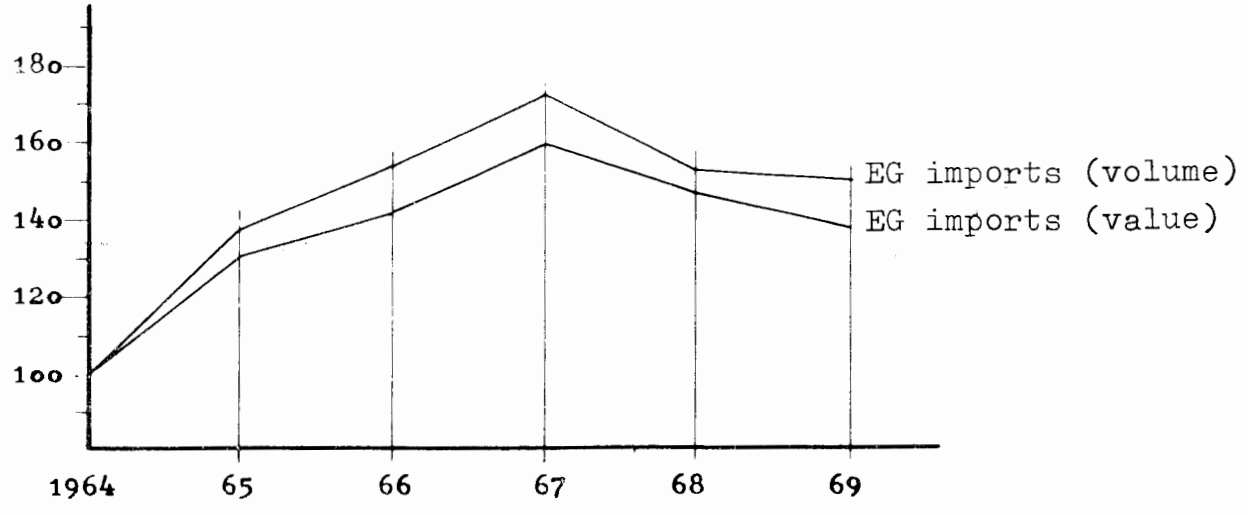
EG imports (value)

EG imports (volume)

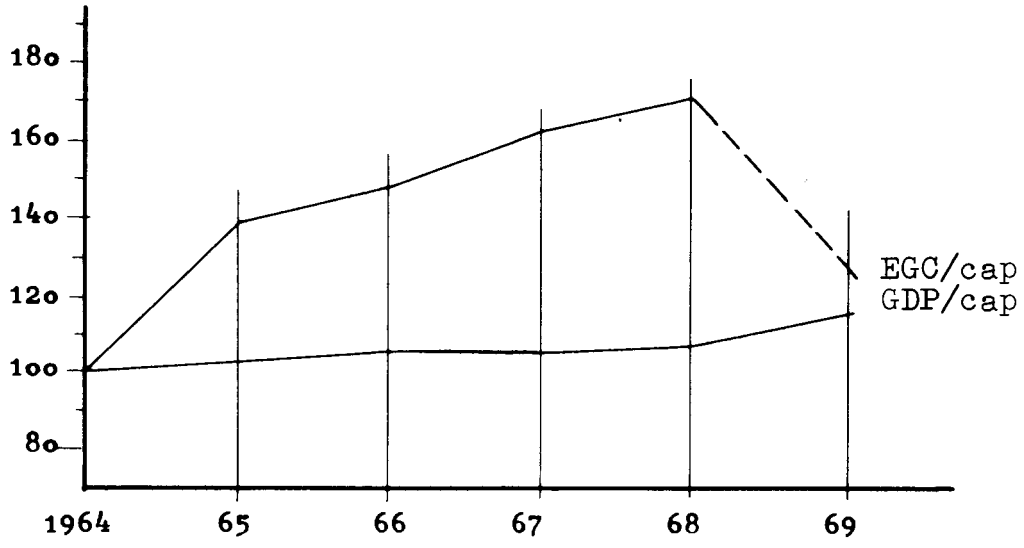
II/13 Uganda: Indices

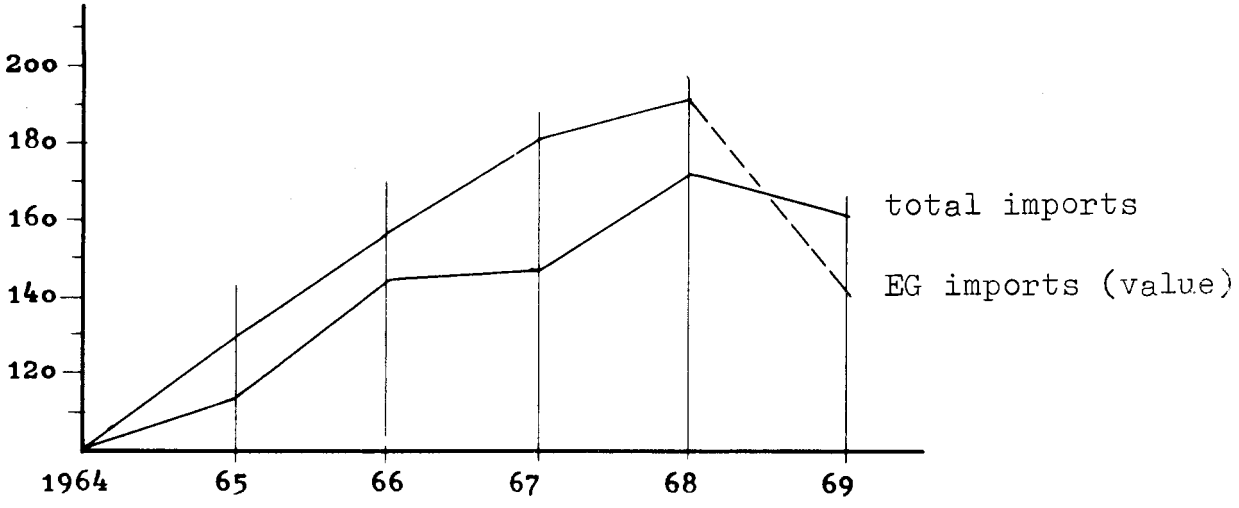


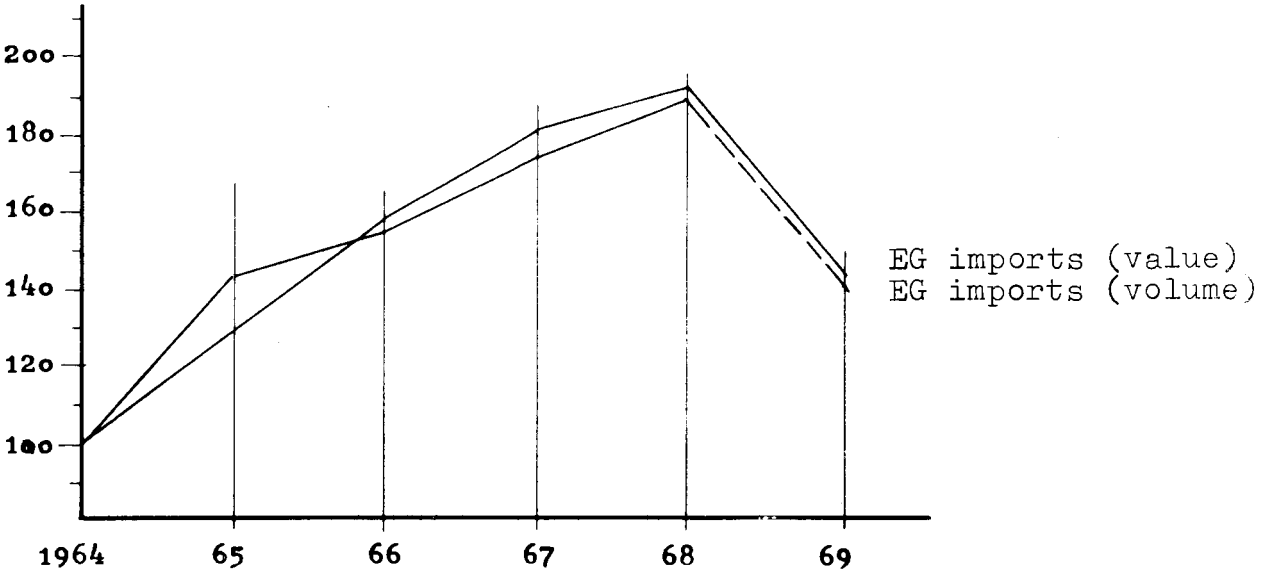




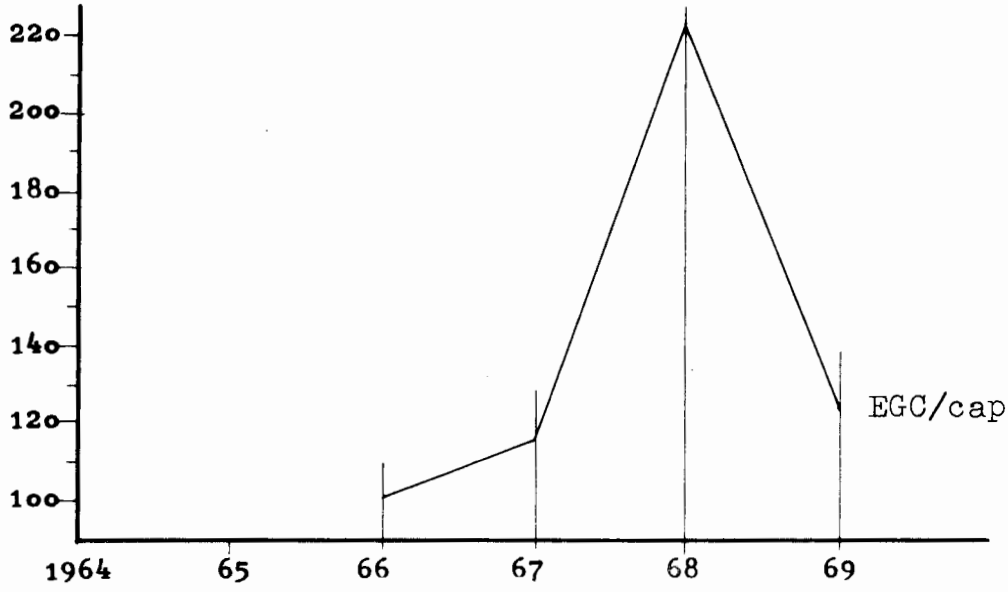
II/14 Tanzania: Indices

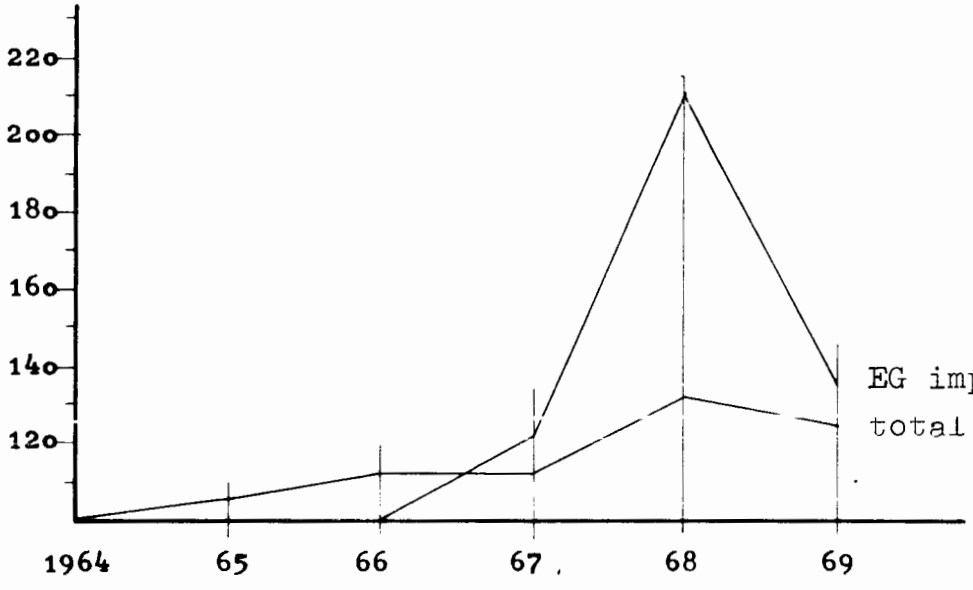


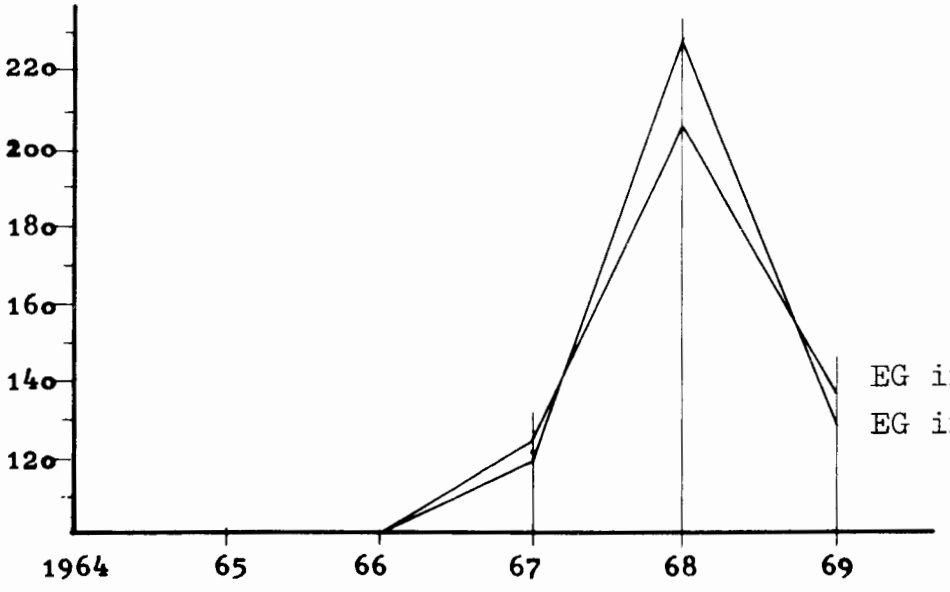




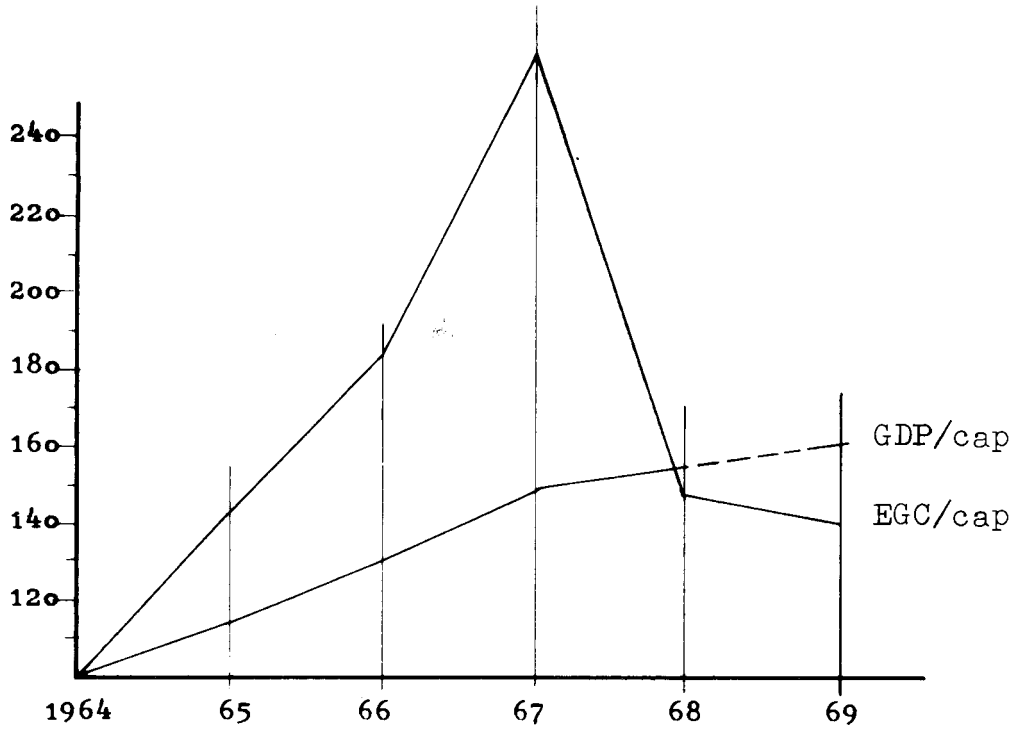
II/15 Burundi: Indices

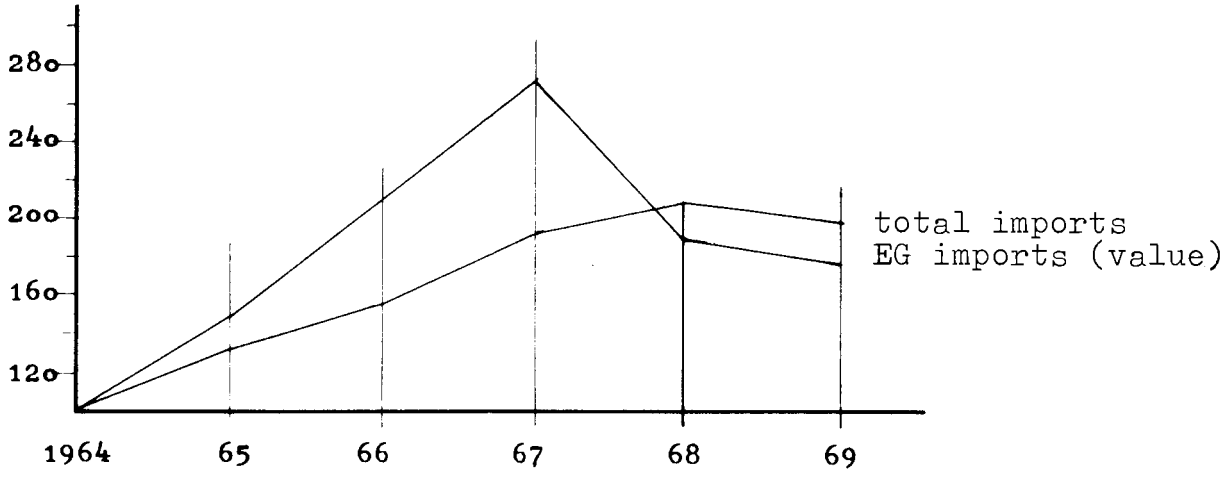


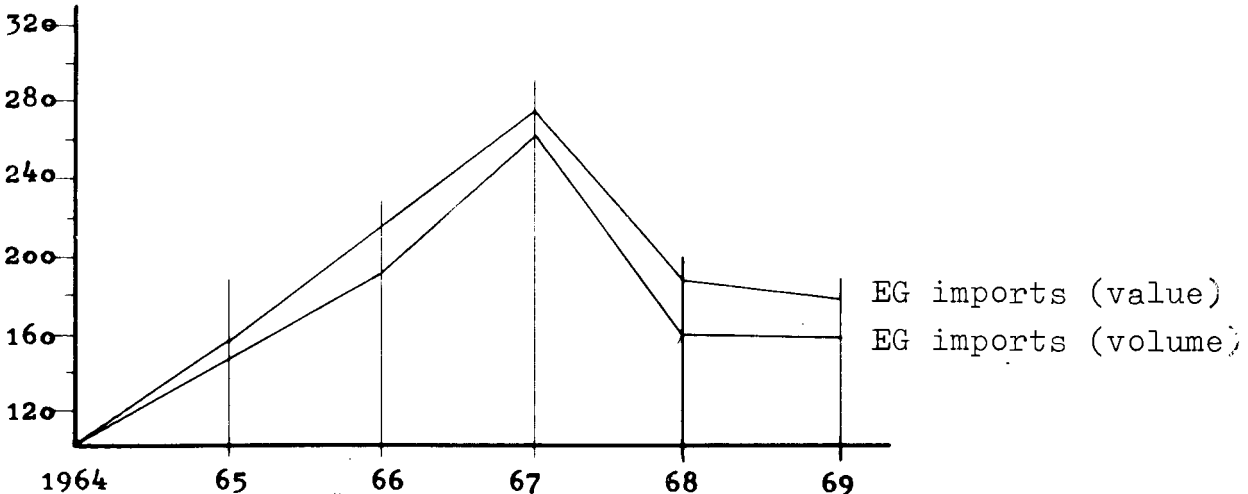




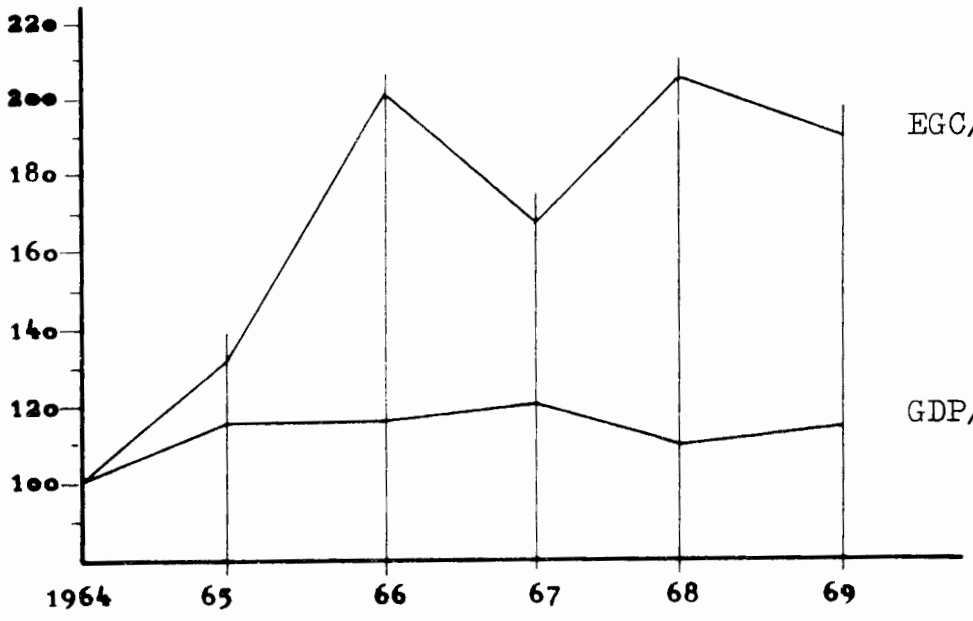
II/16 Zambia: Indices

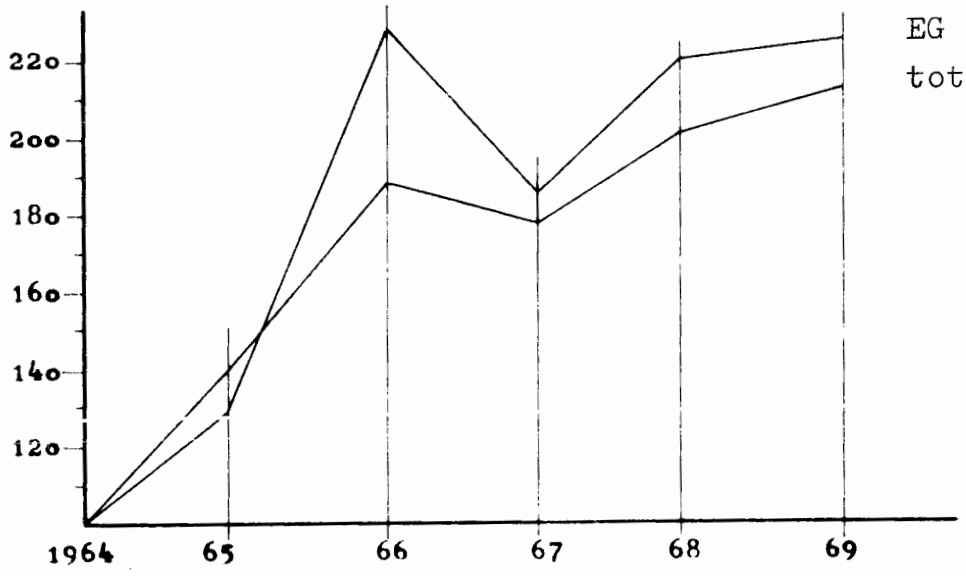


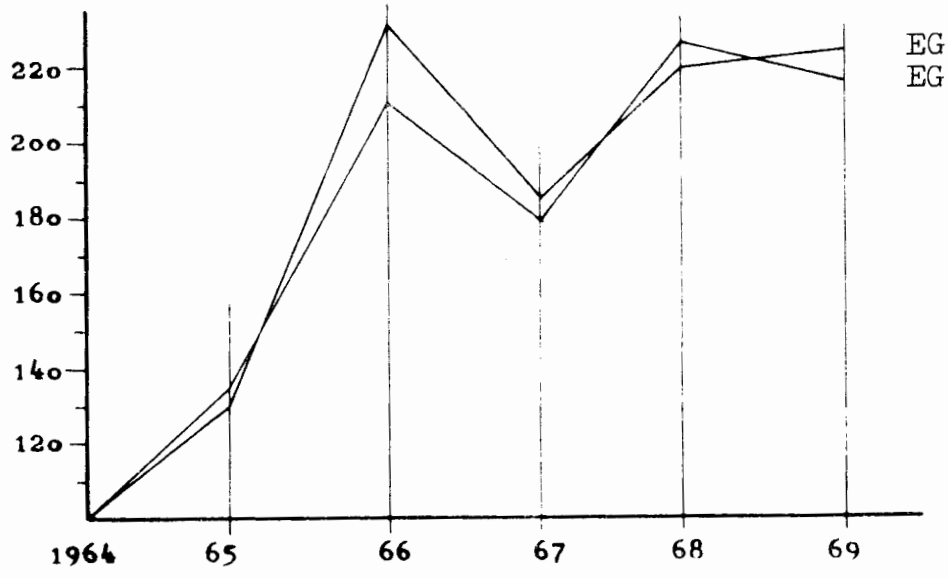




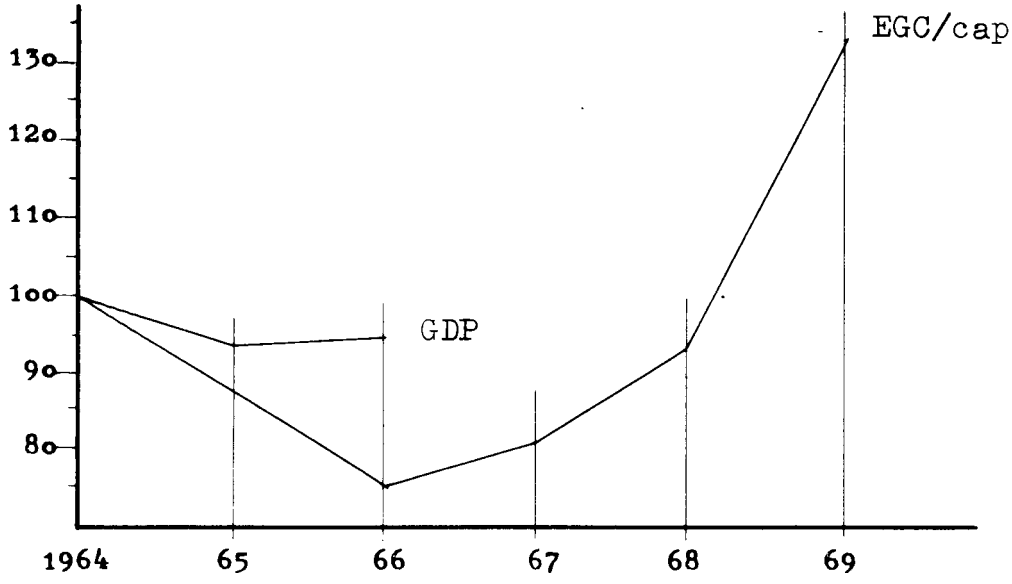
II/17 Malawi: Indices

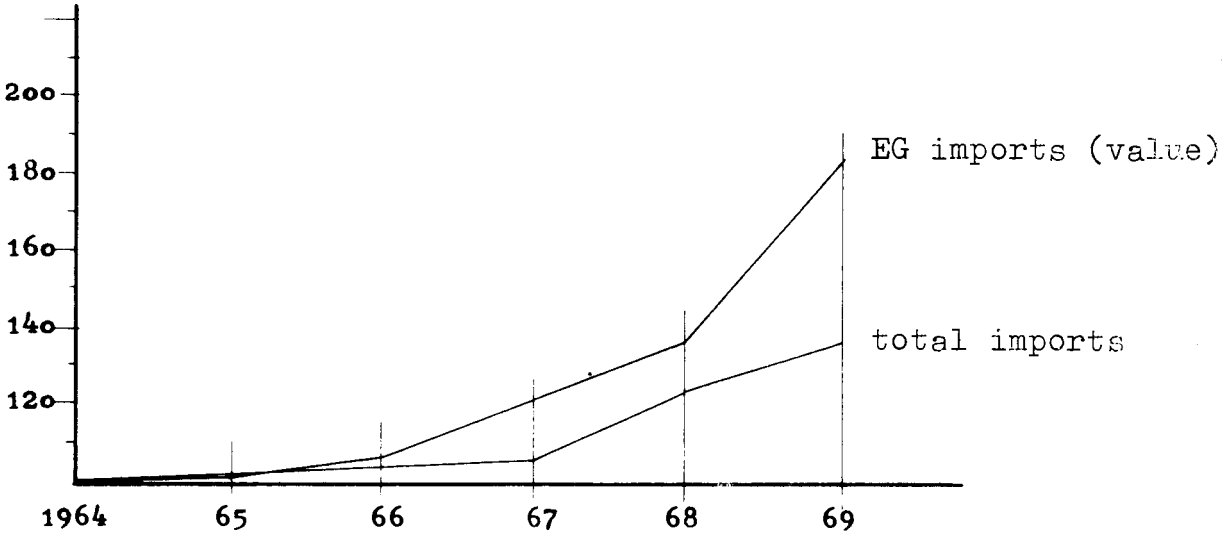


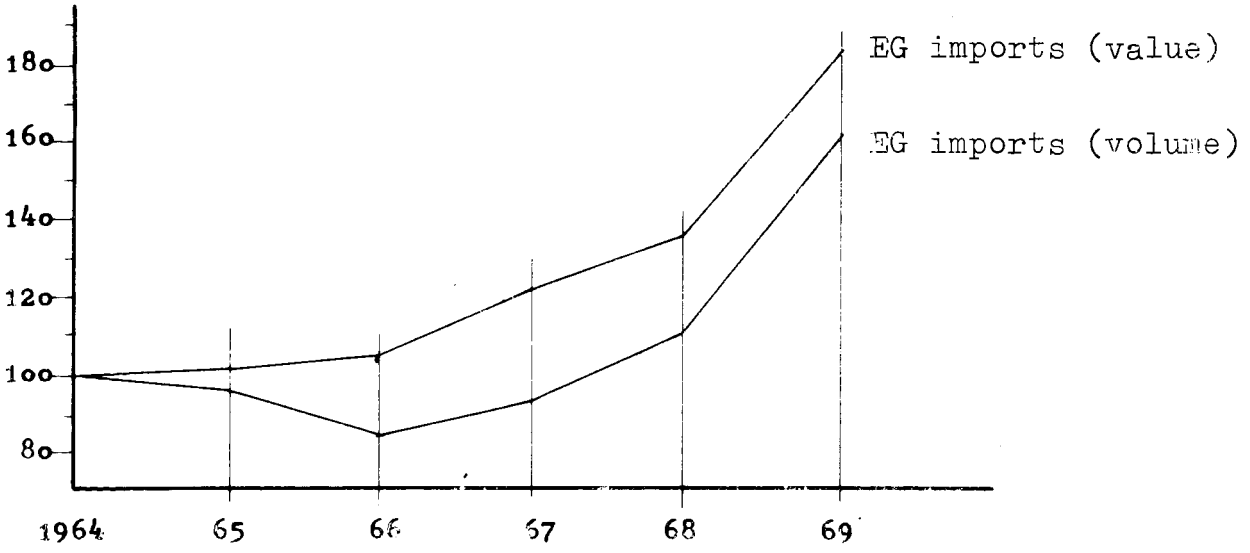




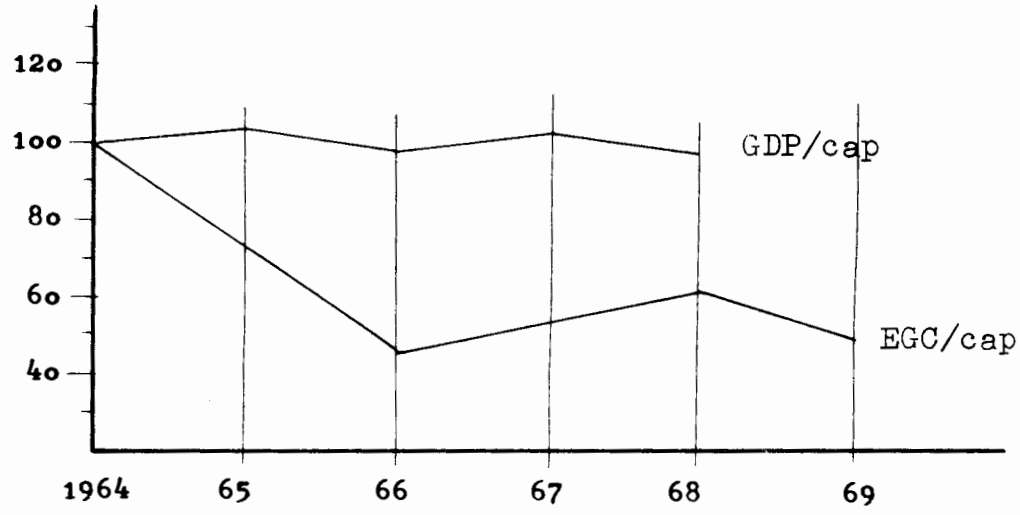
II/18 Madagascar: Indices

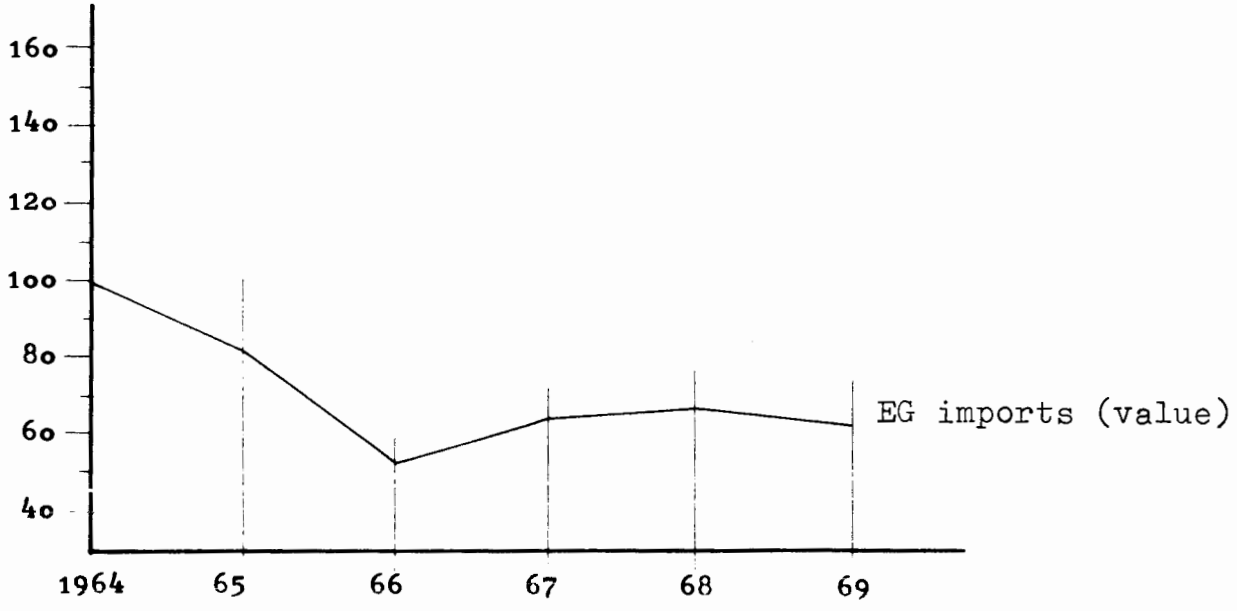






II/19 Mauritius: Indices





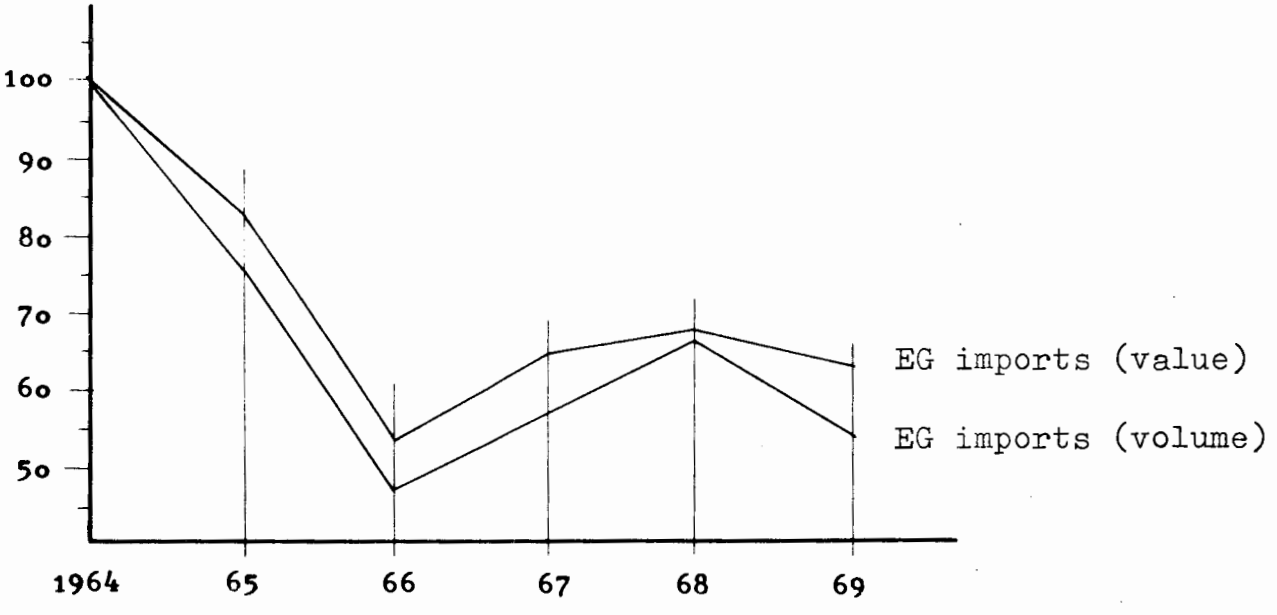


Table II/20

Share and Elasticity of Engineering Goods Imports into East African Countries

YEAR			Ethiopia			Somalia			Kenya			Uganda		
			$	%	%	$	%	%	$	%	%	$	%	%
1964	1	total imports[1]	122.0		100,0	55.0		100,0	214.0		100,0	92.0		100,0
	2	imports of engin.goods	42.7	100,0		13.2	100,0		64.6	100,0		33.3	100,0	
		of which:												
	3	div. 69 SITC	3.9	9,2		1.3[3]	9,9		6.0	9,4		2.6	7,8	
	4	div. 71 SITC	15.7	36,8		4.3	32,6		21.7	33,6		11.9	35,7	
	5	div. 72 SITC	6.8	15,9		1.7	12,9		7.6	11,7		6.4	19,2	
	6	div. 73 SITC	16.3	38,1		5.9	44,6		29.3	45,3		12.6	37,3	
	7	2 as % of 1			34,7			24,0			30,2			36,2
1968	8	total imports[1]	173.0		100,0	42.0		100,0	321.0		100,0	123.0		100,0
	9	imports of engin.goods	78.2	100,0		10.3	100,0		121.6	100,0		49.1	100,0	
		of which:												
	10	div. 69 SITC	7.4	9,5		1.3	12,6		11.0	9,1		4.6	9,4	
	11	div. 71 SITC	23.9	30,6		3.2	31,1		44.8	36,8		18.4	37,5	
	12	div. 72 SITC	9.1	11,6		1.4	13,5		15.5	12,6		6.9	14,0	
	13	div. 73 SITC	37.8[2]	48,3		4.4	42,8		50.6	41,5		19.2	39,1	
	14	9 as % of 8			45,2			24,6			37,9			31,8
		average annual growth:												
	15	of total imports		9,0			neg.			10,5			7,5	
	16	of engin.goods imports		16,3			neg.			17,0			10,3	
	17	elasticity (16:15)			1,81			-			1.62			1,38

Remarks: 1) Figures from "International Financial Statistics". 2) exceptionally high. 3) estimate

Contd. Table II/20

YEAR			Tanzania			Rwanda			Burundi[4]			Zambia		
			$	%	%	$	%	%	$	%	%	$	%	%
1964	1	total imports[1]	123.o		1oo,o	12.o		1oo,o	19.4		1oo,o	219.o		1oo,o
	2	imports of engin.goods	41.5	1oo,o					2.9	1oo,o		78.6	1oo,o	
		of which:												
	3	div. 69 SITC	5.6	13,5					o.45	15,5		11.4	14,5	
	4	div. 71 SITC	13.5	32,5					o.75	25,9		31.3	39,8	
	5	div. 72 SITC	7.o	16,9					o.38	13,3		13.9	17,7	
	6	div. 73 SITC	15.4	37,1					1.29	44,6		22.o	28,o	
	7	2 as % of 1			33,8						14,8			35,9
1968	8	total imports[1]	214.o		1oo,o	2o.o		1oo,o	21.5		1oo,o	457.o		1oo,o
	9	imports of engin.goods	79.9	1oo,o		6.7	1oo,o		3.9	1oo,o		146.2	1oo,o	
		of which:												
	1o	div. 69 SITC	9.1	11,5		2.4	35,8		o.4	1o,1		9.2	6,3	
	11	div. 71 SITC	27.9	34,8		1.2	17,9		o.7	18,7		6o.o	41,o	
	12	div. 72 SITC	9.o	11,3		1.o	14,9		1.4	35,7		22.1	15,1	
	13	div. 73 SITC	33.9	42,4		2.1	31,4		1.4	35,4		54.9	37,6	
	14	9 as % of 8			37,3			33,5			18,3			32,o
		average annual growth:												
	15	of total imports		14,9			13,6			3,7			2o,1	
	16	of engin.goods imports		17,8			-			1o,5	2,8		16,8	
	17	elasticity (16:15)			1,2			-						o,84

Remarks: 1) Figures from "International Financial Statistics" 4) Figures for 1966 and 1969.

Contd.: Table II/20

YEAR			Malawi			Madagascar			Mauritius		
			$	%	%	$	%	%	$	%	%
1964	1	total imports[1]	45.0		100,0	136.0		100,0	82.0		100,0
	2	imports of engin.goods	11.2	100,0		42.4	100,0		17.4	100,0	
		of which:									
	3	div. 69 SITC	2.2	19,6		6.8	16,0		2.8	16,1	
	4	div. 71 SITC	3.0	26,8		12.2	28,8		6.3	36,4	
	5	div. 72 SITC	1.7	15,2		8.2	19,3		3.7	20,9	
	6	div. 73 SITC	4.3	38,4		15.2	35,9		4.6	26,6	
	7	2 as % of 1			24,9			31,2			21,2
1968	8	total imports[1]	79.0		100,0	170.0		100,0	76.0		100,0
	9	imports of engin.goods	25.1	100,0		57.9	100,0		11.9	100,0	
		of which:									
	10	div. 69 SITC	2.9	11,5		7.5	12,9		1.8	15,1	
	11	div. 71 SITC	9.6	38,3		16.1	27,8		3.5	29,4	
	12	div. 72 SITC	3.0	11,9		9.6	16,6		3.1	26,1	
	13	div. 73 SITC	9.6	38,3		24.7	42,7		3.5	29,4	
	14	9 as % of 8			31,8			34,1			15,7
		average annual growth:									
	15	of total imports		15,1			5,8			neg.	
	16	of engin.goods imports		22,4			8,2			neg.	
	17	elasticity (16:15)			1,5			1,4			-

Remarks: 1) Figures from "International Financial Statistics"

PATTERN OF ENGINEERING GOODS IMPORTS INTO EAST AFRICAN COUNTRIES

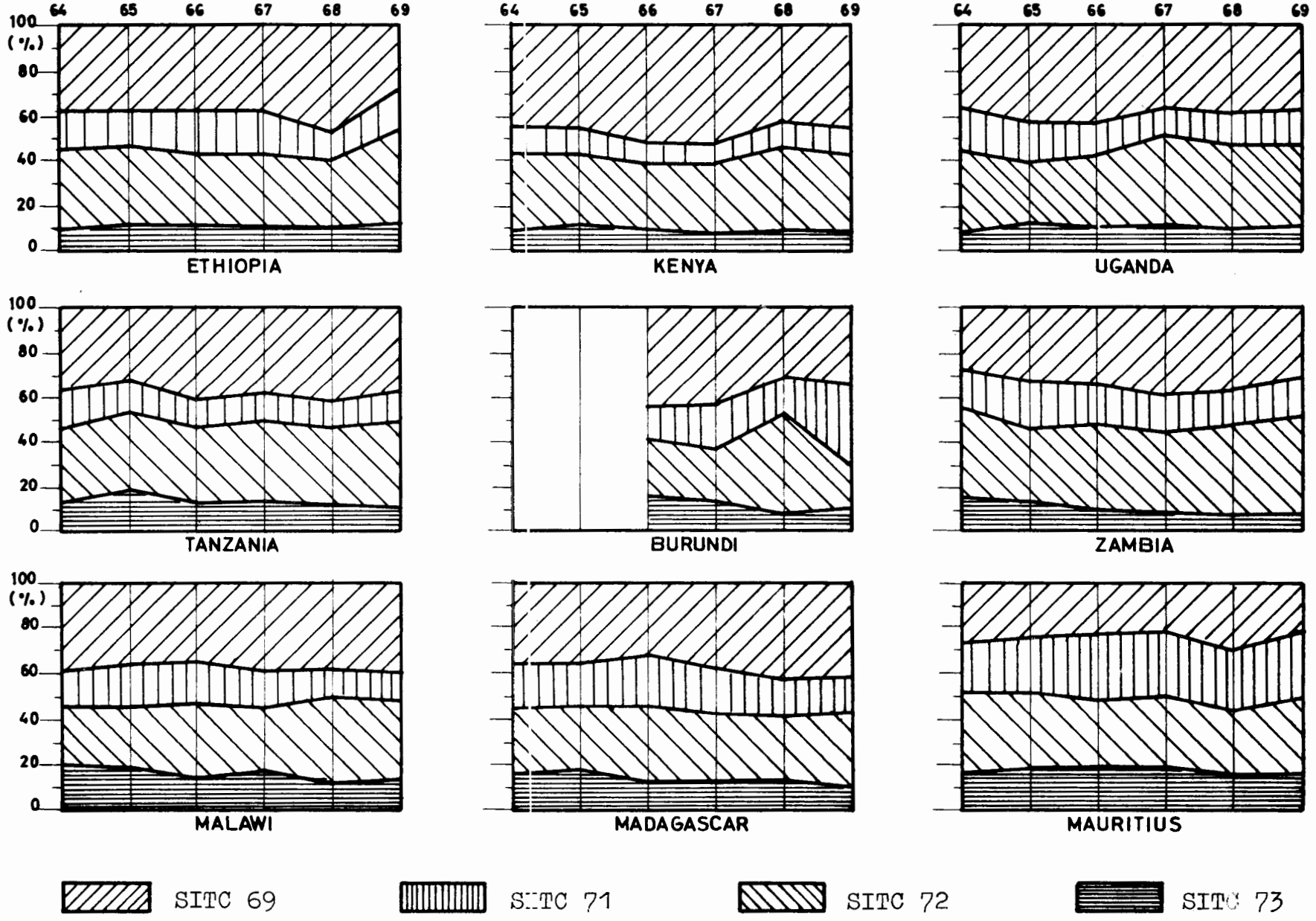


Table II/22

Imports of Engineering Consumer Goods[1)]

DESCRIPTION	SITC	YEAR	Ethiop.	Somalia	Kenya	Uganda	Tanz.	Rwanda	Burundi	Zambia	Malawi	Madag.	Maurit.	total[3)]	%[3)]
cutlery	696	1965	296	-	832	325	460[2)]	-	-	488	128	745	237	3.511	4,5
houshold equipm., base met.	697	1965	1.320	220	840	350	1.184	-	32	354	330	583	185	5.146	6,6
domest. appl.,non-electric	719.4	1965	42	-	182	-	93	-	-	88	-	113	-	518	0,7
television sets	724.1	1965	240	-	125	92	-	-	-	208	-	62	280	1.007	1,3
radio sets	724.2	1965	563	67	720	712	619	97	82	195	96	1.115	156	4.176	5,4
domest. electr.equipment	725	1965	695	-	1.365	809	980	-	44	1.306	264	105	216	5.740	7,4
passenger motor cars	732.1	1965	4.870	1.010	10.841	4.613	3.753	197	964	16.075	2.237	6.339	941	49.642	63,6
motorcycles	732.9	1965	780	-	384	205	325	-	-	646	86	428	108	2.962	3,8
bicycles	733.1	1965	124	-	704	436	1.190	69	-	1.649	645	400	81	5.229	6,7
total consumer goods		1965	9.930		15.993	7.592	8.604			21.009	3.786	9.890	2.204	77.931	100,0
cutlery	696	1968	406	-	477	300	414	-	-	658	118	386	158	2.917	4,5
houshold equipm.,base met.	697	1968	380	100	705	403	624	-	43	1.515	490	1.109	153	5.379	8,4
domest. appl.,non-electric	719.4	1968	31	-	173	-	67	-	-	32	-	60	-	363	0,5
television sets	724.1	1968	99	-	115	20	-	-	-	138	-	34	506	912	1,4
radio sets	724.2	1968	475	21	1.911	741	266	-	11	203	17	811	192	4.616	7,2
domest.electr.equipment	725	1968	910	-	785	874	955	-	-	2.496	177	169	195	6.561	10,1
passenger motor cars	732.1	1968	4.877	777	12.372	3.774	3.070	184	122	6.592	790	5.231	1.329	38.035	59,4
motorcycles	732.9	1968	53	28	417	176	288	-	-	156	35	280	87	1.492	2,3
bicycles	733.1	1968	172	-	866	336	576	-	-	881	818	215	111	3.975	6,2
total consumer goods		1968	7.403		17.821	6.624	6.260			12.671	2.445	8.295	2.731	64.250	100,0
consumer goods imports as % of total engineering goods imports		1965	14,7		22,5	17,2	15,9			17,6	25,9	21,1	15,2		
		1968	9,5		14,6	13,5	7,8			8,7	17,7	14,3	22,7		

1)cif-values, figures from various sources 2)estimate 3)except Somalia, Rwanda, Burundi

Table II/23

Network of Intra-Subregional Trade, 1967 (in '000s $; %)

Imports from \ Imports into	Burundi	Ethiopia	Kenya	Madagascar	Malawi	Mauritius	Rwanda	Somalia	Uganda	Tanzania a)	Zambia	Total
Burundi	-	-	-	-	-	-	777	-	2	37	-	816
Ethiopia	-	-	50	-	-	212	-	1249	93	14	-	1618
Kenya	486	704	-	639	363	2418	557	1122	41428	32385	4077	84179
Madagascar	-	1	466	-	3	1482	-	-	-	73	-	2025
Malawi	-	1	939	50	30	4	-	-	3	7	1123	2157
Mauritius	-	9	7	111	6	-	-	-	1	2	-	136
Rwanda	25	-	112	-	-	-	-	-	27	14	-	178
Somalia	-	-	39	-	-	-	-	-	-	79	-	118
Uganda	145	-	28463	-	-	6	2725	-	-	6865	14	38218
Tanzania	1117	211	9380	3	100	333	157	-	2112	-	12605	26018
Zambia	-	1	368	-	4888	14	-	-	409	574	-	6254
Total, above	1773	927	39824	803	5390	4469	4216	2371	44075	40050	17819	161717
World total	19357	143096	336138	146563	70974	76998	20222	40124	159245	227290	428795	1668802
Share of intra-subregional imports in total imports (percentage)	9.2	0.6	11.8	0.5	7.6	5.8	20.8	5.9	27.7	17.6	4.2	9.7
Total, subregion, adjusted b)			1981						535	800		41084
World total, adjusted b)			298295						115705	188040		1548169
Share of intra-subregional imports, adjusted, b) in total imports, adjusted b) (percentage)			0.7						0.5	0.4		2.7

a) including Zanzibar; b) not including intra-East African imports

Source: United Nations, Foreign Trade Statistics of Africa, Series A; and national sources

Note: Not included in this table are imports from Botswana into Malawi and Zambia, amounting to $ 50.000 and $ 1.097.000, respectively.

Table II/24

Intra-Subregional Imports, by Commodity Group[a], 1965

('000s of $; percentages)

Country	Food	Beverages and tobacco	Crude mater.	Fuels and lubric.	Oils and fats	Chemicals	Manufact. goods	Machinery & transp. equipm.	Miscellan. manufactures	Miscell.	Total
Ethiopia[b]	190	2	36	54	-	180	299	48	53	6	867
As percentage of imports from all sources	2.1	0.1	0.5	0.5	-	1.6	0.8	0.1	0.3	0.3	0.6
Kenya	10850	4302	1330	1176	4181	1727	9503	32	1517	35	34653
As percentage of imports from all sources	29.7	66.1	23.2	3.9	45.4	6.9	12.7	-	8.2	0.3	12.3
Intra-East African imports	9560	4302	1160	1176	4148	1725	9125	31	1510	35	32772
As percentage of imports from all sources	26.2	66.1	20.2	3.9	45.0	6.9	12.2	-	8.2	0.3	11.6
Madagascar	31	13	-	317	-	12	409	3	5	18	808
As percentage of imports from all sources	0.2	0.2	-	4.2	-	0.1	1.0		-	2.3	0.6
Malawi	781	149	1	1	-	22	89	47	269	29	1388
As percentage of imports from all sources	12.5	7.9	-	-	-	0.6	0.4	0.4	3.6	1.7	2.4
Mauritius	1512	-	183	336	8	28	1583	6	81	1	3758
As percentage of imports from all sources	6.7	-	13.0	9.6	0.3	0.3	9.6	0.1	1.2	1.7	4.9
Somalia[c]	1329	57	474	513	714	179	1089	517	137	4	5014
As percentage of imports from all sources	10.5	3.8	18.9	22.3	33.4	7.0	10.0	4.4	4.7	1.4	10.1
Uganda	10600	2363	1213	6315	1134	4828	12496	464	7583	121	47117
As percentage of imports from all sources	67.5	73.7	43.8	83.5	32.5	35.7	25.3	1.1	42.6	2.1	29.2
Intra-East African imports	10547	2363	1054	6315	1088	4828	12391	458	7582	121	46718
As percentage of imports from all sources	67.0	73.7	38.1	83.5	31.2	35.7	25.1	1.1	42.6	2.1	29.0
United Republic of Tanzania d)	8564	4210	916	8005	516	5145	13417	411	6684	297	48165
As percentage of imports from all sources	48.1	82.0	46.3	69.8	33.0	32.2	20.5	0.9	37.5	7.5	25.8
Intra-East African imports	8175	4210	576	8005	493	5145	12718	405	6675	297	46699
As percentage of imports from all sources	45.9	82.0	29.1	69.8	31.5	32.2	19.4	0.9	37.5	7.5	25.0
Zambia	1865	9	64	-	-	108	205	16	327	-	2594
As percentage of imports from all sources	8.1	0.2	1.2	-	-	0.4	0.3	-	0.9	-	0.9
Total, above	35722	11105	4217	16737	6553	12229	39090	1544	16056	510	144364
As percentage of imports from all sources	21.8	35.7	14.3	16.1	28.1	10.0	10.2	0.4	12.1	2.0	10.4
Intra-East African imp.	28252	10875	2790	15496	5729	11698	34234	894	15767	453	126189
Total, excluding intra-East African imports	7470	230	1427	1241	824	531	4856	650	889	57	18175
As percentage of imports from all sources	5.9	1.1	5.4	1.4	4.7	0.5	1.4	0.2	0.7	0.2	1.4

Source: United Nations, Foreign Trade Statistics of Africa, Series B, various issues; Statistical Office of the European Community, Associates: Foreign Trade Statistics, various issues; national sources.

a) Commodity groups correspond to SITC sections.
b) Estimated from 1964 and 1966 data.
c) Intra-subregional imports are estimated on the basis of the distribution of intra-subregional imports in the southern districts of Somalia, which are responsible for about 75 % of the country's total imports.
d) not including Zanzibar.

Table II/25

Intra-East African Trade in Selected Manufactures, 1965 - 1968 ('000s $)

SITC	Commodity	Exports from \ into	Kenya				Uganda				United Rep. of Tanzania[a]				Total exports			
			1965	1966	1967	1968	1965	1966	1967	1968	1965	1966	1967	1968	1965	1966	1967	1968
53332	Paints[b]	Kenya	-	-	-	-	1,362	800	567	104	262	149	53	7	1,624	949	620	111
		Uganda	1	15	4	16	-	-	-	-	8	3	1	37	9	18	5	53
		Tanzania	106	105	109	73	1	-	-	3	-	-	-	-	107	105	109	76
554	Soap[c]	Kenya	-	-	-	-	1,684	1,740	2,689	2,436	1,488	1,516	841	1,541	3,172	3,256	3,527	3,977
		Uganda	856	966	735	479	-	-	-	-	331	43	8	24	1,187	1,009	744	503
		Tanzania	5	9	48	177	-	-	-	1	-	-	-	-	5	9	48	178
561	Fertilizers	Kenya	-	-	-	-	-	8	11	68	-	1	15	23	-	9	26	91
		Uganda	973	1,014	682	529	-	-	-	-	388	43	9	22	961	1,057	691	550
		Tanzania	-	-	-	7	-	-	-	12	-	-	-	-	-	-	-	19
599.2	Insecticides[d]	Kenya	-	-	-	-	337	504	340	646	524	626	331	176	861	1,220	1,271	813
		Uganda	3	4	7	3	-	-	-	-	1	1	1	2	24	5	8	11
		Tanzania	8	36	33	31	1	1	2	8	-	-	-	-	9	37	35	39
629.1	Rubber tyres and tubes	Kenya	-	-	-	-	517	535	344	425	256	215	164	225	773	750	508	650
		Uganda	66	159	172	255	-	-	-	-	237	271	371	295	303	430	543	550
		Tanzania	3	2	-	-	26	-	1	-	-	-	-	-	29	2	1	-
63	Wood and cork manufactures[e]	Kenya	-	-	-	-	141	206	305	448	265	347	431	658	406	553	736	1,106
		Uganda	247	263	353	463	-	-	-	-	10	20	27	54	257	283	380	518
		Tanzania	460	522	332	616	29	56	59	101	-	-	-	-	489	578	391	716
641	Paper and paper board	Kenya	-	-	-	-	7	25	39	55	2	28	39	41	9	53	79	96
		Uganda	6	2	26	-	-	-	-	-	-	2	7	-	6	4	33	-
		Tanzania	5	1	1	-	1	3	2	-	-	-	-	-	6	4	4	-
651	Textile yarn and thread	Kenya	-	-	-	-	6	10	62	144	146	728	856	937	152	738	918	1,080
		Uganda	5	72	92	105	-	-	-	-	1	127	58	111	6	199	149	216
		Tanzania	1	3	1	10	-	-	-	-	-	-	-	-	1	3	1	10
652	Cotton fabrics woven	Kenya	-	-	-	-	171	612	302	343	4	4	66	1	175	616	368	344
		Uganda	3,530	5,335	6,479	4,924	-	-	-	-	3,192	4,392	2,301	1,408	6,722	9,727	8,780	6,332
		Tanzania	166	168	120	85	154	100	106	115	-	-	-	-	320	268	226	200
656	Textile articles (incl. blankets)	Kenya	-	-	-	-	2,290	663	1,527	1,815	515	249	664	813	2,805	912	2,191	2,628
		Uganda	10	3	11	3	-	-	-	-	1	5	6	1	11	8	17	4
		Tanzania	867	862	475	460	18	1	9	7	-	-	-	-	885	863	485	466
6612	Cement	Kenya	-	-	-	-	189	226	452	180	2,464	2,249	1,473	2,618	2,653	2,475	1,926	2,798
		Uganda	-	2	2	2	-	-	-	-	1	-	-	-	1	2	2	2
		Tanzania	1	-	2	-	-	-	-	-	-	-	-	-	1	-	2	-
665	Glassware	Kenya	-	-	-	-	340	437	368	411	195	331	164	121	535	768	532	532
		Uganda	1	1	2	3	-	-	-	-	1	1	-	-	2	2	2	3
		Tanzania	-	40	19	9	-	2	10	1	-	-	-	-	-	42	30	10
692	Metal containers	Kenya	-	-	-	-	371	402	409	593	492	371	491	508	863	773	900	1,101
		Uganda	2	12	13	13	-	-	-	-	3	3	1	3	5	15	14	16
		Tanzania	200	161	61	41	1	1	3	-	-	-	-	-	201	162	64	41
695	Hand and machine tools	Kenya	-	-	-	-	50	5	3	62	92	44	46	29	142	49	50	91
		Uganda	70	84	52	42	-	-	-	-	116	185	21	4	186	269	74	46
		Tanzania	1	-	1	1	-	-	-	-	-	-	-	-	1	-	1	1
696	Cutlery	Kenya	-	-	-	-	24	14	5	19	10	21	12	5	34	35	17	25
		Uganda	3	2	1	1	-	-	-	-	1	2	6	-	4	4	7	1
		Tanzania	10	29	20	7	34	51	29	47	-	-	-	-	44	80	49	54
697	Household equipm.of base metals	Kenya	-	-	-	-	614	508	160	143	527	300	83	94	1,141	805	242	237
		Uganda	173	234	173	124	-	-	-	-	100	77	68	84	273	311	241	208
		Tanzania	87	189	194	314	71	140	71	169	-	-	-	-	158	329	265	483
73312	Bicycle parts[f]	Kenya	-	-	-	-	35	41	19	20	3	-	-	-	38	45	19	20
		Uganda	1	1	1	2	-	-	-	-	-	-	2	1	1	1	3	3
		Tanzania	1	-	-	-	-	-	-	1	-	-	-	-	1	-	-	1
821	Furniture and fixtures	Kenya	-	-	-	-	883	956	371	1,032	821	895	386	526	1,504	1,851	1,123	1,562
		Uganda	9	21	15	16	-	-	-	-	15	11	4	34	24	32	19	51
		Tanzania	6	9	14	34	1	3	4	4	-	-	-	-	7	12	18	38
841 842	Clothing	Kenya	-	-	-	-	3,772	4,130	3,501	1,166	2,855	497	390	1,566	6,627	4,633	3,891	2,731
		Uganda	86	191	283	180	-	-	-	-	46	14	27	41	132	205	309	222
		Tanzania	303	107	137	147	225	43	42	304	-	-	-	-	528	150	178	451
851	Footwear	Kenya	-	-	-	-	1,679	1,430	746	629	1,945	1,700	842	1,296	3,624	2,830	1,628	1,921
		Uganda	119	180	200	557	-	-	-	-	85	77	52	136	204	257	252	693
		Tanzania	724	692	298	181	-	2	-	1	-	-	-	-	728	694	298	189
Total, imports listed		Kenya	-	-	-	-	14,272	13,049	13,224	10,729	12,766	10,271	7,347	11,185	27,138	23,320	20,572	21,915
		Uganda	5,781	8,561	9,303	7,723	-	-	-	-	4,537	5,277	2,970	2,257	10,318	13,838	12,273	9,982
		Tanzania	2,954	2,935	1,865	2,193	566	403	334	241	-	-	-	-	3,520	3,338	2,205	2,972
Grand total, imports listed		.....	8,735	11,496	11,168	9,916	14,838	13,452	13,558	11,510	17,403	15,548	10,318	13,442	40,976	40,496	35,050	34,869

Source: East African Community, Annual Trade Report of Tanganyika, Uganda and Kenya, various issues.

a) Tanganyika only from 1965 to 1967. Including Zanzibar in 1968
b) Including enamels, lacquers, varnishes and artists' colours
c) Including washing preparations and surface-acting agents
d) Including fungicides and disinfectants
e) Excluding furniture
f) Including invalid-carriage parts

Table II/26

Consumption of Electricity in the Subregion

Country		1963						1969					
		Capacity MW	Million kwh				Consumpt p.c. kwh	Capacity MW	Million kwh				Consumpt. p.c. kwh
			Product.	Import	Export	Consumpt.			Product.	Import	Export	Consumpt.	
Ethiopia	P	103,1	186,5	-	-	186,5	8,5	137,4	340,8	-	-	340,8	13,9
Somalia	P	7,9	15,0	-	-	15,0	6,4	14,0	29,0+	-	-	29,0+	10,6
Kenya	P	102,2	263,3	205,0	-	468,3	52,8	153,1	459,3	218,1	-	677,4	64,5
Uganda	P	134	497	-	190	307	42,6	175	731	-	218	513	61,7
Tanzania	P	48,7	185,6	-	15,0	170,6	15,3	101,4	358,3	-	-	358,3	27,4
Rwanda	P	9,0	10,8+	-	-	10,8+	3,7	16,0	19,0	-	2,0	17,0	4,9
Burundi	P	4,7	8,0+	6,0+	-	14,0	4,5	6,5	1,0+	19,8+	-	20,8	6,0
Zambia	P+I	263,0	731,6	1845,0	18,2	2558,4	733,1	359,3	688,1	2952,1	5,1	3635,1	897,5
Malawi	P	13,3	39,2	-	-	39,2	10,5	38,7	114,9	-	-	114,9	26,4
Madagascar	P	46,6	93,0	-	-	93,0	15,7	57,8	150,2	-	-	150,2	20,8
Mauritius	P	31,7	47,5	-	-	47,5	67,8	44,1	104,4	-	-	104,4	130,7
Subregion		764,2				3910,3	54,8	1103,30				5960,9	72,2

P = Public power supply plants
I = Industrial power stations
+) estimated

Source: Statistical Offices

Table II/27

ETHIOPIA INDUSTRIAL CENSUS 1969 — Million US $

Products		No of Establishments by Size of Employees		No of Employees	No of Engaged Persons	Wages & Salaries	Labour Costs	Value Added	Gross Output
Metal Products	ISIC 381	1- 4							
		5- 9	3		22	0.009		0.020	0.020
		10-19	9		127	0.054		0.106	0.255
		20-49	2		48	0.021		0.035	0.270
		50 & m	8		910	0,402		0,860	1,858
Machinery	ISIC 382	1- 4							
		5- 9							
		10-19							
		20-49							
		50 & m							
Electrical Machinery and Supplies	ISIC 383	1- 4							
		5- 9							
		10-19	2		27	0.009		0.023	0.037
		20-49	1		25	0.011		0.032	0.051
		50 & m							
Transport Equipment	ISIC 384	1- 4							
		5- 9							
		10-19							
		20-49							
		50 & m							
Total Engineering Industry			25		1,159	0,506		1,076	2,491
Total Manufacturing Industry			442		49,000	24,774		89,411	186,816

Source: Ministry of Industry, Statistical Office

Table II/28

SOMALIA INDUSTRIAL CENSUS 1969 — Million US $

Products		No of Establishments by Size of Employees		No of Employees	No of Engaged Persons	Wages & Salaries	Labour Costs	Value added	Gross Output
Metal Products	ISIC 381	1- 4							
		5- 9							
		10-19	6	92		0,044		0,130	0,273
		20-49							
		50 & m							
Machinery	ISIC 382	1- 4							
		5- 9							
		10-19							
		20-49							
		50 & m							
Electrical Machinery and Supplies	ISIC 383	1- 4							
		5- 9							
		10-19							
		20-49							
		50 & m							
Transport Equipment	ISIC 384	1- 4							
		5- 9							
		10-19							
		20-49							
		50 & m							
Total Engineering Industry		5 & m	6	92		0,044		0,130	0,273
Total Manufacturing Industry			134	4,556		3,050		10,081	16,959

Source: Ministry of Planning 72, Central Statistical Department Dec. 70

Table II/29

KENYA INDUSTRIAL CENSUS 1969 — Million US $

Products		No of Establishments by Size of Employees		No of Employees	No of Engaged Persons	Wages & Salaries	Labour Costs	Value Added	Gross Output
Metal Products	ISIC 381 3811 3812 3813 3819	1- 4	49	109		0,050		0,064	0,123
		5- 9							
		10-19	40	513		0,620		1,078	4,246
		20-49							
		50 & m	15		3,038		3,734	7,366	21,956
Machinery	ISIC 382 3822 3824 3829	1- 4	19	54		0,029		0,587	0,801
		5- 9							
		10-19	65	1.055		1,004		1,063	2,228
		20-49							
		50 & m	7		555		0,801	1,108	2,054
Electrical Machinery and Supplies	ISIC 383 3831 3832 3833 3834	1- 4	32	56		0,030		0,040	0,161
		5- 9							
		10-19	55	537		0,719		0,406	2,545
		20-49							
		50 & m	6		3,193		4,892	6,835	14,628
Transport Equipment	ISIC 384 3841 3842 3843	1- 4	6		10	0,010		0,029	0,076
		5- 9							
		10-19	21		414	0,487		0,626	1,305
		20-49							
		50 & m	13		10,174		10,531	12,187	20,842
Total Engineering Industry		all	328					31,389	70,965
		50 & m	41		16,960		19,958	27,496	59,480
Total Manufacturing Industry		all	(estimated)						510,394
		50 & m	241		59,366		65,766	124,001	414,954

Source: Statistical Division 71/72

Table II/30

UGANDA INDUSTRIAL CENSUS 1969 — Million US $

Products		No of Establishments by Size of Employees		No of Employees	No of Engaged Persons	Wages & Salaries	Labour Costs	Value Added	Gross Output
Metal Products	ISIC 381 3811 3812 3813 3819	1- 4							
		5- 9							
		10-19	17						
		20-49							
		50 & m							
Machinery	ISIC 382 3824	1- 4							
		5- 9							
		10-19	1						
		20-49							
		50 & m							11,977
Electrical Machinery and Supplies	ISIC 383 3832 3833 3839	1- 4							
		5- 9							
		10-19	5						
		20-49							
		50 & m							
Transport Equipment	ISIC 384 3843	1- 4							
		5- 9							
		10-19	4						
		20-49							
		50 & m							
Total Engineering Industry		10 & m	27						11,977
Total Manufacturing Industry		10 & m	260		36 089				160,426

Source: Manufacturing Industry of Uganda in Figures 1969 and 1970, Ministry of Industry 1971

Table II/31

TANZANIA INDUSTRIAL CENSUS 1967									Million US $
Products		1969 No of Establishments by Size of Employees		No of Employees	No of Engaged Persons	Wages & Salaries	Labour Costs	Value Added	Gross Output
Metal Products	ISIC 381 3811 3812 3813 3819	1- 4	-						4,903
		5- 9	-						
		10-19	11						
		20-49	12						
		50 & m	8						
Machinery	ISIC 382 3822 3824 3825 3829	1- 4	4						1,072
		5- 9	-						
		10-19	6						
		20-49	7						
		50 & m	1						
Electrical Machinery and Supplies	ISIC 383 3832 3839	1- 4	-						0,948
		5- 9	-						
		10-19	1						
		20-49	1						
		50 & m	2						
Transport Equipment	ISIC 384 3843 3844	1- 4	-						1,635
		5- 9	-						
		10-19	2						
		20-49	3						
		50 & m	6						
Total Engineering Industry									8,558
Total Manufacturing Industry		1967	431		34 502	19,470		44,608	184,145

Source: Survey of Industrial Production 1967, Bureau of Statistics

Table II/32

ZAMBIA INDUSTRIAL CENSUS 1969 — Million US $

Products		No of Establishments by Size of Employees		No of Employees	No of Engaged Persons	Wages & Salaries	Labour Costs	Value Added	Gross Output
Metal Products	ISIC 381 3811 3812 3813 3819	1- 4							
		5- 9							
		10-19	48	3 204		5,249		12,621	25,806
		20-49							
		50 & m							
Machinery	ISIC 382 3822 3824 3825 3829	1- 4							
		5- 9							
		10-19	17	800		2,001		4,561	13,523
		20-49							
		50 & m							
Electrical Machinery and Supplies	ISIC 383 3831 3832 3833 3839	1- 4							
		5- 9							
		10-19	13	706		1,165		3,739	6,534
		20-49							
		50 & m							
Transport Equipment	ISIC 384 3842 3843 3845	1- 4							
		5- 9							
		10-19	10	793		1,315		3,525	14,432
		20-49							
		50 & m							
Total Engineering Industry			88	5 493		9,730		24,446	60,300
Total Manufacturing Industry			434	36 976		55,916		134,190	379,946

Source: Central Statistical Office, Nov. 1971

Table II/33

MALAWI INDUSTRIAL CENSUS 1969 — Million US $

Products		No of Establishments by Size of Employees		No of Employees	No of Engaged Persons	Wages & Salaries	Labour Costs	Value Added	Gross Output
Metal Products	ISIC 381	1- 4	-	-	-	-	-	-	-
		5- 9	-	-	-	-	-	-	-
		10-19	-	-	-	-	-	-	-
		20-49	3	100	-	0,035	-	0,128	0,334
		50 & m	6	482	-	0,200	-	0,438	1,567
Machinery	ISIC 382	1- 4	-	-	-	-	-	-	-
		5- 9	-	-	-	-	-	-	-
		10-19	-	-	-	-	-	-	-
		20-49	1	39	-	0,022	-	0,092	0,342
		50 & m	1	69	-	0,027	-	0,136	0,250
Electrical Machinery and Supplies	ISIC 383	1- 4	-	-	-	-	-	-	-
		5- 9	-	-	-	-	-	-	-
		10-19	-	-	-	-	-	-	-
		20-49	-	-	-	-	-	-	-
		50 & m	1	62	-	0,038	-	0,072	0,179
Transport Equipment	ISIC 384	1- 4	-	-	-	-	-	-	-
		5- 9	-	-	-	-	-	-	-
		10-19	-	-	-	-	-	-	-
		20-49	1	31	-	0,033	-	0,234	2,127
		50 & m	-	-	-	-	-	-	-
Total Engineering Industry		20 & m	13	783	-	0,355	-	1,100	4,799
Total Manufacturing Industry			169	20 024	-	8,623	-	22,138	76,081

Source: National Statistical Office, Zomba 13th Jan. 1972

Table II/34

MADAGASCAR INDUSTRIAL CENSUS 1968 — Million US $

Products		No of Establishments by Size of Employees		No of Employees	No of Engaged Persons	Wages & Salaries	Labour Costs	Value Added	Gross Output
Metal Products	ISIC 381	1- 4							
		5- 9	7	81		0,050			0,269
		10-19							
		20-49	4	122		0,076			0,389
		50 & m	8	747		0,571			4,820
Machinery	ISIC 382	1- 4							
		5- 9							
		10-19							
		20-49							
		50 & m							
Electrical Machinery and Supplies	ISIC 383 Data Year 1966 * Output ISIC 383 year 1968 estimated 1,113	1- 4							
		5- 9							
		10-19	11	340		0,277			0,994
		20-49							
		50 & m							
Transport Equipment	ISIC 384	1- 4							
		5- 9							
		10-19	7	224		0,331			1,353
		20-49							
		50 & m	8	914		1,068			5,299
Total Engineering Industry *									13,243
Total Manufacturing Industry (estimated)									128,772

Source: Inventaire Socio-Economique 1968, I.N.S.R.E. 1972

Table II/35

MAURITIUS INDUSTRIAL CENSUS 1969 — Million US $

Products		No of Establishments by Size of Employees		No of Employees	No of Engaged Persons	Wages & Salaries	Labour Costs	Value Added	Gross Output
Metal Products	ISIC 381	1- 4	-	-	-	-	-	-	-
		5- 9	-	-	-	-	-	-	-
		10-19	7	74	-	0,043	-	0,047	0,163
		20-49	4	110	-	0,045	-	0,052	0,190
		50 & m	2	163	-	0,048	-	0,048	0,225
Machinery	ISIC 382	1- 4	-	-	-	-	-	-	-
		5- 9	-	-	-	-	-	-	-
		10-19	3	42	-	0,033	-	0,043	0,126
		20-49	3	117	-	0,070	-	0,080	0,321
		50 & m	4	458	-	0,318	-	0,316	0,831
Electrical Machinery and Supplies	ISIC 383	1- 4	-	-	-	-	-	-	-
		5- 9	-	-	-	-	-	-	-
		10-19	1	17	-	0,023	-	0,030	0,113
		20-49	2	45	-	0,042	-	0,048	0,131
		50 & m	1	71	-	0,053	-	0,066	0,193
Transport Equipment	ISIC 384	1- 4	-	-	-	-	-	-	-
		5- 9	-	-	-	-	-	-	-
		10-19	10	135	-	0,036	-	0,038	0,143
		20-49	7	212	-	0,094	-	0,099	0,322
		50 & m	9	1 155	-	0,653	-	0,954	2,600
Total Engineering Industry		10 & m	53	2 599	-	1,458	-	1,821	5,358
Total Manufacturing Industry			245	15 167	-	9,203	-	23,403	87,290

Source: Central Statistical Office, March 1972

Table II/36

Local Production of Engineering Commodities in the Countries of the East African Subregion (1969, values in '000s US $)

	Ethiopia	Somalia	Kenya	Uganda	Tanzania+	Rwanda+	Burundi+	Zambia	Malawi	Madagascar+	Mauritius
Electrical machinery, apparatus and appliances	88	-	17334	1677	1085	610	-	6534	179	1218	437
Structural engineering and metal products	2403	273	26325		5613		625[1]	25866	1901	5862	578
Machinery other than electrical	-	-	5083	10300	770	-	-	13523	592		1278
Transport equipment	-	-	22223		1872	-	-	14437	2127	7118	3065
T o t a l	2491	273	70965	11977	9340	610	625	60300	4799	14198	5358
Population (million)	24,49	2,73	10,50	8,32	13,06	3,50	3,48	4,05	4,36	7,22	0,799
Per capita local production (US$)	0,10	0,10	6,76	1,43	0,72	0,17	0,18	14,89	1,10	1,97	6,71

+ estimated

1)incl. shipbuilding

Sources: Statistical Offices, Ministries of Industry ECA

Table II/37

Local Production of Engineering Commodities in the Countries of the East African Subregion (1963, values in '000 US $)

	Ethio-pia	Soma-lia	Kenya	Uganda	Tanzania	Rwanda	Burun-di	Zambia	Mala-wi	Mada-gasc.	Mau-rit.
Electrical machinery apparatus and appl.	125	-	780	-	-	-	-	620	-	1200	60
Structural engineering and metal products	1560	-	17190	2800	8180	-	540	7000	-	50	650
Machinery other than electrical	-	-	1710	-	180	-	-	2000	-	-	-
Transport Equipment	-	-	16420[1)]	-	140	-	-	8600	-	800	-
T o t a l	1685	-	36100	2800	8500	-	540	18220	-	2050	710
Population (million)	21,35		8,85	7,19	9,80		2,70	3,50		5,94	0,70
Per capita local production (US $)	0,08		4,08	0,39	0,87		0,20	5,20		0,35	1,01

1) includes railway, motor vehicle and ship maintenance and repair

Source: UN 1965, Electrotechnical engineering industries in the East African Subregion

Table II/38

Synoptic Statement of Factors in the Build-up of Cost of M/C in E.A. Countries

V. Final Cost	IV. Physical installation	III. Additional in-country cost up to factory site	II. Cif cost	I. Fob price	Stage in sequence of cost build-up ←
	erection charges interest cost scale of expatriate involvement in installation - wage/salary cost - transport - accomodation - provision of fallback persons for emergency local sequence failures greater salaries for all personnel because of longer gestation period incidence of contingenc.	port charges etc. customs duties storage costs insurance charges breakage high transport cost for inland locations	freight insurance disadvantage because of small scale consignment	functional design, formally or informally tied sources of finance, mistakes of omission, failure to articulate and itemize needs fully, additional requirement of fallback m/c larger provision for spares and tools, malpractices	relevant factors
					appr. range of cost:
150-285	35 - 100 150 - 285	5 - 20 115 - 185	10 - 15 110 - 165	100 - 150 100 - 150	level in E.A. cumulative
	210 135	145 112	132 105	120 100	E.A. project W.European project

Source: East African Development Bank

Table II/39

Population of Urban Areas and Cities

Country	Year	City	Population ('000)	Percentage of total population
Burundi	1967	Comune of Bujumbura	71	2.1
Ethiopia	1967	Addis Ababa	644	2.7
		Asmara	179	0.8
		Dire Dawa	51	0.2
		Harar	43	0.2
		Desse	41	0.2
		others	157	0.6
		T o t a l	1,113	4.7
Kenya	1962	Nairobi	267	3.1
		Mombasa	180	2.1
		Nakuru	38	0.4
		Kisumu	24	0.3
		Eldoret	20	0.2
		T o t a l	528	6.1
Madagascar	1966	Tananarive	355	5.4
Malawi	1966	Blantyre-Limbe	110	2.7
		Zomba	19	0.5
		T o t a l	129	3.2
Mauritius	1962	Port Luis	89	12.7
		Vacoas-Phoenix	42	6.0
		Beau-Bassin		
		Rose Hill	38	5.4
		Curepipe	35	5.0
		Quatre Bornes	28	4.1
		T o t a l	232	33.2
Rwanda	1959	Kigali	4	0.2
Somalia	1966	Mogadiscio	170	6.6
Uganda	1959	Kampala	123	1.9
		Junja	30	0.5
		T o t a l	153	2.4
United Republic of Tanzania	1967	Dar-es-Salaam	273	2.2
		Zanzibar township	68	0.6
		Tanga	61	0.5
		Mwanza	35	0.3
		Arusha	32	0.3
		Moshi	27	0.2
		Morogoro	25	0.2
		others	87	0.8
		T o t a l	608	5.0
Zambia	1968	Lusaka	201	4.9
		Kitwe	156	3.8
		Ndola	132	3.2
		Mujuliva	86	2.1
		Luanshya	79	1.9
		others	235	5.6
		T o t a l	888	21.4

Source: UN Demographic Yearbook 1967 and national sources

Table II/40

Distribution of Industrial Activities, 1963 and 1967 (rank, percentages)

Rank		Country	Industrial value added per capita (dollars)		Share in subregional industrial value added (percentage)		Share in subregional population (percentage)		Industrial activities distribution ratio a)	
1963	1967		1963	1967	1963	1967	1963	1967	1963	1967
1	1	Zambia	89.9	97.9	52.2	47.1	5.1	5.2	10.29	9.06
2	2	Mauritius	64.0	66.5	6.6	5.7	0.9	0.9	7.33	6.33
3	3	Kenya	8.5	11.4	12.3	13.5	12.7	12.7	0.97	1.06
4	4	Madagascar	7.2	9.7	6.6	7.1	8.2	7.9	0.80	0.90
5	5	Uganda	6.1	8.0	7.4	7.7	10.6	10.3	0.70	0.75
6	6	United Republic of Tanzania	3.6	4.6	5.9	6.8	14.7	16.0	0.40	0.43
7	9	Somalia	2.1	2.3	0.8	0.7	3.2	3.0	0.25	0.23
8	7	Malawi	1.9	3.3	1.2	1.8	5.7	5.7	0.21	0.32
9	11	Burundi	1.6	1.6	0.7	0.6	3.9	3.9	0.18	0.15
10	8	Ethiopia	1.5	3.0	5.4	8.4	30.9	30.3	0.17	0.28
11	10	Rwanda	1.3	1.6	0.6	0.6	4.1	4.1	0.15	0.15

Source: United Nations Economic Commission for Africa

a) Ratio of share in subregional industrial value added to share in subregional population

Table II/41

Industrial Staff Requirements, 1963 - 1980 (Thousands)

Industry	1963	1980	Net increase, 1963 to 1980
Mines and quarries	19.5	81.4	61.8
Food, drink, tobacco	83.7	171.4	87.7
Spinning, weaving	17.8	150.7	132.9
Foot-wear, clothing	7.1	106.0	99.0
Timber	45.8	68.4	22.6
Furniture	1.8	7.7	5.9
Pulp, paper, others	0.8	3.6	2.8
Leather	1.1	10.2	9.1
Rubber	0.8	6.2	5.4
Chemical products	3.8	25.4	21.6
Petroleum products	-	17.9	17.9
Non-metal products	8.9	42.0	33.1
Iron, steel, non-ferrous metals	50.1	94.7	44.7
Metal products	8.9	18.0	9.1
Machines (other than electrical)	2.1	10.0	8.0
Electrical machines	0.3	9.6	9.4
Transport equipment	13.5	22.9	9.4
Miscellaneous	0.2	7.3	7.1
Total	266.2	853.4	587.2

Source: ECA, Statistics Division

Table II/42

Economic Indices

ETHIOPIA									
		Unit	1963	1964	1965	1966	1967	1968	1969
Population	total	Million	21.91	22.30	22.70	23.14	23.67	24.07	24.49
	annual growth rate	%	1.8	1.8	1.8	1.9	2.3	1.7	1.7
Gross-Domestic-Production (factor cost)	Agriculture, forestry, fishing	Million US$	620.1	689.2	781.2	805.8	761.0	802.0	847.6
	Mining	"	1.7	2.2	3.8	4.6	4.8	4.5	3.6
	Manufacturing	"	65.9	77.7	88,5	98.0	119.2	133.6	155.5
	Electricity and Water	"	4.6	5.4	5.7	6.0	7.2	8.2	8.7
	Construction	"	59.4	62.6	66.3	74.9	87.0	83.4	85.7
	Commerce	"	65.2	81.8	94.4	102.4	98.5	114.4	127.9
	Transportation +Communication	"	33.7	39.9	46.6	49.6	50.3	55.9	57.1
	Other	"	149.5	165.8	188.7	206.6	221.1	240.4	258.2
	Total	"	1000.1	1124.6	1275.2	1347.9	1350.1	1442.4	1544.3
	per capita	US$	45.6	50.4	56.2	58.2	57.0	59.9	63.1
	annual growth rate	%		10.5	11.5	3,6	-2.1	5,1	5.3

Sources: Statistical Abstract 1970
Addis Ababa

1 US$ = 2.50 Eth$
1 Eth$ = 0.4 US$

Table II/45

Economic Indices

SOMALIA									
		Unit	1963	1964	1965	1966	1967	1968	1969
Population	total	Million	2.33	2.42	2.50	2.56	2.62	2.67	2.73
	annual growth rate	%		3.9	3.3	2.4	2.3	1.9	2.2
Gross - Domestic Production (factor cost)	Agriculture, forestry, fishing	Mio.US$							
	Mining	"							
	Manufacturing	"							
	Electricity and Water	"							
	Construction	"							
	Commerce	"							
	Transportation and Communication	"							
	Other	"							
	Total	"						168.2	
	per capita	US$						63.0	
	annual growth rate	%							

Sources: Statistical Bulletin for Africa 67
Survey of Economic Conditions in Africa 71
AID 71, Révision No. 282

1 SoSh = 0.14 US$
1 US$ = 7.14 SoSh

Table II/ 44

Economic Indices

KENYA									
		Unit	1963	1964	1965	1966	1967	1968	1969
Population	total	Million	8.87	9.12	9.36	9.60	9.90	10.20	10.50
	annual growth rate	%	3.1	2.8	2.6	2.5	3.1	3.0	2.9
Gross-Domestic-Production (factor cost)	Agriculture, forestry, fishing	Mio.US$		364.6	323.4	403.2	409.4	418.0	436.8
	Mining	"		4.2	3.9	4.5	5.6	6.4	7.0
	Manufacturing	"		94.4	105.0	117.3	126.6	139.7	154.8
	Electricity and Water	"		19.3	20.2	21.8	25.8	26.3	29.1
	Construction	"		35.3	37.5	47.0	57.1	65.6	73.9
	Commerce	"		92.4	98.0	110.0	112.6	124.0	126.8
	Transportation + Communication	"		70.6	77.3	89.0	93.8	107.8	112.3
	Other	"		246.9	260.1	284.4	307.6	349.9	393.8
	Total	"		927.7	925.4	1077.2	1138.5	1237.6	1334.5
	per capita	US$		101.72	98.86	112.20	115.00	121.33	127.09
	annual growth rate	%			-2.8	13.4	2.4	5.5	4.7

Sources: Statistical Abstract 1970, Nairobi
Survey of Economic Conditions 1969, UN
Summaries of Economic Data 1970, ECA

1 K£ = 2.80 US$
1 US$ = 7.14 KShs

Table II/45

Economic Indices

U G A N D A									
		Unit	1963	1964	1965	1966	1967	1968	1969*)
Population	Total	Million	7.20	7.37	7.55	7.74	7.93	8.13	8.32
	annual growth rate	%	2.5	2.4	2.4	2.5	2.5	2.5	2.3
Gross-Domestic-Production (factor cost)	Agriculture, forestry, fishing	Mio.US$	333.9	379.0	430.4	449.0	445.8	458.2	531.3
	Mining	"	73.5	12.7	17.1	10.2	7.8	9.2	9.7
	Manufacturing	"		50.5	51.1	57.1	60.3	62.9	70.3
	Electricity and Water	"		7.4	8.5	9.5	10.6	11.5	11.8
	Construction	"		13.6	17.6	16.4	19.5	21.1	23.4
	Commerce	"	82.7	93.5	112.7	120.1	122.5	133.8	143.1
	Transportation and Communication	"	24.4	26.5	29.1	31.1	33.0	35.4	39.1
	Other	"	123.5	134.9	151.5	162.3	178.4	180.1	179.3
	Total	"	638.0	718.1	818.0	855.7	872.9	912.2	1026.0
	per capita	US$	88.6	97.4	108.3	110.6	110.0	112.2	123.3
	annual growth rate	%		9.9	11.2	2.1	-0.5	1.9	9.9

Sources: Statistical Abstract, 1970 Kampala
Summaries of Economic Data, ECA 1970

+ estimated

1 U£ = 2.80 US$
1 US$ = 7.14 USh

Table II/46

Economic Indices

TANZANIA									
		Unit	1963	1964	1965	1966	1967	1968	1969
Population	total	Million	11.16	11.45	11.73	12.00	12.30	12.67	13.06
	annual growth rate	%		2.5	2.4	2.3	2.5	3.0	3.0
Gross-Domestic-Production (factor cost)	Agriculture, forestry, fishing	Mio.US$		390.6	363.4	413.3	399.7	416.2	430.4
	Mining	"		18.8	19.5	26.9	27.7	18.8	22.1
	Manufacturing	"		39.9	46.9	58.1	66.8	72.7	82.6
	Electricity and Water	"		5.9	6.4	8.5	9.0	9.7	10.4
	Construction	"		21.8	24.1	30.4	41.4	46.3	45.5
	Commerce	"		91.7	97.7	114.4	119.6	135.2	138.7
	Transportation + Communication	"		48.7	54.0	67.8	75.3	94.8	92.8
	Other	"		175.1	192.4	203.5	224.1	224.0	245.8
	Total	"		792.5	804.4	922.9	963.6	1035.7	1068.3
	per capita	US$		69.2	68.6	76.9	78.3	81.7	81.8
	annual growth rate	%			-0.8	12.0	1.8	4.3	0.1

Sources: The Economic Survey 1970/71
Dar-es-Salaam

1 T£ = 2.80 US$
1 US$ = 7.14 TSh

Table II/47

Economic Indices

RWANDA									
		Unit	1963	1964	1965	1966	1967	1968	1969
Population	Total	Million		3.019	3.109	3.203	3.299	3.398	3.500
	annual growth rate	%		3.1	3.0	3.0	3.2	3.0	2.8
Gross-Domestic-Production (factor cost)	Agriculture, forestry, fishing	Mio.US$		99.1			102.3	108.7	
	Mining	"		2.6			3.9	3.7	
	Manufacturing	"		5.1			4.2	5.0	
	Electricity and Water	"							
	Construction	"		2.6			6.0	7.3	
	Commerce	"		7.6			12.4	13.7	
	Transportation and Communication	"		1.0			1.8	1.9	
	Other	"		12.0			21.6	24.1	
	Total	"		130.0			152.2	164.4	
	per capita	US$		43.0			46.0	48.2	
	annual growth rate	%						4.9	

Sources: Statistical Bulletin Africa 67
Summaries of Economic Data ECA 70

1 FR = 0.02 US$
1 US$ = 50 FR

since April 1966:

1 FR = 0.01 US$
1 US$ = 100 FR

Table II/48

Economic Indices

BURUNDI									
		Unit	1963	1964	1965	1966	1967	1968	1969
Population	total	Million	3.09	3.15	3.21	3.27	3.34	3.41	3.48
	annual growth rate	%	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Gross-Domestic-Production (factor cost)	Agriculture, forestry, fishing	Mio.US$			104.2				
	Mining	"			6.2				
	Manufacturing	"							
	Electricity and Water	"							
	Construction	"			3.6				
	Commerce	"			11.2				
	Transportation and Communication	"			1.9				
	Other	"			16.6				
	Total	"			143.7			149.6	
	per capita	US$			44.8			43.9	
	annual growth rate	%							

Sources: Summaries of Economic Data ECA 70
Jeune Afrique 70

1 FB = 0.02 US$
1 US$ = 50 FB

since Jan 1965:

1 FB = 0.0114 US$
1 US$ = 87.50 FB

Table II/49

Economic Indices

ZAMBIA									
		Unit	1963	1964	1965	1966	1967	1968	1969
Population	total	Million	3.49	3.57	3.66	3.75	3.85	3.95	4.05
	annual growth rate	%		2.2	2.5	2.4	2.6	2.5	2.5
Gross-Domestic-Production (factor cost)	Agriculture, forestry, fishing	Mio. US$		74.6	76.6	84.7	92.9	92.0	93.8
	Mining	"		309.1	292.5	336.1	356.4	353.5	567.6
	Manufacturing	"		39.5	56.0	84.3	102.5	106.7	103.0
	Electricity and Water	"		7.0	7.4	10.4	11.3	17.2	20.4
	Construction	"		28.0	55.2	75.6	78.3	88.3	77.3
	Commerce	"		64.1	99.8	109.6	134.4	160.3	143.4
	Transportation and Communication	"		28.8	45.4	45.4	69.2	67.3	91.3
	Other	"		99.8	135.2	156.2	206.5	229.1	289.3
	Total	"		650.9	768.2	902.3	1051.5	1114.4	1336.1
	per capita	US$		182.3	209.9	240.6	273.1	282.1	342.3
	annual growth rate	%			15.1	14.6	13.5	3.3	21.3

Sources: Statistical Yearbook, Zambia 1970

1 Z£ = 2.80 US$
1 US$ = 7.14 ZSh

since 1968:

1 Z£ = 2 K
1 K = 1.40 US$
1 US$ = 0.714 K

Table II/50

Economic Indices

MALAWI									
		Unit	1963	1964	1965	1966	1967	1968	1969
Population	total	Million	3.75	3.85	3.94	4.04	4.14	4.25	4.36
	annual growth rate	%		2.6	2.3	2.5	2.5	2.6	2.5
Gross-Domestic-Production (factor cost)	Agriculture, forestry, fishing	Mio.US$		118.7	138.9	150.6	154.0	132.0	142.2
	Mining	"		0.1	0.1	0.1	0.0	0.1	0.1
	Manufacturing	"		16.9	21.4	26.5	30.4	28.6	33.1
	Electricity and Water	"		1.5	1.8	2.4	2.8	2.8	3.0
	Construction	"		7.8	9.2	12.5	12.0	12.2	14.5
	Commerce	"		16.7	20.7	22.0	21.7	23.2	27.1
	Transportation and Communication	"		7.8	9.8	12.5	14.8	12.5	12.5
	Other	"		35.7	38.8	43.5	48.4	43.8	45.9
	Total	"		205.2	240.7	270.1	284.1	255.2	278.4
	per capita	US$		53.3	61.1	66.9	68.6	60.0	63.9
	annual growth rate	%			14.6	9.5	2.5		6.5

Sources: Statistical Bulletin for Africa 67
Summaries of Economic Data ECA 70

1 M£ = 2.80 US$
1 US$ = 7.14 MSh

since December 1967:

1 M£ = 2.40 US$
1 US$ = 8.33 MSh

since February 1971:

1 M£ = 2 K

Table II/51

Economic Indices

MADAGASCAR									
		Unit	1963	1964	1965	1966	1967	1968	1969
Population	Total	Million	5.94	6.14	6.34	6.56	6.77	6.99	7.22
	annual growth rate	%	3.3	3.3	3.3	3.3	3.3	3.3	3.3
Gross-Domestic-Production (factor cost)	Agriculture, forestry, fishing	Mio.US$							
	Mining	"							
	Manufacturing	"							
	Electricity and Water	"							
	Construction	"							
	Commerce	"							
	Transportation and Communication	"							
	Other	"							
	Total	"	546.8	575.1	593.3	624.5	652.1	684.5*)	716.9*)
	per capita	US$	92.1	93.7	93.6	95.2	96.3	97.9	99.3
	annual growth rate	%	-1.8	1.7	0	1.7	1.2	1.6	1.2

Sources: Statistical Bulletin for Africa ECA 67
Inventaire Socio-Economique 64-68
Summaries of Economic Data ECA 70
Statistical Yearbook ECA 1970

+ estimated

1 FMG = 0.00405 US$
1 US$ = 246.85 FMG

since August 1969:

1 FMG = 0.0036 US$
1 US$ = 277.71 FMG

Table II/52

Economic Indices

MAURITIUS									
		Unit	1963	1964	1965	1966	1967	1968	1969
Population	Total	Million	0.701	0.722	0.741	0.759	0.774	0.787	0.799
	annual growth rate	%	2.8	3.0	2.6	2.4	2.0	1.7	1.5
Gross-Domestic-Production (factor cost)	Agriculture, forestry, fishing	Mio.US$	62.1	37.8	41.6	39.9	42.6	34.7	40.3
	Mining	"	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	Manufacturing	"	36.8	24.8	26.9	25.2	27.1	22.1	25.6
	Electricity and Water	"	4.4	4.6	5.2	5.5	6.3	5.4	5.4
	Construction	"	10.3	11.1	11.5	10.9	12.4	8.8	8.3
	Commerce	"	17.0	18.1	18.3	17.6	18.7	16.6	16.4
	Transportation and Communication	"	19.3	19.9	21.4	20.8	21.0	18.4	18.9
	Other	"	40.2	43.0	44.5	46.1	48.2	42.7	44.6
	Total	"	190.2	159.5	169.6	166.2	176.5	148.9	159.7
	per capita	US$	271.3	220.9	228.9	219.0	228.0	189.2	199.9
	annual growth rate	%		-22.8	3.6	-4.5	4.1		5.7

Sources: Statistical Bulletin for Africa 67
Bi-Annual Digest of Statistics 70

1 Rs = 0.2099 US$
1 US$ = 4.762 Rs

since December 1967:

1 Rs = 0.180 US$
1 US$ = 5.555 Rs

Table II/53

Status East Africa in 1969

	Ethio-pia	Kenya	Uganda	Tan-zania	Zambia	Mada-gascar	Mauri-tius	Mala-wi	Soma-lia	Burun-di	Rwanda
Population mill.	24,49	10,50	8,32	13,06	4,05	7,22	0,799	4,36	2,73	3,48	3,50
Area (country) sp.km '000	1212	582,6	193,6	939,7	729,4	592	1,86	119	627	28,8	25,1
Population density per sq. km	20	18	43	14	6	12	430	36	4	125	139
Gross domestic product (factor cost) mill. US$	1544,3	1334,5	1026,0	1068,3	1386,1	716,9	159,7	278,4	168,2	1) 149,6	1) 164,4
" " " per capita US	63,1	127,1	123,3	81,8	342,3	99,3	199,9	63,9	1) 63,0	43,9	1) 48,2
Production manufacturing industry mill.US$	4) 186,8	2)3) 510,4	5) 160,4	2)5) 210,8	3) 379,9	2)4) 137,8	5) 87,3	6) 76,1	4) 17,0	2) 18,68	2) 18,17
" per capita " US$	6,89	48,60	19,28	16,14	93,80	19,08	109,25	17,45	6,23	2) 5,37	2) 5,19
Engineering Industry mill. US$	4) 2,49	3) 70,97	5) 11,98	2)5) 9,34	3) 60,30	2)4) 14,20	5) 5,36	6) 4,80	4) 0,27	2) 0,63	2) 0,61
" " per capita US$	0,10	6,76	1,43	0,72	14,89	1,97	6,71	1,10	0,10	2) 0,18	2) 0,17
Ratio of production of engineering and manuf. industry (%)	1,3	13,9	7,5	4,4	15,9	10,3	6,1	6,3	1,6	2) 3,3	2) 3,4

1) 1968
2) estimated
3) size of factory with 1 or more employees
4) size of factory with 5 or more employees
5) size of factory with 10 or more employees
6) size of factory with 20 or more employees

Sources: Statistical Offices
Ministries of Industry

Table II/54

Installed Capacity and Production of Electric Power

Country	Year	P						P + I					
		Installed capacity MW			Production kwh			Installed capacity MW			Production kwh		
		Total	Hydro.	Therm.	Total	Hydro.	Therm.	Total	Hydro.	Therm.	Total	Hydro.	Therm.
Ethiopia	1964	103,1	73,0	30,1	186,5	136,1	50,4	119,0			208	175	
	1965	103,6	74,6	29,0	226,5	145,5	81,0				246		
	1966	118,8	74,6	44,2	252,2	146,0	106,2	166,5	114,3	52,2	276	175	101
	1967	137,8	92,1	45,7	294,5	210,3	84,2				318		
	1968	138,7	92,1	46,6	322,9	233,5	89,4				398		
	1969	137,4	91,4	46,6	340,8	240,0	100 8						
Somalia	1964				15,0[a]	-	15,0[a]						
	1965												
	1966	12,0	-	12,0									
	1967												
	1968	12,4	-	12,4									
	1969	14,0+	-	14,0+	29,0+	-	29,0+						
Kenya	1964	101,4	27,9	73,5	323,2	205,0	118,2						
	1965	100,0	27,9	72,1	327,5	219,6	126,8						
	1966	113,6	27,9	85,7	346,4								
	1967	113,6	28,1	85,5	339,3								
	1968	153,0	66,4	86,6	401,7								
	1969	153,1	66,1	87,0	459,3								
Uganda	1964	134	122	12	521	521	-	148					
	1965	140			572								
	1966	158			635			167	136	31	670	652	18
	1967	158			704								
	1968	175			731								
	1969	175			731								

P = Public power supply plants
I = Industrial power stations
a) 1963
\+ estimated

Cont. I

Country	Year	P						P + I					
		Installed capacity MW			Production kwh			Installed capacity MW			Production kwh		
		Total	Hydro.	Therm.	Total	Hydro.	Therm.	Total	Hydro.	Therm.	Total	Hydro.	Therm.
Tanzania	1964	69,9	41,2	28,7	192,3	131,0	61,3						
	1965				213,2								
	1966	71,6	41,2	30,4	252,5	190,5	62,0						
	1967				282,0								
	1968	92,5			313,4								
	1969	101,4			358,3								
Rwanda	1964	9,0[a]			11,0+			21,8					
	1965												
	1966	10,0	8,6	1,4	16,0	15,0	1,0	22,5	21,3	1,2	20,3		
	1967										20,9		
	1968										25,5		
	1969	16,0+			19,0								
Burundi	1964	4,7	-	4,7	8,0	-	8,0						
	1965	4,7	-	4,7	1,5	-	1,5						
	1966	4,7	-	4,7	1,0	-	1,0						
	1967	4,7	-	4,7	1,0	-	1,0						
	1968	5,9	-	5,9	0,7	-	0,7						
	1969	6,5	-	6,5	1,0+	-	1,0+						
Zambia	1964							261,0	49,6	211,4	693,2	305,5	387,7
	1965							260,0	49,6	210,4	671,8	276,1	395,7
	1966							259,5	49,6	209,9	605,8	274,1	331,7
	1967							254,7	95,9	158,8	600,4	272,0	328,4
	1968							254,7	95,9	158,8	654,5	294,1	360,4
	1969							359,3	155,9	203,4	688,1	315,8	372,3

Cont. II

Country	Year	P						P + I					
		Installed capacity MW			Production kwh			Installed capacity MW			Production kwh		
		Total	Hydro	Therm.	Total	Hydro.	Therm.	Total	Hydro	Therm.	Total	Hydro.	Therm.
Malawi	1964	13,3	0,6	12,7	43,0								
	1965	14,2	0,6	13,6	49,9								
	1966	30,2	16,6	13,6	67,0	39,0	28,0						
	1967	38,2	24,6	13,6	84,1								
	1968	38,7	25,1	13,6	101,4								
	1969	38,7	25,1	13,6	114,9								
Madagascar	1964	46,5	27,6	18,9	92,5	78,2	14,3	72,9			139,0		
	1965	47,8	27,8	20,0	102,2	81,8	20,4	82,4					
	1966	53,7	34,3	19,4	110,3	84,2	26,1	107,0	40,8	66,2	161,0		
	1967	55,6	34,3	21,3	126,7	96,3	30,4	112,0	43,4	68,6	180,0		
	1968	57,8	34,3	23,4	139,8	101,6	38,2	109,0	43,5	65,5	188,0		
	1969	57,8	34,3	23,4	150,2								
Mauritius	1964	44,1	15,7	28,4				95,9	16,4	79,5	93,0	56,0	37,0
	1965	44,1	15,7	28,4	89,0	63,5	25,5	97,0	16,4	80,6	103,0	64,0	39,0
	1966	44,1	15,7	28,4				97,0	16,4	80,6	112,0		
	1967	44,1	15,7	28,4	103,6	57,6	46,0	101,6	16,4	85,0	120,6	58,1	67,5
	1968	44,1	15,7	28,4	107,8	46,5	61,3	101,4	16,4	85,0	126,6	47,1	79,5
	1969	44,1	15,7	28,4	104,4	26,5	77,9	101,4	16,4	85,0	129,9	27,0	102,9

GOPA - GESELLSCHAFT FÜR ORGANISATION, PLANUNG UND AUSBILDUNG MBH

PART III

THE PROSPECTS

GOPA – GESELLSCHAFT FÜR ORGANISATION, PLANUNG UND AUSBILDUNG MBH

1. Projections

1.1 Trend Projections

In order to obtain a basis for the subsequent identification of viable projects, projections of the subregion's engineering goods consumption (EGC) up to 1985 have been attempted. As quality and availability of the data required for that process vary considerably, a number of assumptions had to be made in many instances, which will be explained in the following.

The principal source of information on past EGC are figures from import statistics. They are presented in tables II/1-II/10, of the annex. As not all countries of the subregion use the SITC classification or have adapted it to their requirements, some inaccuracies might enter at that point. Where only fob-values are listed, these had to be converted to cif-values by using indices of freight and insurance rates for the period covered. The most serious discrepancies might arise from the fact that a number of import statistics give only value figures but no or only incomplete corresponding weight figures. These, however, are essential for projections in order to eliminate price fluctuations. In such cases, weight figures had to be calculated on the basis of average prices/unit of the SITC-subdivisions. Finally, figures for the latest year available for all countries of the subregion (1969) were generally only provisional ones and consequently of limited usefulness.

With these reservations regarding their accuracy, the import figures have been used for a linear trend projection of the total subregional EGC of SITC-divisions 71,72 and 73[1)]. For these divisions, the discrepancy incurred by not taking into account existing local production should be tolerable. This is not the case for division 69, for which, therefore, no projection on this basis has been made.

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1) table III/1

1.2 Projection based on Development of Gross Domestic Product

Another approach to projections was made by using the correlation between per capita GDP and per capita EGC. This correlation was established for three different years, the coefficients being r=0,82, 0,95 and 0,98 respectively[1]. The average value obtained for increase of p.c. EGC related to an increase of p.c. GDP by 1 % was 0,090 kg. GDP was projected at constant 1960 prices for reasons of comparability and continuity with the figures given in the most recent ECA survey of the subregion[2] and by choosing terminal target rates of real growth on the basis of past performance and targets set by the individual countries. From these figures, p.c. GDP was calculated by using population growth rates projected in UN statistics[3]. In connection with the above elasticity this yields per capita and total EG consumption figures over the projection period, again and for the same reasons as before only for SITC divisions 71, 72 and 73[4]. The assumption made in calculating the figures for these divisions from the total EG consumption figure was that their relative share will remain about constant over the projection period, which seems operational considering the past development[5].

1.3 Projection based on Development of Gross Fixed Capital Formation

A third projection method for divisions 71, 72 and 73 uses gross fixed capital formation in machinery and transport equipment as a percentage of the GDP to arrive at the respective consumption

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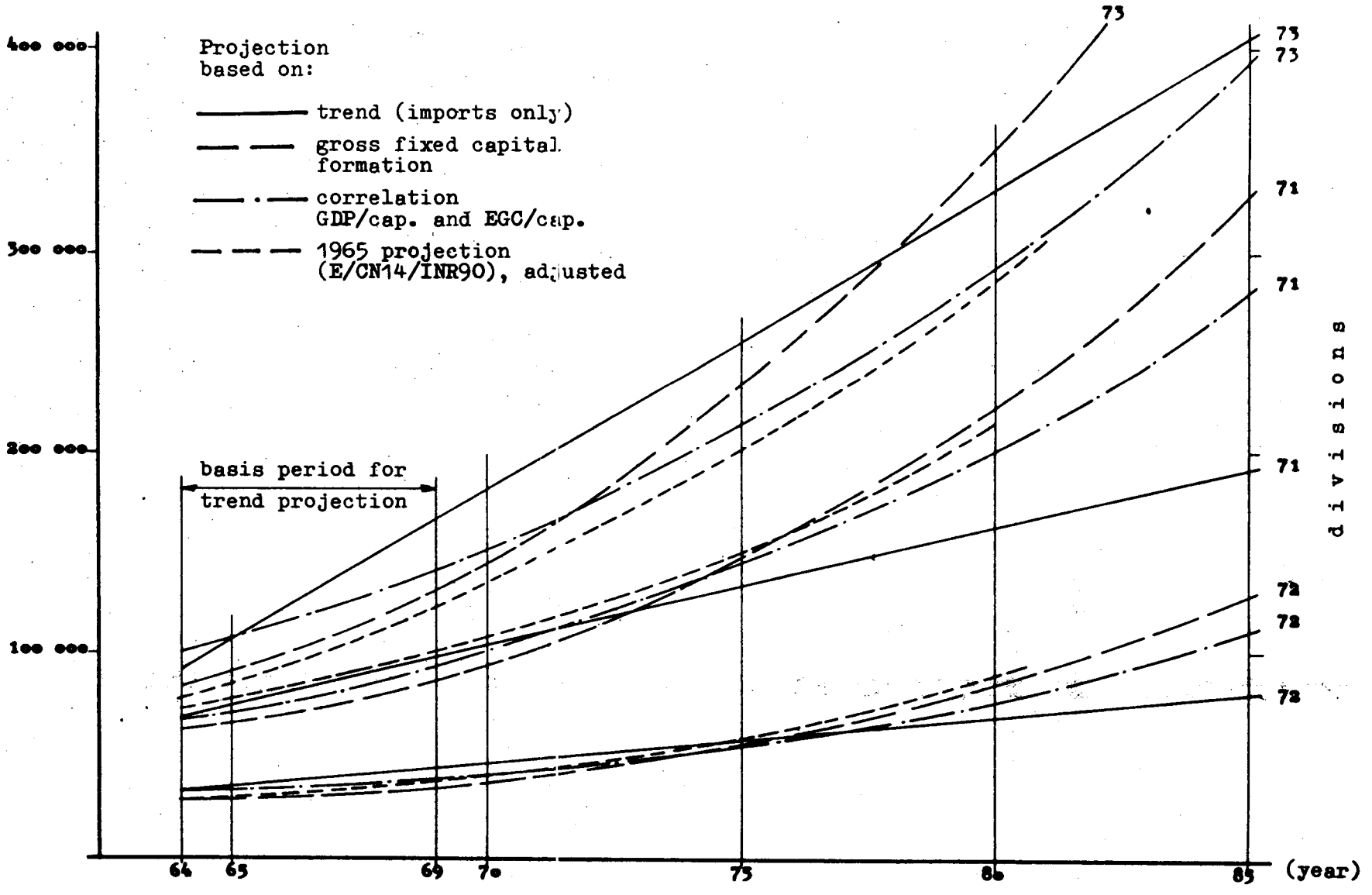
1) table III/2. The validity of this correlation has also been shown in previous reports on the subject of Engineering Industries(Documents E/CN 14/INR, 89/90 and E/CN 14/INR 126)
2) Document ST/ECA/140/Part II
3) table III/3
4) tables III/4 and III/5
5) see II/1.2 and graph II/21

figures. Here, three assumptions have to be made: first, target rates for this percentage must be set; this was done on the basis of corresponding figures of other developing and industrialized countries. Secondly, the share of machinery and transport equipment in total gross fixed capital formation must be projected, again on the basis of comparable data and the past performance of the countries of the subregion themselves, and thirdly, the figure thus obtained must be split up among the three divisions[1]. Graph III/8 combines the consumption figures resulting from the three projections. For comparison, an adjusted projection made in 1965 has been added[2]. Up to 1980, the spread of the curves remains tolerable, with the exception of the trend projection for division 71, but only for division 72 their coherence is satisfactory over the entire projection period. On the whole, the curve based on projection of per capita EGC appears to be the most acceptable, and this one has therefore been chosen for the subsequent calculation, in which the global figures for the three divisions are broken down into their subdivisions. This is done by using the average percentage share of each of the subdivisions in the divisional total over the past years as basis figures and by making assumptions on future shifts of these shares. The further the projection reaches into the future, the more global such assumptions must necessarily be, which is reflected in the percentages indicated in the tables[3].

The same procedure has been adopted for projection of division 69 with the difference, that in this case the basic figures of imports have been adjusted to take local production into account. Unfortunately, the lack of weight figures is even more pronounced in statistics on local production than in those on imports. Thus, various and sometimes not very re-

1) tables III/6 and III/7
2) Based on figures from document E/CN 14/INR/89/90
3) table III/9, III/10 and III/11

III/8 Summary of Projections Divisions 71, 72 and 73



liable sources had to be used to arrive at some order of magnitude for locally produced goods of division 69, which was then added to the import figures[1].

4.4 Projections for Individual Engineering Products

Finally, in addition to these projections by SITC subdivisions, a number of projections for individual items is given together with the results of the calculations described above[2].

2. Engineering Industries in the National Plans

Some of the countries of the subregion, in their national development plans, through their development banks, or through other bodies identify individual projects or indicate sections of the field of Engineering Industries, which they consider most promising for or most in need of investments. The prospects outlined in such plans are short - to medium-term, though past experience shows that they tend to be over-optimistic. At the same time such plans go to prove that only the Community countries think beyond their borders in terms of co-operation instead of merely export markets, and even there, what is commonly accepted in theory may look quite different in practice. Only a project which is considered viable on the strength of the national market alone stands a chance of being sponsored through loans of statal or parastatal bodies.

Following is a compilation of projects, which have been found mentioned in various sources of the respective countries.

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1) table III/12
2) tables III/14-III/22. These are projections contained in the document ST/ECA/40/Part VI. Most of them have been adjusted to exclude those countries which were considered in the ECA-study but are not part of the subregion as it is defined here.

Ethiopia:[1)]

A number of items which had been pointed out for local production several years ago without much activity resulting are being reconsidered at present. They include:

cutlery	hurricane lamps
building hardware	agricultural machinery
safes and strong boxes	assembly of typewriters
iron and steel stoves	assembly of sewing machines
household utensils	electrical fittings, flashlights
soldering and welding rods	production of batteries
aluminium articles	electric bulbs
castings(non-ferrous)	refrigerators, air-conditioners
castings(cast iron)	assembly of trucks

Existing production of agricultural implements is expected to expand and at the same time include new items. Assembly of tractors and passenger cars is under consideration; a feasibility study has been prepared for the latter.

1) From: Investment possibilities in Metal Processing Industries in Ethiopia, compiled by the Technical Agency

Somalia[1]

1st priority projects:[2]

Foundry[3]	240 t castings 200 t structures + jobbing	400.000 US$	2 shifts	plus 42.000 $ working capital

2nd priority projects:

Car batteries[4]	15.000 units	100.000US$	2 shifts	plus reconditioning and servicing
Aluminium utensils	300 t	450.000US$	1 shift	pressed and spun household utensils
Wire drawing and netting	1.000 t wire 300 t netting	600.000US$	2 shifts	imported mild steel wire rod to produce cold drawn wire for building and other purpose
Rivets, bolts nuts	850 t	450.000US$	2 shifts	to produce aluminium rivets, steel rivets, black and galvanized hot drop bolts and nuts using reinforced bars + cuttings
Wire products	400 t	1.200.000US$	2 shifts	nails, tacks, wood screws, barbed wire
Enamelled ware	250 t	60.000US$	2 shifts	to enamel castings and steel pressings for sanitary ware and household use incl. kitchen utensils

1) From unpublished sources
2) Only one project is in the 1st priority class, which includes a number of agricultural and foodstuff projects, besides. Even this project has been postponed for further study.
3) To be financed by UNIDO
4) Was established before but had to close down again due to lack of market.

Pump assembly	5.000 units	300.000US$	2 shifts	machining and assembly of hand and water pumps from castings and imported parts
mechanical workshops	· 300 t	250.000US$	2 shifts	general machining of steel and non-ferrous metals as well as heat treatment. To be combined with foundry.

3rd priority projects:

The following projects are taken into consideration:

PVC insulated electric wire, up to 1.000 V, for local needs;
steel springs and suspension parts, mainly for automative needs;
razor blades from imported carbon and stainless steel materials;
agricultural implements, mainly hand tools, bushman and garden tools;
building hardware incl. hinges, handles, knobs, locks padlocks;
machine bolts and nuts;
bicycle assembly;
radio assembly incl. servicing;

Kenya[1)]

Metal products:

The projected growth of 7,5 per cent per annum[2)] takes into account the continued expansion of the existing intermediate products, such as windows, sheets and nails for the building industry, tanker and trailer bodies for the transport sector, and tins for the canning of meat, fruit and vegetables, and also reflects possibilities for new products.

1) From: 2nd Development Plan 1970-1974
2) During the plan period

One new project is already under way, expanding the operations of an existing Mombasa company which manufactures nails, rivets, and welded mesh. The new factory will be built on Mombasa mainland and the expanded operations will include the re-rolling of imported steel billets to produce reinforcement rods, bars, angles and flats. The investment required will be KŁ 500.000, some of which is being provided by DFCK[1)], and there will be a substantial saving in imports.

Another opportunity is the manufacture of a wide range of agricultural hand tools. Most pangas and hoes are at present imported. However, prices must be kept at present levels, which means in effect that locally made implements will have to compete against imports without the protection of import duties.

Machinery:

Feasibility studies will be undertaken to examine the production possibilities of diesel engines, centrifugal pumps, sprayers, bush cutters, spare parts for automobiles and a number of other items in the non-electric group. In the electrical section, new production will be introduced in motors, particularly winding operations, electric lamp bulbs, bakelite switches, electric cookers, heaters, radiators, refrigerators and washing machines where feasibility studies give positive results.

Transport equipment:

This industry is the largest in manufacturing in terms of gross product and employment and is expected to grow during the Plan period at 7 per cent per annum. Some industries, such as the building and repair of railways rolling stock

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1) Development Finance Corpn. of Kenya

will grow more slowly, while others, such as motor vehicle repair, and shipbuilding and repairing are expected to grow faster. The motor repair industry will continue to grow at least as fast as in the past. At Mombasa, an expansion of the dock-yard facilities may open up the possibility of a new project for shipbuilding and repair.

The overall growth rate would be considerably higher if feasibility studies of local assembly of passenger cars were to give encouraging results. Several manufacturers have made proposals for the local assembly of cars, but so far none has proved viable[1].

The assembly of lorries and buses has been expanding fairly rapidly in recent years and is expected to continue during the Plan period. The bulkiness of fully assembled lorries and the high cost of freight resulting are such that it is economic to assemble them locally without high protection. East African demand for tractors is reaching the level which could make local assembly viable, and the Government intends to re-examine this possibility.

Uganda[2]

The following projects have been taken into consideration:

Radios and radiogramme sets: plans to increase variety of output;
Nails: plans to raise output to 10.000 bags by 1975

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1) Recently another large-scale study on local production of passenger cars in the Community has again come up with a negative result.
2) From a list compiled by the Ministry of Commerce and Industry, Kampala, on the basis of questionnaires asking existing industries about possible future developments (end 1970).

Brake linings: estimated investment Shs. 200.000 up to 1975

Various metals: start making sugar cane crushers, water pumps, bolts, nuts and pipes

Enamel ware, metal furniture, signs, beds etc: investment of Shs. 3.000.000 between 1970 and 1975

Refrigerators: enlargement to start manufacture of gas and electric cookers before 1975, investment 1 mill. Shs.

Transistor radios: plans to diversify into production of tape recorders, record-players, TV sets

Tin cans, steelwool: investment of Shs. 1.4 million up to 1975

Chain link fencing wire: start production of barbed wire

Exhaust collar rings, pipes and silencers: start electro-plating plant, investment Shs. 400.000

Hoes, picks, shovels, other tools: diversify into new range of products: railway wagons, pumps, cranes, conveyors

Tanzania[1)]

Pre-feasibility studies or feasibility studies have been worked out for the following projects:

MALLEABLE IRON GALVANIZED PIPE FITTINGS - Tanga
Total equipment in the order of TShs. 0,4 million.

BUCKLES - Dar-es-Salaam
Total equipment in the order of TShs. 100.000.

HEXAGONAL WIRE NETTING - Tanga
Manufacturing of fencing wire netting from galvanized wire.

IRON TOWER BOLTS, HASPS AND STAPLES - Tanga or Dar-es-Salaam
Equipment amounts to TShs. 0,2 million.

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1) From a list compiled by the Tanzania Investment Bank.

STEEL DOOR HINGES (BUTT TYPE) - Dar-es-Salaam
Equipment amounts to TShs. 0.25 million.

TAPS, BIB CORKS, STOP CORKS AND OTHER CAST BRASS ITEMS
- Dar-es-Salaam equipment amounts to TShs. 0,25 million.

WELDED MESH - Tanga
For constructive and protection purposes. Equipment amounts to TShs.0,25 million.

WIRE DRAWING - Tanga
Wire drawing and wire products manufacturing.

METAL WORKING PLANTS WITH COMMON FACILITIES CENTRE
In 10 towns; various smaller workshops with an average equipment of TShs. 75.000 each for the manufacture of a number of consumer's items.

INDUSTRIAL ESTATE FOR LIGHT ENGINEERING WORKSHOPS -Dar-es-Salaam
Including about 20 workshops with common facilities for electroplating, heat treatment, tool room and forging shop. Total equipment amounts to TShs. 2 million.

CAR BATTERIES - Probably Dar-es-Salaam or Tanga
Manufacture and assembly of a limited number of types.

LORRY ASSEMBLY PLANT - Location undecided
Total investment in the order of TShs. 10 million.

ELECTRICAL ACCESSORIES - Dar-es-Salaam
Exact nature not known. Total equipment about TShs.0,2 mill.

ELECTRICAL LINK CLIPS - Dar-es-Salaam
Total equipment about TShs. 50.000.

POCKET AND HAND TORCHES - Dar-es-Salaam
Manufacture of aluminium cases. Total equipment about TShs. 175.000.

Some of the projects mentioned, in particular the extension ones, will most probably be implemented in the near future, while for other more or less preliminary studies have been prepared on the sponsoring bodies' own account, which are offered to interested parties.

East African Community[1)]

Basic agreements on the allocation of production of

- agricultural machinery and implements and
- engineering products

exist within the East African Community.

Allocation of agricultural implements industries

KENYA

1. Tractors 25 HP and upwards
2. Tractor drawn soil equipment 25 HP upwards
3. Power driven harvesting und threshing (grain)equipment
4. Processing equipment coffee and tea
5. Industrial milling, grading and husking machines

1) From a study prepared by the Industrial Studies and Development Centre, Dar-es-Salaam.

UGANDA

1. Tractors up to 25 HP
2. Tractor drawn soil equipment up to 25 HP
3. Special harvesting equipment (potatoes,sugar,cotton etc.)
4. Processing equipment for sugar, groundnuts, cotton etc.
5. Farm size milling, grading and husking machines
6. Animal drawn equipment (beyond ploughs)

TANZANIA

1. Small diesel engines
2. Power driven irrigation equipment
3. Animal drawn equipment (beyond ploughs)
4. Additional hand tool factory
5. Handling, transport and drying equipment for grain and seed etc.
6. Hand operated machinery (pumps, dusters, threshers etc.)
7. Sisal and coir equipment

Allocation of electrical industries

KENYA

1. Motors and generators, 1hp and upwards
2. Switchgear, distribution equipment
3. Clothes driers, washing machines (domestic)

UGANDA

1. Wires and cables
2. Transformers, control devices
3. Refrigerators, freezers (domestic)
4. Sewing machines (domestic)
5. Vacuum cleaners (domestic)

TANZANIA

1. Fractional hp-motors
2. Air-conditioners, fans (domestic)
3. Domestic heating appliances (cookers, hot plates, water heaters, irons etc.)
4. Lamp sockets, switches, receptacles, plugs, connectors, fuseboxes etc. (all domestic)
5. Blowers and pumps

RWANDA

No projects have been identified.

BURUNDI

No projects have been identified.

ZAMBIA[1)]

Products not at present manufactured in Zambia or not manufactured in sufficient quantities to supply the market. Establishment of manufacturing units is basically taken into consideration.

Electrical appliances: Toasters, irons, stoves, refrigerators, water heaters

Electrical machinery: Transformer assembly, small electric motor assembly, switchgear assembly, core building

1) From a list of investment opportunities listed by Zambia Industrial und Commercial Trade Promotion.

Electrical units:	Dry cell batteries
Iron and steel:	Sections, wire, tubes, fittings
Machinery:	Assembly agricultural machinery, pump assembly, winch assembly, rock drills
Metal finished goods:	Tins, cans, electric cable, wire, bolts, nuts, rivets, screws, chains, razor blades, bottle tops, hinges, butts, window fittings, welding electrodes, stoves, hardware, buckets, lawn mowers, sprinklers, taps, cocks, valves, radiators, tenders
Motor vehicles and parts:	tractor assembly
Sanitary ware:	Wash basins
Telecommunication equipment:	TV receivers
Tools:	Axes, hoes, picks, shovels, ploughs (animal)
Vehicles:	Bicycles, caravans, perambulators

MALAWI

Malawi uses a revolving development plan, which does not mention any specific projects in the field of Engineering Industries. The only project the Malawi Government Corporation mentions for future consideration is concerned with sheet metal galvanizing.

MADAGASCAR

Tables III/ 24+25 give a summary of new and extension projects in the field of mechanical and electrical industries for the 2nd plan (1970-1974), as elaborated in the respective basis sectoral studies[1].

MAURITIUS

The Four-Year Development Plan (1971-1975) gives a list of products, which are considered promising for future local production. These include the following in the field of Engineering Industries[2].

1. Production facilities exist, but are insufficient to cover all of present and future demand. Extension and/or diversification may be feasible. The following products and groups of products are considered:

   - metal doors and windows
   - nails, bolts, washers, rivets, screws of iron or steel
   - hardware (builders padlocks fittings etc.)
   - steam generating boilers, boiler house plants and parts
   - bodies and other parts for road motor vehicles
   - trailers of iron and steel.

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1) Perspectives de Développement des Industries Manufacturières, 1970-1974, Document de travail pour la commission de développement industriel, branche XIX(industries métallurgiques et mécaniques) et branche XX(industries électriques).
2) From 4-Year-Plan for Social and Economic Development, Vol I, General Analysis and Policies.

2. Commodities for which the market potential may be sufficient to justify establishment of production facilities:

- electro-domestic appliances (assembly, 30.000 pcs.p.a.)
- hand-tools
- metal cans and containers (25 t p.a.)
- sinks, wash basins and fittings, central heating
- apparatus
- lighting fixtures
- electrical accessories
- agricultural machinery and implements (implements: 60 t p.a.)
- pumps for liquids
- fluorescent tubes (20.000 pcs. p.a.)
- electrothermic apparatus incl. stoves
- household utensils and articles of metal, cutlery

3. Possibilities for the Establishment of new Engineering Industries in the East African Subregion

Following, a number of products will be identified, which are considered suitable for production in the subregion. In this process, the SITC- rather than the ISIC-classification of divisions and subdivisions is used, since it was employed for the projection of consumption figures and at the same time allows for a better breakdown into the individual products.

Demand for engineering products and capacity of the proposed plants are determined on the basis of 1980 projection figures. Regarding demand this is because 1975 and 1985 would be too close or too far off, respectively, to be representative for the entire projection period, the latter, in addition, being subject to a high degree of uncertainty. Concerning capacity, 1980 is preferable for two reasons: first, capacity should be chosen sufficiently large to cope with future increase of demand but without too much excess until that demand materializes. Secondly, detailed feasibility studies as well as erection and start-up period for any plant proposed in this study will require a considerable time, probably beyond 1975 in most cases. Furthermore it should be noted that capacities were so planned as to allow producing plants to cover the demand for spare parts for their respective products.

While some of the subdivisions include only few and comparatively homogeneous items, others contain dozens of products that cannot be treated together. In such cases, an initial selection is made on the basis of the importance of these products, judging from past import figures, and only those retained are subsequently further examined. Capacity of the proposed plants is given in units or products wherever possible and applicable, but in some instances where the exact nature and range of the production program requires in-depth investigations, capacity in tons is a more appropriate description.

Three terms are employed to define the markets these new production facilities are supposed to serve: 'subregional' means all countries of the subregion, 'regional' means some, but not all countries, while 'local' indicates that production will be directed to the home market of an individual country only (in some clearly distinguishable cases, the term 'local' is employed in contrast to 'imported').

Exports to countries outside the subregion, though mentioned in some cases, are not treated as a determining factor when examining the possibilities of production in the subregion, as this would give a different angle to this study.

In principle, the view is taken that local or regional production, if economically viable at all, should be given preference over subregional production, unless the disadvantages arising from having several small units instead of one large establishment are too aggravating. Engineering industries, as was pointed out earlier on, are a basic element to the whole process of industrialization and co-operation between the countries of the subregion must therefore be balanced against the growth and development of the national economies.

In allocating the proposed (sub)regional industries, two principles had to be considered, which tend to yield conflicting results: first, it is desirable to arrive at a balanced distribution of industries in the subregion, which means that those countries should be favoured with regard to new production facilities, that are less industrialized at present. On the other hand, under economic aspects, new industries will prefer to go to where they find an already established industrial infrastructure. This tendency would favour those countries in the subregion that even now have an advantage over the others. The contradiction can be solved only by establishing an order of priorities, which for this

study can be formulated as follows: Unless economic aspects carry so much weight as to make any other alternative unrealistic, the first of the above principles is given preference over the second. Naturally, the results thus obtained must be viewed again in the context of an overall industrialization strategy for the subregion, as engineering is only one out of many industrial branches. The realization of those projects which are in their capacity tailored to subregional markets or the total regional market will only be possible in those cases where all countries participate to the same extent in the industrial development of the region. For this reason also political considerations will decisively influence the allocation of industrial projects of all sectors. Despite this the best possible locations have to be chosen (within the framework of a 'bartering' basis) under consideration of all factors.

Obviously, consideration of the political aspect in allocating the proposed industries must be reserved to the government of the countries concerned. The following approach is, therefore, limited to economic factors influencing allocation, the most important of which are:

1. the transport costs
2. supply of electricity, water etc.
3. availability of manpower
4. market potential
5. cost of installation and production
6. existing industrial infrastructure

As a first step possible locations were chosen in each of the countries, which satisfy the above points 2, 3 and 6:

Ethiopia:	Addis Ababa area,	
	Asmara-Massawa area	
Somalia:	Mogadishu	
	Kisimaio	
Kenya:	Mombasa)	
	Nairobi)	or any point between these
	Eldoret)	places
Uganda:	Kampala)	
	Tororo)	or any point between these places
Tanzania:	Dar-es-Salaam	
	Arusha	
Rwanda:	Kigali	
Burundi:	Bujumbura	
Zambia:	Lusaka	
	Copperbelt area	
Malawi:	Blantyre area	
	Llilongwe	
Madagascar:	Tananarive area	
	Tamatave	
Mauritius:	Pt. Louis area (which can be considered to include the whole island)	

Cost of installation and production are largely determined by 1, 2 and 3, which leaves items 1 and 4 (transport cost and market potential) as parameters to the above list of possible locations.

Graph III/37 gives the network of existing and planned surface (road, rail and sea) links between the possible locations, the corresponding distances are presented in table III/36. Necessarily, these are arbitrary in those cases, where alternative and roughly equivalent routings are possible between two given places. Table III/38 takes up the information contained in table III/36 and presents it in more detailed form by giving the distances from every selected siting to all of the others (in units of 1oo km) together with the number of transhipments on the selected routing;(e.g. Blantyre-Tananarive 33/2 means: total distance 3300 km, 2 transhipments: Blantyre-Mozambique by rail, Mozambique - Tamatave by ship, Tamatave - Tananarive by road or rail), in order to convert these indications into terms of cost, a comprehensive knowledge of all transport tariffs applied in the subregion for all types of goods by the alternative carriers would be necessary, which is quite impossible. Therefore, the simplified assumption is made that tariffs are the same for all carriers and all goods. Thus, transportation cost of any given good between two places would be determined directly by the distance between them. Using the distance units of table III/38 as cost units and assuming furthermore that cost of one transhipment is equivalent to cost of five distance units, obtain the figures in the upper right-hand corner of each section of table III/38.

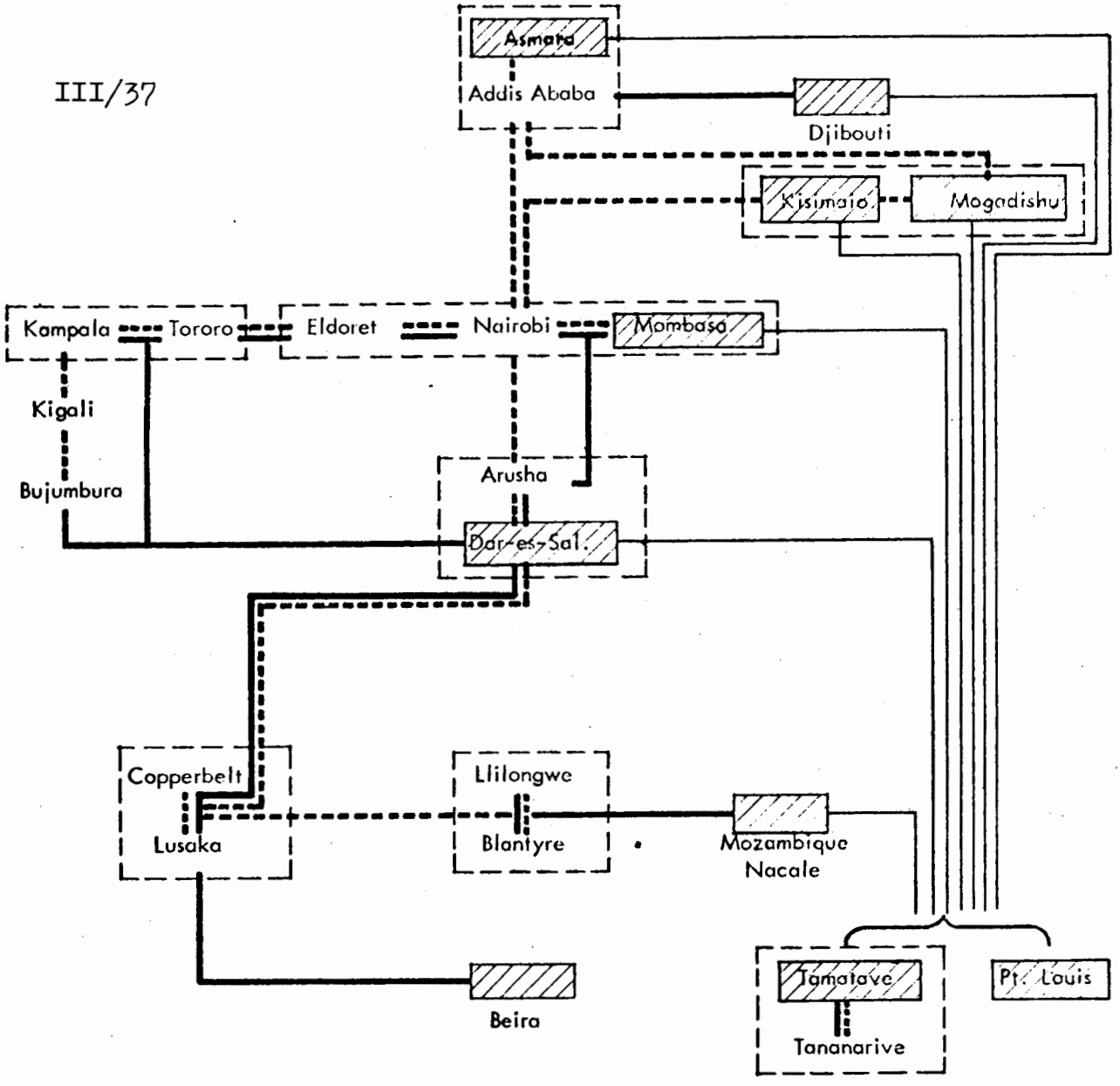
Thus, the indication 318/7 = 353 for Dar-es-Salaam means: Accumulated transport cost of one unit of goods from Dar-es-Salaam to each of the other places would be 318 units plus 7 x 5 = 35 cost units for necessary transhipments for a total of 353 cost units. These figures allow to group the selected locations in the order

Table III/36

Distances between Principal Demand Centers (and possible sitings of industries) in the East African Subregion

Asma																			
800	A.A.																		
3.000	1.500	Maga.																	
3.400	1.900	400	Kisim.																
3.700	1.900	950	500	Momb.															
4.200	1.400	1.200	800	500	Nair.														
4.500	1.700	1.500	1.100	800	300	Eldo.													
4.800	2.000	1.800	1.400	1.100	600	300	Toro.												
5.000	2.150	1.950	1.550	1.250	750	450	200	Kamp.											
5.400	2.600	2.500	2.000	1.700	1.200	900	600	450	Kiga.										
5.800	2.800	2.700	2.200	1.900	1.400	1.100	800	650	200	Buju.									
4.500	1.650	1.700	1.400	400	250	550	850	900	1.500	1.800	Arus.								
4.000	2.150	1.200	900	350	750	1.050	1.200	1.400	1.500	1.300	500	Dar.							
6.200	4.350	2.400	3.100	3.100	2.950	3.250	3.400	3.600	3.300	3.300	2.700	2.200	Lusa.						
6.100	4.250	3.300	3.000	3.000	2.850	3.050	3.300	3.500	3.400	3.200	2.600	2.100	300	Copp.					
5.400	5.000	2.700	2.400	1.600	2.100	2.400	2.700	2.900	3.200	3.000	2.200	1.700	800	1.100	Blant.				
5.700	5.300	3.000	2.700	1.900	2.400	2.700	3.000	3.200	3.500	3.300	2.500	2.000	900	900	300	Uil.			
5.200	5.500	2.700	2.700	2.600	3.100	3.400	3.700	3.850	4.300	4.500	3.000	2.500	3.800	4.600	3.200	3.600	Tana.		
4.900	5.200	2.400	2.400	2.300	2.800	3.100	3.400	3.550	4.000	4.200	2.700	2.200	3.500	4.300	3.000	3.200	300	Tama.	
5.200	5.400	2.900	2.800	2.800	3.300	3.600	3.900	4.000	4.500	4.700	3.100	2.600	4.000	4.400	3.500	3.800	1.300	900	P.L.

III/37



Existing and proposed surface transport network in the East African Subregion

rail links

road links

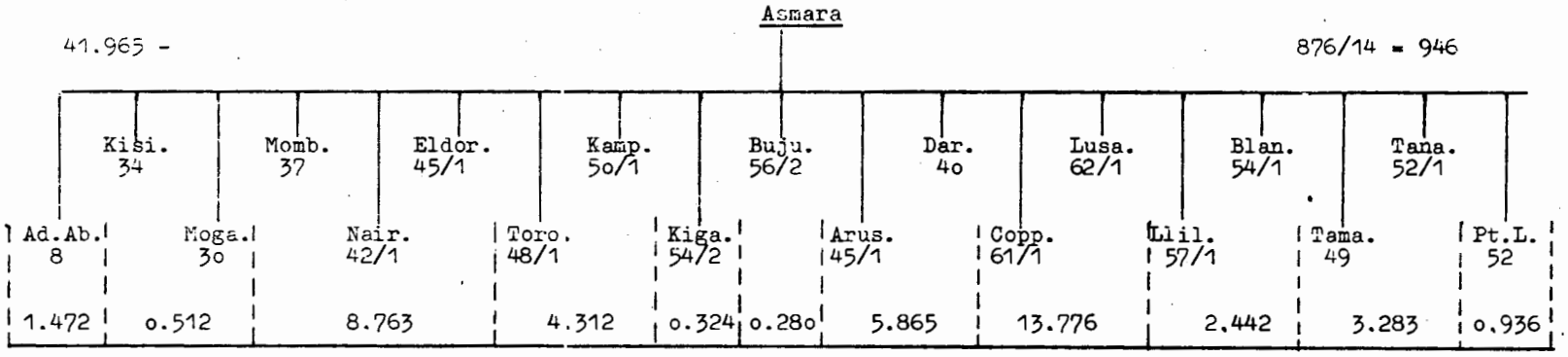
waterways

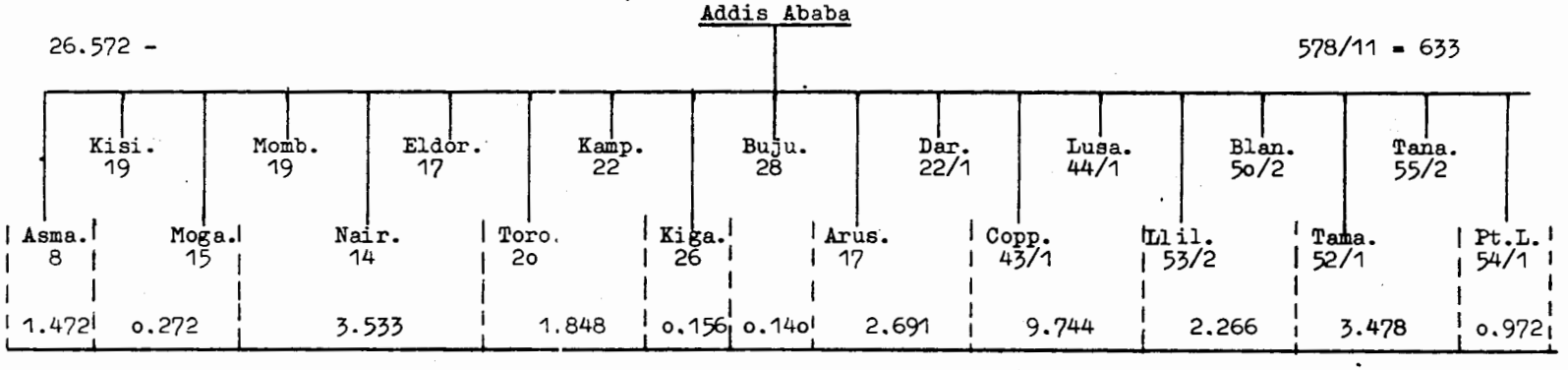
Asmara — port within subregion

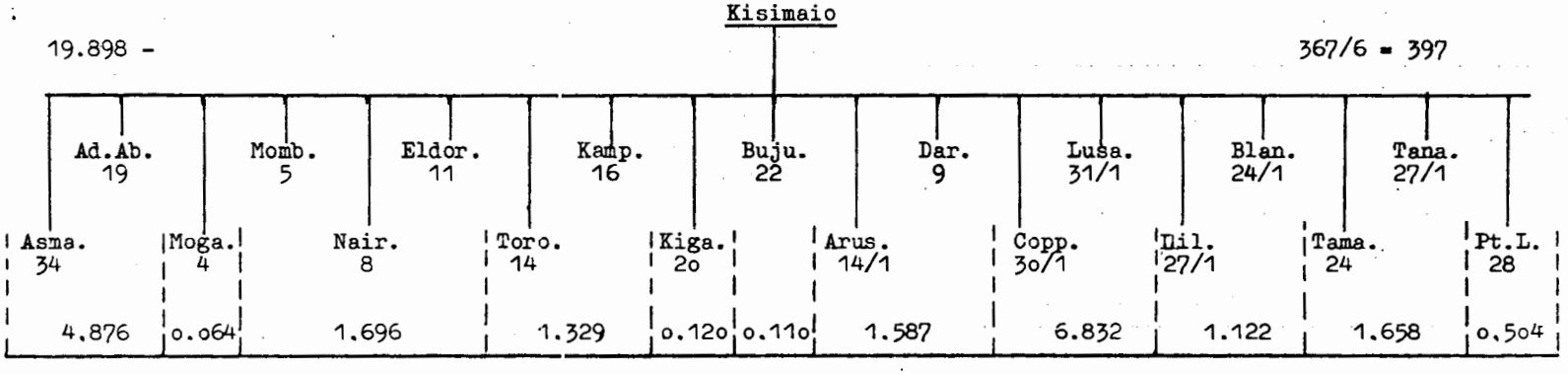
Beira — port outside subregion

Table III/38

Indices of Transportation Cost between Principal Demand Centers of the Subregion







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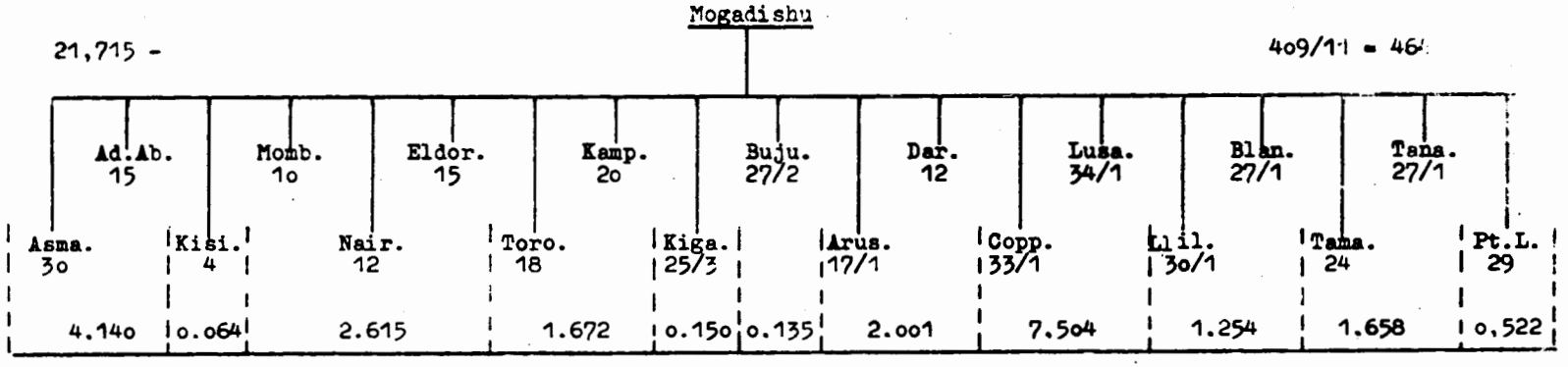
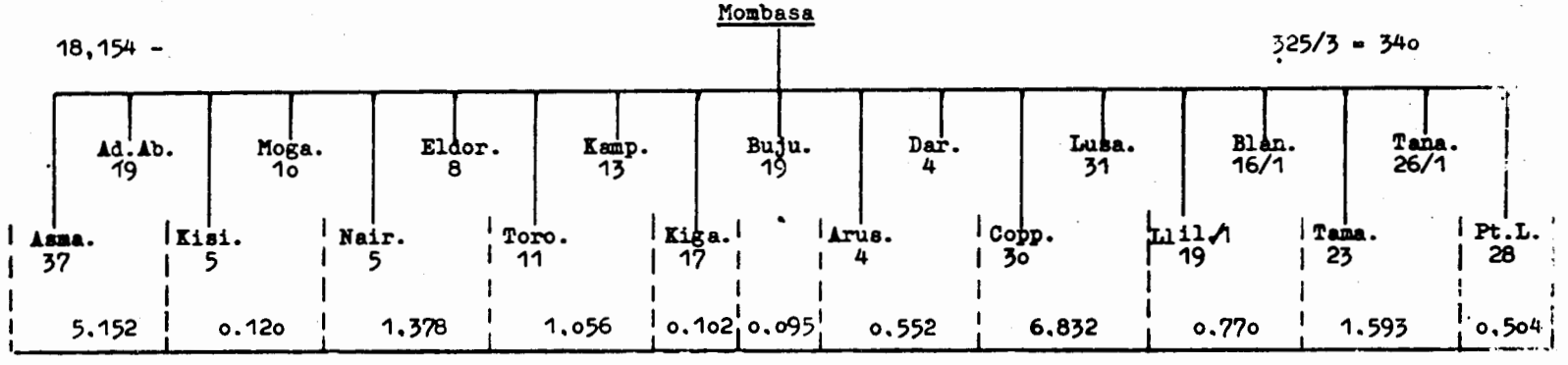
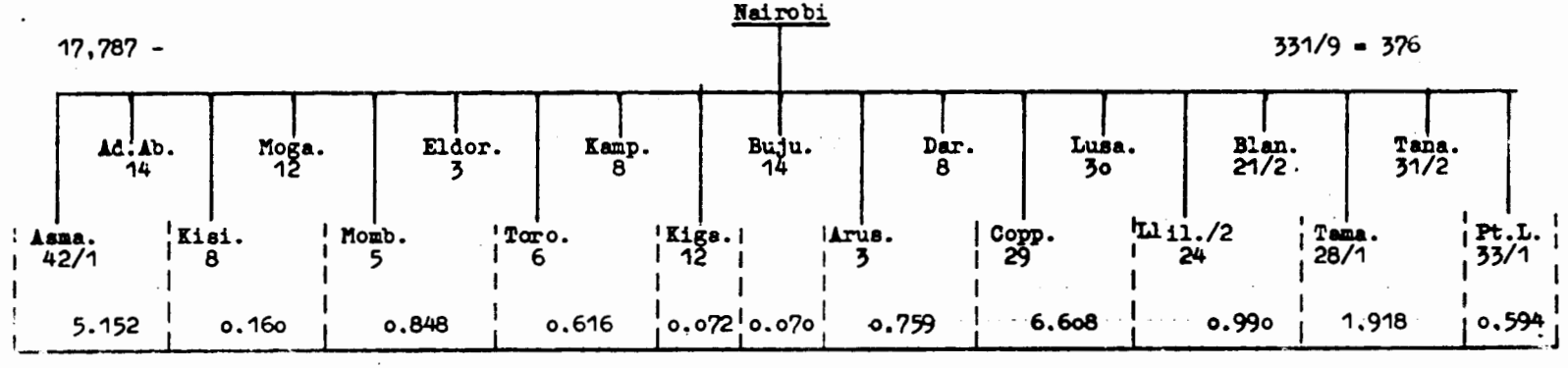
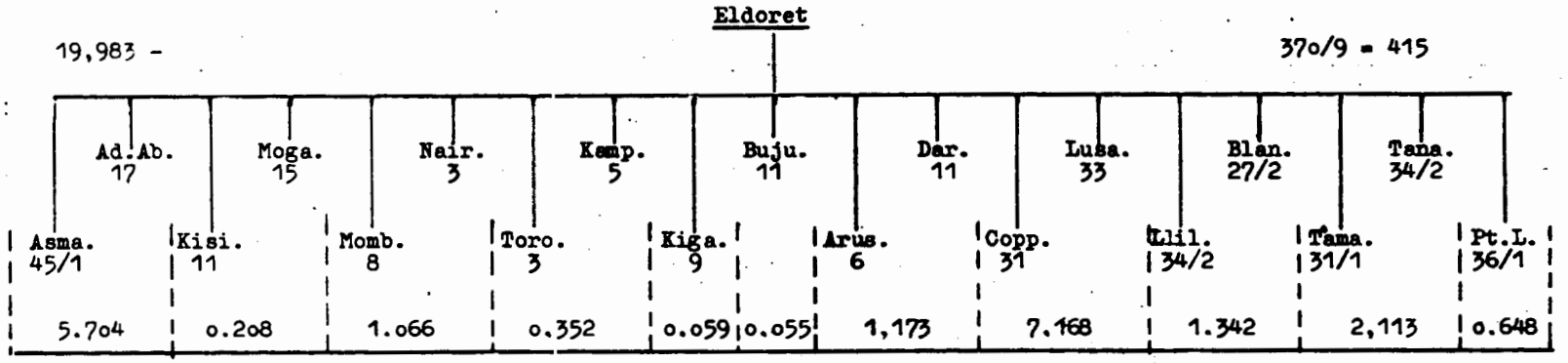
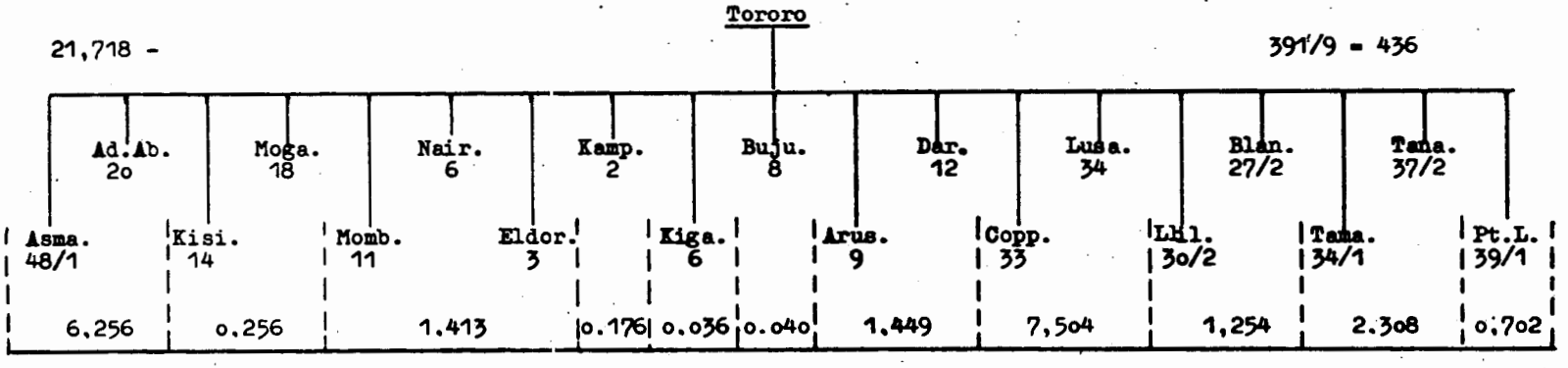

Mogadishu
21,715 -
409/11 = 46
Ad.Ab. 15
Momb. 1o
Eldor. 15
Kamp. 2o
Buju. 27/2
Dar. 12
Lusa. 34/1
Blan. 27/1
Tana. 27/1
Asma. 3o
Kisi. 4
Nair. 12
Toro. 18
Kiga. 25/3
Arus. 17/1
Copp. 33/1
Llil. 3o/1
Tama. 24
Pt.L. 29
4.14o
o.o64
2.615
1.672
o.15o
o.135
2.oo1
7.5o4
1.254
1.658
o.522

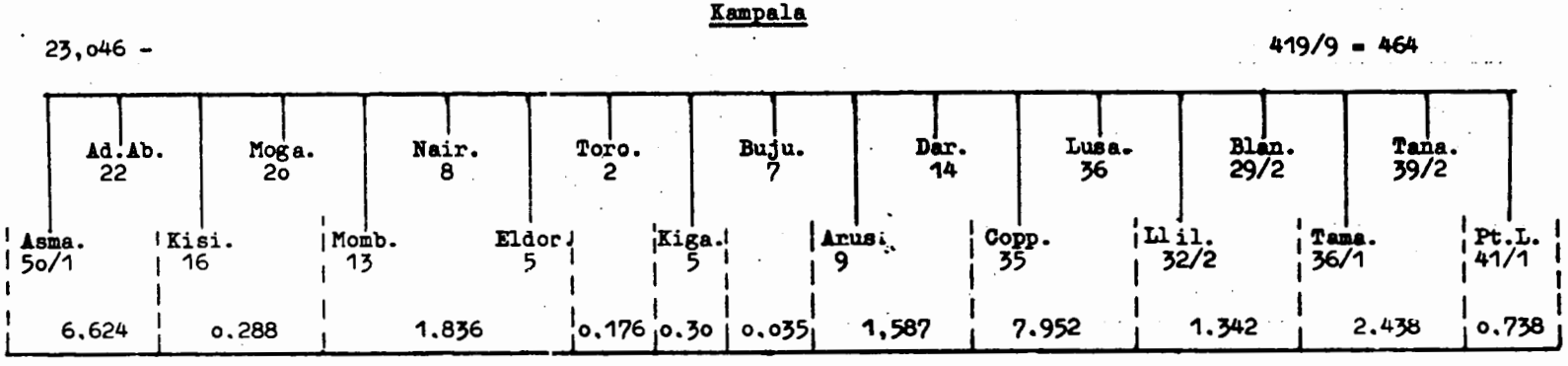

Mombasa
18,154 -
325/3 = 34o
Ad.Ab. 19
Moga. 1o
Eldor. 8
Kamp. 13
Buju. 19
Dar. 4
Lusa. 31
Blan. 16/1
Tana. 26/1
Asma. 37
Kisi. 5
Nair. 5
Toro. 11
Kiga. 17
Arus. 4
Copp. 3o
Llil. 19
Tama. 23
Pt.L. 28
5.152
o.12o
1.378
1.o56
o.1o2
o.o95
o.552
6.832
o.77o
1.593
o.5o4


Nairobi
17,787 -
331/9 = 376
Ad.Ab. 14
Moga. 12
Eldor. 3
Kamp. 8
Buju. 14
Dar. 8
Lusa. 3o
Blan. 21/2
Tana. 31/2
Asma. 42/1
Kisi. 8
Momb. 5
Toro. 6
Kiga. 12
Arus. 3
Copp. 29
Llil./2 24
Tama. 28/1
Pt.L. 33/1
5.152
o.16o
o.848
o.616
o.o72
o.o7o
o.759
6.6o8
o.99o
1.918
o.594

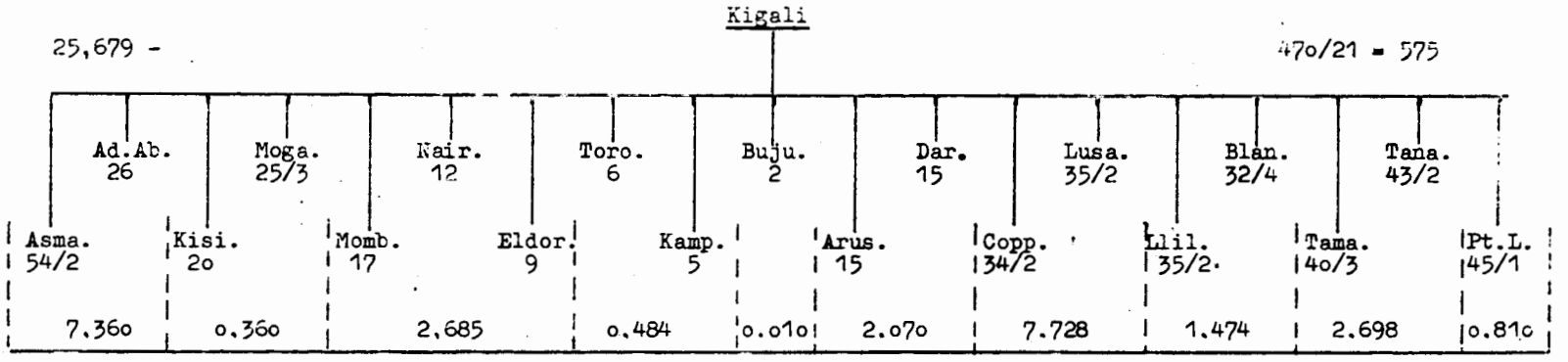
Contd.

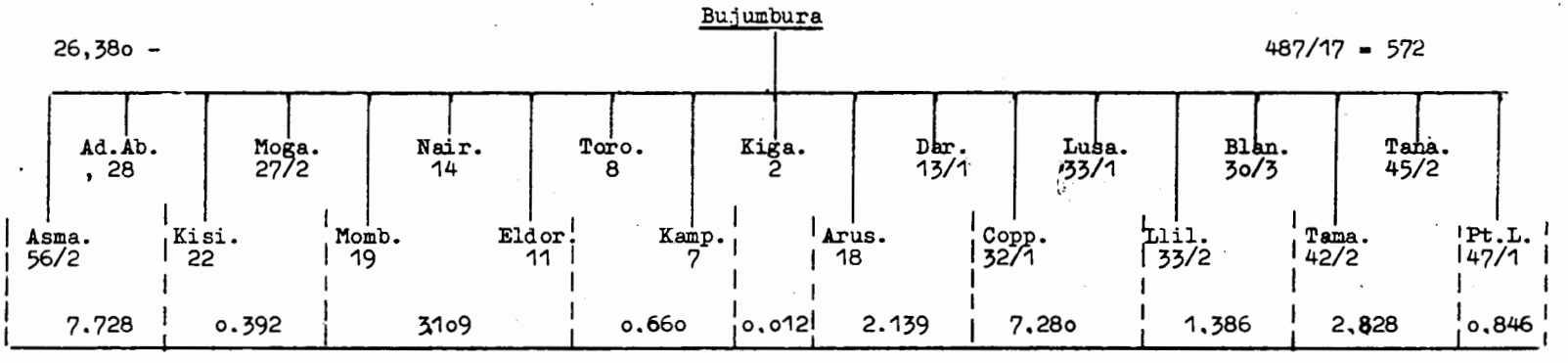

Eldoret
19,983 -
370/9 = 415
Ad.Ab. 17
Moga. 15
Nair. 3
Kamp. 5
Buju. 11
Dar. 11
Lusa. 33
Blan. 27/2
Tana. 34/2
Asma. 45/1
Kisi. 11
Momb. 8
Toro. 3
Kiga. 9
Arus. 6
Copp. 31
Llil. 34/2
Tama. 31/1
Pt.L. 36/1
5.704
0.208
1.066
0.352
0.059
0.055
1,173
7.168
1.342
2,113
0.648

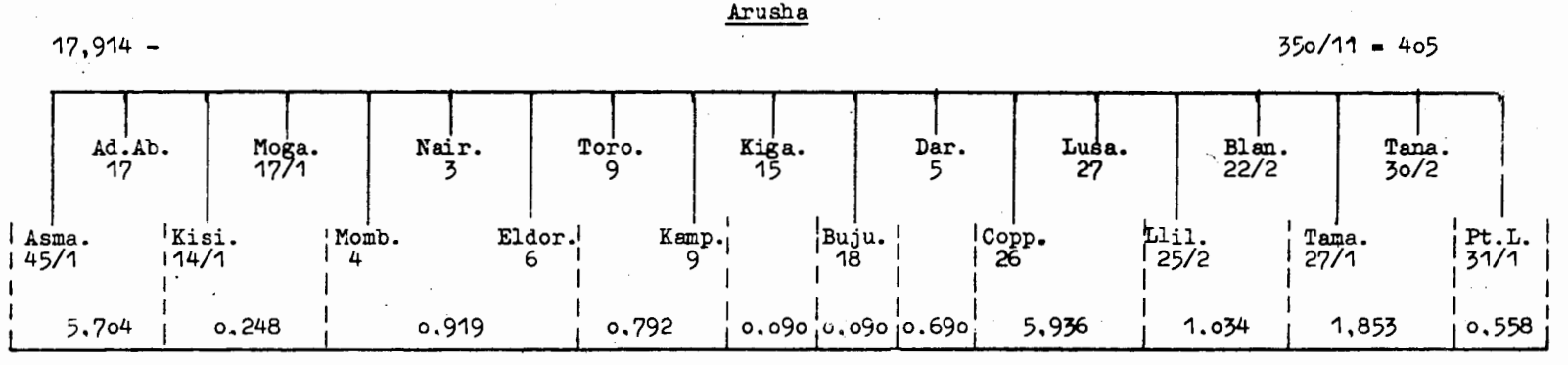

Tororo
21,718 -
391/9 = 436
Ad.Ab. 20
Moga. 18
Nair. 6
Kamp. 2
Buju. 8
Dar. 12
Lusa. 34
Blan. 27/2
Tana. 37/2
Asma. 48/1
Kisi. 14
Momb. 11
Eldor. 3
Kiga. 6
Arus. 9
Copp. 33
Llil. 30/2
Tama. 34/1
Pt.L. 39/1
6,256
0.256
1.413
0.176
0.036
0.040
1,449
7,504
1,254
2.308
0,702


Kampala
23,046 -
419/9 = 464
Ad.Ab. 22
Moga. 20
Nair. 8
Toro. 2
Buju. 7
Dar. 14
Lusa. 36
Blan. 29/2
Tana. 39/2
Asma. 50/1
Kisi. 16
Momb. 13
Eldor. 5
Kiga. 5
Arusi. 9
Copp. 35
Llil. 32/2
Tama. 36/1
Pt.L. 41/1
6.624
0.288
1.836
0.176
0.30
0.035
1,587
7.952
1.342
2.438
0.738

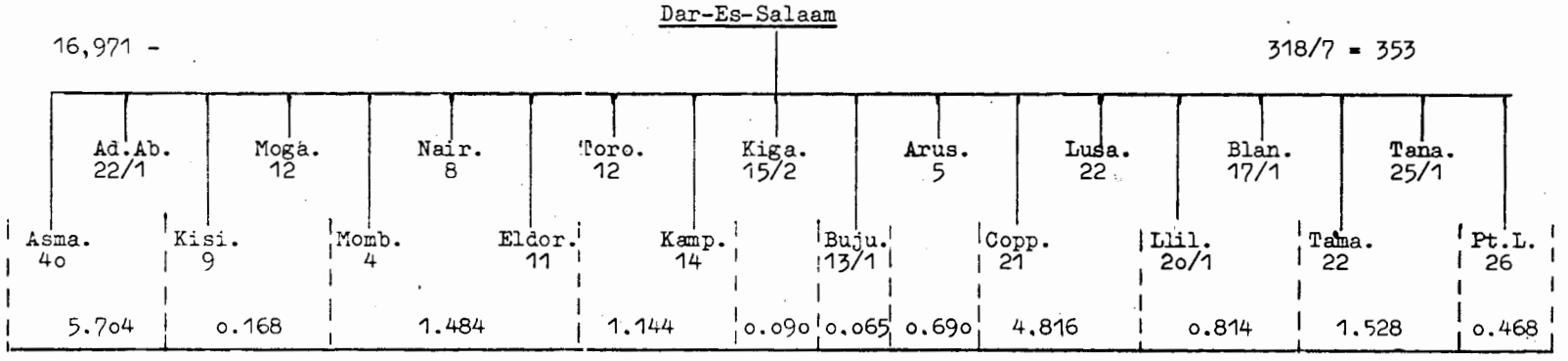
Contd.

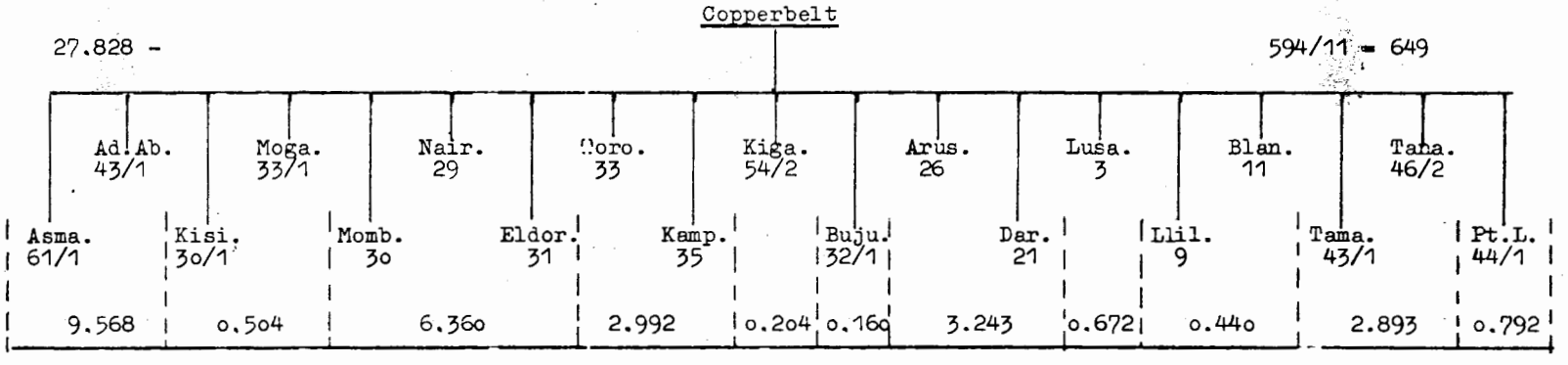

Kigali
25,679 -
47o/21 = 575
Ad.Ab. 26
Moga. 25/3
Nair. 12
Toro. 6
Buju. 2
Dar. 15
Lusa. 35/2
Blan. 32/4
Tana. 43/2
Asma. 54/2
Kisi. 2o
Momb. 17
Eldor. 9
Kamp. 5
Arus. 15
Copp. 34/2
Llil. 35/2.
Tama. 4o/3
Pt.L. 45/1
7.36o
o.36o
2,685
o.484
o.o1o
2.o7o
7.728
1.474
2.698
o.81o

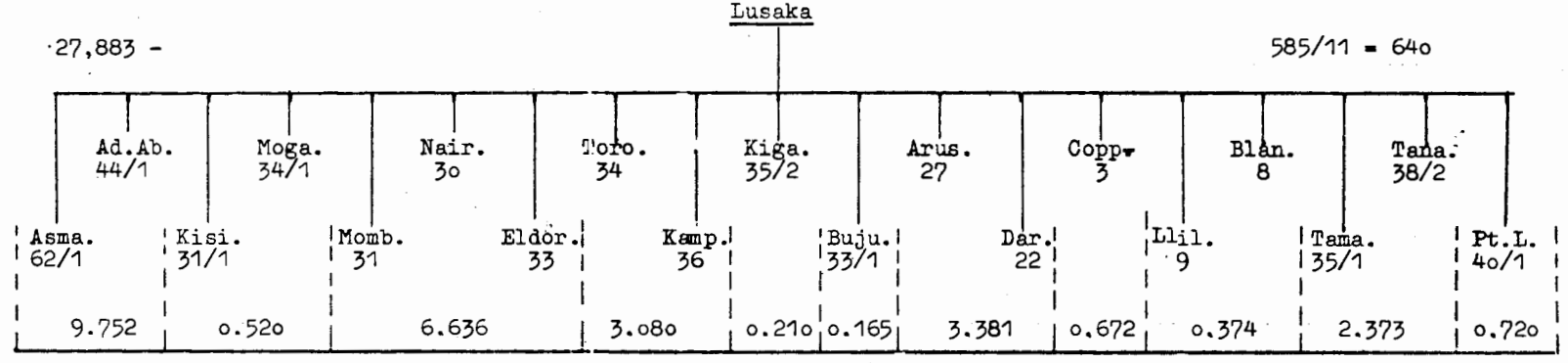

Bujumbura
26,38o -
487/17 = 572
Ad.Ab. , 28
Moga. 27/2
Nair. 14
Toro. 8
Kiga. 2
Dar. 13/1
Lusa. 33/1
Blan. 3o/3
Tana. 45/2
Asma. 56/2
Kisi. 22
Momb. 19
Eldor. 11
Kamp. 7
Arus. 18
Copp. 32/1
Llil. 33/2
Tama. 42/2
Pt.L. 47/1
7.728
o.392
31o9
o.66o
o.o12
2.139
7.28o
1.386
2,828
o.846


Arusha
17,914 -
35o/11 = 4o5
Ad.Ab. 17
Moga. 17/1
Nair. 3
Toro. 9
Kiga. 15
Dar. 5
Lusa. 27
Blan. 22/2
Tana. 3o/2
Asma. 45/1
Kisi. 14/1
Momb. 4
Eldor. 6
Kamp. 9
Buju. 18
Copp. 26
Llil. 25/2
Tama. 27/1
Pt.L. 31/1
5.7o4
o.248
o.919
o.792
o.o9o
o.o9o
o.69o
5.936
1.o34
1,853
o.558

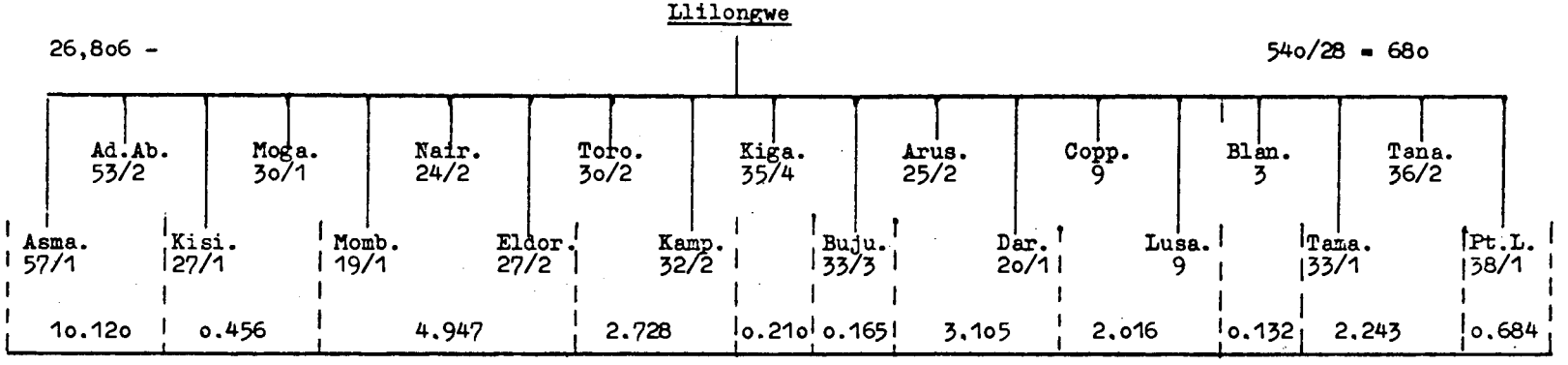
Contd.

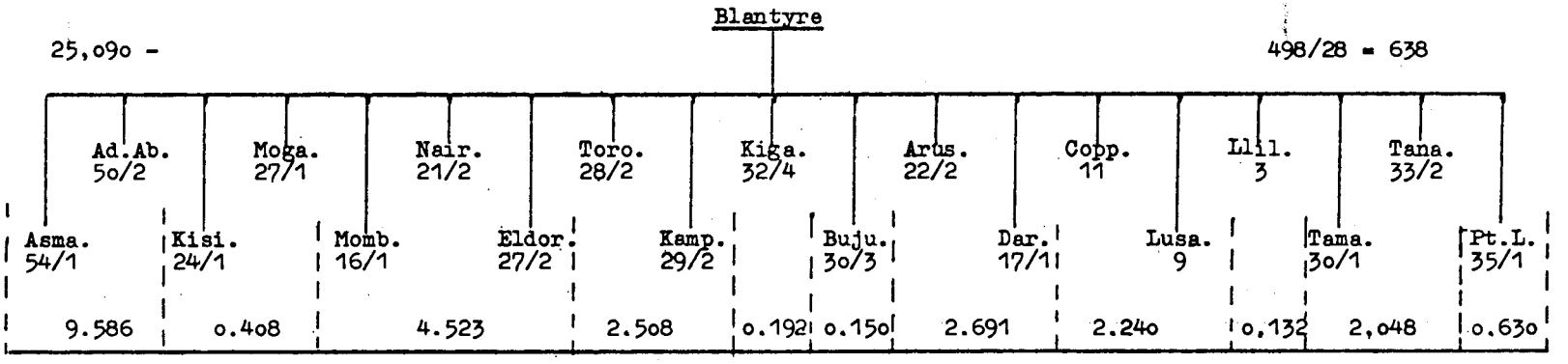

Dar-Es-Salaam
16,971 -
318/7 = 353
Ad.Ab. 22/1
Moga. 12
Nair. 8
Toro. 12
Kiga. 15/2
Arus. 5
Lusa. 22
Blan. 17/1
Tana. 25/1
Asma. 4o
Kisi. 9
Momb. 4
Eldor. 11
Kamp. 14
Buju. 13/1
Copp. 21
Llil. 2o/1
Tama. 22
Pt.L. 26
5.7o4
o.168
1.484
1.144
o.o9o
o.o65
o.69o
4.816
o.814
1.528
o.468

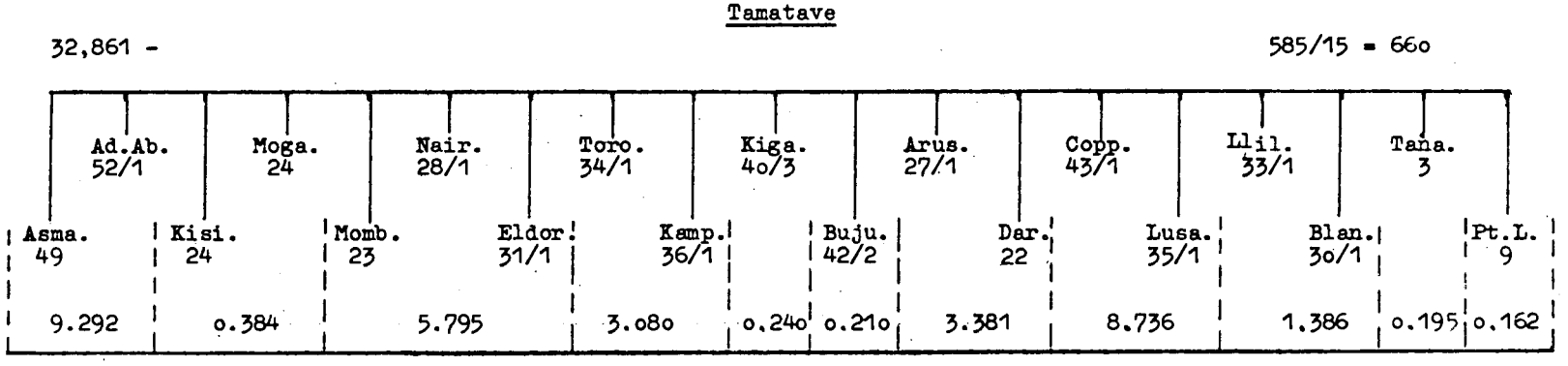

Copperbelt
27.828 -
594/11 = 649
Ad.Ab. 43/1
Moga. 33/1
Nair. 29
Toro. 33
Kiga. 54/2
Arus. 26
Lusa. 3
Blan. 11
Tana. 46/2
Asma. 61/1
Kisi. 3o/1
Momb. 3o
Eldor. 31
Kamp. 35
Buju. 32/1
Dar. 21
Llil. 9
Tama. 43/1
Pt.L. 44/1
9.568
o.5o4
6.36o
2.992
o.2o4
o.16o
3.243
o.672
o.44o
2.893
o.792


Lusaka
27,883 -
585/11 = 64o
Ad.Ab. 44/1
Moga. 34/1
Nair. 3o
Toro. 34
Kiga. 35/2
Arus. 27
Copp. 3
Blan. 8
Tana. 38/2
Asma. 62/1
Kisi. 31/1
Momb. 31
Eldor. 33
Kamp. 36
Buju. 33/1
Dar. 22
Llil. 9
Tama. 35/1
Pt.L. 4o/1
9.752
o.52o
6.636
3.o8o
o.21o
o.165
3.381
o.672
o.374
2.373
o.72o

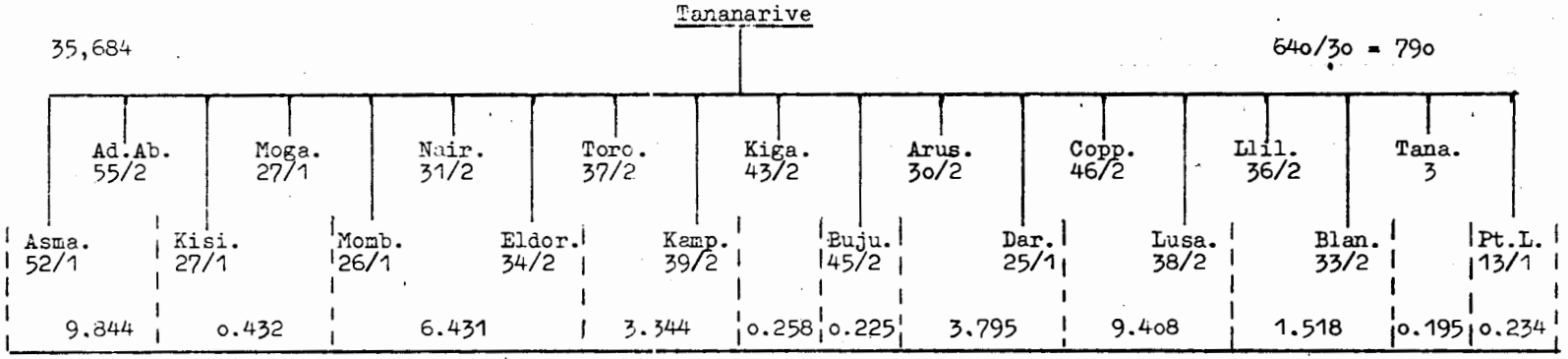
Contd.

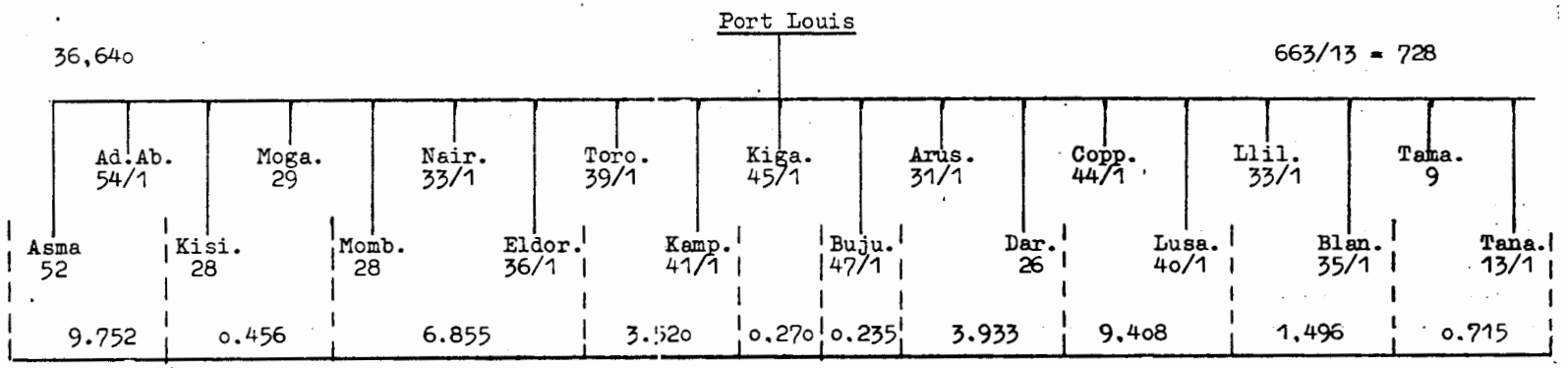

Llilongwe
26,806 -
54o/28 = 68o
Ad.Ab. 53/2
Moga. 3o/1
Nair. 24/2
Toro. 3o/2
Kiga. 35/4
Arus. 25/2
Copp. 9
Blan. 3
Tana. 36/2
Asma. 57/1
Kisi. 27/1
Momb. 19/1
Eldor. 27/2
Kamp. 32/2
Buju. 33/3
Dar. 2o/1
Lusa. 9
Tama. 33/1
Pt.L. 38/1
1o.12o
o.456
4.947
2.728
o.21o
o.165
3.1o5
2.o16
o.132
2.243
o.684


Blantyre
25,o9o -
498/28 = 638
Ad.Ab. 5o/2
Moga. 27/1
Nair. 21/2
Toro. 28/2
Kiga. 32/4
Arus. 22/2
Copp. 11
Llil. 3
Tana. 33/2
Asma. 54/1
Kisi. 24/1
Momb. 16/1
Eldor. 27/2
Kamp. 29/2
Buju. 3o/3
Dar. 17/1
Lusa. 9
Tama. 3o/1
Pt.L. 35/1
9.586
o.4o8
4.523
2.5o8
o.192
o.15o
2.691
2.24o
o.132
2,o48
o.63o


Tamatave
32,861 -
585/15 = 66o
Ad.Ab. 52/1
Moga. 24
Nair. 28/1
Toro. 34/1
Kiga. 4o/3
Arus. 27/1
Copp. 43/1
Llil. 33/1
Tana. 3
Asma. 49
Kisi. 24
Momb. 23
Eldor. 31/1
Kamp. 36/1
Buju. 42/2
Dar. 22
Lusa. 35/1
Blan. 3o/1
Pt.L. 9
9.292
o.384
5.795
3.o8o
o.24o
o.21o
3.381
8.736
1.386
o.195
o.162

Contd.





of column 2 of table III/39. Obviously, this order is unsatisfactory in that it does not take into account the remaining parameters, i.e. the market potential represented by the different locations. This market potential is reflected in the demand figures calculated for the different countries of the subregion; (table III/5, 1980 figures; the corresponding percentages are calculated in table III/40. By weighing the mean distance between a given location and the demand centers of another country with the percentage figure representing the demand of that country (bottom row of figures in the sections of table III/38) and adding up these, we arrive at the figures in the upper left-hand corner of the sections of table III/38 . Again ranged in their order of magnitude (column 3 of table III/39) they represent a much clearer picture of the position of each potential site with regard to distribution cost advantage. Graphically, the result is given in graph III/41. According to this graph, the subregion can be split up into 6 zones of decreasing advantage of transportation cost (of finished goods).

- Zone 1: the areas of the port cities Dar-es-Salaam and Mombasa, Arusha and Nairobi;

- Zone 2: stretches to Eldoret in the west and to Kisimaio and Mogadishu in the east;

- Zone 3: includes Tororo and Kampala areas;

- Zone 4: stretches to Addis Ababa in the north, Kigali and Bujumbura in the west and Blantyre and Llilongwe in the south;

Table III/39

Order of proposed locations according to distribution cost sensitivity

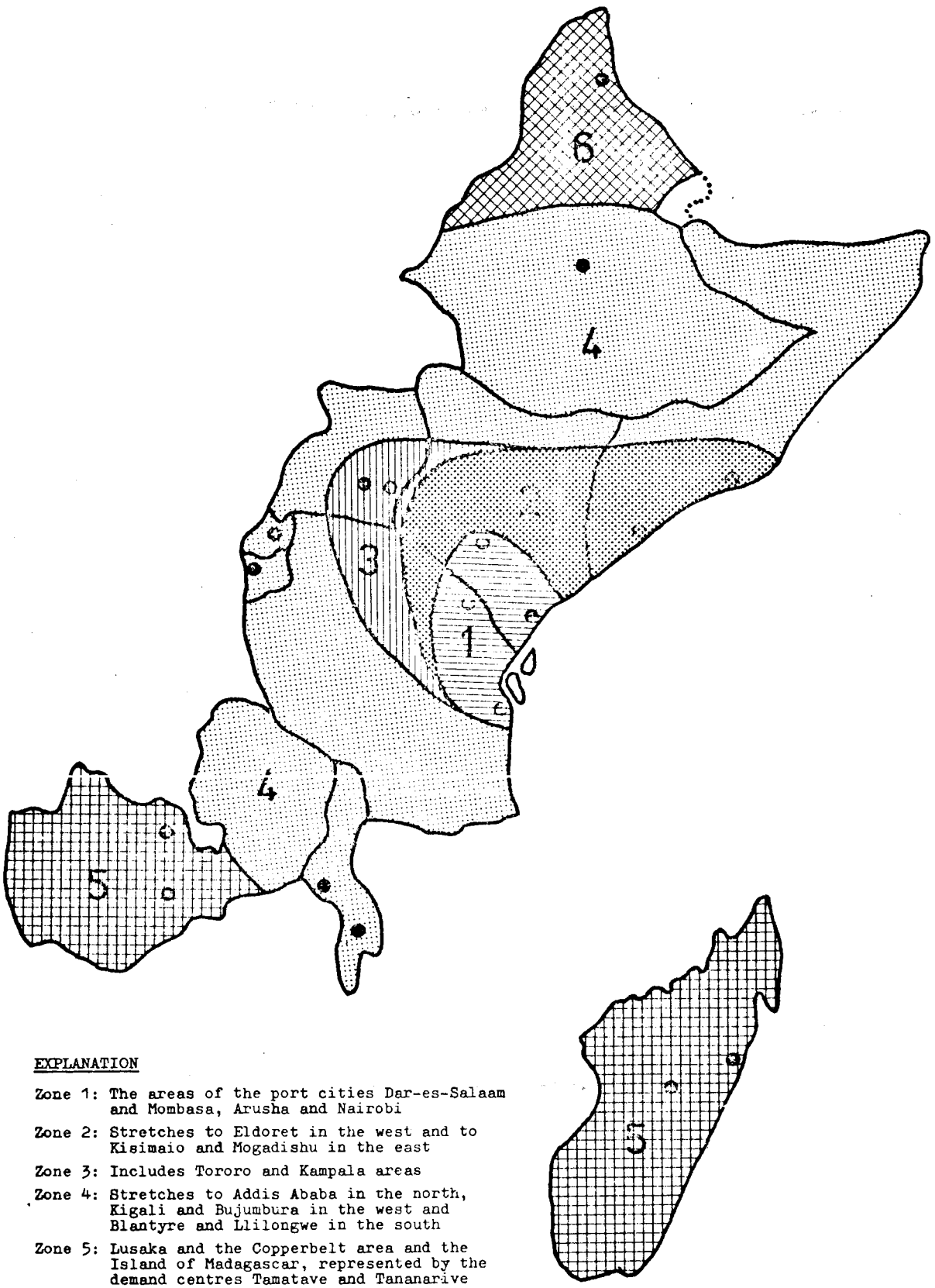
(1)	(2)	(3)
Location	Order	Order weighted
Asmara	2o	2o
Addis Ababa	12	13
Kisimaio	4	5
Mogadishu	9	7
Mombasa	1	4
Nairobi	3	2
Eldoret	6	6
Tororo	7	8
Kampala	8	9
Kigali	11	11
Bujumbura	1o	12
Arusha	5	3
Dar-es-salaam	2	1
Copperbelt	15	15
Lusaka	14	16
Llilongwe	17	14
Blantyre	13	1o
Tamatave	16	17
Tananarive	19	18
Pt. Louis	18	19

Table III/40

Share of the countries of the subregion in EGC (1980)

Country	EGC (1980)	%
Ethiopia	132.100	18.4
Somalia	11.500	1.6
Kenya	153.500	21.2
Uganda	63.600	8.8
Tanzania	100.500	13.8
Rwanda	4.500	0.6
Burundi	3.800	0.5
Zambia	162.800	22.4
Malawi	32.200	4.4
Madagascar	47.500	6,5
Mauritius	12.800	1.8
	724.800	100.0

III/41 Zoning of the Subregion according to Distribution Cost Advantage



EXPLANATION

Zone 1: The areas of the port cities Dar-es-Salaam and Mombasa, Arusha and Nairobi

Zone 2: Stretches to Eldoret in the west and to Kisimaio and Mogadishu in the east

Zone 3: Includes Tororo and Kampala areas

Zone 4: Stretches to Addis Ababa in the north, Kigali and Bujumbura in the west and Blantyre and Llilongwe in the south

Zone 5: Lusaka and the Copperbelt area and the Island of Madagascar, represented by the demand centres Tamatave and Tananarive

Zone 6: Includes the extreme areas of the subregion, represented by Asmara in the north and Pt. Louis in the south-east

- Zone 5: Lusaka and the Copperbelt area and the island of Madagascar, represented by the demand centers Tamatave and Tananarive;

- Zone 6: includes the extreme areas of the subregion, represented by Asmara in the north and Pt. Louis in the south-east.

It should be noted that his zoning is based on the assumption of the surface transport network laid out in graph III/37. Thus, Kisimaio and Mogadishu will drop out of Zone 2, if the assumed road links between Addis Ababa and Mogadishu and Kisimaio and Nairobi are not implemented and the harbour development of Kisimaio is not carried out.

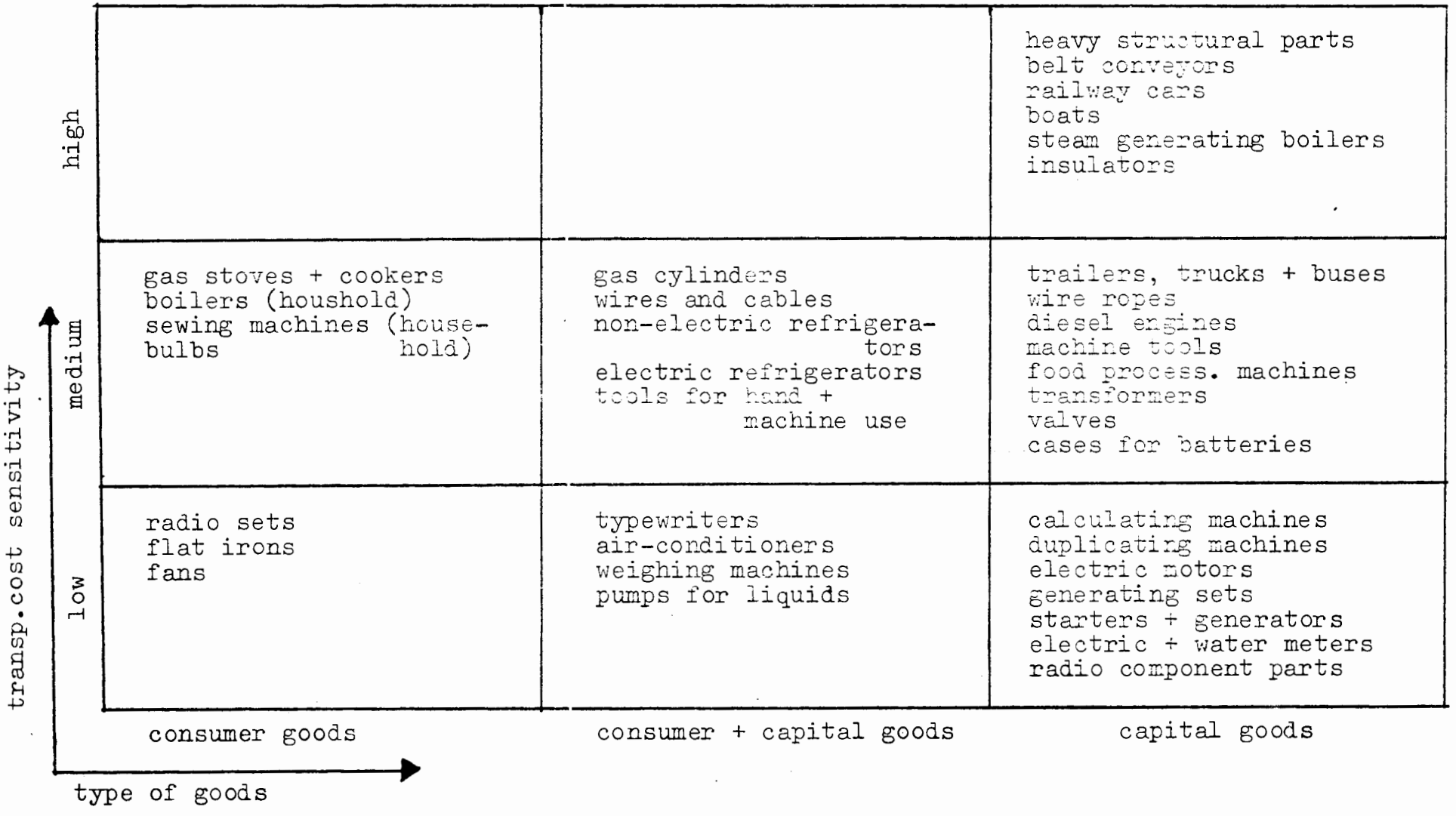
Equally, Blantyre and Llilongwe, which are now grouped in Zone 4, will fall back to 5 or even 6, if the present rail links to Mozambique, Nacale and Beira, which at present are the country's major inlets and outlets, should drop out for political reasons.

As a next step, the selected industries were grouped according to the sensitivity of their products to transportation cost. This is done in table III/42, which at the same time makes a distinction as to their (main) use between consumer goods, capital goods and mixed, i.e. consumer/capital goods.

The allocations proposed for the selected subregional industries on this basis are presented in summary form in tables III/32 and III/33. Only the countries proposed are indicated in these tables and -in brackets- the numbers of the zones (corresponding to those of graph III/41) from which alternative locations should preferably be chosen.

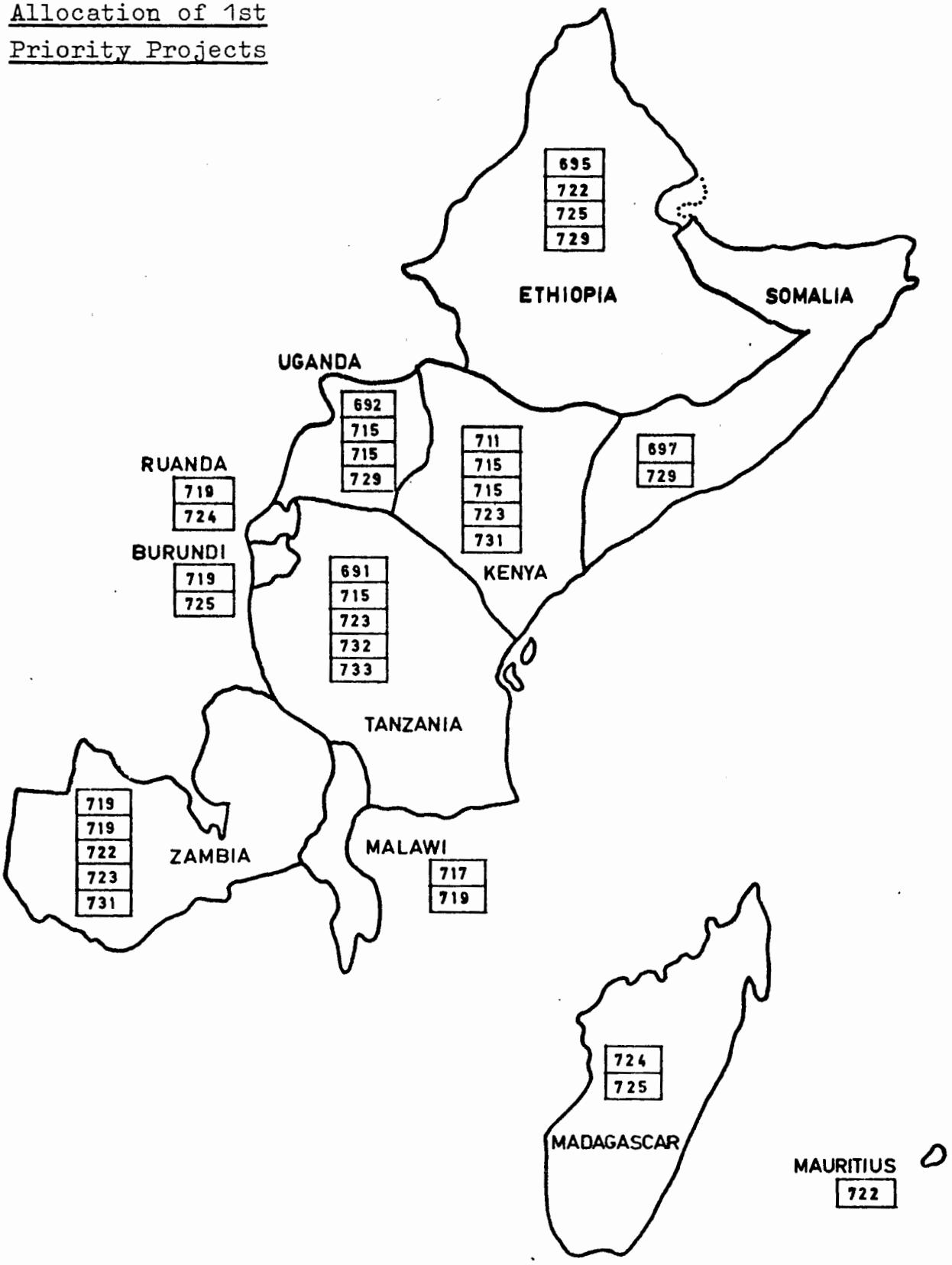
Table III/42

Grouping of proposed industries according to transport cost sensitivity of products and type of goods



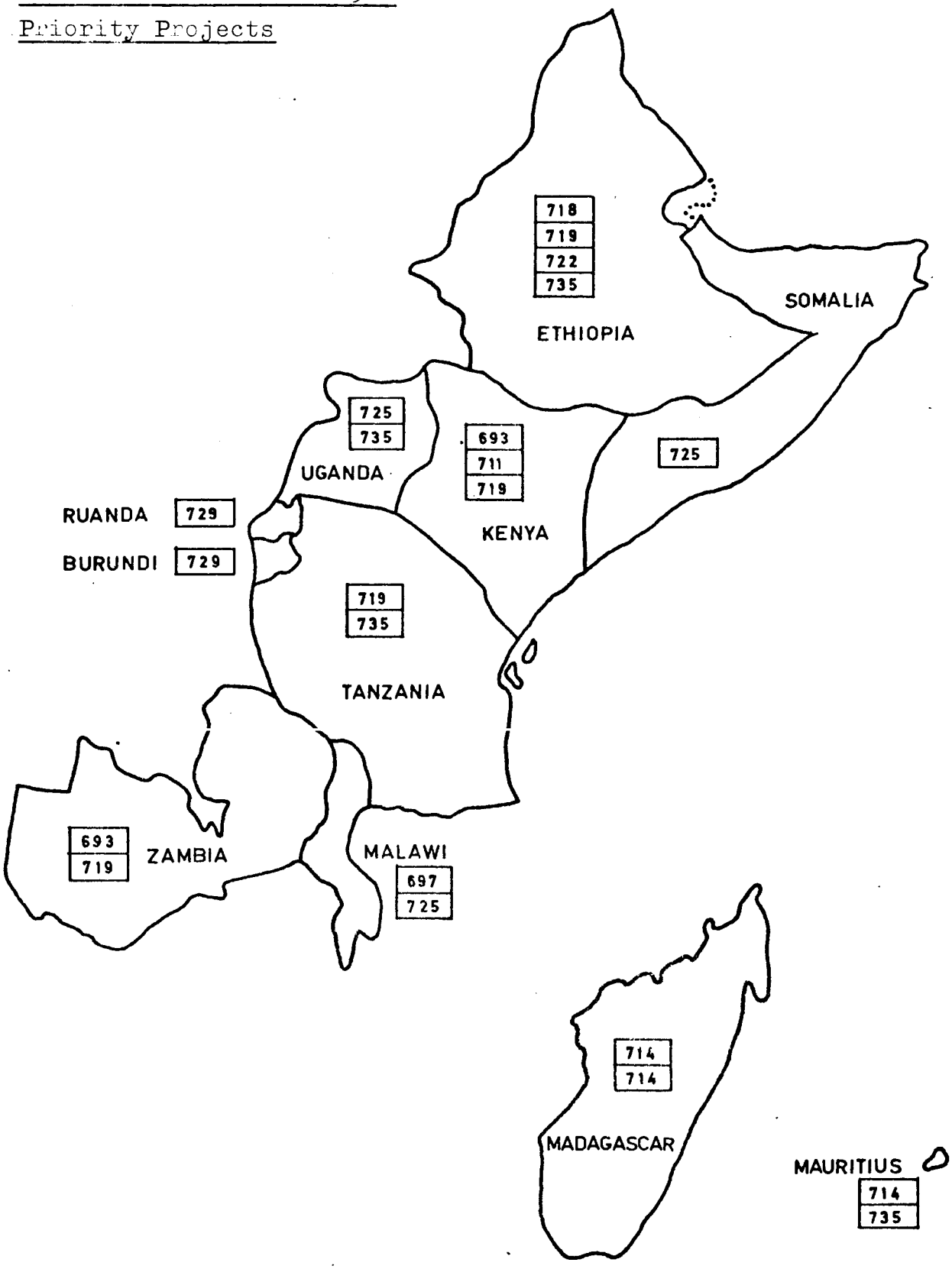
III/32

Allocation of 1st Priority Projects



III/33

Allocation of 2nd and 3rd Priority Projects



In the individual parts of the following sections 3.1 to 3.4 locations within the countries are proposed in some cases, but, in principle, it is thought that it is up to the governments to select the final siting in accordance with their development policies, once an agreement on the country distribution has been reached between them.

Furthermore, the proposed subregional industries have been classified into first, second and third priority projects. This classification combines several aspects: firstly, given financial, administrative etc. constraints, projects should be considered in the order indicated, secondly, industries in the first category are generally those with a higher degree of linkage effects, and thirdly, demand for products of second and third priority industries is expected to materialize more slowly over the projection period than for those in the first category.

In a number of cases more than one plant is proposed for the production of identical goods (e.g. motors, pumps, wires and cables), either to be implemented simultaneously (both plants are in the same priority class) or subsequently (different priority classes). This is done:

- where minimum economic size allows for such a split

- where existing production facilities can be expanded to develop into regional industries

- where demand can be expected to develop in such a way as to make the necessity of new production units foreseeable.

It is realized that valid arguments can be brought forward in favour of one large instead of two smaller production units, above all that of reduced investment cost. Against this should be seen the advantages of several units: a more equitable distribution of industries over the subregion providing for a larger number of starting points for further development.

3.1 SITC-Division 69: Manufactures of metal

In terms of tons consumption of division 69 products will exceed that of the other divisions in 1980 (though only fractionally for division 73). At the same time it is the one which even now is covered by local production to a considerable part for reasons already outlined. This will continue to be so to an increasing extent, as for a number of items in this division the threshold, at which local production becomes viable will be passed for individual countries. Past experience shows that, when this point is reached, entrepreneurs in these countries will invest in this field- and be granted a licence to do so - irrespective of the fact that production facilities already exist in another maybe even neighbouring country of the subregion. With this mind it appears realistic not to propose any regional production for those items in division 69 which are beyond the scope of any or most single countries now but will not continue to be so even in the medium-term outlook. Therefore, in division 69, only very few items will be proposed for subregional production, namely those, for which even in the long run no country in the subregion could expect to develop a sufficient home market.

3.1.1 Subdivision 691: Finished structural parts and structures

Consumption in subdivision 691 is expected to reach abt. 60.000 t p.a. for the subregion in 1980. An estimated 80-85% of it is light structures of all kinds, and the remaining 15-20%, i.e. abt. 10.000 t, heavy structures, such as bridgework, marine moles, pylons etc., which require special machining, handling and transportation equipment. Manufacture of those parts should be concentrated in one factory for the whole subregion, for which expansion of an existing plant in Tanzania is proposed.

The figure for light structures - abt. 50.000 t - includes a substantial amount of metal furniture. Requiring basically the same operations and processes for their production, such furniture (Chairs, tables, bedsteads, cabinets) is now frequently done by the companies, which at the same time produce window- and door-frames, trusses etc. At least one such company is operating in each of the countries of the subregion and most of them still have idle capacities. Future demand in the field of light structural parts and metal furniture should therefore be taken care of by local production in each country, preferably by extension of the existing plants. Its increase will give such multi-purpose establishments the chance to specialize and thereby become more productive and profitable. Through a higher degree of specialization (e.g. furniture for hospitals or offices) a regional splitting-up of the production can be promoted.

3.1.2 Subdivision 692: Metal containers for storage and transport

Estimated consumption in 1980 will be abt. 30.000 t in this subdivision. From this total, two rather homogeneous groups can be singled out; large tanks with a capacity of several thousand litres, stationary or to be mounted on trucks for storage or transport mainly of fuels, accounting for an estimated 25% i.e. 7.500 t, and cylinders, mainly of steel, for storage and transport of compressed gases, accounting for an estimated 10% i.e. 3.000 t. Tanks of the first kind are at present produced by establishments catering for products of subdivision 691 and fabrication should be continued in each individual country. Gas cylinders, on the other hand, should be produced in one plant servicing the subregion, particularly so, as they are subject to strict safety regulations, which can be better observed in mass production. As gas cylinders can be refilled practically unlimited times, they have a very long life and no large increase can be expected in their demand. Uganda is proposed for location of the plant.

Production of metal boxes and cans for meat, fish, fruit etc. becomes viable and necessary only in connection with the processing of such goods and must then, for reasons of transportation costs, either be integrated into it or take place in the close vicinity. As several countries of the subregion are planning to increase their production for export of such goods, a number of manufacturing units for cans will become nesessary in addition to the existing ones in future.

3.1.3 Subdivision 693: Wire products (exc. electric)

The principal groups within this subdivision, whose volume in 1980 is estimated at abt. 53.000 t, are wire cables, ropes, slings, etc., fencing wire, and wire gauze and netting. While the latter two account for abt. 25% each, i.e. abt. 12.000 t, ropes and cables take the largest share with abt. 25.000 t.

Drawing of mild steel wire is now done in a number of countries, usually in connection with the steel works that supply the wire rod. This production can be expanded in comparatively small steps and thus rather flexibly along with the demand. It should therefore not be envisaged on a regional scale. This is true, too, for wire gauze and netting, where minimum economic capacities are not too high and existing production facilities can be expanded and diversified.

Regional production should, however, be envisaged for ropes cables of high tensile wire. Two factories are proposed with an annual capacity of abt. 6.000 - 8.000 t to be located in Zambia and Kenya, as these two countries will have the highest consumption of such products.

3.1.4 Subdivision 694: Nails, screws, bolts, rivets, etc.

Total consumption in this subdivision is estimated at abt. 36.000 t. p.a. in 1980. It embraces, however, a large variety of products, many of which in turn come in a wide range of sizes, shapes and materials. The principal items are those mentioned above: nails, screws, bolts and nuts.

As far as nails are concerned, substantial production capacities are installed in the subregion, which usually exceed the demand of the individual countries. As in the case of some other wire products, expansion possibilities are flexible, and minimim scale of output low. Moreover, the weight/value ratio is unfavourable and discourages transportation over long distances. The same is true for screws, nuts and bolts, where demand is lower, and consequently less production facilities exist now. Still, wood screws up to 50 mm and bolts and nuts in the standard sizes of M4 to M12 could be produced in all of the countries once the comparatively low threshold values (abt. 200 t and 600 t p.a. respectively) are passed. Other products in the subregion, as e.g. steel rivets and washers could be added as side lines.

Summing up, this subdivision contains products, production of which appears to be particularly suitable on a rather small scale. Any regional production would therefore probably find itself faced before long with many competitors in the individual countries and run into difficulties.

3.1.5 Subdivision 695: Tools for use in the hand and with machines

Consumption in the subdivision 695 is estimated at abt. 30.000 t in 1980. Approximately 80% of this total will stem from demand for hand tools and here again, agricultural tools (hoes, picks, shovels etc.) have the largest share. Except for Somalia (production planned, but not likely), Rwanda, Zambia (production planned, but postponed) and Mauritius (study by UNIDO completed, production likely) all countries of the subregion already have promoted production in this

field with capacities generally sufficient to cope with the expected increase of demand during the next few years. The extent of that increase will depend on the success of vulgarization campaigns aimed at intensifying the use of tools in agriculture in volume as well as in diversity.

Some degree of specialization and co-operation in the subregion should be attempted with regard to future extensions. For example, planned production of agricultural tools in Mauritius will rely on machetes as its mainstay, and could improve its economic basis by exporting these to the other countries as well, which, in turn, could specialize on some other less widely used tools in addition to their regular lines.

Production to start with, of some of the more simple hand tools other than agricultural - such as cutting pliers, nippers, chisels, screw drivers, punches, files and rasps- should be undertaken in one factory for the subregion. Owing to the fact that tool manufacture, in particular that of cutting tools, such as drills, milling cutters and lathe tools, is rather complicated, manufacture should be taken up at a later stage, when the planned factories have been established to a certain extent. At this stage manufacture of simple tools could be started, so that the demand is covered.

Tool shops are planned to be attached to the proposed factories in which special machine tools will be manufactured, such as drawing tools, cutting and punching tools etc., which have to be in strict accordance with the series of production.

Preferably tool manufacture should be on a joint venture basis with an experienced foreign manufacturer, as

diversification in subsequent years into more complicated lines of hand and machine tools will require substantial know-how.

Ethiopia (Addis Ababa) is proposed as location for such a factory - it is, however, advisable to expand one already existing factory.

3.1.6 Subdivision 696: Cutlery

This subdivision is the smallest in volume in division 69 with an estimated consumption of abt. 5.000 t in 1980. The principal items included in it are knives for table and other uses, spoons and forks, scissors and razor blades. For the latter, capacities exist in Tanzania and Mauritius, and shortly in Uganda, which are ample for the subregion for some time to come. As for knives, spoons and forks, a number of factories with a capacity of abt. 100 t each should become viable in several countries within the next years. Production could be either of the aluminium alloy or the stainless steel variety. Manufacturing process and cost being practically the same, the first is slightly cheaper due to lower raw material costs. This is largely offset by the longer durability and better looks of the latter, which therefore appears preferable. Production will have to be restricted to some standard qualities and patterns to start with and cover only part of the demand, as consumer taste (particularly in the upper-income groups) tends to be very discriminating with respect to such items as cutlery.

3.1.7 Subdivision 697: Household equipment of base metals

Consumption in this subdivision, in 1980, is estimated to

amount to abt. 24.000 t. The principal categories it includes are enamel holloware and domestic stoves and cookers, the first of which accounts for abt. 50% of the total. A number of factories are operating in the subregion, and as the example of Malawi shows, a large enough demand exists even in small countries to support production of enamel holloware on a country basis.

As for stoves, except those operating on wood, charcoal and coal (which are widely produced by workshop-type establishments) the demand goes primarily for gas stoves and cookers, as electricity - if available - is too expensive for fuel in most countries. Assuming that an output of abt. 3.000 units p.a. of stoves and the same number of gas cookers would be an economic starting size for production, two to three such factories would be viable for the subregion, the first two to be located in Somalia and Malawi.

3.1.8 Subdivision 698: Manufactures of metal n.e.s.

Subdivision 698, together with 691, is the largest in division 69 with an estimated consumption of abt. 59.000 t in 1980. However, it includes a wide variety of rather heterogeneous items, such as locks, welding rods, chains, safes, bottle caps etc. One larger group, which is fairly homogeneous from the point of view of production techniques, is building hardware. It includes locks, padlocks, fittings, etc. and makes up for abt. 20-25% of the total. Manufacturing requires standard machinery such as lathes, presses, boring and milling machines and is therefore quite flexible to adjust to varying demand. Some production exists in most of the countries, though usually by small-scale and not too well equipped establishments. However, with its close connection to the construction industry, which shows fairly stable growth rates around 8% in the subregion, production of hardware can be

Table III/26

Division 69: Summary of Identified Projects

Subdivision	Items in subdivision suitable for	
	local production	(sub)regional prod.
691	light structural parts metal furniture	heavy structural parts
692	large tanks metal boxes and tins	gas cylinders
693	wire drawing (mild steel wire) for fencing wire gauze and netting	wire ropes
694	nails screws (wood) bolts and nuts rivets, washers	-
695	agricultural hand tools	other hand and machine tools
696	knives, spoons and forks scissors	-
697	enamel holloware buckets, pots, pans etc.	gas stoves and cookers
698	building hardware	-

expected to become viable in most countries well before 1980, and should therefore not be envisaged on a regional scale. The same goes for other items of the subdivision, which can rather be taken up as a sideline to some other local production (e.g. needles and pins together with wire products, safes and strong rooms with metal furniture, chains with structural parts, names and sign plates with almost any type of metal processing, manhole covers with foundry products etc.).

3.2 SITC-Division 71: Machinery, other than Electric

Manufacture of items in this division, as can be seen from the country reports, has the smallest share in the activities of the existing Engineering Industries. This is consistent with the pattern of development as it was outlined in part I. Some of the products, such as internal cumbustion engines and machine tools are basic to industrial development, but, on the other hand, being technically complicated and requiring high investments, they must be produced in large series. This presupposes a big enough market and consequently most items in this division, under East African conditions, are eligible for production only on a regional or subregional scale. Even then the projected demand figures are too low in most cases to allow for an economic minimum size by the standards of industrialized countries.

Being high value products, manufacture, if feasible at all, can take place almost anywhere in the subregion, as costs of raw material transportation and of distribution do not vitally affect total cost of production. Though this is an advantage under the aspect of balanced distribution of new industries in the subregion, it implies at the same time the danger of strong competition of producers from outside countries.

3.2.1 Subdivision 711: Power generating machinery

Consumption in this subdivision is estimated to amount to abt. 19.000 t in 1980. The two principal categories it includes are steam generating boilers and internal combustion engines, accounting for abt. 20 and 60% respectively of the total figure. So far no manufacture of either exists in the subregion.
There are several basic types of steam generating boilers of which only few can be considered suitable for production in the subregion. Inclined and vertical tube and radiation boilers are built for high evaporation capacity and steam pressures and are subject to very stringent security measures for their manufacture as well as for their operation. In addition, they generally require auxiliary equipment for water treatment and forced water circulation. These types of boilers will have to be imported for some time to come, while more simple types could be partially produced in the subregion, namely flue and firetube boilers. These are particulary suitable for the small- and medium-sized factories, which constitute the bulk of industrial establishments in East Africa because of their low sensibility to variations of load and water quality and because of their easier operation and maintenance.

One factory is proposed for the production of boilers with a capacity of abt. 2.000 t. Principal inputs will be steel plates and tubes. Only manufacture of the boiler jacket and grate unit and installation of the tubes will be undertaken. All auxiliary equipment like firebox control instruments, feed pumps, safety valves, discharge devices etc. will have to be imported. Some of it, however, are proposed in this study for production in the subregion.

While production in the initial phase should concentrate on the above-mentioned types, manufacture of low capacity water-tube boilers (with natural water circulation) could be taken up as a second step. Kenya (Mombasa) is proposed as location for the plant.

The second heading in subdivision 711 concerns internal combustion engines of which diesel engines are proposed for production in the subregion. In subdivision 732 manufacture of trucks will be recommended, with a capacity of 30 to 35.000 units in 1980. This will generate a corresponding demand for diesel engines that in itself will be sufficient to justify their production in the subregion. Requiring extensive know-how and experience, co-operation with an established producer is a pre-condition for this venture, and only a gradual process of substitution of imported components by locally produced ones over a number of years will be possible. Corresponding to the limitation of the range and types of trucks to be produced, standardization of the motors must be attempted from the very beginning. This will have to be done on the basis of experience gained with the various types of trucks and engines used in the subregion now.

Apart from supplying motors to the truck factory, diesel engines for other applications will be built as well, which will increase the required capacity by an estimated 5 to 7.000 units (1980), mainly in the lower hp-range. It will have to be decided on the basis of a detailed study, whether production of all types should be concentrated in

one large plant with a capacity of abt. 35.000 units or split up between two factories with complementary programmes. In the first case, Kenya would offer the most suitable location, in the second Kenya and Zambia are proposed.

3.2.2 Subdivision 712: Agricultural machinery and implements

Consumption in this subdivision is estimated at abt. 44.000 t in 1980. The two main headings it includes are tractors and soil cultivating and harvesting machinery. However, this figure, large as it is, should be viewed with caution. More than others it incorporates assumptions that go beyond merely technical aspects. Though the East African countries are predominantly - and some practically exclusively - agricultural, the use of modern machinery is virtually restricted to some large-size farms of plantations in all of them. The four principal reasons for this state of affairs are: lack of knowledge of modern farming methods on the part of the peasants, lack of capital, availability of cheap (family) labor and unsuitability of the (small) plots for the use of machinery. To overcome these obstacles will require a difficult and large-scale administrative and educational effort.

At a first glance it would seem that particularly soil preparation and cultivating machinery is required and would, therefore, be the first choice for production in the subregion. However, as studies and also the experience of other tropical countries have shown, extreme caution is indicated. It is not possible

to simply transfer the agricultural technology of industrialized countries to those of the subregion as soil characteristics are quite different. Preparing and cultivating machinery, which improves the soil under, say European conditions, might have a quite different effect in African countries, as such machinery has not only the - beneficial - advantage of substituting hard manual labour, but at the same time affects the properties of the soil itself. Unless this aspect of agricultural mechanization in the subregion has been intensively studied, no realistic proposal for the manufacture of this type of equipment can be made.

As for tractors no special effort was undertaken to determine subregional production possibilities, as, simultaneously, a comprehensive study on a multinational motor vehicle industry in the subregion, separately sponsored by ECA, was under way. (The same applies to road motor vehicles, subdivision 732.)

The following text is quoted from the above-mentioned study[1]):

The market for agricultural tractors

Here again, available statistics are scarce and often hardly consistent.

As for demand projection, it is difficult to envisage some kind of correlation, between demand or fleet and such parameters as agricultural GDP, cultivated surface, etc. In the opinion of the experts, there is much room for the expansion and improvement of agriculture by the use of cattle-drawn implements.

It thus appears that besides a highly specialized professional background a great amount of first-hand knowledge of local operating

1) UNECA, Motor Vehicle Multinational Project in the Eastern Africa, Annex 3, The Markets's Size, p. 15

conditions is required to interpret available statistics and to forecast tractor demand. In this connection it was only possible to compare statistical data from ECA and FAO sources[1]) and to refer to a comprehensive FAO study[2]) on agricultural mechanization in Africa[3]).

An interpolated 1980 demand forecast drawn from the forecast is also shown in table III/18b[2]).

For such countries as Burundi, Somalia, Mauritius and Rwanda not covered by this study, demand was roughly estimated on the basis of the past trend.

It should be noted, however, that these countries have hardly a 3% impact on the demand of the whole subregion, and therefore our estimate, whatever its reliability, does not affect the magnitude of the demand forecast.

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1) tables III/18 and III/18a; in the original, these tables are nos. 24 and 25

2) table III/18b; in the original this is table no. 26

3) C. Voss. Objectives for expansion of agricultural mechanization in Africa, FAO, Rome, July 1968.

Table III/18

Eastern Africa - Agricultural Tractor Fleet

	Ken	Tan	Uga	Bur	Eth	Som	Zam	Mad	Mlw	Mau	Rwa	Total[a]
1963 - Total	6,111	4,200[c]	400[c]	15[c]	122[b]	120	2,760[b]	854[b]	210	280	12	15,084
Wheel	5,167	2,375	300[c]	19[c]	90[b]	90[c]	2,700	774[b]	210	35	7	11,767
1964 - Total	5,783	..	550[a]	..	..	..	..	1,770[a]	..	280	12	..
Wheel	4,976	2,575	..	..	..	..	..	..	..	35	7	..
1965 - Total	5,729	..	..	..	..	..	..	..	..	283	12	..
Wheel	4,886	2,667	441	..	400	92	3,158	885	..	40	7	..
1966 - Total	6,232	..	..	..	..	..	..	..	..	283	..	..
Wheel	5,420	..	..	..	..	..	..	..	..	40	..	..
1967 - Total	6,617	5,600[c]	1,000[c]	20[c]	1,200[c]	125[c]	4,800[c]	1,100	450	283	15[c]	21,210
Wheel	5,894	3,100[c]	800[c]	16[c]	1,000	100[c]	4,600[c]	1,000	400[c]	40	8[c]	16,958
Total imports 1964-67 (thousand)	3,647	2,127	1,503	..	..	..	..	824	..	121	..	..
Average renewal rate (%)	10,6	14.0	28.7					15.4		17.8		

Sources: ECA Statistical Division; ECA-CDPPP; FAO Production Yearbook

a) including tractors for non-agricultural use (earth-moving)

b) 1962

c) Estimated

Table III/18a

Eastern Africa - Imports of Tractors other than Road Tractors for Tractor-Trailer Combination (712,5 SITC Rev., Statistical Papers, Series M, No. 34) (units)

	Ken	Tan	Uga	Bur	Eth	Som	Zam	Mad	Mlw	Mau	Rwa	Total[a]
1962	416	281	61	..	..	..	..	191	..	59	..	1,008
1963	809	846	240	..	..	..	..	185	..	65	..	2,145
1964	790	596	397	..	..	..	450	239	-	82	..	2,104
1965	902	612	202	..	..	..	719	186	87	27	..	1,929
1966	1,078	399	618	..	..	18	689	226	99	8	..	2,329
1967	877	520	286	..	..	18	..	173	76	4	..	1,860
Average 1962-64	672	574	232	..	..	..	..	205	..	69	..	1,754
Average 1965-67	952	510	368	..	..	..	..	195	..	13	..	2,038
Average rate of growth (%)	12.2	-4.0	16.6	..	..	..	..	-1.7	..	-174.0	..	5.2

Source: FAO Trade Yearbook 1968

a) Only for Ken, Tan, Uga, Mad, Mau

Table III/18b

Eastern Africa - Objectives for Expansion of Agricultural Mechanization[a)]

	Ken	Tan	Uga	Bur	Eth	Som	Zam	Mad	Mlw	Mau	Rwa	Total
Fleet 1965 (thousand)	6,400	2,600	600	15[b)]	600	120[b)]	2,750	1,750	300	280[b)]	12[b)]	15,427
1975 "	10,000	4,000	1,000	..	2,000	..	4,000	2,400	600	..	..	..
1985 "	15,000	6,000	2,000	..	4,000	..	6,000	3,500	1,000	..	..	..
Harvested Hectares p. Tract 1965	500	1,425	6,165	..	15,500	..	440	915	4,700	..	..	..
1975	360	1,275	4,800	..	5,900	..	425	830	3,300	..	..	..
1985	280	970	2,800	..	3,575	..	370	685	2,000	..	..	..
Average Yearly Demand for Tractors 1960-65 (thousand)	650	500	180	..	100	..	500	180	70	..	..	..
Demand 1975 - Total (thousand)	1,500	950	325	..	700	..	1,000	350	140	..	..	..
Replacement "	1,000	770	270		400		850	270	100			
Fleet increase "	500	180	55		300		150	80	40			
Demand 1985 - Total (thousand)	2,400	1,400	530	..	1,100	..	1,500	550	220	..	..	..
Replacement "	1,750	1,130	380		800		1,200	420	170			
Fleet increase "	650	270	150		300		300	130	50			
Average growth rate of fleet 1975-1985 (%)	4.2	4.2	7.2	5.0[c)]	7.2	3.0[c)]	4.2	3.9	5.2	3.0[c)]	5.0[c)]	..
Average growth rate of fleet demand 1975-85 (%)	4.8	4,0	5.1	..	4.7	..	4.2	4.7	4.7	..	..	..
Fleet 1980 (thousand)	12,280	4,910	1,420	32	2,830	190	4,910	2,910	770	440	25	30,717
Demand 1980 "	1,900	1,160	420	8[d)]	880	43[d)]	1,230	420	180	101[d)]	6[d)]	6,798

a) C.Voss, FAO, July 1968 - b) From table 24 - c) Estimated average growth rate in the period 1965-85
d) Calculated on the basis of 20 % replacement and of the assumed growth rate of the Fleet

The conclusion can be summarized as follows:

- In the period 1965 to 1980 the fleet is expected to increase from 15,400 to 30,700 with an average growth rate of 4.7 %;

- The yearly demand by 1980 is expected to reach 6,800. As compared to the estimated (1963) average yearly demand in the period 1960 to 1965, this gives a yearly gross rate of 6,5 %.

- The resulting average yearly rate of renewal is in the range of 15%[1]).

The demand structure as shown in table III/18 warrants the belief that the share of wheel tractors evolved from 84% to 89% in the reference period, wheel tractors in the class 50 to 70 HP are likely to be in the range of 75% of the total fleet.

The study from which the above was quoted, does, to our knowledge, not proceed to any recommendations as to the viability of tractor production in the subregion, which may be reserved for a later date. Still, two points should be added to its observations:

- the present fleet is characterized by a profusion of types and makes

- contrary to trucks and buses not much advantage can be derived from ckd import and local assembly of tractors as the transport cost differential - due to their bulkiness in the case of the former - is negligible for the latter.

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1) According to the figures shown in table III/18b (26 in the original) this may be so calculated:

$$\frac{\frac{6{,}798 + 2{,}245}{2} - \frac{30{,}717 - 15{,}427}{15}}{30{,}717 + 15{,}427} = 15.1\%$$

3.2.3 Subdivision 714: Office machinery

Consumption in this subdivision, in 1980, is estimated to amount to only abt. 2.000 t, but the items it includes are set out by a very high value/weight ratio. They are primarily typewriters with abt. 30% of the total, calculating and accounting machines with abt. 25% and duplicating machines again with abt. 30%. Taking average weight figures, this would correspond to abt. 60.000, 55.000 and 20.000 units respectively. For international standards, these figures are very close to the bottom end of an economic minimum production size, particularly so, as they represent the overall total of a variety of makes and types. This minimum size is reduced, however, if local manufacture starts on an assembly basis in co-operation with a foreign producer who would supply the know-how. Due to the above mentioned high value of these products, they are particularly well suited for manufacture in those countries, which are at a disadvantage, where transportation costs are decisive. Thus, three factories are proposed in this subdivision, one for typewriters to be located in Mauritius, one for calculating machines and one for duplicating machines both to be located in Madagascar.

3.2.4 Subdivision 715: Metalworking machinery

Consumption in subdivision 715 is estimated at abt. 6.000 t in 1980. Apart from machines which are required in too small numbers to justify production even on a subregional scale, it includes a number of types which are basic for any kind of metal processing and for which there is a regular demand. The more simple varieties of such machines could be produced in the subregion and as considerable economies of scale can be derived from large series, manufacture should be concentrated in five factories, each serving the subregion with

its respective product, namely:

- One factory producing sheet metal working machines (bending, lapping, shearing machines etc.) and in addition grinding and sawing machines with an output 500 t p.a. located in Tanzania (Arusha);
- One factory producing several sizes of lathes to be located in Kenya;
- One factory producing milling and drilling machines, equally located in Kenya;
- One factory producing shaping and planing machines and in addition one larger size of lathe to be located in Uganda, and
- one factory producing several sizes of hydraulic and excenter presses, again located in Uganda.

Details of each of these factories are given in the attached fact sheets.

Though transportation cost, mainly, in this case, of the raw materials were an important point to be considered, the overriding arguments for the choice of the above locations were the following: first, the machine tool industry is characterized by particularly strong linkages within the branch, thus, the factories should be geographically close to each other and connected by a good transportation network. Secondly, for this type of industry, a large part of the direct production personnel must be skilled labour, therefore, those locations must be given preference, that are most advantageous in this respect.

3.2.5 Subdivision 717: Textile and leather machinery

Estimates for consumption in subdivision 717 amount to abt. 14.000 t in 1980, the bulk of which, i.e. abt. 60-70% will be textile machinery. Even this large figure, however, is not considered sufficient to justify production of any kind of textile machinery in the subregion. Hardly any branch of industry has experienced such rapid technological change and progress as textile industry and the process is still continuing. Only very few producers in the world today can turn out the up-to-date machinery which is essentially necessary to obtain competitive end-products in this field of mass-production. Experience from other developing countries shows that attempts to establish an own production of textile machinery are costly and largely unsuccessful because of lack of experience and resources. Even the method that has proved rewarding in many other cases, namely start by producing simple spare and component parts in the first place can hardly be recommended here. Again experience shows that such parts, even if their quality is acceptable, usually turn out to just as expensive or even more so than imported ones, due to their comparatively heavy investment required for production of even a limited range of items.

Sewing machines of all types account for abt. 20% of consumption in subdivision 717. Assuming that abt. half of this stands for domestic sewing machines of the mechanical type, this would correspond to abt. 30.000-35.000 units, which could be produced in one factory serving the whole subregion. Being high value products, for which distribution costs are not a decisive pricing element, manufacture of sewing machines could take place in one of the less centrally located countries of the subregion. Malawi is therefore suggested as factory location. It is strongly recommended that manufacture

should be started in co-operation with and under the brand name of one of the well-introduced suppliers now in the market, as purchasing attitudes of consumers are strictly conservative with regard to sewing machines.

3.2.6 Subdivision 718: Machinery for special industries

Consumption in this subdivision is estimated at abt. 62.000 t in 1980, which makes it the largest in the group of non-electric machinery. It includes machinery for pulp and paper making and processing, printing and bookbinding, food processing, road making, mineral crushing and sorting, and glass working. In terms of import values, printing and bookbinding, food processing and construction, mining and mineral crushing machinery are the most important categories. It must be kept in mind, however, that these value figures do not represent new equipment only, but include a considerable amount of spare and replacement parts.

Consumption of printing and bookbinding machinery can be expected to remain at a high level with the steady growth of the literacy rate. Still, it is not sufficient by a long way to justify production of such equipment in the subregion which, as in the case of textile machinery, is very sophisticated, and subject to a permanent technological change. No investment is recommended in this field during the period under consideration.

In the case of construction, mining and mineral crushing and sorting machinery, it is the physical heaviness and bulkiness of most such equipment, requiring equally heavy tools for their production, which makes them unsuitable for manufacture in the subregion rather than their technical sophistication.

Particularly for earth moving machines, the tendency goes for larger units because of their greater efficiency and economy. In practically all countries of the subregion an important part of these machines and vehicles drops out for extended periods for lack of spare parts and repair facilities. Rather than attempting any full-scale production it is therefore recommended that in countries with a sizable pool of such equipment central repair facilities be established, which should be equipped for fabrication of the most important wear-and-tear parts as well.

The case of mining machinery is special in so far as only Zambia and Uganda have a sizable mining industry (though its importance is stagnant or even decreasing in Uganda). Production of such machinery would therefore be restricted to the Zambian market, and it is difficult to see how it can expand far beyond the present level under these circumstances.

Machinery for the food processing industry offers the most tangible opportunities for production in the subregion. In some of the countries establishments have already come into existence which are geared to the requirements of particularly extensive branches of that industry, e.g. sugar extraction in Mauritius, and tea and coffee processing in Uganda. Establishment of a subregional industry is considered possible for cereal processing machinery. East Africa has a substantial share in the continent's production of maize, barley and sorghum, which should be sufficient to justify manufacture in the subregion of basic machinery for the processing of these.

However, the reservations that have been made in connection with agricultural tools and implements (subdiv. 695) must be repeated here: production of such machinery is a problem of education and propagation rather than of technology. The

production programme of the factory should include machinery such as vibrating sieves, hand and motor operated sifters, (trieur impact and other pulverizers), filter presses and hot air drying equipment. Besides, cassava chipping machinery could be produced. Principal raw materials for all these machines will be steel sheets, plates and profiles castings, and drive units. Ethiopia which is an important producer of agricultural goods itself, is proposed for location of a plant with a capacity of abt. 2.000 t p.a. (Addis Ababa area).

3.2.7 Subdivision 719: Machinery and appliances (other than electrical) and machine parts n.e.s.

Subdivision 719 is a large one with an estimated consumption of abt. 57.000 t in 1980. It includes a wide variety of intermediate and final products most of which must be eliminated, however, when considering their feasibility for local or subregional production. Only the following categories are retained: air-conditioners, non-electric refrigerators, pumps for liquids, lifting and loading machinery, weighing machines, and taps, cocks, valves etc.

Manufacture or assembly of air-conditioners (window-type) is not carried out now, though plans for either have been under consideration for some time. At present, the market in the subregion is controlled by a small number of American and Japanese producers.

Consumption in the subregion is estimated at abt. 12.000 units in 1969 with a growth rate of abt. 7%. This figure is definitely too small to allow for anything else but starting on an assembly basis even on a subregional scale. Co-operation under a joint-venture or licence agreement - preferably the former - with an experienced producer would be a pre-condition, not only because of the know-how involved but also under the aspect of securing a well established brand name for air-conditioners assembled in the subregion.

Only a limited number of models should be assembled in the 1 to 2 hp range, on which the greater part of the demand concentrates. Abt. 50% of the output should be of the 1 hp type, which in turn is the most popular in that range. Local production must start with the bulky cabinets and other fairly easy parts such as front grill, knobs and switches, air filters and rubber parts. After that, production of the condenser and evaporator, and condenser and blower fans can be taken up, while the fan motor will be supplied by the proposed electromotor factory.

This will leave only the compressor unit and thermostat. The former can either be of the more simple reciprocating type or of the hermetically sealed rotary type, which poses greater problems of manufacture. Being technologically similar to refrigerators, production of which is proposed further down, air-conditioners should be manufactured together with these, either in two divisions of the same factory or in two closely co-operating establishments with common sub-suppliers. In both cases, Burundi is proposed for location, though the country itself offers only a small market.The initial output could be abt. 8.000 units if production is started later than 1975

Non-electrical refrigerators are produced on a larger scale only by one factory in Malawi which exports a considerable part of its output. If further expanded, this plant could supply to all countries of the subregion and be put in a position to take up production of other components besides the sheet metal work that accounts for the greater part of its activities now.

There is no production of pumps for liquids in the subregion now, but a certain amount of improvised manufacture of spare

parts is done in connection with repairs in all countries. Though a variety of pumps for different uses are required, the most important type are centrifugal pumps, self-priming or not, with or without electric motor attacned. This type is, therefore, proposed for production in the subregion. Its principal uses are for delivery and circulating of pure liquids (mostly water), and draining of soiled water. Roughly, pumps with up to 30 m (water column) delivery head and abt. 60 to 80 l/min should be proposed for the former application, and up to 30 m delivery head at 500 l/min for the latter. The corresponding electric motors (three phase a.c.) would be in the range of 0.5 to 2.5 kw (rated power) and 5 to 7.5 respectively. They could be supplied by the two proposed factories (see subdiv. 722), though motors for pumps have to comply with special standards. Other parts supplied by plants in the subregion would include angles, shapes, and sections, bars and rods, nuts, bolts, rivets etc. and paint. Assuming that abt. 1/3 of the imports of pumps for liquids into the subregion consists of pumps of the proposed types, and assuming further an average weight/unit of 50 kg[1]), consumption in 1969 would have been abt. 20.000 units. This figure would be sufficient to justify erection of two factories, with a capacity of abt. 15.000 units each. They should be located close to their principal markets, i.e. the Community countries and Zambia, Rwanda and Zambia are, therefore, proposed for location.

Machinery for lifting, loading and conveying of goods in many of its applications is very specialized to fit the improved technology of production facilities. However, there are some items in this heading which are very universally applicable and therefore eligible for production in the subregion, such as belt conveyors (stationary or movable), electric chain hoists and overhead travelling cranes.

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1) with motor attached

The latter, by the type of material used and the specific requirements in each case (capacity, span etc.) could be fabricated by structural engineering shops existing in each country, using electric motors and steel wire ropes whose production in the subregion is proposed.

Electric chain hoists on the other hand must be produced by a specialized factory, preferably under licence of a foreign producer, and by sharing the foundry facilities of another factory.

General purpose belt conveyors in the range of abt. 5 to 10 m could be produced by using a number of components available in the subregion, such as profiles, angles, sections, and tyres for the frame, rollers, and electric motors (for stationary use). Being sensible to transportation cost, belt conveyors should be produced in several locations close to the respective markets. As manufacture of frames will have the largest share in the local value added, production of belt conveyors could be added as a sideline to the fabrication of light structural parts. Three locations are proposed with a capacity of abt. 500 units each, namely Zambia, Kenya and Tanzania.

Concerning weighing machines, only weight-operated scales (i.e. machines with movable jockey) of the household and general purpose platform type should be considered. Principal inputs would be iron sheets and plates, sections and castings. One plant is proposed for the subregion with a capacity of abt. 6 to 8.000 units, located in Ethiopia.

The final heading in subdivision 719 includes taps, cocks, valves and similar appliances, of which valves are the most important item. There are dozens of types, requiring different materials, different degrees of precision and in corporating different numbers of components. From the point of view of material only those types of valves are proposed for production

in the subregion, whose basic material is brass, bronze, cast steel or grey cast iron. Furthermore, in the initial phase no piston or electric power-operated valves and only the less complicated types of spring-loaded valves should be included in the production programme. Subject to a more detailed analysis, this will leave various types of shutoff-valves mainly for water pipes, back-pressure valves for non-aggressive fluids and gases and pressure-reducing valves for fluids, gas cylinders and other pressure containers.

Location of the plant in Zambia (Copperbelt area) would provide the most favourable raw material basis and proximity to the largest homogeneous market in the subregion. Its initial output will be abt. 1.500 t p.a. but future expansion should be anticipated particularly with regard to the capacity of the foundry.

Table III/27

Division 71: Summary of Identified Projects

Subdivision	Items in subdivision suitable for	
	Local production	(sub)regional production
711		steam generating boilers diesel engines
712		
714		typewriters, calculating machines, duplicating machines
715		sheet metal working machines, drilling, sawing, grinding machines, lathes, planing machines
717		sewing machines (domestic)
718	mining machinery (Zambia)	food processing machinery
719		air-conditioners, non-electric refrigerators, pumps for liquids, belt conveyors, weighing machines, valves

3.3 SITC-Division 72: Electrical Machinery, Apparatus and Appliances

As indicated in the country reports, some fabrication and assembly of items in this division already exists in the subregion.

While division 71 contains a high percentage of products, which go into productive consumption or fixed capital formation, division 72 includes some important consumer goods as well. Though not all of them depend on the availability of electric power for their use, as might be suggested by the heading 'electric machinery', many of them do. This makes it difficult to project demand figures as future expansion of electric supply, mainly into rural areas, has to be taken into consideration.

The same points that have been made in connection with division 71 regarding minimum size and geographical distribution are applicable in this case, with the addition that already existing production facilities should, wherever possible, serve as a starting point for the proposed industries. In this way, the subregion's scarce resources of skill and experience will be most economically used.

3.3.1 Subdivision 722: Electric power machinery and switchgear

Consumption in this subdivision is estimated at abt. 15.ooo t in 1980. It comprises three principal headings: electric motors, other power machinery such as generators, alternators, converters and transformers, and apparatus for making, breaking or protecting electrical circuits.

There is no production of electric motors in the subregion so far, but some degree of manufacturing is done by numerous repair shops. New motors are invariably imported, still it is practically impossible to break down the figures of present and future consumption into their details as only global figures for all types and sizes are given in the statistics. Secondly, motors which are imported attached to some piece of machinery, are not shown separately. As far as can be established, the most common motor imported unattached is the 22o/38o V, three-phased, asychronous squirrel-cage type with 1ooo to 3ooo rpm in the range of 1 to 15 hp (0,75 to 11,2 kw), besides, fractional hp-motors for various applications constitute a regular market.

It is proposed that electric motors should be produced in the subregion, being integral parts of all kinds of machinery and appliances, consumption of motors can be expected to rise steadily as industrialization progresses. Two factories should be established, which for reasons of economies of scale, will in the beginning split up the market between themselves by concentrating on different ranges (e.g. fractional units and units up to 2 kw in one place and units above 2 kw in the other). Input material such as dynamo metal sheets, bearings, brushes insulation material and special profiles will have to be imported for some time, while castings will come from a foundry attached to each factory, and wires and cables from suppliers in the subregion (see subdivision 723).

In this study a number of items are proposed for production in the subregion, which incorporate electric motors as component parts, e.g. airconditioners, metal-working machines and fans.

The regular demand arising from these sources would provide a backbone to the activity of the three companies and make it possible for them to branch out lateron into production of those types, which take only a small share in the market, (i.e. mainly large units of, say, 100 to 200 kw).

The demand for electromotors for the proposed annual production of machine tools, air conditioners and fans will be as follows:

motors for machine tools	
2,100 units	0.5 kw
2,500 "	1.0 kw
440 "	1.5 - 2.0 kw
560 "	3.0 kw
360 "	4.0 kw
120 "	7.5 -10.0 kw

motors for air conditioners	
8,000 units	aerated motor 0.2 kw

motors for fans	
15,000 units	0.2 - 1.0 kw

Accordingly, the demand for the group with up to 2 kw will already amount to 28,000 motors , approximately.

Though it would be preferable to locate the factories in the more industrialized areas of the subregion, electric motors, being high value products, could be produced in less centrally located countries as well. Ethiopia (large units) and Mauritius and Madagascar (small units) are therefore proposed as locations.

Of the second heading in subdivision 722 - generators, alternators, converters, transformers and rectifiers - only generating sets and transformers are retained as viable propositions.

Generating sets which consist of a synchronous alternator in combination with a conventional internal combustion motor are required, where no regular electricity supply is available or as emergency power units. Demand in the subregion arises particulary from the former application, as large areas are not and will not for some time be connected to the power distribution network.

Assuming that generating sets in the range of 5 to 20 KVA would be produced, the corresponding diesel motors in the range of 7 to 30 hp, geared to 3000 rpm, would be supplied by the proposed factor (see subdivision 711). Production of the alternators, being technologically similar to that of electric motors would be integrated into the production of larger motor units as proposed above, so that Ethiopia would be the most suitable location. The frames, on which both units are mounted could easily be supplied by a structural engineering shop on a subcontracting basis.

Manufacture, in addition to repair, of power and distribution transformers is undertaken by only one factory in Zambia now. This plant is considering the fabrication of wire and heavy copper sections to expand their production. It is recommended that this expansion be carried further to a point, where the plant can satisfy the demand in the subregion, of transformer units up to 250 KVA.

The final heading in subdivision 722 includes a wide variety of items, among them such common ones as fuses, plugs, relays, sockets, and switches. Unfortunately the countries of the sub-

region employ different standards in many instances. Regional production would therefore have to cope with a profusion of variations even if restricted to only a limited range of items. It is therefore proposed that a more detailed study be carried out with the aim of establishing which standards are already compatible and what measures can be taken to further improve standardization. Only on this basis it will be possible to work out a programme for regional production for the above-mentioned items.

3.3.2 Subdivision 723: Equipment for distribution electricity

Consumption in this subdivision is estimated to amount to abt. 20.000 t in 1980. The two principal headings it includes are insulated wire and cable and electrical insulators, of which the first is by far the more important in terms of value.

Insulators for high and medium tension power transmission (mainly of ceramic materials) are not produced in the subregion so far. Being long-lived products the primary demand for such insulators arises not from replacements but in connection with construction of new overhead lines. In the normal practice, these are tendered out and the insulators are included in the value of the contract. Production in the subregion would therefore be feasible only on two conditions: firstly that the electrification schemes of the respective authorities are sufficient to generate an annual demand for insulators of the most current types (pin-type, suspension, strain) of abt. 2.000 to 2.500 t, and secondly that insulators would be singled out from contracts for new transmission lines and supplied only by a plant catering for the whole subregion. The location of such a plant would have to be close to the deposits of the raw materials required (clay of different types). Low tension insulated (i.e. for domestic voltages) in their indoor applications are generally component parts of electrical appliances (e.g. resistances in electric irons and toasters, bodies for sockets and plugs) and their production becomes viable along with the growth of industries producing these.

Wire and cables are at present produced in several countries of the subregion, mostly houswire, PVC insulated and bare wire

(Ethiopia, Kenya, Uganda, Zambia). In addition production of power and telephone cables and bare copper conductors is undertaken only in one large plant in Zambia and a smaller one in Kenya. Materials used are copper; only the Zambian plant has facilities for 900 t p.a. of aluminium wire and cables, but production of these is planned in Uganda and Tanzania.

It is proposed that in addition to the already existing factories for housewire and bare wire, two new ones should be established in Tanzania and Madagascar with a capacity of abt. 400 and 500 t respectively, on the basis of wire rod, of which abt. 80% will be housewire. While the Tanzania plant will mainly cater for the requirements of the home market, the Madagascar plant will export part of its production to Mauritius

As for copper cables (bare and insulated) the existing plants in Zambia and Kenya (expanded), with a production of abt. 3.500 t each should supply the whole subregion.

One factor influencing the demand for wire and cable made of copper is the extent to which they will be substituted by those using aluminium as material. For technical reasons, housewire, telephone cables, cables used in mines and overhead transmission lines for railways will continue to be made of copper. However, for high tension and increasingly for low tension transmission lines aluminium is generally given preference over copper for economic reasons, though the process is gradual. The demand arising from this change-over should be satisfied from the capacity now installed in Zambia, but this will probably become insufficient even before 1980. As particularly the Electricity Authorities of the Commuity countries and Ethiopia are substituring aluminium for copper cables almost universally, the already planned production

of aluminium cables in Tanzania should be implemented before then. This will require a corresponding expansion of the existing aluminium fabrication plant in Dar-es-Salaam, whose present capacity of 5.000 t is to the greater part taken up by sheets, coils and foils.

3.3.3 Subdivision 724: Telecommunications apparatus

Consumption in this subdivision is estimated at abt. 10.000 t in 1980. It consists of four important categories: television receivers, radio receivers, telephone and telegraph equipment, loudspeakers and amplifiers.

Assembly of radio sets and to a lesser degree of television sets is undertaken in a number of countries of the subregion. Only one small but well managed plant in Rwanda turns out what might be considered a local product though most components are still imported.

Transistor-type radios enjoy a large popularity and have a high income elasticity coefficient[1]. This, together with the importance attached to it by the authorities as a means of constant contact even with remote areas explains the high growth rates of consumption in the past that can be expected to continue in future[2].

The example of existing plants shows that on an assembly basis each country of the subregion can now or in the near future operate its own factory. At the same time it proves, however, that with the variety of makes and types resulting, manufacture of components will not be possible. It is therefore proposed to discontinue the present practice and develop pro-

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1) 1.6 according to ECA document ST/ECA/40/Part 10/page 70
2) see projection table III/21

duction of radio sets into a large-scale regional industry with a gradually increasing amount of component part manufacture. On the basis of the projection figures, two such large-scale plants will be feasible, one before 1975 and the second between then and 1980. For their location, those countries should be given preference, that are not eligible where minimization of transportation and distribution costs are essential. Rwanda and Madagascar are proposed under these aspects. In both cases the existing (assembly) plants could provide the nucleus for the new establishments. It will have to be decided on the basis of detailed feasibility studies whether it would be preferable to integrate manufacture of all components into these two plants or have some of them produced by subcontractors. Concerning the other existing assembly plants, they should either participate in this development by modifying their products to a point where they can use the same components, or else concentrate on the assembly of types that will not be produced by either of the two factories.

While production of radios in the subregion should be started as early as possible, it is recommended that no attempt should be made at partial manufacture or TV-sets for some time. They are not only much more complex and sophisticated but also the demand is still too limited to allow for the economies of scale that would be necessary for competitive production. Manufacture of phonographs could, on the other hand, be combined with that of radios at an earlier stage.

Manufacture, of telephone and telegraph equipment, even in the industrial countries, is undertaken only by a very limited number of companies, who share the market in the developing countries among themselves. Production in the subregion appears possible only under a joint-venture agreement with one of these companies and would presuppose the standardiza-

tion of equipment in the member countries. Still it should be worthwhile investigating that possibility, not only under the aspect of satisfying demand in the subregion but also under the aspect of re-exporting the finished products to the industrialized countries.

The final heading in the subdivision concerns loudspeakers, amplifiers, and similar equipment. At present, they are assembled together with radio sets in some of the countries. This practice should be continued with substitution of imported components by local components, as far as manufacture of these is possible and economical in connection with the manufacture of components for radio sets. Particularly in the case of amplifiers, technological progress has been and still is rapid, and a very prudent approach should be taken to investments in this field.

3.3.4 Subdivision 725: Domestic electrical equipment

Consumption in this subdivision is estimated at abt. 11.000 t in 1980. The principal headings it includes are: refrigerators, washing machines, electro-mechanical appliances and space heating equipment.

There is no manufacture of electric refrigerators in the subregion so far, but assembly is undertaken in Uganda with a capacity of 1.600 units p.a. Though they are certainly an essential piece of furniture under the climatic condition prevailing in East Africa, refrigerators are luxury goods by their price. Only a small group including expatriates, disposes of sufficient purchasing power, and this group has largely satisfied its demand. Growth rates of future consumption can therefore not be expected to exceed 5 to 6% p.a. Still, even at that rate of growth and with the present level of demand, assembly with an increasing degree of manu-

facture should be possible, restricted to a limited number of types in the standard range of abt. 120 to 200 l. Manufacture must then start with the metal bodies as otherwise import of complete units is almost as cheap as that of parts. Following that, other components such as piping and wiring, hinges and handles, plastic and rubber parts can be substituted fairly easily, before local manufacture of motors, condensors, coolers compressors etc. is attempted. Two factories are proposed, one as an extension of the existing assembly plant in Uganda to a capacity of abt. 10.000 units p.a., and a new one in Burundi with a capacity of abt. 20.000 units p.a.[1]).

Demand for domestic washing machines is considered too small to justify any investment, even on a subregional scale, before 1980 (e.g. import into the Community countries in 1969: abt. 850 units of all types). Experience from other developing countries shows that the income elasticity coefficient for domestic washing machines is much lower than for refrigerators and other household appliances. Growth rates of demand must therefore be expected to average abt. 5%, but even at higher rates, demand would still be small in terms of absolute figures.

The most important item included under the heading electro-mechanical domistic appliances are fans. Other products such as vacuum cleaners, coffee mills, mixers, grinders, peelers etc. do not appear promising, again under the aspect of a very limited demand on the one hand, and the large series necessary for competitive production on the other.

No manufacture of fans is undertaken in the subregion now, but the present level of demand - estimated at abt. 18.000 units p.a. (1969) - and its projection - 30 to 35.000 units.

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1) It is assumed that abt. 70% of the demand for electric refrigerators is for the compressor type and abt. 30% for the absorber type.

in 1980 - indicate the feasibility of production, if started on a regional basis. The three basic types are ceiling, table and pedestal fans, of which the latter two are most important. Parts that could be manufactured locally include blades and guards (chromium-plated), base plates and supports, wiring and motors and lateron plastic parts. Particularly in the case of fans for domestic use, design and styling are an important factor to which much attention must be given. Co-operation with an experienced producer under licence or as a joint-venture, therefore appears imperative. Two factories are proposed, one in Ethiopia / Asmara with a capacity of abt. 15.000 units of all types and a second one in Madagascar with abt. 10.000 units.

Principal items included under the heading space heating equipment are boilers, stoves and cookers, irons, grills, toasters, and coffee makers. Of these, cookers and stoves are eliminated as electricity is too expensive a fuel and gas-operated stoves are cheaper and more universally usable (see subdivision 697). Grills and coffee makers, too, are screened out because of the insufficient demand and the high quality standards necessary for their production.

Boilers for commercial and domestic appliances appear more promising, but their use will certainly be restricted to the urban areas for quite some time. Subregional production of one standard type with abt. 50 l capacity and abt. 4 kw connect load might be envisaged between 1975 and 1980 in one factory with an output of abt. 10.000 units. The factory will have to be located not too far from the main centres of consumption and at the same time low cost of transportation of the principal input materials (steel, sheets, and flats, and insulating materials) is essential. Somalia is therefore proposed for location (Kisimaio).

Flat irons for domestic use, though incorporating abt. 50 component parts, are considered eligible for production in the subregion. Some of these, like thermostat and insulating bodies will have to be imported for some time while others, like screws, trolleys, and wiring will come from sub-suppliers in the subregion. One plant with a capacity of abt. 20.000 units is proposed, which could be located practically anywhere, due to the favourable value/weight ratio of the finished product. Malawi is suggested as location. Production of pressing irons for industrial use by the same plant could be taken up later on but only after a detailed study has been made on which types are required by the textile industry as such irons are designed to fit very specialized applications. A second line proposed to be taken up by that plant are toasters for which some of the inputs and processing techniques are similar to those used for flat irons.

3.3.5 Subdivision 726: Electro-medical apparatus

Consumption in this subdivision in terms of tons is extremely small and estimated at only abt. 260 t in 1980. However, the items it includes are high value apparatus and appliances used in hospitals and by medical practitioners. Since all countries of the subregion have a considerable backlog in this fiels, the figure might well be exceeded if in future a larger part of the budget is spent on health and social welfare. Still, even in that case the figure would be too small and the products in this subdivision too specialized to justify production in the subregion. There would be a possibility, however, to produce some uncomplicated items as sidelines to technologically related products. Following is a tentative list of such items:

- inspection boxes for x-ray films; massotherapeutical devices;
- sterilizing apparatus; physical appliances
- centrifuges; feeble current heating apparatus;
- irradiation lamps (without bulbs)

3.3.6 Subdivision 729: Other electrical machinery and apparatus

Consumption in this subdivision is estimated at abt. 21.000 t in 1980. It is the largest in the group of "electrical machinery" and includes a vast number of items, the most important ones being: batteries and accumulators, electric lamps, starting and ignition equipment for internal combustion engines, electrical measuring and controlling instruments, and electro-mechanical hand tools.

Dry cell batteries are or will be produced in several countries of the subregion. Though the variety of sizes, shapes and voltages in the market is considerable, the bulk of demand (abt. 70%) concentrates on those types used for transistor radios and torch lights. Its increase can fairly well be related to consumption of these. Minimum economic size of production plants is generally put at abt. 10 million units, but calculations for the factory to be established in Mauritius indicate that even with an output of only 6 million units production is still viable [1]. If this figure is correct and the projected consumption of radio receivers (table III/21, assuming an 80% share of battery-operated sets) is taken as a basis, establishment of a factory will be feasible between 1975 and 1980 for all countries of the subregion with the exception of Somalia. Production of dry cell batteries should therefore not be envisaged on a regional scale, but only one factory is suggested for Rwanda and Burundi. With part of the (Kivu) included as its market this factory could then operate well above the minimum scale and thus compensate for the disadvantage arising from higher costs of imported materials.

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1) with semi-automatic machinery

Production of car batteries is undertaken in most countries of the subregion, though in some cases restricted to assembling still serviceable parts of used batteries into new units. Minimum economic size for the assembly of completely new units was found to be abt. 10.000 o.a. Once this size is passed, a considerable amount of manufacturing becomes possible, as shown by an example of a plant in Madagascar (which produced abt. 15.000 units in 1969). The only part of the Batteries that is invariably imported are cases, which require large series for economic production. The profusion of types (abt. 20 in the case of Madagascar plant) and the somparatively small number of each does not allow for that in any country of the subregion now. Subregional manufacture should, however, become viable in connection with the proposed production of trucks and the regular demand for a restricted number of battery types that will result from it. This will allow installation of an injection press, which will supply cases to manufacturers in the individual countries. Ethiopia (Addis Ababa) is proposed as location of this plant.

Starters and generators for internal combustion engines are among those component parts, local production of which would become possible only along with the establishment of an automotive industry in the subregion, since replacement demand alone is too small. As production of passenger cars, with the reservations that will be made, is not considered feasible (see subdiv. 732), this would leave a demand for about 35.000 units each p.a. (in 1969) generated by the proposed production of trucks and buses. This quantity would be sufficient to support manufacture of starters and generators in the subregion, if started on an assembly basis with a gradual shifting to manufacture and under licence of an experienced producer of such parts. Somalia has been proposed for location of the factory and the suggestion is upheld here.

The heading "electric lamps" encloses a wide range of bulbs, lamps and tubes of different kinds, but it can be assumed that abt. 60% of the demand concentrates on the metal filament, incandescent type of different voltages and wattages, which is mainly used in private households. Production of such bulbs must be highly mechanized and automated to become profitable, with a minimum output of abt. 3 to 4 million units p.a. The figure is considerable lower if the bulbs are only assembled, but so is the value added.

So far one factory for the production of bulbs exists in Kenya with an output of abt. 8 million units, which supplies to the Community countries. Still, in 1969 abt. 2 million additional bulbs were imported by these countries. Considering the above-mentioned minimum output figures, it seems obvious that any new production facilities must be planned on a regional scale.

As rural electrification schemes figure high in the priority list of all countries and as electricity, when it becomes available, is almost exclusively used for lighting in these areas, the demand for bulbs can be expected to increase considerably over the next years. The capacity of a new plant for production of bulbs must therefore be determined in view of these developments. Its location should be decided under two aspects: proximity of the market and existence of a glass producing industry in the area. Under these viewpoints, establishment of the factory in Uganda is proposed.

Measuring and controlling instruments by their very purpose imply a high degree of precision in their manufacture. This fact taken together with the limited number required makes most of them unsuitable for production in the subregion for some time to come. The only types of measuring instruments

for which there is a steady and substantial demand are electricity supply and water meters. Apart from a comparatively small share of replacements the demand arises primarily in connection with the addition of new consumers to the supply network, for which electricity and water authotities are in charge. Unfortunately, the standards applied in this field vary among the countries of the subregion. A thorough study is therefore necessary to determine whether they are or can be made compatible to a degree that would make production in the subregion feasible. To this the manufacture of some other common types of measuring instruments could be added, such as voltmeters, ampère- and galvanometers. Location of this plant could be Burundi.

Demand for electro-mechanical hand tools for industrial and domestic use, though rising, is altogether too small to make production a realistic production for the time being. Unless at least some of the components (motors, plastic or metal casings) can be produced in the subregion, there is no chance for competitive manufacture of such tools.

A final heading in subdiv. 729 concerns thermionic valves and tubes, photocells, transistors etc. They are typically intermediate products, whose production involves complicated techniques and must be on a large scale, which presupposes an equally large scale of the industries using them. Their manufacture in the subregion can therefore be envisaged only in the frame of what has been said of radio, television and allied industries.

Table III/28

Division 72: Summary of Identified Projects

Subdivision	Items in subdivision suitable for	
	local production	(sub)regional production
722	-	Electric motors generating sets transformers
723	housewire	high tension insulators copper and aluminium wires and cables
724	radio sets (assembly of types not produced subregionally) TV-sets (assembly)	radio sets (transistor type) phonographs loudspeakers amplifiers
725		refrigerators fans boilers flat irons
726	some items as sidelines to other production	-
729	dry cell batteries car batteries	cases for car batteries starters and generators bulbs electricity and water meters radio component parts

3.4 SITC-Division 73: Transport Equipment

A precondition for industrialization of an area is the existence of transport equipment in conjunction with the corresponding transport volume. Thus it is easy to understand that demand for motor vehicles is dominant in the East African countries and here especially the demand for trucks. In all countries, therefore, small and medium sized production units exist for the manufacture of truck bodies and the assembly of trucks. The demand for passenger cars is nearly exclusively covered by imports.

In comparison with the big demand for road motor vehicles the demand for other transport equipment (railway rolling stock, road vehicles other than motor vehicles, ships) is relatively low. It is estimated at 20% of the whole transport equipment sector for 1980.

In order to achieve a uniform transport system in the subregion (e.g. railway) and for the sake of economic spare part supplies (e.g. motor vehicles) special attention has been given to the standardization of vehicles in the subdivisions.

3.4.1 Subdivision 731: Railway rolling stock

Consumption in this subdivision, in 1980, is estimated to amount to abt. 25.000 t, the bulk of which will be freight cars. The number required will depend not only on whether the anticipated increase of freight to be transported materializes, but also on whether the railways operating in the subregion can improve their efficiency. It seems that they are now operating well below what is possible with the existing rolling stock due to organizational shortcomings (mainly in international traffic).

As was pointed out earlier, some of the railway workshops do a considerable amount of assembly and repair work now and have thus gathered experience that should make it possible to go one step further towards regular production of freight and passenger car bodies, with continued imports of chassis, wheels and axles. For this kind of production, the workshop of the East African Railways at Nairobi and the very extensive new facilities of the Zambian Railways at Kabwe appear to be the most suitable and best equipped. Agreements between the countries of the subregion on standards for the construction of wagons (as proposed in document ST/ECA/140/Part VII) would be a precondition as well as an understanding between the two factories on what types and ranges should be produced by either of them. Production of the bodies would require inputs of between 5 and 10.000 tons of steel, mainly sheet steel, which would give a considerable boost to the existing or proposed steel works in the subregion.

3.4.2 Subdivision 732: Road motor vehicles

Subdivision 732 is by far the largest for all engineering products with an estimated consumption of abt. 230.000 t in 1980. It includes five principal categories: passenger cars, trucks, buses, chassis with engines mounted and motorcycles. Of these, passenger cars are the most important one in terms of value. The question of whether to manufacture passenger cars in the subregion has therefore been considered for some time.

In 1971, a very detailed investigation into the feasibility of passenger car production for the East African Community countries - but considering the entire subregion under market aspects - has been completed. Being concerned with only that

aspect of engineering production and on a larger scale in terms of time and research team the results of that study are necessarily more detailed and better established than what can be done within the scope of this report. Therefore, in the following, only some crucial aspects of the problem will be listed with a conclusion that should be regarded as an opinion rather than a recommendation.

1. Estimates of the demand for passenger cars (in units) diverge widely. The projection by ECA (table III/15) puts consumption in the Community countries at abt. 33.000 in 1975 and abt. 58.000 in 1980. The corresponding figures of an EADB projection are 19.000 and 24.000 (and 30.000 in 1985); i.e. abt. half.

2. The number of vehicles in the actual fleet is made up of a wide variety of makes and models; e.g. the 25.000 cars in Uganda in 1968 included 66 different models, the 3.000 newly registered vehicles in the same year 33 models. The situation should be similar in the other countries and reflects the differences in preference and purchasing power of the consumers.

3. The present pattern of consumption shows that currently the African population which, by mere number forms the largest market for local production, has only a small share in the demand for passenger cars, whereas European and Asian expatriates, though much smaller in number, account for a much higher share. If, in the course of Africanization programs part of the positions now held by these expatriates (starting with the middle-level ones) are taken over by Africans, this does not imply that they will automatically substitute the purchasing power and demand for cars of the former.

4. Local production will have to be restricted to a very limited range of models. Even if duties are raised, this will not altogether stop imports of cars by consumers who are not satisfied with that limited choice and can afford to pay a higher price. These continued imports will further reduce demand for locally produced cars by, say, 20-30%.

5. Local automotive industry will have to start on an assembly basis and gradually introduce production of components. The assembly phase should be as short as possible as it is characterized by a very low value added and has practically no linkage effect at all. On the other hand, as soon as assembly-cum-production is started, costs begin to rise sharply, and this effect is enhanced, if the series to be produced are too small. The automotive industries of some South American countries are a case in point and the above-mentioned uncertainties of demand projections indicate the danger that things might take a similar course in the case of East Africa.

6. If starting production - even partial - too early involves the risk of high costs due to a yet insufficient market, it still appears very urgent that the countries of the subregion should come to some understanding on the question. Madagascar already has a well-established and expanding assembly industry and Zambia has its own under construction with a projected final output of 15.000 units in 1975. Ethiopia has plans for local assembly under consideration. If she goes ahead, another important part of a potential market will drop out, as it is difficult to see that the heavy investments involved even in an assembly plant will be easily sacrificed.

7. What makes automotive industry a key sector in developed economies is the extensive linkage effects it has on most other sectors. Among others it gives rise to a large number of subcontractors, each of them very specialized and therefore dependent on large series. In the absence of these, costs of component parts produced by numerous subcontractors might be higher than their manufacture in one largely integrated establishment. This, however, would greatly reduce the above-mentioned linkage effects and the possibility to spread this industry over several countries of the subregion to distribute the benefits accrueing from it.

Summing up these few points, they all boil down to the argument, that setting up a production plant at the present time involves a considerable risk. Ignoring the results of the study referred to above, the view taken here is that a final decision should be postponed until a more solid basis - which means market in the first place - has materialized. This does certainly not mean that nothing should be done now. A basic multinational industry as this will require a number of preliminary studies and agreements of a technical, financial and legal nature between the countries of the subregion. By the time these are carried out - and past experience shows that they are very time-consuming - the picture should be clear enough to take another final look at it. At worst, if the result is negative then, a lot of energy will have been wasted, but certainly much less money and confidence in co-operation than stands to be lost if a wrong decision is taken at this point. At the same time, local production of spare parts should be encouraged but kept under control with regard to the number of establishments. If lateron the go-ahead for production of a mutually agreed-on type of passenger car is given,

such establishments could, with reasonable additional investment, develop into the subcontractors and suppliers required, and shorten the period of transition from assembly to production.

The second heading in subdivision 732 concerns trucks and must be treated in connection with that of chassis with engines mounted, as the larger part of them are truck chassis which are locally fitted with bodies.

Assembly of trucks and light commercial vehicles is now undertaken in a number of countries of the subregion. For one thing, being very bulky, their transport in c.k.d. condition makes local assembly viable on the strength of the transport cost advantage and at the same time, trucks are technically much less complicated than passenger cars. It is that latter quality that makes it possible to produce trucks economically in much smaller series than cars. Though the unit figures of the ECA-projection (table III/16) again seem to be on the high side, even a more conservative estimate will lead to figures that make production of trucks on a subregional scale a realistic proposition.

Again, as in the case of cars, this will require agreements on standards, to which the present profusion of makes is a serious obstacle (28 makes of lorries and trucks in Uganda in a fleet of abt. 1.500 in 1968). The backbone of the proposed production should be two models of light and medium sized trucks in the most universal range of 3-8 tons, each with variations according to requirements. The diesel engines with hp-ranges to fit the size and use of the trucks will come from specialized factories (see subdivision 711), while the complete chassis will be produced by the proposed establishment, with part of the components, e.g. types and tubes, batteries etc. supplied by subcontractors. The final

product will thus be chassis with engines mounted while the building of the bodies should in all cases be left to (already existing) companies in the individual consumer countries. Demand for buses and their chassis does not justify a separate production and should therefore be integrated into that of truck chassis, with body building again done in the respective countries of destination. Altogether, this will give the proposed factory an output of abt. 30.-35.000 units in 1980, of which an estimated 10% will be chassis for buses. When demand goes beyond that figure, establishing a second plant should be considered rather than extension of the first, as in this case external benefits derived from a new major enterprise should be given priority over the heavier investment involved. Concerning the location of a truck factory, Tanzania has always been considered as first choice and in fact the arguments in favour of it are strong enough to repeat that recommendation.

Consumption of motor cycles has only a minor share in the total figure for subdivision 732 (e.g. imports into the Community countries of all types amounted to only abt. 3.500 units in 1969). This figure does not yet justify the establishment of an assembly plant or even partial manufacture. However, experience from other developing countries shows that demand for small, i.e. 50 cc types of motor cycles increases rapidly and partly substitutes that for bicycles as disposable incomes grow. However, this stage is not expected to be reached by any of the countries of the subregion before 1980 and no investment in this field is proposed until then.

3.4.3 Subdivision 733: Road vehicles other than motor vehicles

Consumption in subdivision 733 is estimated at abt. 23.000 t in 1980. The two principal categories it includes are bicycles and parts thereof and trailers, with the former accounting for abt. 60% of the total.

In terms of units, demand for trailers in 1980 will be abt. 4.800 (see projection table III/17) of which Kenya, Zambia and Tanzania will be the largest consumers in that order of importance.

Already now, trailer bodies are produced locally in all countries of the subregion, either in connection with manufacture of structural parts or assembly of trucks and buses. For the smaller types, chassis are produced as well from profiles cut to size, with only wheel sets, axles and bearings imported.

This practice should be continued, as it will become more profitable with an increasing demand for trailers and fits well into the activities of the establishments catering for it now. With regard to large trailers body building should again be left to establishments in each individual country; but production of chassis should be concentrated in one factory for the subregion. This factory should either be integrated into or work in close co-operation with the proposed production of trucks (subdivision 732).

As for bicycles, a number of establishments are operating in the subregion now, on an assembly basis with a more or less large extent of manufacturing. Mudguards, carriers, frames, handle bars and rims can be produced without need of much special machinery, whereas spokes, chains, cog-wheels, springs, axles, lamps etc. are generally imported. As the example of Rwanda shows, assembly can be started on an

extremely small basis, though the subsequent step of partial manufacture requires a larger minimum size of abt. 15.000 units p.a. As this size already is or will soon be within the scope of all countries of the subregion it is proposed that bicycles should be produced by expanding existing or establishing new factories in each individual country.

A possible sideline to manufacture of bicycles could be production of prams and invalid carriages.

3.4.4 Subdivision 734: Aircraft

Estimates for consumption in this subdivision amount to abt. 3.000 t in 1980, but the significance of this figure is limited. It consists of a regular supply of spare parts mainly for the commercial airlines and the purchase, at irregular intervals, of new aircraft. Manufacture of any kind in this field is quite out of the question in the near future except for what can be done within the scope of service operations.

3.4.5 Subdivision 735: Ships and boats

Consumption in this subdivision is estimated at abt. 14.000 t in 1980.

At present, ship and boat building, on the Great Lakes, is confined to constructions of small units. The demand is irregular and altogether too small to give rise to a large scale specialized industry, except on Lake Victoria, which is already extensively used for low-cost transportation of goods and passengers. If production of steel sheets and plates which is under consideration in Uganda is implemented, this country would offer the most suitable location for a shipyard catering for the requirements for ships and boats on this lake.

As for maritime shipbuilding only Tanzania and Mauritius dispose of drydock and slipway facilities suitable for coastal trading and ocean-going fishing vessels (up to 380 ft length and 13/14 ft draught for Mauritius). However, their activities are reduced to overhauling, servicing and repairing and reflect the difficulties encountered by much larger shipyards in most industrialized countries: without strong (financial) support and some degree of protection they find it impossible to compete for orders concerning complete construction and equipping of large units, which alone could give them a solid basis for their operations.

Fishing off the East African coast is dominated by the modern fleets of countries outside the subregion. The East African countries themselves are only beginning to take the first steps towards tapping this potential, which will involve not only building up and modernizing their own fleets but also heavy investment in storing, processing and marketing facilities. Several studies are under way to determine the exact extent of the fishing potential and the actions and investments required on the part of the East African countries to make use of it.

Should their results be encouraging, the maritime countries of the subregion will have to agree on appropriate measures to develop their shipbuilding industries. As mentioned above, such measures will have to include financial support and protective regulations. The existing facilities in Tanzania, Mauritius and possibly Madagascar could then be expanded to cope with this development.

Table III/30

3.5 Summary of Identified Projects

a) Industries which should be continued (if already existent) or established on a national basis

		Item	Remarks
69	691	light structural parts metal furniture	production facilities exist in all or most countries (metal furniture), generally with excess capacities
	692	large tanks metal boxes and tins	production of large tanks in all countries, viability of tins production depends on expansion of fruit etc. processing industry
	693	wire drawing wire gauze and netting	production exists in some countries, minimum capacities below 100 t p.a.
	694	nails, screws, bolts, nuts, rivets, washers etc.	production of nails in some countries, minimum capacity p. a. abt. 150t (screws), 500t (bolts)
	695	agricultural hand tools	production existing or planned in all countries, specialization is proposed for certain lines
	696	knives, spoons, forks, scissors	minimum capacity for knives, spoons and forks abt. 80t p. a.
	697	enamel hollow-ware	production exists in some countries, minimum capacity abt. 250t p. a.
	698	building hardware	production exists in some countries, minimum capacity abt. 200 t p.a. (locks, padlocks etc.)
71	718	mining machinery (Zambia)	chute boxes, rockdrill stems, ore dressing, filtration and flotation equipment, crushing mills
72	723	housewire	production exists in some countries, new plants proposed for Tanzania (400t) and Madgascar (500t)
	726	some items as sidelines to other productions	as detailed in 3.3.5
	729	dry cell batteries car batteries	production exists in most (car batt.) or some (dry cell) countries minimum capacity abt. 8000 and 6.000.000 units respectively
73	733	bicycles small trailers	production of trailers in most countries in connection with 732, min. cap. for bicycles abt. 15.000

4. Fact Sheets

The following data have been used in the elaboration of fact sheets:

Land: Frequently special agreements are made with regard to cost of land, especially if the industry is considered important for the economy of the country. As a common basis it is assumed that the proposed industries will move into an industrial estate with access roads and water and electricity mains up to the factory building existent. It is further assumed that a development charge of 2000 US$ per acre = abt. 5000 US$ per ha and annual rent of 50 $ per acre = abt. 125 $ per ha has to be paid.

Machinery and Equipment: Prices for machinery and equipment used in the calculations are generally those obtained from European (mostly West German) suppliers. Where fob-prices have been quoted, an allowance of 15 to 20 % is made, which covers:

- sea freight and insurance
- handling and clearing charges in the port of destination
- inland transportation to the factory site
- erection and installation cost

Buildings: Unless the respective production process requires special sizes, materials etc. it is assumed that buildings will be of the following type: concrete floor, brick walls, steel structure, asbesto-cement roofing, height 5 to 10 m, span up to abt. 20 m. Cost is put at 60 $/sqm for the industrial buidling and 150 $ for office accommodation. If housing facilities for the (expatriate) staff have to be provided, cost is put at 220 $/sqm. (all excluding land).

Working Capital: 25 % of annual turnover

Local and Foreign Currency Requirements: It is assumed that the total amount for machinery and equipment and 50 % of the working capital (for imported raw materials) has to be paid in foreign currency, while buildings and the balance of the working capital are paid in local currency.

Financing: It is assumed that a foreign currency loan is granted for the acquisition of machinery and equipment with an interest rate of 8 % p. a. and two years' grace period, to be repaid within six years in equal yearly instalments.

Raw Materials: As detailed in the attached list for basic materials or in the individual fact sheets for others. For internal transportation 10 $/t is added to the respective prices.

Labour Cost: Rates vary within the countries (urban and rural areas) as well as between them. The following average rates, which are approximately those of the Community countries, have been applied:

manager (expatriate)	1,200 $ per month
assistant manager	300 $ per month
technician	200 $ per month
foreman (expatriate)	700 $ per month
foreman (African)	150 $ per month
skilled labour	85 $ per month
semi-skilled labour	45 $ per month
unskilled labour	35 $ per month
clerk, bookkeeper	85 $ per month
watchman, cleaner etc.	30 $ per month

In addition allowance is made for 5 % fringe benefits, except for expatriate personnel.

Energy, Water etc.: Unlimited availability of electric energy and water is assumed. For electricity, the respective country rates for industrial use are applied, while water is calculated at 25 % per m^3.

Spare Parts: 1 % p. a. of the value of machinery and equipment

Administrative Costs: In addition to stationery, postage, advertising etc,, this item covers costs in connection with sales (rebates, commissions etc.). It is put at 3 % of the turnover value.

Depreciation: 10 % p. a. on machinery and equipment, 5 % p. a. on buildings

Import Duties: Assumed to be waived for the initial import of machinery and equipment and for the raw materials required for the production.

Taxes: It is assumed that a tax holiday is granted for the income of the company during the initial three years of operation. For various other taxes (transaction, sales, municipality, stamp capital tax etc.) a lump rate of 10 % is calculated on the sales turnover.

Capacity Utilization: For the first year of operation, 60 % capacity utilization is assumed. This refers to the items 'sales receipts, raw material, other expenses', and 'taxes' in the cash flow calculation. 'Labour cost', on the other hand, is put at 100 % from the first year on, as the initial period at reduced capacity will serve for on-the-job training of the workers at the same time.

4.1 Gas stoves and cookers

1. Product description
Stoves, fitted with three or four burners, baking oven and cover plate; cookers, fitted with one or two burners, table-type.

2. Users
Households, restaurants, canteens etc. Cookers may be used for camping and similar purposes as well.

3. Market
As both, stoves and cookers, are fed from gas cylinders, which can be transported anywhere, their use is not subject to any restrictions. They are, therefore, particularly suited for rural areas, but in urban areas, too, they are generally preferred to electric stoves, due to the lower price of gas fuel.

4. Skill requirements
Skilled labour will be required for supervisory work and operation of some machinery, otherwise semi- and unskilled workers can be trained on the job.

5. Raw materials and operations
Principal raw materials are steel sheets, while burner units, nuts, bolts, insulation material etc. will be obtained from subsuppliers, mostly within the subregion. Main operations are cutting, pressing and bending of the steel sheets, enameling of the stove and cooker bodies, assembly, mounting of burner units, testing and crating.

6. Automation and mechanization
No automated equipment is proposed, but high degree of mechanization throughout.

7. Future expansion of operations

Future expansion should be by diversification of the production programme rather than by integrating production of further components. Their manufacture should be left to suppliers in the subregion in order to increase linkage effects.

8. Capacity and sales price

Capacity is based on 300 units of stoves and cookers, but can be shifted between these according to demand. Sales prices have been fixed at 90 $ for stoves and 14 $ for cookers and correspond to ex factory prices of West German producers, who supply a considerable part of the stoves and cookers sold in the East African market at present. Local production would, therefore, enjoy a competitive advantage at least corresponding to the savings on transportation and distribution cost.

CAPACITY 3.000 units each of gas stoves & cookers			US $
I CAPITAL REQUIREMENTS			
LAND 1 acre			2,000
BUILDING 1 building 45' x 150', incl. office			42,525
MACHINERY AND EQUIPMENT			
1 hydraulic press, 250 t			
2 excenter presses, 125 t and 60 t			
1 plate shearing machine			
1 small bending machine			
1 enameling oven, electric			
2 enamel mills			
1 welding plant			
1 spray-painting plant			
1 compressor plant			
1 pickling plant			
workshop equipment (lathe, drilling machine etc.) furniture and fixture			228,000
+ 20 %			45,600
WORKING CAPITAL 25 % of annual turnover			78,000
TOTAL CAPITAL			396,125
OF WHICH LOCAL			83,525
II FINANCING			
EQUITY			122,525
LOAN			273,600
III PRODUCTION COST	**NUMBER**	**UNIT COST**	
RAW MATERIALS			
steel sheets	200 t	200 $/t	40,000
pipes, valves, burners	16500 sets	2.70$	44,350
buttons, nuts, bolts			1,500
insulation material			1.000
enamel paint			7,000
packing material			6,000
LABOUR			
manager (expatriate)	1	14,400	
assistant manager	1	3,600	
secretary, bookkeeper	2	2,040	
foreman	2	3,600	
technician	1	2,400	
skilled labour	5	5,100	
semi-skilled labour	5	2,700	
unskilled labour	15	6,300	
watchman	3	960	41,100
cleaner			
5 % fringe benefits			1,335

ELECTRICITY AND WATER	
electricity	19,000
water, 8000 m^3 / year	2,000
SPARE PARTS, MAINTENANCE ETC.	
spare parts, 1 % of m/c value	2,300
lubricants	500
cutting tools	15,000
ADMINISTRATIVE COST	
3 % of annual turnover	9,360
DEPRECIATION	
machinery	22,800
buildings	2,125
INTEREST ON LOAN	
8 % p. a.	21,900
TOTAL PRODUCTION COST	237,270
SALES RECEIPTS	312,000
GROSS PROFIT	74,730

IV CASH FLOW	1ST YEAR	3RD YEAR
SALES RECEIPTS	187,200	312,000
EXPENSES		
LABOUR	42,435	42,435
RAW MATERIAL	59,900	99,850
OTHER EXPENSES	28,900	48,160
TAXES	18,700	31,200
CASH AVAILABLE TO SERVICE CAPITAL	37,265	90,355
SERVICE OF LOAN		
INTEREST	21,900	21,900
INSTALMENTS		34,200
CASH SURPLUS/DEFICIT	15,365	34,255

REMARKS: Amount of loan is exceptionally high as compared to equity and total capital requirements. The loan repayment period has, therefore, been stretched to eight years.

4.2 Gas cylinders

1. Product description
Butan gas cylinders, fitted with valve, capacity 13 and 15 kg, testing pressure 30at (427psi).

2. Users
Mainly households as storage tanks for cooking and heating gas; for industrial purposes, cylinders of a larger capacity are generally used, which can be produced by the proposed plant as well.

3. Market
Electricity being a comparatively expensive fuel, gas is widely preferred by households even where electric power is available. In rural areas, which are not yet connected to the distribution network, gas is often the only 'modern' fuel.
Empty gas cylinders can be refilled many times and thus have a very long life (abt. 15 years). Demand, therefore, will grow only slowly.

4. Skill requirements
Gas cylinders are subject to strict safety standards, and a high degree of accuracy is required for their production. Most of the workers in direct production will have to be skilled or semi-skilled.

5. Materials and operations
Steel sheets are practically the only raw material. Valves are obtained from subsuppliers and could be produced by the factory proposed in this study (see 3.2.7). Principal operations are cutting, bending, forming and annealing of the sheets, and subsequent welding, assembling, testing and spray-painting.

6. Mechanization and automation

Automatic equipment is proposed only for the welding process, but mechanization is high throughout.

7. Future expansion of operations

One plant with a capacity of 120,000 units of the abbve type is proposed. Average sales prices are put at 8.70 $/unit, which is abt. 1 $ below prices currently valid for Kenya.

CAPACITY 120.000 units p. a., 1-shift operation			US $
I CAPITAL REQUIREMENTS			
LAND	1 acre		2,000
BUILDING	1 building 50' x 100', incl. office		31,500
MACHINERY AND EQUIPMENT			
1 press, 300 t, 18" stroke			
1 bending press			
1 excenter press			
1 annealing furnace			
1 phosphatiation plant			
1 guillotine			
1 bending roller			
1 seam rolling machine			
2 automatic welding machines			
1 centre lathe, 1500 mm			
1 spray-painting set			
1 sand-blasting plant	testing equipment		
1 compressor plant	furniture and		
1 grinding machine	fixtures		197,000
+ 20 %			39,400
WORKING CAPITAL	25 % of annual turnover		250,000
TOTAL CAPITAL			519,900
OF WHICH LOCAL			158,500
II FINANCING			
EQUITY			283,500
LOAN			236,400
III PRODUCTION COST	NUMBER	UNIT COST	
RAW MATERIALS			
steel sheets	2000 t	190 $/t	
valves	120.000	1.50 $	
welding rod	120 t	500 $/t	
CO2	3000 bott.	10 $	
paint	600 gal.	8.00 $	
miscellaneous		15.000 $	669,800
LABOUR			
manager (expatriate)	1	14,400	
assistant manager	1	3,600	
secretary, bookkeeper	2	2,040	
foreman	2	3,600	
technician	1	2,400	
skilled labour	4	4,080	
semi-skilled labour	10	5,400	
unskilled labour	10	4,200	
watchman, cleaner	3	960	40,680
5 % fringe benefits			1,300

ELECTRICITY AND WATER	
electricity abt. 120.000 kWh/year (abt. 70 kVA)	5,000
water 4000 m3/year	1,000
SPARE PARTS, MAINTENANCE ETC.	
spare parts, 1 % of m/c value	1,000
lubricants, maintenance material, cutting tools	6,000
ADMINISTRATIVE COST	
3 % of annual turnover	31,000
DEPRECIATION	
machinery	19,700
buildings	1,600
INTEREST ON LOAN	
8 % p. a.	19,000
TOTAL PRODUCTION COST	796,080
SALES RECEIPTS	1,044,000
GROSS PROFIT	247,920

IV CASH FLOW	1ST YEAR	3RD YEAR
SALES RECEIPTS	626,400	1,044,000
EXPENSES		
LABOUR	41,980	41,980
RAW MATERIAL	401,880	669,800
OTHER EXPENSES	26,400	44,000
TAXES	62,640	104,400
CASH AVAILABLE TO SERVICE CAPITAL	93,500	183,820
SERVICE OF LOAN		
INTEREST	19,000	19,000
INSTALMENTS		39,400
CASH SURPLUS/DEFICIT	74,500	125,220

REMARKS:

4.3 Hand tools

1. Product description
Hand tools of a simple type, such as hammers, pliers, screw drivers, wrenches, tinner snips, chisels, punches, hand vices, squares, scrapers, wrecking bars, files, and rasps.

2. Users
Households, repair workshops, production units

3. Market
Hand tools of a simple type are used in the building industry, in workshops, in production units and for the carrying out of repair work in households. The tools which have hitherto been used have nearly all been imported. Through the industrialization and the growth of agriculture a constant increase of the demand is expected.

4. Skill requirements
The manufacture of simple hand tools, such as e. g. pliers, tinner snips, wrenches etc. calls for skill, knowledge of the nature of the raw material (e. g. forging, hardening) as well as of the machinery. It is, therefore, necessary to employ a larger group of skilled labour (technician, foreman, skilled worker).

5. Raw material and operations
High carbon steel which is mainly imported in form of rods, is required for the manufacture of tools.
The principal operations are: cutting, forging, forming, hardening, annealing, grinding, polishing, painting.

6. Automation and mechanization
In order to achieve a certain quality as regards accuracy, stability, wear and tear, surface etc. in comparison with

the world market offer high mechanization of the production flow as well as automation will be necessary.

7. Future expansion of the operations
Through the proposed machinery and equipment flexibility of the production programme will be possible to a far extent. Changing of the machine tools will, in most cases, be sufficient. In this case a best possible adaptation to the market demand will be possible.

8. Capacity and sales price
The capacity is based on a production of 3000 t p. a. in a 1-shift operation, which can, however, be expanded to a multi-shift operation in case of need. Additional ecocomic advantages will result from this, as e. g. better economic use of the furnacing shop. The sales price is based on international market comparisons with medium production quality taken into consideration.

HAND TOOLS

Capacity: 3000 t hand tools p. a., 1-shift operation

No.	Item	weight (tons)	sales price (million US$)
700.000	hammers	350	0,700
1.000.000	pliers +	400	1,300
1.500.000	screw drivers	480	0,750
1.500.000	wrenches	300	1,050
600.000	chisels	400	0,042
100.000	punches	90	0,030
300.000	tinner snips	180	0,480
75.000	hand vices	30	0,113
25.000	squares	25	0,028
75.000	wrecking bars	600	0,375
600.000	files	120	0,360
100.000	rasps	20	0,050
6.600.000	pieces	3000	5,280

+ 150.000 flat pliers
150.000 pipe wrenches
250.000 combination pliers
350.000 pincers
100.000 blacksmith tongs

1.000.000 pliers

CAPACITY 3000 t hand tools p. a., 1-shift operation			US $
I CAPITAL REQUIREMENTS			
LAND 2 1/2 acres			5,000
BUILDING 100' x 300', incl. office			2,025,000
MACHINERY AND EQUIPMENT			1,794,860
(see list of machinery and equipment)			
+ 20 %			358,972
WORKING CAPITAL 25 % of annual turnover			1,320,000
TOTAL CAPITAL			5,503,832
OF WHICH LOCAL			2,813,832
II FINANCING			
EQUITY			3,350,000
LOAN			2,153,832
III PRODUCTION COST	NUMBER	UNIT COST	
RAW MATERIALS			
high carbon steel	3400 t	310$/t	
wooden handles		50,000$ tot.	
packing material		150,000$ "	1,254,000
LABOUR			
manager (expatriate)	1	14,400	
assistant manager	1	3,600	
secretary, bookkeeper, typist	8	8,160	
foreman (expatriate)	5	42,000	
foreman (African)	5	9,000	335,952
technician	4	9,600	
skilled labour	50	51,000	
semi-skilled labour	270	145,800	
unskilled labour	90	37,800	
watchman, cleaner	6	2,160	
5 % fringe benefits		12,432	

ELECTRICITY AND WATER		
electricity 671.000 kWh p. a. (567 kW)		27,028
water 20.000 m3		5,000
SPARE PARTS, MAINTENANCE ETC.		
spare parts, 1 % of machinery value	17,949	
lubricants, maintenance material	2,000	
cutting tools	75,000	94,949
ADMINISTRATIVE COST		
3 % of annual turnover		158,400
DEPRECIATION		
10 % on machinery	215,383	
5 % on building	101,250	316,366
INTEREST ON LOAN		
8 % of loan (2,153,832)		172,307
TOTAL PRODUCTION COST		2,364,269
SALES RECEIPTS		5,280,000
GROSS PROFIT		2,915,731

IV CASH FLOW	1ST YEAR	3RD YEAR
SALES RECEIPTS	3,168,000	5,280,000
EXPENSES		
LABOUR	335,952	335,952
RAW MATERIAL	752,400	1,254,000
OTHER EXPENSES	171,226	285,377
TAXES	316,800	528,000
CASH AVAILABLE TO SERVICE	1,591,622	2,876,671
CAPITAL		
SERVICE OF LOAN		
INTEREST	172,307	172,307
INSTALMENTS		358,972
CASH SURPLUS/DEFICIT	1,419,315	2,345,392

REMARKS:

1st year: cash surplus $ 1,419,315
-depreciation $ 316,633
net profit $ 1,102,682

Profitability

$$P = \frac{\text{net profit}}{\text{total capital}} \times 100 = \frac{1,102,682}{5,503,832} \times 100 = 20.0\ \%$$

3rd year: net profit

cash surplus $ 2,345,392
-depreciation $ 316,633
net profit $ 2,028,759

Profitability

$$P = \frac{\text{net profit}}{\text{total capital}} \times 100 = \frac{2,028,759}{5,503,832} \times 100 = 36.9\ \%$$

capital intensity

$$\frac{\text{fixed assets}}{\text{total capital}} \times 100 = \frac{4,183,832}{5,503,832} \times 100 = 76.0\ \%$$

capital-labour-ratio

$$\frac{\text{total capital}}{\text{tot. labour force}} = 9.509\ \$\text{p.c.}$$

MACHINERY AND EQUIPMENT

Item	No.	Description	Unit Cost US $	Total Cost US $
drop forging hammer	16	250 kg	31,250	500,000
excenter press	8		6,875	55,000
electrical forging furnace	8	10 kW	10,000	80,000
guillotine for cutting rods	1		1,500	1,500
copying milling machine	2		5,000	10,000
universal milling machine	2		10,000	20,000
turning lathe(univ.)	2	6'	7,500	15,000
turning lathe(")	1	4'	5,000	5,000
shaping machine	2	18"	3,000	6,000
band saw for metal	1		3,000	3,000
drilling machine	1	pillar type, 2"	2,000	2,000
dito	1	pillar type, 1"	600	600
dito	1	pillar type, 1/2"	300	300
tool grinding m/c	1	universal	10,000	10,000
grinding post	1		400	400
surface grinding machine	1		15,000	15,000
circular grinding machine	1		10,000	10,000
tool grinding m/c	1	for chisels	3,500	3,500
dito	1	for wrenches	3,500	3,500
dito	1	for screw drivers	3,500	3,500
dito	1	for punches	3,500	3,500
dito	1	for scrapers	3,500	3,500
friction spindle press for trial moulds with lead	1	35 t	10,000	10,000
circular disk cutting m/c (stripes for squares)	1		900	900
resistance welding machine (f.squares)	1		3,000	3,000
belt sanding m/c (for squares)	1		700	700
hardening furnace	8	10 kW	10,000	80,000
annealing furnace	8	5 kW	5,000	40,000
quenching tank	4		2,500	10,000
automation set	1	for hammers	60,000	60,000
dito	1	for pliers	60,000	60,000
dito	1	for screw drivers	60,000	60,000
dito	1	for tinner snips	60,000	60,000
excenter press	1	85 t	15,000	15,000
special file forging hammer	4		20,000	80,000
special file grinding machines	4		15,000	60,000
special file temperating furnace	4		10,000	40,000
file cutting m/c	10		10,000	100,000
double wheel grinding post	2		350	700
				1,431,600

MACHINERY AND EQUIPMENT

Item	No.	Description	Unit Cost US $	Total Cost US $
				1,431,600
hardening furnace for files	2		10,000	20,000
sand blasting unit	1		10,000	10,000
jib crane	1		10,000	10,000
fork lift trolley	1	1,5 t	10,000	10,000
medium pressure blowers	4		1,000	4,000
cadmium plating tank	1	with filter	2,000	2,000
nickel plating tank	1	with filter	2,000	2,000
chromium plating tank	1	with filter	2,000	2,000
pickling tank	1		1,000	1,000
rinsing tank for tri-chlor-ethane	1		1,500	1,500
rinsing tank for water	1		1,000	1,000
DC-generator	1	2 kW	1,000	1,000
travelling hoist	1		20,000	20,000
polishing post	10	6 HP	400	4,000
polishing machine for small parts	1		1,500	1,500
polishing drum	10		500	5,000
dipping tank with specialized conveyors	8		4,000	32,000
drying chamber	8		2,000	16,000
conveyor belt	8		1,000	8,000
exhaust fan	1	20 HP	1,500	1,500
spray gun	2		80	160
air compressor	2		1,000	2,000
moulding m/c	1		10,000	10,000
multi-copying lathe for wood-working	1		12,000	12,000
band saw	1		1,000	1,000
circular saw	1		1,000	1,000
wood planing m/c	1		4,000	4,000
joiner bench	2		300	600
workshop equipment and fixtures				150,000
office machines, furniture, cars				30,000
				1,794,860

4.4 Lathes

1. Product description

Lead and feed screw lathe for universal use, individual drive and change-gear box with the following distances between centres: 3', 4', and 6'.

2. Users

For the processing of metallic material (for repair work and in production processes);

3. Market

As lathe work has to be carried out in nearly all repair shops and production units of the metal processing and engineering industry, the use of lathes is indispensable. As a lathe production is non-existent in the East African subregion, all lathes have to be imported. The present demand is considerable and will rise constantly due to increasing industrialization. A local production of 600 universal lathes (3' distance between centres, 200 pieces, 4' distance between centres, 200 pieces, 6' distance between centres, 200 pieces) would cover the market. In this case also export is possible.

4. Skill requirements

For the management of such a plant foreign managerial staff with high qualifications will be required for a period of say 10 years, so that good technical as well as economic management could be guaranteed and so that successful training of the local personnel could be possible. At the same time a large number of skilled workers will be required for the production.

5. Raw material and operations

The raw material, such as pig iron, steel profiles, steel sheets, aluminium ingots, have all to be imported as well as a great part of the supplementary parts for the mechanic and electric equipment of the lathes. Scrap-iron is to a far extent obtained from local suppliers.

The operations are manifold, starting in the foundry, after that dividing among the forging shop, the milling shop, turning shop, fitting shop and quality control.

6. Automation and mechanization

In order to achieve a high degree of accuracy of the lathes (low tolerance of work), precise production is necessary. For this reason automation and mechanization within the plant and the use of precise processing machinery is proposed.

7. Future expansion of operations

Owing to high investments, automation and mechanization, expansion of operations should be limited to the proposed types of lathes. Integration of other types in the existent lathe production is, therefore, not advisable. Production of the individual lathe types can vary according to demand.

8. Capacity and sales price

The capacity of the proposed plant is estimated at 600 lathes p. a., which can, however, be shifted according to demand. The sales price is based on European market prices. The following average sales prices have been fixed:

universal lathe, 3' distance between centres	2,500 $ p. u.
universal lathe, 4' distance between centres	5,000 $ p. u.
universal lathe, 6' distance between centres	7,500 $ p. u.

CAPACITY 600 lathes of 3', 4', 6'; 1-shift operation			US $
I CAPITAL REQUIREMENTS			
LAND	2 acres		4,000
BUILDING	total floor area required: 4000 m^2, foundry attached or as separate building		270,000
MACHINERY AND EQUIPMENT			2,000,000
(see list of machinery and equipment)			
+ 20 %			400,000
WORKING CAPITAL 25 % of annual turnover			750,000
TOTAL CAPITAL			3,424,000
OF WHICH LOCAL			649,000
II FINANCING			
EQUITY			1,024,000
LOAN			2,400,000
III PRODUCTION COST	**NUMBER**	**UNIT COST**	
RAW MATERIALS			
steel profiles, rods	270 t	180 $/t	48,600
steel sheets	210 t	165 $/t	34,650
pig iron	1730 t	140 $/t	242,200
steel scrap	430 t	25 $/t	10,750
aluminium ingots	55 t	500 $/t	27,500
varnish, putties, fillers	3 t	20.000 $/t	60,000
purchased parts	10 % of	sales value	300,000
packaging material	2 % of	sales value	60,000
coke	432 t	80 $/t	34,560
			818,260
LABOUR			
manager (expatriate)	1	14,400	
assistant manager	1	3,600	
office supervisor	1	2,400	
clerk, bookkeeper etc.	8	8,160	
foreman (expatriate)	5	42,000	255,060
foreman	5	9,000	
tool designer (expatriate)	2	16,800	
tool designer	2	3,600	
skilled labour	50	51,000	
semi- and unskilled labour	195	102,300	
watchman, cleaner	5	1,800	

ELECTRICITY AND WATER		
connect load 800 kW, load factor 0,25		49,684
water abt. 30.000 m3 p. a. for general purposes		7,500
		57,184
SPARE PARTS, MAINTENANCE ETC.		
spare parts	24,000	
lubricants, hand and cutting tools	18,000	
cleaning material	900	42,900
ADMINISTRATIVE COST		
3 % of annual turnover		90,000
DEPRECIATION		
10 % p. a. on machinery	240,000	
5 % p. a. on buildings	13.500	253,500
INTEREST ON LOAN		
8 % p. a.		192.000
TOTAL PRODUCTION COST		1,708.904
SALES RECEIPTS		3,000,000
GROSS PROFIT		1,291,096

IV CASH FLOW	1ST YEAR	3RD YEAR
SALES RECEIPTS	1,800,000	3,000,000
EXPENSES		
LABOUR	255,060	255,060
RAW MATERIAL	490,956	818,260
OTHER EXPENSES	114,350	190,584
TAXES	180,000	300,000
CASH AVAILABLE TO SERVICE	759,634	1,436,096
CAPITAL		
SERVICE OF LOAN		
INTEREST	192,000	192,000
INSTALMENTS		400,000
CASH SURPLUS/DEFICIT	567,634	844,096

REMARKS:

Profitability: 1st year $\frac{314,134}{3,424,000} \times 100 = 9.2\ \%$

3rd year $\frac{590,596}{3,424,000} \times 100 = 17.3\ \%$

Capital-Labour-Ratio: 9.724 US$ per capita

MACHINERY AND EQUIPMENT

Item	No.	Description	Unit Cost US $	Total Cost US $
A. Mechanical Workshop				
lathe	15	4', 3 HP	3,500	52,500
dito	10	6', 6 HP	8,000	80,000
dito	3	10', 10 HP	12,000	36,000
turret lathe	10	2" spindle, 10 HP	13,000	130,000
dito	10	1" spindle, 5 HP	11,000	110,000
leadscrew making machine	1	5 HP	14,000	14,000
shaper	3	12" stroke, 2 HP	4,000	12,000
dito	3	18" stroke, 3 HP	6,000	18,000
planing machine	3	10" stroke, 6 HP	20,000	60,000
horizontal milling machine	5	4' table length	14,000	70,000
dividing head for horizontal milling machine	5		700	3,500
boring machine	2	horizontal, 10 HP	50,000	100,000
surface grinding machine for grinding guideways,	1	planer type, 10' stroke, 10 HP	70,000	70,000
gear generating m/c	1	5 HP	60,000	60,000
bevel gear cutting machine	1	2 HP	10,000	10,000
gear grinding m/c	1	3 HP	50,000	50,000
grinding post	6	3 HP	250	1,500
electric hand tool for chipping	10	1/5 HP	100	1,000
electric hand tool for fettling	10	1/5 HP	100	1,000
electric hand tool for scraping	5	1/5 HP	140	700
drilling machine, pillar type	10	1/2", 1/5 HP	500	5,000
dito	10	3/4", 1/2 HP	800	8,000
dito	10	1", 1 HP	1,200	12,000
radial drilling machine	2	1", 3 HP	13,000	26,000
dito	1	3", 6 HP	30,000	30,000
electric hand drilling machine	10	1/2", 1/10 HP	100	1,000
dito	10	3/4", 1/5 HP	200	2,000
engraving machine	2	2 HP	12,000	24,000
welding generator	2	2 HP	2,500	5,000
welding set	2		600	1,200
straight plate for marking	1	8' x 8'	8,000	8,000
slotting machine	2	3 HP	6,000	12,000
hand spindle press	1	2 t	500	500
sheet metal shear, hand operated	1		200	200
straight plate for sheet metal work	1	6' x 6'	7,000	7,000
				1,022,100

MACHINERY AND EQUIPMENT

Item	No.	Description	Unit Cost US $	Total Cost US $
				1,022,100
sheet metal bending machine	1	6' x 6'	7,000	7,000
forging furnace(el.)	1	4 kW	1,500	1,500
forging equipment			1,500	1,500
misc.			20,000	20,000
B. Tool Room				
universal tool and cutter grind. m/c	1	2 HP	15,000	15,000
surface grind. m/c	2	4' table length	13,000	26,000
cylindrical grinding machine	2	3' betw. centres, 6 HP	17,000	34,000
radial drilling m/c	1	1", 3 HP	12,000	12,000
pillar drilling m/c all geared	1	1", 2 HP	2,500	2,500
table drilling m/c	3	1/2", 1/4 HP	150	450
boring m/c, vertical coordinates	1	10 HP	60,000	60,000
univ. precision lathe	2	6', 6 HP	13,000	26,000
univ. mill. m/c, precision w.attachm.	1	6 HP	20,000	20,000
shaping machine	1	18" stroke	6,000	6,000
surface plate	2	2' x 2'	400	800
vise	10		60	600
misc. hand tools			5,000	5,000
C. Fitting Shop				
electric hand drilling machine	5	1/2", 1/10 HP	100	500
dito	5	3/4", 1/5 HP	200	1,000
surface plate	2	2' x 2'	700	1,400
hand tools (screwdriver, wrench, chisel, file, hammer, punch etc.)			2,400	2,400
misc. tools				
drilling machine table type	5	1/2", 1/4 HP	150	750
D. Heat Treament Shop				
electric furnace for hardening	1	3 kW	8,000	8,000
electric furnace for annealing	1	2 kW	8,000	8,000
gas hardening machine for gears	1		40,000	40,000
gas hardening machine for shafts	1		20,000	20,000
				1,341,000

MACHINERY AND EQUIPMENT

Item	No.	Description	Unit Cost US $	Total Cost US $
				1,341,000
salt bath furnace	1	6 kW	6,000	6,000
quenching basin	2		1,500	3,000
additional machinery and equipment			14,000	14,000
E. Electroplating Shop				
chromium plating tank	1		1,300	1,300
cadmium plating tank	1		1,300	1,300
pickling tank	1	with filter	1,000	1,000
rinsing tank for tri-chlor-ethane	1		1,000	1,000
copper plating tank	1		1,300	1,300
water rins. tank	1		300	300
sandblasting equipm.		3 HP	3,500	3,500
DC generator	1	2 kW	600	600
exhaust fan unit	1	10 HP	1,000	1,000
polishing post	3	3 HP	300	900
polishing drum	1	1/2 HP	400	400
F. Painting Shop				
air compressor	1	3 HP	700	700
spray gun	4		75	300
exhaust fan unit	1	10 HP	2,000	2,000
drying chamber	1	4 kW	8,000	8,000
G. Foundry				
cupola, incl.blower, wind gauge, feeder	2	36" Ø	17,000	34,000
seasoning kiln for casting	2	4 HP	8,000	16,000
sand mixing m/c	1	5 HP	8,000	8,000
core making m/c	1	5 HP	10,000	10,000
sand whirling m/c	1	6 HP	7,000	7,000
weighing machine	1		3,500	3,500
laboratory equipm.			7,300	7,300
travelling crane	1	10 HP	35,000	35,000
H. Pattern Shop				
band saw	1	3 HP	600	600
circular saw (wood)	1	4 HP	1,000	1,000
planing m/c (wood)	1	6 HP	2,000	2,000
milling machine	1	3 HP	1,300	1,300
exhaust fan	1	6 HP	2,000	2,000
				1,515,300

MACHINERY AND EQUIPMENT

Item	No.	Description	Unit Cost US $	Total Cost US $
				1,515,300
air compressor, spray gun		3 HP	700	700
joiner bench	3	4 HP	300	900
I. Packaging Shop				
band saw	1	3 HP	600	600
circular saw	1	4 HP	1,000	1,000
K. Cutting Tools				
milling cutter, turning lathe tool, planer chisel, spiral drill, grinding wheel, tools for boring m/c etc.				200,000
L. Transportation Equipment				
truck	2	3.5 t	10,000	20,000
sedan car	2		2,000	4,000
conveyor belt for coal bins	1		1,000	1,000
trolley for handling ladles in foundry	1		11,000	11,000
M. Electric Apparatus & Fixtures				
airconditioner f. vertical boring m/c	1	18,000 BTU	700	700
airconditioner for office	9		700	6,300
fan f. workshop etc.	150		100	15,000
lighting & power installation			30,000	30,000
N. Office Equipment				
typewriter, calculating & duplicating m/c, desks, tables, chairs, shelves and racks; drawing tables, blue printing m/c etc.			50,000	50,000
				1,856,500

MACHINERY AND EQUIPMENT

Item	No.	Description	Unit Cost US $	Total Cost US $
				1,856,500
O. Measuring Tools				
caliper, micrometer, angle protractor, thread gauge, hardness tester, angle, rule, slip gauge, taper mandrel etc.				3,500
P. Equipment for Workshops				
desks, shelves, cupboards, trolleys etc.				140,000
				2,000,000

4.5 Planing and shaping machines

1. Product description
Planing and shaping machines in several types for different table lengths and strokes with change-gear box for four different speeds and electro drive.

2. Use
For planing and shaping of material in production units and workshops of the metal processing industry.

3. Market
Tool machines of the type mentioned are mainly used in larger production units of the metal processing industry, as e. g. in the field of machine and automobile construction (pumps, motors etc.), in light engineering (office machines, tool construction etc.) and in larger repair workshops (railway repair works, car repair works etc.).

The demand in the East African market has hitherto been covered by imports. Through industrialization demand is already significant and will continue to increase with the process of further industrialization.

4. Skill requirements
A high degree of accuracy is necessary for the production of tool machinery. This fact calls for high-grade machinery as well as for employment of skilled labour. Foreign managerial staff will principly be required for the management for a period of 10 years, in order to guarantee a thorough training of the counterparts.

5. Raw material and operations

The raw material required for the manufacture of tool machines (shaping and planing machines) have nearly all to be imported as well as a larger number of component parts and finished parts. The scrap iron required for the foundry can be obtained from local resources.

The production flow is manifold and comprises several processes, such as forging, drawing, milling, drilling, annealing, assembling and others. To guarantee a high degree of accuracy an extensive final control as well as several intermediate controls are necessary in the flow of production.

6. Automation and mechanization

To achieve high accuracy in the manufacture of the individual components for the machines, mechanization and automation of the production flow will be necessary.

7. Future expansion of operations

On account of the extensive machinery at the disposal of the proposed factory high flexibility within the production programme is possible. Owing to the special type of the machinery it is not advisable to take up manufacture of other products of the metal processing industry but to restrict expansion to the proposed production programme.

8. Capacity and sales price

Annual production of the factory is calculated at 520 units in a 1-shift operation. Thus expansion of capacity is possible in case of need. Sales prices are based on European average market prices under consideration of a certain deduction for a decrease in quality.

Annual production and sales prices have been fixed as follows:

200 pieces	shaping machines	12"	US $ 4,500
120 pieces	shaping machines	18"	US $ 5,500
100 pieces	planing machines	6'	US $ 8,000
60 pieces	planing machines	10'	US $ 10,000
40 pieces	planing machines	15'	US $ 17,000

CAPACITY 320 shaping m/c and 200 planing m/c p.a. 1-shift operation			US $
I CAPITAL REQUIREMENTS			
LAND 3 acres			6,150
BUILDING 8000 m^2			536,000
MACHINERY AND EQUIPMENT			2,253,700
(see list of machinery and equipment			
+ 20 %			450,074
WORKING CAPITAL 25 % of annual turnover			910,000
TOTAL CAPITAL			4,155,924
OF WHICH LOCAL			997,150
II FINANCING			
EQUITY			1,452,150
LOAN			2,703,774
III PRODUCTION COST	NUMBER	UNIT COST	
RAW MATERIALS			
steel profiles, rods	180 t	180 $/t	32,400
pig iron	1000 t	140 $/t	140,000
steel scrap	40 t	25 $/t	1,000
sheet metal	150 t	165 $/t	24,750
aluminium ingots	40 t	550 $/t	22,000
varnish, putties etc.	5 t	2000 $/t	10,000
purchased parts	10 % of	sales value	364,000
packaging material	2 % of	sales value	72,800
coke	200 t	80 $/t	16,000
			682,950
LABOUR			
manager (expatriate)	1	14,400	
assistant manager	1	3,600	
foremen (expatriate)	5	42,000	
assistant foremen	5	9,000	
tool designers (exp.)	2	16,800	
asst. tool designers	2	3,600	
office supervisor	1	1,800	
office clerks	8	8,160	
bookkeeper etc.	5	1,800	
skilled labour	50	51,000	
semi-skilled labour	220	118,800	
unskilled labour	30	12,600	283,560

ELECTRICITY AND WATER connect load 900 KVA, consumpt.p.a. 528000 kWh water 30.000 m^3		50,460 7,500 57,960
SPARE PARTS, MAINTENANCE ETC.		
lubricants and hand tools	5,000	
cleaning material	2,000	
cutting tools	20,000	
repair parts	25,920	52,920
ADMINISTRATIVE COST 3 % of annual turnover		109,200
DEPRECIATION		
10 % p.a. on m/c	270,378	
5 % p.a. on buildings	26,800	297,178
INTEREST ON LOAN 8 % p.a.		216,302
TOTAL PRODUCTION COST		1,700,070
SALES RECEIPTS		3,640,000
GROSS PROFIT		1,939,930

IV CASH FLOW	1st Year	3rd Year
SALES RECEIPTS	2,184,000	3,640,000
EXPENSES		
LABOUR	283,560	283,560
RAW MATERIAL	409,770	682,950
OTHER EXPENSES	132,048	220,080
TAXES	218,400	364,000
CASH AVAILABLE TO SERVICE	1,140,222	2,089,410
CAPITAL		
SERVICE OF LOAN		
INTEREST	216,302	216,302
INSTALMENTS	-	450,074
CASH SURPLUS/DEFICIT	923,920	1,423,034

REMARKS:

Profitability
1st year $\frac{626,742}{4,155,924} \times 100 = 15,1\ \%$

3rd year $\frac{1,125,856}{4,155,924} \times 100 = 27,1\ \%$

Capital labour ratio 9,836 $ per capita

MACHINERY AND EQUIPMENT

Item	No.	Description	Unit Cost US $	Total Cost US $
A. Mechanical workshop				
lathe	10	4', 3 HP	3,500	35,000
dito	15	6', 6 HP	8,000	120,000
dito	6	10'	12,000	72,000
turret lathe	10	3" spindle internal, 12 HP	16,000	160,000
dito	10	1" spindle internal, 10 HP	12,000	120,000
leadscrew making machine	1	5 HP	14,000	14,000
shaping machine	6	18" stroke	6,000	36,000
planing machine	3	6' stroke, 6 HP	20,000	60,000
dito	3	15' stroke 10 HP	30,000	90,000
dito	1	20' stroke 15 HP	40,000	40,000
horizontal milling machine	5	table 4'	14,000	70,000
dividing head for horizontal milling machine	5		700	3,500
boring machine, horizontal	2	10 HP	50,000	100,000
surface grinding machine for grinding guide ways, plane type	1	6' stroke, 10 HP	50,000	50,000
dito	1	15' stroke, 12 HP	80,000	80,000
dito	1	20' stroke, 15 HP	100,000	100,000
gear hobbing machine	1	5 HP	60,000	60,000
bevel gear cutting machine	1	2 HP	10,000	10,000
gear grinding machine	1	3 HP	50,000	50,000
grinding post	6	6 HP	250	1,500
electric hand tools for chipp.	10	1/4 HP	100	1,000
dito for fettling	5	1/2 HP	100	500
dito for scraping	5	1/4 HP	140	700
drilling machine pillar type	10	1/2", 1/4 HP	500	5,000
dito	10	3/4", 1/2 HP	800	8,000
dito	10	1", 1 HP	1,200	12,000
radial drilling mach.	2	1", 3 HP	13,000	26,000
dito	2	3", 10 HP	30,000	60,000
engraving machine	2	2 HP	12,000	24,000
welding generator	2	2 Kw.	2,500	5,000
gas welding set	2		600	1,200
straight plate for marking	1	20' x 8'	13,000	13,000
slotting machine	1	3 HP	6,000	6,000
hand spindle press	1	2 t	600	600

MACHINERY AND EQUIPMENT

Item	No.	Description	Unit Cost US $	Total Cost US $
sheet metal shear hand operated	1		200	200
straight plate for sheet metal work	1	6' x 6'	7,000	7,000
friction spindle press for deep drawing of steel metal covers	1	75 t, 8 HP	17,000	17,000
sheet metal bending machine, hand operated	1		500	500
forging furnace, el.	1	4 Kw	1,600	1,600
forging equipment			1,600	1,600
different attachments for lathes and milling machines			15,000	15,000
B. Tool room				
universal tool & cutter grinding machine	1	2 HP	15,000	15,000
surface grinding machine	2	4' table length 5 HP	13,000	26,000
cylindrical grinding machine	1	3' between centres 6 HP	17,000	17,000
dito	1	6', 6 HP	30,000	30,000
radial drilling machine	1	2", 6 HP	27,000	27,000
pillar drilling machine, all geared	1	1", 2 HP	2,500	2,500
table drilling machine	3	1/2", 1/4 HP	150	450
boring machine, vertical coordinates	1	10 HP	60,000	60,000
lathes, universal, precision	2	6', 6 HP	13,000	26,000
milling machine, universal precision with all attachments	1	6 HP	20,000	20,000
shaping machine	1	18" stroke, 3 HP	6,000	6,000
surface plate	2	2' x 2'	700	1,400
different hand tools vises	10		60	600

MACHINERY AND EQUIPMENT

Item	No.	Description	Unit Cost US $	Total Cost US $
C. Fitting shop				
el. hand drilling m/c	5	1/2", 1/10 HP	100	500
dito	5	3/4", 1/4 HP	200	1,000
surface plate	2	2' x 2'	700	1,400
screw driver	20 sets			
wrenches	20	sets		
open mouth				
dito, ring type	20	sets		
dito, box type	20	sets		
dito, inner hexagonal	20	sets		4,700
chisels	20	sets		
punches	20	sets		
centre punches	20	sets		
hammers	20	sets		
spiral drills	30	sets		
files	20	sets		
vises	15			
miscellaneous tools				
drilling machine, pillar type	5	1", 2 HP	1,000	5,000
dito, table type	5	1/2", 1/4 HP	150	750
D. Heat treatment shop				
e. furnace for hard.	1	3 Kw	8,000	8,000
el. furnace for anneal.	1	2 Kw	8,000	8,000
gas hardening machine for gears	1		40,000	40,000
gas hardening machine for surface hardening of shafts	1		20,000	20,000
salt bath furnace	1	6 Kw	6,000	6,000
quenching basins	2		1,500	3,000
other equipment			10,000	10,000
E. Electroplating shop				
chromium plating tank with filter etc.	1		1,300	1,300
cadmium plating tank with filter etc.	1		1,300	1,300

MACHINERY AND EQUIPMENT

Item	No.	Description	Unit Cost US $	Total Cost US $
pickling tank with filt.	1		1,000	1,000
rinsing tank for tri-chlorethane	1		1,000	1,000
rinsing tank for water	1		300	300
copper plating tank	1		1,300	1,300
sand blasting machine	1	3 HP	3,500	3,500
DC-generator	1	2 Kw	600	600
exhaust fan unit	1	10 HP	1,000	1,000
polishing post	3	3 HP	300	900
polishing drum	1	1/2 HP	400	400
F. Painting shop				
air compressor	1	3 HP	700	700
spray guns	4		75	300
exhaust fan unit	1	10 HP	2,000	2,000
drying chamber	1	4 Kw	8,000	8,000
G. Foundry				
cupola incl. el. blower, wind gauge, feeder	3	10 HP	17,000	51,000
seasoning kiln (large) for casting	2	4 HP	8,000	16,000
sand mixing m/c	1	5 HP	8,000	8,000
core making m/c	1	5 HP	10,000	10,000
sand whirling m/c for cleaning castings	1	6 HP	7,000	7,000
weighing m/c	1		3,500	3,500
foundry laboratory				20,000
travelling crane unit	1	10 HP	35,000	35,000
H. Pattern shop				
band saw	1	3 HP	600	600
circular saw	1	4 HP	1,000	1,000
wood planing m/c	1	6 HP	2,000	2,000
wood milling m/c	1	3 HP	1,300	1,300
exhaust fan unit	1	6 HP	2,000	2,000
air compressor and spray gun	1	3 HP	700	700
joiner bench	3		300	900
I. Packaging shop				
band saw	1	3 HP	600	600
circular saw	2	4 HP	1,000	2,000

MACHINERY AND EQUIPMENT

Item	No.	Description	Unit Cost US $	Total Cost US $
K. Measuring tools				
vernier calipers	20	6"		
dito	2	12"		
micrometer, outside	5	2"		
dito	5	4"		
dito, inside	2	2"		
dito	2	4"		
angle protractors	2			
thread gauges	5			
thread micrometers	2			3,500
gear calipers	2			
hardness tester, station.	1			
dito, portable	5			
filter gauges	5			
wire gauges	5			
dial indicators	10			
dito, for inside gauging	10			
angles, rules, slip gaug., etc.				
L. Office equipment				
typewriters, duplicating m/c calculating m/c, tables, chairs, typewriter desks, shelves, lamps, etc.				25,000
M. El. installation				
air conditioner for vert. boring m/c in tool room	1	18.000 BTU		700
airconditioners for off.	7		700	4,900
fans for offices stores, workshop lighting and power inst. and fixtures				33,200

MACHINERY AND EQUIPMENT

Item	No.	Description	Unit Cost US $	Total Cost US $
N. Transport. equipment				
trucks	3	3,5 t	8,000	24,000
passenger cars	2	(VW)	2,000	4,000
conveyor belt for coal bins	1		1,000	1,000
el. trolleys for handl. ladles in foundry	2		3,000	6,000
O. Cutting tools				
milling m/c, cutters of diff. sizes chisels for turning lathes of diff. sizes chisels for shapers and planing m/c spiral drills grinding wheels cutting tools for boring m/c other cutting tools				145,000
				2,253,700

4.6 Milling and Drilling Machines

1. Product description
Milling machines of three different sizes (table length 2', 3' and 4'). Drilling machines as pillar type (3 types) or as table type (1 type).

2. Use
For machining of metallic material

3. Market
Milling and drilling machines as mentioned above are proposed for use in larger production units of the metal processing industry as well as in smaller workshop-like units. Owing to the larger number of smaller units, demand for the smaller types of these machines is particularly high. In the course of increasing industrialization within the East African subregion demand for larger types will also increase in future. The market has hitherto been covered by imports.

4. Skill requirements
In view of the fact that only good quality products can compete with imported products, it is necessary to employ an experienced managerial staff, which is not only in a position to guarantee good organization and management of the enterprise in question but which is also capable of training skilled workers.

5. Raw material and operations
The raw material which is required for manufacture of the above-mentioned machines has to be imported (with the exception of scrap iron) as well as ball bearings, electric motors, cable etc.

Production comprises several working processes, such as casting of cases, posts, beds etc. as well as the usual processes of metal (forging, drawing, cutting, assembling, controlling, and packaging).

6. Automation and mechanization
For the purpose of achieving an unvarying quality, low tolerances and an economic work flow, it is necessary to automize and mechanize certain working processes.

7. Future expansion of operations
On account of the special type of machinery it is advisable to adhere to the proposed production programme. The manufacture of new types of the existing products can, however, be taken up in case of need (e.g. hand-operated drilling machines).

8. Capacity and sales prices
Production is based on an annual output of 400 milling machines, 1000 pillar-type drilling machines as well as 500 table-type drilling machines in case of a 1-shift operation. An increase in production can be achieved in case of applying and expanding the unit construction system for several types, by applying the same finished parts for several products or by introducing a 2-shift operation.

Sales prices correspond to the European prices with medium production quality taken into consideration.

CAPACITY milling and drilling m/c 1900 units p.a. 1-shift operation			US $
I CAPITAL REQUIREMENTS			
LAND	2 acres		4,000
BUILDING	4000 m^2		270,000
MACHINERY AND EQUIPMENT			
(see list of machinery and equipment)			2,000,000
+ 20 %			400,000
WORKING CAPITAL	25 % of annual turnover		750,000
TOTAL CAPITAL			3,424,000
OF WHICH LOCAL			649,000
II FINANCING			
EQUITY			1,024,000
LOAN			2,400,000
III PRODUCTION COST	NUMBER	UNIT COST	
RAW MATERIALS			
steel profiles	270 t	180 $/t	48,600
pig iron	1,730 t	140 $/t	242,200
steel scrap	430 t	25 $/t	10,750
steel sheets	210 t	165 $/t	34,650
aluminium ingots	55 t	500 $/t	27,500
varnish, putties, fillers	3 t	20,000 $/t	60,000
purchased parts	10 %	of sales value	300,000
packaging material	2 %	of sales value	
coke	430 t	80 $/t	34,400
			818,100
LABOUR			
manager (expatriate)	1	14,400	
assistant manager	1	3,600	
Office supervisor	1	2,400	
clerk, bookkeeper etc.	8	8,160	
foreman (expatriate)	5	42,000	
foreman	5	9,000	257,160
tool designer (expatr.)	2	16,800	
tool designer	2	3,600	
skilled labour	50	51,000	
semi-skilled labour	170	91,800	
unskilled labour	30	12,600	
watchman, cleaner	5	1,800	

ELECTRICITY AND WATER		
connect load 800 kW, load factor 0,25		49,684
water abt. 30.000 m3		7,500
		57,184
SPARE PARTS, MAINTENANCE ETC.		
spare parts 1 % of machinery and equipment	24,000	
lubricants and hand tools	3,000	
cutting tools	16,000	
cleaning material	1,000	44,000
ADMINISTRATIVE COST		
3 % of annual turnover		90,000
DEPRECIATION		
10 % p.a. on machinery	240,000	
3 % p.a. on buildings	13,500	253,500
INTEREST ON LOAN		
8 % p.a.		192,000
TOTAL PRODUCTION COST		1,711,944
SALES RECEIPTS		3,000,000
GROSS PROFIT		1,288,056

IV CASH FLOW	1st Year	3rd Year
SALES RECEIPTS	1,800,000	3,000,000
EXPENSES		
LABOUR	257,160	257,160
RAW MATERIAL	490,860	818,100
OTHER EXPENSES	114,710	191,184
TAXES	180,000	300,000
CASH AVAILABLE TO SERVICE CAPITAL	757,270	1,433,556
SERVICE OF LOAN		
INTEREST	192,000	192,000
INSTALMENTS		400,000
CASH SURPLUS/DEFICIT	565,270	841,556

REMARKS:

Profitability 1st year $\frac{311,770}{3,424,000} \times 100 = 9,1\ \%$

3rd year $\frac{588,056}{3,424,000} \times 100 = 17,2\ \%$

Capital/Labour Ratio 9,550 US$ per capita

ANNUAL PRODUCTION

Milling machine horizontal, all geared, individual drive

		sales price per unit US$	total sales price US$
200 pieces	table length 2'	3,000	6000000
100 pieces	table length 3'	6,000	600,000
100 pieces	table length 4'	10,000	1,000,000

Drilling machine pillar type individual drive and belt driven

500 pieces	size 1/2"	400	200,000
300 pieces	size 3/4"	1,000	300,000
200 pieces	size 1"	1,000	200,000

Drilling machine table type

500 pieces	size 1/2"	200	100,000
1900 pieces			US$ 3,000,000

MACHINERY AND EQUIPMENT

Item	No.	Description	Unit Cost US $	Total Cost US $
A. Mechanical Workshop				
lathe	15	4', 3 HP	3,500	52,500
lathe	10	6', 6 HP	8,000	80,000
lathe	3	10', 10 HP	12,000	36,000
turret lathe	10	2" spindle, 10 HP	13,000	130,000
turret lathe	10	1" spindle, 5 HP	11,000	110,000
leadscrew making machine	1	5 HP	14,000	14,000
shaper	3	12" stroke, 2 HP	4,000	12,000
shaper	3	18" stroke, 3 HP	6,000	18,000
planing machine	3	10' stroke, 6 HP	20,000	60,000
horizontal milling machine	5	4' table length	14,000	70,000
dividing head for horizontal milling machine	5		700	3,500
boring machine	2	horizontal, 10 HP	50,000	100,000
surface grinding machine for grinding guideways, planer type	1	10' stroke, 10 HP	70,000	70,000
gear generating machine	1	5 HP	60,000	60,000
bevel gear cutt. machine	1	2 HP	10,000	10,000
gear grinding machine	1	3 HP	50,000	50,000
grinding posts	6	3 HP	250	1,500
electric hand tool for chipping	10	1/5 HP	100	1,000
electric hand tool for fettl.	10	1/5 HP	100	1,000
electric hand tool for scrap.	5	1/5 HP	140	700
drilling machine, pillar type	10	1/2", 1/5 HP	500	5,000
drilling machine, pillar type	10	3/4", 1/2 HP	800	8,000
drilling machine, pillar type	10	1", 1 HP	1,200	12,000
radial drilling machine	2	1", 3 HP	13,000	26,000
radial drilling machine	1	3", 6 HP	30,000	30,000
electric hand drilling machine	10	1/2", 1/10 HP	100	1,000
electric hand drilling machine	10	3/4", 1/5 HP	200	2,000

MACHINERY AND EQUIPMENT

Item	No.	Description	Unit Cost US $	Total Cost US $
engraving machine	2	2 HP	12,000	24,000
welding generators	2	2 HP	2,500	5,000
welding sets	2		600	1,200
straight plate for mark.	1	8' x 8'	8,000	8,000
slotting machine	2	3 HP	6,000	12,000
hand spindle press	1	2 t	500	500
sheet metal shear, hand op.	1		200	200
straight plate for sheet metal work	1	6' x 6'	7,000	7,000
sheet metal bending machine	1		500	500
forging furnace	1	4 Kw	1,500	1,500
electric forging equipment.				1,500
misc.				20,000
B. Tool Room				
universal tool and cutter grinding machine	1	2 HP	15,000	15,000
surface grinding machine	2	4' table length	13,000	26,000
cylindrical grinding machine	2	3' betw. centres 6 HP	17,000	34,000
radial drilling machine	1	1", 3 HP	12,000	12,000
pillar drilling machine all geared	1	1", 2 HP	2,500	2,500
table drilling machine	3	1/2", 1/4 HP	150	450
boring machine, vertical coordin.	1	10 HP	60,000	60,000
universal precision lathe	2	6', 6 HP	13,000	26,000
universal mill. machine precis. with attachm.	1	6 HP	20,000	20,000
shaping machine	1	18" stroke	6,000	6,000
surface plate	2	2' x 2'	400	800
vises	10		60	600
hand tools misc.			3,000	5,000

MACHINERY AND EQUIPMENT

Item	No.	Description	Unit Cost US $	Total Cost US $
C. Fitting Shop				
electric hand drilling machine	5	1/2", 1/10 HP	100	500
electric hand drilling machine	5	3/4", 1/5 HP	200	1,000
surface plate	2	2' x 2'	700	1,400
hand tools (screwdrivers, wrenches, chisels, files, hammers, punches etc.)				2,400
misc. tools				
drilling machine, pillar type	5	1", 2 HP	1,000	5,000
drilling machine, table type	5	1/2", 1/4 HP	150	750
D. Heat Treatment Shop				
electric furnace for hardening	1	3 kw	8,000	8,000
electric furnace for annealing	1	2 kw	8,000	8,000
gas hardening machine for gears	1		40,000	40,000
gas harding mach. for shafts	1		20,000	20,000
salt bath furnace	1	6 kw	6,000	6,000
quenching basin	2		1,500	3,000
additional machinery and equipment				14,000
E. Electroplating shop				
chromium plating tank	1		1,300	1,300
cadmium plating tank	1		1,300	1,300
pickling tank with filter	1		1,000	1,000
rinsing tank for tri-chlorethane	1		1,000	1,000
copper plating tank	1		1,300	1,300
water rinsing tank	1		300	300
sandblasting equipment		3 HP	3,500	3,500

MACHINERY AND EQUIPMENT

Item	No.	Description	Unit Cost US $	Total Cost US $
DC generator	1	2 kw	600	600
exhaust fan unit	1	10 HP	1,000	1,000
polishing post	3	3 HP	300	900
polishing drum	1	1/2 HP	400	400
F. Painting Shop				
air compressor	1	3 HP	700	700
spray gun	4		75	300
exhaust fan unit	1	10 HP	2,000	2,000
drying chamber	1	4 kw	8,000	8,000
G. Foundry				
cupola, incl. blower, wind gauge, feeder	2	36" Ø	17,000	34,000
seasoning kiln for cast.	2	4 HP	8,000	16,000
sand mixing mach.	1	5 HP	8,000	8,000
core making mach.	1	5 HP	10,000	10,000
sand whirling machine	1	6 HP	7,000	7,000
weighing machine	1		3,500	3,500
laboratory equipm.				7,300
travelling crane	1	10 HP	35,000	35,000
H. Pattern Shop				
band saw	1	3 HP	600	600
circular saw (wood)	1	4 HP	1,000	1,000
planing machine (wood)	1	6 HP	2,000	2,000
milling machine	1	3 HP	1,300	1,300
exhaust fan	1	6 HP	2,000	2,000
air compressor, spray gun	1	3 HP	700	700
joiner bench	3		300	900
I. Packaging Shop				
band saw	1	3 HP	600	600
circular saw	1	4 HP	1,000	1,000
K. Cutting Tools				
milling cutters turning lathe tool planer chisels spiral drills grinding wheels tools for boring machines others				200,000

MACHINERY AND EQUIPMENT

Item	No.	Description	Unit Cost US $	Total Cost US $
L. Transport, Equipment				
truck	2	3.5 t	10,000	20,000
sedan car	2		2,000	4,000
conveyor belt for coal bins	1		1,000	1,000
trolley for handling ladles in foundry	1		11,000	11,000
M. Electric Apparatus				
airconditioner for vert. boring machine	1	18,000 BTU	700	700
airconditioner for office	9		700	6,300
fan for workshop etc.	150		100	15,000
lighting and power inst.				30,000
N. Office Equipment				
typewriters, calculating and duplicating machines, desks, tables, chairs, shelves and racks drawing tables, blue printing machine etc.				50,000
O. Measuring Tools				
calipers, micrometers, angle protractors, thread gauges, hardness testers, angles, rules, slip gauge taper mandrels etc.				3,500
P. Equipment for workshops				
desks, shelves, cupboards, trolleys etc.				140,000
				2,000,000

4.7 Wood and sheet metal working machines

1. Product description
Band saws and planing machines for wood working, sheet metal bending machines and metal shears, grinding posts and metal saws.

2. Use
For wood and metal working, especially for sheet metal working;

3. Market
The wood working machines (band saws and planing machines) are mainly used for cabinet-making and building carpentry. Moreover they are used in pattern shops, in shops for vehicle construction (agricultural vehicles, car bodies) ship building and packaging departments of large industrial units.

The above mentioned metal working machines are mainly used in sheet metal workshops (e. g. for body-work construction) and in industrial units for sheet metal working (e. g. cans, drums, casks, household appliances, stoves, fans etc.). Grinding posts are used in all workshops for sheet metal working.

4. Skill requirements
Even if in contrast to other machine-tools (lathes, milling machines etc.) the working tolerances of the proposed machines can be higher and even if the machines are of a simpler nature, it is advisable to employ experienced foreign personnel for the management, which will guarantee sound training of the local staff as well as good organization within the factory.

5. Raw material and operations
The raw materials have nearly all to be imported with the exception of steel scrap (local supplies) as well as several structural parts and single parts (ball bearings, saw blades, grinding wheels and electric fixtures).

The individual production processes are casting, milling, drilling, hardening, grinding, assembling, painting, and others.

6. Automation and mechanization
In order to achieve an economic production process a high degree of mechanization of the work flow will be necessary. Automation will be restricted to a minimum.

7. Future expansion of operations
The whole equipment of the factory and its technical structure will allow for high flexibility within the production programme so that an adaptation to the respective market situations will always be possible. It should, however, be avoided to take up production of completely new items mainly for organizational and economic reasons.

8. Capacity and sales price
The factory is calculated at an annual consumption of 300 t of steel in case of a 1-shift operation. By introducing a multi-shift operation and automation the output could be increased, so that adaptation to the market situation might be possible at any time.

Sales prices are based on European market prices for medium quality.

CAPACITY	wood band saws, wood planers, steel metal machines, jig saw etc, 2900 u.p.a. 1-shift-op		US $
I CAPITAL REQUIREMENTS			
LAND	2 acres		4,000
BUILDING	4000 m2		270,000
MACHINERY AND EQUIPMENT			2,000,000
(see list of machinery and equipment)			
+ 20 %			400,000
WORKING CAPITAL 25 % of annual turnover			750,000
TOTAL CAPITAL			3,424,000
OF WHICH LOCAL			649,000
II FINANCING			
EQUITY			1,024,000
LOAN			2,400,000
III PRODUCTION COST	NUMBER	UNIT COST	
RAW MATERIALS			
steel profiles	270 t	180 $/t	48,600
pig iron	1730 t	140 $/t	242,200
steel scrap	430 t	25 $/t	10,750
steel sheets	210 t	165 $/t	34,650
aluminium ingots	55 t	500 $/t	27,500
varnish, putties, fillers	3 t	20,000 $/t	60,000
purchased parts	10 % of sales value		300,000
packaging material	2 % of sales value		60,000
coke	430 t	80 $/t	34,400
			818,100
LABOUR			
manager (expatriate)	1	14,400	
assistant manager	1	3,600	
office supervisor	1	2,400	
clerk, bookkeeper etc.	8	8,160	
foreman (expatr.)	5	42,000	
foreman	5	9,000	257,160
tool designer (expatr.)	2	16,800	
tool designer	2	3,600	
skilled labour	50	51,000	
semi- and unskilled labour	200	104,400	
watchman, cleaner	5	1,800	

ELECTRICITY AND WATER		
connect load 800 kW, load factor 0,25	33,791	
water 30.000 m3	7,500	41,291
SPARE PARTS, MAINTENANCE ETC.		
spare parts 1 % of m/c and equipment	24,000	
lubricants and hand tools	3,000	
cutting tools and cleaning material	17,000	44,000
ADMINISTRATIVE COST		
3 % of annual turnover		90,000
DEPRECIATION		
10 % p. a. on machinery	240,000	
5 % p. a. on buildings	13,500	253,500
INTEREST ON LOAN		
8 % p. a.		192,000
TOTAL PRODUCTION COST		1,696,051
SALES RECEIPTS		3,000,000
GROSS PROFIT		1,303,949

IV CASH FLOW	1ST YEAR	3RD YEAR
SALES RECEIPTS	1,800,000	3.000,000
EXPENSES		
LABOUR	257,160	257,160
RAW MATERIAL	490,860	818,100
OTHER EXPENSES	105,175	175,291
TAXES	180,000	300,000
CASH AVAILABLE TO SERVICE	766,805	1,449,449
CAPITAL		
SERVICE OF LOAN		
INTEREST	192,000	192,000
INSTALMENTS		400,000
CASH SURPLUS/DEFICIT	574,805	857,449

REMARKS:

Profitability: 1st year $\frac{321,305}{3,424,000} \times 100 = 9.4\ \%$

3rd year $\frac{603,949}{3,424,000} \times 100 = 17.6\ \%$

Capital/Labour Ratio 9.550 US$ per capita

ANNUAL PRODUCTION

Item	No.	Sales Price per Unit US$	Total Sales Price US$
bad saw for wood-working table size 2' x 2' table size 3' x 3'	 300 400	 1,200 2,000	 360,000 800,000
bending press for sheet metal	150	200	30,000
rolling machine for sheet metal hand operated	150	200	30,000
shearing machine for sheet metal hand operated	500	120	60,000
metal jig saw power driven	500	800	400,000
grinding post	600	200	120,000
wood planing machine	300	4,000	1,200,000
Total	2900		3,000,000

MACHINERY AND EQUIPMENT

Item	No.	Description	Unit Cost US $	Total Cost US $
A. Mechanical Workshop				
lathe	15	4', 3 HP	3,500	52,500
dito	10	6', 6 HP	8,000	80,000
dito	3	10', 10 HP	12,000	36,000
turret lathe	10	2" spindle, 10 HP	13,000	130,000
dito	10	1" spindle, 5 HP	11,000	110,000
leadscrew mak. m/c	1	5 HP	14,000	14,000
shaper	3	12" stroke, 2 HP	4,000	12,000
dito	3	18" stroke, 3 HP	6,000	18,000
planing machine	3	10' stroke, 6 HP	20,000	60,000
horizontal mill. m/c	5	4' table length	14,000	70,000
dividing head f. horizontal mill. m/c	5		700	3,500
boring machine	2	horizontal, 10 HP	50,000	100,000
surface grind. m/c f. grind. guideways	1	10' stroke, 10 HP	70,000	70,000
planer type gear generat. m/c	1	5 HP	60,000	60,000
bevel gear cutting machine	1	2 HP	10,000	10,000
gear grind. m/c	1	3 HP	50,000	50,000
grinding posts	6	3 HP	250	1,500
electric hand tool for chipping	10	1/5 HP	100	1,000
dito for fettling	10	1/5 HP	100	1,000
dito for scraping	5	1/5 HP	140	700
drilling machine pillar type	10	1/2", 1/5 HP	500	5,000
dito	10	3/4", 1/2 HP	800	8,000
dito	10	1", 1 HP	1,200	12,000
radial drilling machine	2	1", 3 HP	13,000	26,000
dito	1	3", 6 HP	30,000	30,000
electric hand drilling machine	10	1/2", 1/10 HP	100	1,000
dito	10	3/4", 1/5 HP	200	2,000
engraving machine	2	2 HP	12,000	24,000
welding generators	2	2 HP	2,500	5,000
welding sets	2		600	1,200
straight plate for marking	1	8' x 8'	8,000	8,000
slotting machine	2	3 HP	6,000	12,000
hand spindle press	1	2 t	500	500
sheet metal shear hand operated	1		200	200
straight plate for sheet metal work	1	6' x 6'	7,000	7,000
sheet met. bend. m/c	1		500	500
forging furnace	1	4 kW	1,500	1,500
forging equipment			1,500	1,500
misc.				20,000
				1,045,600

MACHINERY AND EQUIPMENT

Item	No.	Description	Unit Cost US $	Total Cost US $
				1,045,600
B. Tool Room				
universal tool & cutter grind. m/c	1	2 HP	15,000	15,000
surface grind. m/c	2	4' table length 6 HP	13,000	26,000
cylindrical grind. machine	2	3' betw. centres	17,000	34,000
radial drill. m/c	1	1", 3 HP	12,000	12,000
pillar drill. m/c all geared	1	1", 2 HP	2,500	2,500
table drill. m/c	3	1/2", 1/4 HP	150	450
boring machine vertical coordin.	1	10 HP	60,000	60,000
universal precision lathe	2	6', 6 HP	13,000	26,000
universal mill. m/c precision with attachment	1	6 HP	20,000	20,000
shaping machine	1	18" stroke	6,000	6,000
surface plate	2	2' x 2'	400	800
vises	10		60	600
hand tools misc.			3,000	5,000
C. Fitting Shop				
electric hand drilling machine	5	1/2", 1/10 HP	100	500
dito	5	3/4", 1/5 HP	200	1,000
surface plate	2	2' x 2'	700	1,400
hand tools (screw drivers, wrenches, chisels, files, hammers, punches and others)			2,400	2,400
drilling machine, pillar type	5	1", 2 HP	1,000	5,000
drilling machine, table type	5	1/2", 1/4 HP	150	750
D. Heat Treatment Shop				
electric furnace for hardening	1	3 kW	8,000	8,000
dito f. annealing	1	2 kW	8,000	8,000
gas hard. machine for gears	1		40,000	40,000
dito for shafts	1		20,000	20,000
salt bath furnace	1	6 kW	6,000	6,000
quenching basin	2		1,500	3,000
add. machinery and equipment				14,000
				1,364,000

MACHINERY AND EQUIPMENT

Item	No.	Description	Unit Cost US $	Total Cost US $
				1,364,000
E. Electroplating Shop				
chromium plating tank	1		1,300	1,300
cadmium plat.tank	1		1,300	1,300
pickl. tank w.filt.	1		1,000	1,000
rinsing tank for trichlorethane	1		1,000	1,000
copper plat.tank	1		1,300	1,300
water rins. tank	1		300	300
sandblasting equipm.		3 HP	3,500	3,500
DC generator	1	2 kW	600	600
exhaust fan unit	1	10 HP	1,000	1,000
polishing post	3	3 HP	300	900
polishing drum	1	1/2 HP	400	400
F. Painting Shop				
air compressor	1	3 HP	700	700
spray gun	4		75	300
exhaust fan unit	1	10 HP	2,000	2,000
drying chamber	1	4 kW	8,000	8,000
G. Foundry				
cupola,incl.blower wind gauge, feeder	2	36" Ø	17,000	34,000
seasoning kiln f. casting	2	4 HP	8,000	16,000
sand mix. machine	1	5 HP	8,000	8,000
core mak. machine	1	5 HP	10,000	10,000
sand whirl. m/c	1	6 HP	7,000	7,000
weighing machine	1		3,500	3,500
laboratory equipm.			7,300	7,300
travelling crane	1	10 HP	35,000	35,000
H. Pattern Shop				
band saw	1	3 HP	600	600
circular saw (wood)	1	4 HP	1,000	1,000
planing m/c(wood)	1	6 HP	2,000	2,000
milling machine	1	3 HP	1,300	1,300
exhaust fan	1	6 HP	2,000	2,000
air compressor,	1	3 HP	700	700
joiner bench	3		300	900
I. Packaging Shop				
band saw	1	3 HP	600	600
circular saw	1	4 HP	1,000	1,000
K. Cutting Tools				
milling cutters turning lathe tool planer chisels spiral drills grinding wheels and others				200,000
				1,718,500

MACHINERY AND EQUIPMENT

Item	No.	Description	Unit Cost US $	Total Cost US $
				1,718,500
L. Transportation Equipment				
truck	2	3.5 t	10,000	20,000
sedan car	2		2,000	4,000
conveyor belt for coal bins	1		1,000	1,000
trolley for handl. ladles in foundry	1		11,000	11,000
M. Electric Apparatus and Fixtures				
air-conditioner f. vertical boring machine	1	18,000 BTU	700	700
air-conditioner f. office	9		700	6,300
fans f. workshop etc	150		100	15,000
lighting and power installation				30,000
N. Office Equipm.				
typewriters, calculating & dupl. machines, desks, tables, chairs, shelves & racks, draw. tables, blue printing machine and others				50,000
O. Measuring Tools				
calipers, micrometers, angle protractors, thread gauges, hardness testerns, angles, rules, slip gauge taper madrels, and others				3,500
P. Equipment for Workshops				
desks, shelves, cupboards, trolleys etc.				140,000
				2,000,000

4.8 Hydraulic Presses and Excenter Presses

1. Product description

The following manufactures are recommended for the proposed factory:

1. Hydraulic presses with drawing equipment for 40 t, 65 t and 100 t;
2. Molding presses without drawing equipment for 40 t, 65 t and 100 t;
3. Excenter presses with adjustable table and flywheel for 15 t, 25 t, 50 t and 75 t.

2. Users

Industrial units and larger workshops for metal working (drawing, pressing, bending)

3. Market

The principal users are production units, such as machine tool factories, units for the manufacture of hand tools, household appliances, cutlery, gas cylinders, stoves, car bodies, as well as larger workshops. On account of the steadily increasing industrialization demand for these products, which has hitherto been covered by imports, will grow.

4. Skill requirements

The production, especially that of large hydraulic presses, requires sound experience and specific knowledge. For this reason a large number of skilled workers has to be employed. The management should principly be taken over by experts of highly developed industrial countries for a period of approximately 10 years.

5. Raw material and operations
All raw materials and supplementary parts have to be imported with the exception of steel scrap. The main operations are: casting, forging, hardening, machining (milling, planing, drilling), assembling and painting.

6. Automation and Mechanization
The production of presses calls for a high degree of mechanization (use of high-class machine tools) and to a certain extent also for automation (e.g. in case of gear manufacture).

7. Future expansion of operations
The whole production plant being principly equipped for the manufacture of presses, it is advisable to adhere to the existing production programme and not to take up manufacture of other items.

8. Capacity and sales prices
The production capacity of the factory is based on 3000 t p. a., can, however, be expanded by introducing a multi-shift operation and changes in the organization (standardization of the individual parts and structural parts).

The sales prices are based on European market prices for the same quality and finish.

CAPACITY hydraulic presses and excenter presses 540 units p.a. 1-shift operation			US $
I CAPITAL REQUIREMENTS			
LAND	3 acres		6,000
BUILDING	8000 m^2		540,000
MACHINERY AND EQUIPMENT (see list of Machinery and Equipment)			2,283,000
+ 20 % insurance, freight and assembly			456,000
WORKING CAPITAL 25 % of annual turnover			958,000
TOTAL CAPITAL			4,243,600
OF WHICH LOCAL			1,025,000
II FINANCING			
EQUITY			1,504,000
LOAN			2,739,600
III PRODUCTION COST	NUMBER	UNIT COST	
RAW MATERIALS			
steel profiles	270 t	180 $/t	48,600
pig iron	1730 t	140 "	242,200
steel scrap	430 t	25 "	10,750
steel sheets	210 t	165 "	34,650
aluminium ingots	55 t	500 "	27,500
varnish, putties, fillers	3 t	20,000 "	60,000
purchased parts (10 % of sales value)			383,000
packaging material (2 % of sales value)			76,600
coke	430 t	80 "	34,400
			917,700
LABOUR			
manager (expatriate)	1	14,400	
assistant manager	1	3,600	
office supervisor	1	2,400	
clerk, bookkeeper etc.	8	8,160	
foreman (expatriate)	5	42,000	257,160
foreman	5	9,000	
tool designer (expatr.)	2	16,800	
tool designer	2	3,600	
skilled labour	50	51,000	
semi-skilled labour	170	91,800	
unskilled labour	30	12.600	
cleaner, watchman	5	1,800	

ELECTRICITY AND WATER		
connect load 900 kw, load factor 0,25	61,322	
water 30.000 m³	7,500	68,822
SPARE PARTS, MAINTENANCE ETC.		
spare parts 1 % of machinery a. equipm.	27,400	
lubricants and hand tools	5,000	
cutting tools	17,000	
cleaning material	1,500	50,900
ADMINISTRATIVE COST		
3 % of annual turnover		114,900
DEPRECIATION		
10 % p. a. on machinery	273,960	
5 % p. a. on buildings	27,000	300,960
INTEREST ON LOAN		
8 % p. a.		219,168
TOTAL PRODUCTION COST		1,929,610
SALES RECEIPTS		3,830,000
GROSS PROFIT		1,900,390

IV CASH FLOW	1ST YEAR	3RD YEAR
SALES RECEIPTS	2,298,000	3,830,000
EXPENSES		
LABOUR	257,160	257,160
RAW MATERIAL	550,620	917,700
OTHER EXPENSES	140,773	234,622
TAXES	229,800	383,000
CASH AVAILABLE TO SERVICE CAPITAL	1,119,647	2,037,518
SERVICE OF LOAN		
INTEREST	219,168	219,168
INSTALMENTS		456,600
CASH SURPLUS/DEFICIT	900,479	1,361,750

REMARKS:

Profitability 1st year $\frac{599,519}{4,243,600} \times 100 = 14,1\ \%$

3rd year $\frac{1,060,790}{4,243,600} \times 100 = 25,0\ \%$

Capital/Labour Ratio 11,734 US$ per capita

ANNUAL PRODUCTION

	number	price per unit US$	total price
hydraulic presses with deep drawing equipment 40 t	40	10,000	400,000
dito 65 t	40	12,000	480,000
dito 100 t	40	15,000	600,000
hydraulic presses for plastics without deep drawing equipment 40 t	40	7,000	280,000
dito 65 t	40	9,000	360,000
dito 100 t	40	12,000	480,000
excenter presses (with adjustable table and flywheel) 15 t	60	2,500	150,000
dito 25 t	60	3,000	180,000
dito 35 t	60	4,000	240,000
dito 50 t	60	5,000	300,000
dito 75 t	60	6,000	360,000
	540 pieces		3,830,000

MACHINERY AND EQUIPMENT

Item	No.	Description	Unit Cost US $	Total Cost US $
A. Mechanical workshop				
lathe	10	4', 3 HP	3,500	35,000
dito	15	6', 6 HP	8,000	120,000
dito	6	10'	12,000	72,000
turret lathes	10	3" spindle internal, 12 HP	16,000	160,000
dito	10	1" spindle internal 10 HP	12,000	120,000
leadscrew making machine	1	5 HP	14,000	14,000
shaping machine	6	18" stroke	6,000	36,000
planing machine	3	6' stroke, 6 HP	20,000	60,000
dito	3	15' stroke, 10 HP	30,000	90,000
dito	1	20' stroke, 15 HP	40,000	40,000
horizontal milling machine	5	table 4'	14,000	70,000
dividing head for horizontal milling machine	5		700	3,500
boring machine, horizontal	2	10 HP	50,000	100,000
surface grinding machine for grinding guide ways, plane type	1	6' stroke, 10 HP	50,000	50,000
dito	1	15' stroke, 12 HP	80,000	80,000
dito	1	20' stroke, 15 HP	100,000	100,000
gear hobbing machine	1	5 HP	60,000	60,000
bevel gear cutting machine	1	2 HP	10,000	10,000
gear grinding machine	1	3 HP	50,000	50,000
grinding posts	6	6 HP	250	1,500
electric hand tools for chipping	10	1/4 HP	100	1,000
dito for fettling	5	1/2 HP	100	500
dito for scraping	5	1/4 HP	140	700
drilling machine pillar type	10	1/2", 1/4 HP	500	5,000
dito	10	3/4", 1/2 HP	800	8,000
dito	10	1", 1 HP	1,200	12,000
radial drilling machine	2	1", 3 HP	13,000	26,000
dito	2	3", 10 HP	30,000	60,000
engraving machine	2	2 HP	12,000	24,000
welding generator	2	2 kw	2,500	5,000
gas welding set	2		600	1,200
straight plate for marking	1	20' x 8'	13,000	13,000
slotting machine	1	3 HP	6,000	6,000
hand spindle press	1	2 t	600	600

MACHINERY AND EQUIPMENT

Item	No.	Description	Unit Cost US $	Total Cost US $
sheet metal shears hand operated	1		200	200
straight plate for sheet metal work	1	6' x 6'	7,000	7,000
friction spindle press for deep drawing of steel metal covers	1	75 t, 8 HP	17,000	17,000
sheet metal bending machine, hand operated	1		500	500
forging furnace, el.	1	4 kw	1,600	1,600
forging equipment			1,600	1,600
different attachments for lathes and milling machines			15,000	15,000
B. Tool room				
universal tool and cutter grinding machine	1	2 HP	15,000	15,000
surface grinding machine	2	4' table length, 3 HP	13,000	26,000
cylindrical grinding machine	1	3' between centres 6 HP	17,000	17,000
dito	1	6', 6 HP	30,000	30,000
radial drilling machine	1	2", 6 HP	27,000	27,000
pillar drilling machine all geared	1	1", 2 HP	2,500	2,500
table drilling machine	3	1/2", 1/4 HP	150	450
boring machine, vertical coord.	1	10 HP	60,000	60,000
lathe, universal precision	2	6', 6 HP	13,000	26,000
milling machine, universal percis.	1	6 HP	20,000	20,000
with all attachm.	1		6,000	6,000
shaping machine	1	18" stroke, 3 HP	700	1,400
surface plates	2	2' x 2'		3,000
different hand tools			60	600
vise	10			

MACHINERY AND EQUIPMENT

Item	No.	Description	Unit Cost US $	Total Cost US $
C. Fitting shop				
el. hand drilling m/c	5	1/2", 1/10 HP	100	500
dito	5	3/4", 1/4 HP	200	1,000
surface plate	2	2' x 2'	700	1,400
screw drivers	20 sets			
wrench, open mouth	20 sets			
dito, ring type	20 sets			
dito, box type	20 sets			
dito, inner hexagonal	20 sets			
chisels	20 sets			5,700
punches	20 sets			
centre punches	20 sets			
hammers	20 sets			
spiral drills	30 sets			
files	20 sets			
vises	15 sets			
miscellaneous tools,				
drilling machine, pillar type	5	1", 2 HP	1,000	5,000
dito, table type	5	1/2", 1/4 HP	150	750
D. Heat treatment shop				
el. furnace for hard.	1	3 kw	8,000	8,000
el. furnace for anneal.	1	2 kw	8,000	8,000
gas hardening machine for gears	1		40,000	40,000
gas hardening machine for surface hardening of shafts	1		20,000	20,000
salt bath furnace	1	6 kw	6,000	6,000
quenching basins	2		1,500	3,000
other equipment			10,000	10,000
E. Electroplating shop				
chromium plating tank with filter etc.	1		1,300	1,300
cadmium plating tank with filter etc.	1		1,300	1,300
pickling tank with filt.	1		1,000	1,000

MACHINERY AND EQUIPMENT

Item	No.	Description	Unit Cost US $	Total Cost US $
rinsing tank for trichlorethane	1		1,000	1,000
rinsing tank for water	1		300	300
copper plating tank	1		1,300	1,300
sand blasting machine	1	3 HP	3,500	3,500
DC-generator	1	2 kw	600	600
exhaust fan unit	1	10 HP	1,000	1,000
polishing posts	3	3 HP	300	900
polishing drum	1	1/2 HP	400	400
F. Painting shop				
air compressor	1	3 HP	700	700
spray guns	4		75	300
exhaust fan unit	1	10 HP	2,000	2,000
drying chamber	1	4 kw	8,000	8,000
G. Foundry				
cupola incl. el. blower, wind gauge, feeder	3	10 HP	17,000	51,000
seasoning kilns (large) for cast.	2	4 HP	8,000	16,000
sand mixing m/c	1	5 HP	8,000	8,000
core making m/c	1	5 HP	10,000	10,000
sand whirling m/c for cleaning casting	1	6 HP	7,000	7,000
weighing m/c	1		3,500	3,500
foundry laboratory				20,000
travelling crane unit	1	10 HP	35,000	35,000
H. Pattern shop				
band saw	1	3 HP	600	600
circular saw	1	4 HP	1,000	1,000
wood planing m/c	1	6 HP	2,000	2,000
wood milling m/c	1	3 HP	1,300	1,300
exhaust fan unit	1	6 HP	2,000	2,000
air compressor and spray gun	1	3 HP	700	700
joiner benches	3		300	300
I. Packaging shop				
band saw	1	3 HP	600	600
circular saw	2	4 HP	1,000	1,000

MACHINERY AND EQUIPMENT

Item	No.	Description	Unit Cost US $	Total Cost US $
K. Measuring tools				
vernier calipers	20	6"		
dito	2	12"		
micrometer, out-side	5	2"		
dito	5	4"		
dito, inside	2	2"		
dito	2	4"		
angle protractors	2			
thread gauges	5			3,500
thread micrometers		2		
gear calipers	2			
hardness tester, station.	1			
dito, portable	5			
filter gauges	5			
wire gauges	5			
dial indicators	10			
dito, for inside gauging	10			
angles, rules, slip gaug. etc.				
L. Office equip-ment				
typewriters, duplicating m/c, calculating m/c, tables, chairs, typwriter desks, shelves, lamps, etc.				25,000
M. El. install-ation				
air conditioner for vert. boring m/c in tool room	1	18.000 BTU		700
airconditioners for off.	7		700	4,900
fans for office and store	20		100	2,000
fans for workshop, fitt.	145		100	14,500
shop and tool room lighting and power inst. fixtures, benches, shelves etc.				30,000

MACHINERY AND EQUIPMENT

Item	No.	Description	Unit Cost US $	Total Cost US $
N. Transport equipment				
trucks	3	3,5	8,000	24,000
passenger cars	2	(VW)	2,000	4,000
conveyor belt for coal bins	1		1,000	1,000
el. trolleys for handl. ladles in foundry	2		3,000	6,000
O. Cutting tools				
milling m/c, cutters of diff. sizes, chisels for turn. lathes of diff. sizes chisels for shapers and planing m/c spiral drills grinding wheels cutting tools for boring m/c other cutting tools				160,000
				2,383,000

4.9 Centrifugal pumps

1. Product description

Motor-driven centrifugal pumps, self priming or not, with or without motor attached, up to abt. 30 m delivery head (water column) and abt. 500 l/min capacity.

2. Users

All types of industries, water supply and irrigation systems, public works, private households (piston-type pumps are, however, more frequent for household uses).

3. Market

Geographically, the market for pumps can be regional or even subregional. With industrial enterprises being the principal users, demand for pumps will increase in close relation to the increase in number of industrial establishments. Competition will be severe, no exports are envisaged.

4. Skill requirements

Proportion of skilled workers in direct production must be high, particularly those engaged in machining, assembling and testing. Supervisors and foremen must be fully experienced.

5. Materials and operations

Principal direct materials include: castings, ferrous and non-ferrous, steel plates, bars and rods, bearings, and small hardware (nuts, bolts, etc.). Assuming that castings are supplied by a subcontracting foundry, main operations are machining, assembling, painting and testing.

6. Mechanization and automation

Automated machining equipment (welding, turning, milling) might be considered but is not recommended. Mechanization should be high in the machining and testing sections.

7. Future expansion of operations
As the proposed plants will be important consumers of castings cast-iron foundries should be attached directly to them. Expansion of the production programme to include larger units should be undertaken progressively.

8. Capacity and sales prices
Annual production of the works will be based on 16.000 pieces. An increase in the production will be possible considering the existing technical equipment. Sales prices correspond to the German prices for the same finish.

Centrifugal pumps

In developing countries such as India, Pakistan and similar countries piston pumps are still being produced and used in greater number besides centrifugal pumps.

The common opinion prevails that centrifugal pumps are not self-priming as are piston pumps and that they cannot compete with piston pumps as regards their suction height which is required in wells with altering ground water level. Piston water pumps are, therefore, preferred in many cases despite their great disadvantages, as e. g. the need of frequent lubrification and repairs, especially those of valves and springs, wear and tear through muddy and sandy water.

This opinion can,however, only derive from ignorance about the present state of technical development. Nowadays good designs for centrifugal pumps exist which have a suction height of approx. 24 ft (8 m) with only 1450 rpm. These pumps are also more resistant to sand and mud (these designs are not to be confused with a special type of self-priming centrifugal pump which works with waterrings and which can only be used for very clean liquids). This type of pump is recommended for manufacture because of its simplicity, sturdiness and universality.

The manufacturing programme should comprise the following sizes:

Self-priming single-stage centrifugal pumps also for very dirty water with coarse sand (Production Group A)

HP	2.8	6.0	1.7	3.6
suction and pressure con. in mm	65	80	40	50
capacity in l	270-700	400-1400	55-300	160-580
manometric. lift head in m	14-10.3	16.6-7.8	24-16	26-16
permissible grainsize of sand in mm	25	30	12	20
rpm	1450	1450	2850	2850
price in US$	353	467	222	247

The following sizes are recommended for manufacture:

type	I	II	III	IV	V	VI	VII
HP	0.16-0.27	0.32-0.54	0.84-1.2	0.56-1.16	1.12-2.32	1.1-2.3	1.68-3.48
manometrical total head in metres	2-25	4-48	45-112	14-42	26-82	7-35	39-120
dia (inch)	1	1	1	1 1/4	1 1/4	1 1/2	1 1/4
litres/min	25-10	25-10	15-10	75-30	75-30	200-100	75-30
price in US$	30	40	50	38	48	78	62

Self-priming multi-stage pumps for household purposes

(Production Group B)

Besides this very sturdy type of pump, which can be used under very soiled water conditions, another type of self-priming centrifugal pump should be manufactured which allows smaller sizes, so that they are also suitable for household and similar purposes. These pumps can also be used for sandy water, but of smaller grains. The sizes, which are recommended for manufacture are shown in the following table (see table self-priming multi-stage pumps for household purposes).

Besides the above-mentioned types also normal non-self priming low pressure pumps should be manufactured by the same factory in such quantities that local requirements can be covered. These pumps may be used where the ground water level is high and more constant and where personnel is available to do the priming whenever it is required. The type proposed may pump clean to slightly soiled water.

The types which are recommended for manufacture are shown in the table below:

Non-self-priming low pressure centrifugal pumps
(Production Group C)

HP	0.47-0.62	0.9-1.4	1.6-2.2	3.3-4.5
head in metres	6.4-3.4	10.8-6.5	10.0-6.5	13.2-7
capacity l/min	200-400	200-400	500-900	800-1500
pipe dia in mm	50	50	80	100
price in US$	100	110	121	134

ANNUAL PRODUCTION

Centrifugal Pumps

	no.	average price per unit US$	total price US$
Production Group A			
self-priming multi-stage pumps	8000	49	392,000
Production Group B			
self-priming dirty liquid pumps	3000	322	966,000
Production Group C			
non-self-priming centrifugal pumps	5000	116	580,000
	16000		1,938,000

CAPACITY 16,000 centrifugal pumps p. a. 1-shift operation			US $
I CAPITAL REQUIREMENTS			
LAND	2 acres		4,000
BUILDING	400 m^2		270,000
MACHINERY AND EQUIPMENT			
(see list of Machinery and Equipment)			1016,270
+ 20 %			203,254
WORKING CAPITAL 25 % of annual turnover			484,500
TOTAL CAPITAL			758,500
OF WHICH LOCAL			1219,524
II FINANCING			
EQUITY			758,500
LOAN			1219,524
III PRODUCTION COST	NUMBER	UNIT COST	
RAW MATERIALS			
steel profiles	50 t	180 $/t	9,000
pig iron	300 t	140 $/t	42,000
steel scrap	100 t	25 $/t	2,500
bronce ingots	40 t	1,500 $/t	60,000
varnish	5 t	2,000 $/t	10,000
purchased parts (5% of sales value)			96,900
packaging material (2 % of sales value)			38,760
coke	80 t	80 $/t9	6,400
			447,660
LABOUR			
manager (expatriate)	1	14,000	)
assistant manager	1	3,600	)
office supervisor	1	2,400	)
clerk, bookkeeper etc.	8	8,160	)
foreman (expatriate)	4	33,600	)238,460
foreman	4	7,200	)
tool designer (expatriate)	3	25,200	)
tool designer	3	5,400	)
watchman, cleaner	5	1,800	)
skilled labour	50	51,000	)
semi-skilled labour	140	75,600	)
unskilled labour	25	10,500	)

ELECTRICITY AND WATER		
connect load 500 KVA, load factor 0,25	24,842	
water 20,000 m³	5,000	29,842
SPARE PARTS, MAINTENANCE ETC.		
spare parts 1 % of machinery a.equipm.	12,195	
lubricants and hand tools	2,000	
cutting tools	15,000	
cleaning material	1,000	30,195
ADMINISTRATIVE COST		
3 % of annual turnover		58,140
DEPRECIATION		
10 % p. a. on machinery	121,952	
5 % p. a. on buildings	13,500	135,452
INTEREST ON LOAN		
8 % p. a.		97,562
TOTAL PRODUCTION COST		855,211
SALES RECEIPTS		1,938,000
GROSS PROFIT		1,082,789

IV CASH FLOW	1ST YEAR	3RD YEAR
SALES RECEIPTS	1,162,800	1,938,000
EXPENSES		
LABOUR	238,460	238,460
RAW MATERIAL	159,336	265,560
OTHER EXPENSES	70,906	118,177
TAXES	116,280	193,800
CASH AVAILABLE TO SERVICE CAPITAL	577,818	1,122,003
SERVICE OF LOAN		
INTEREST	97,562	97,562
INSTALMENTS		203,254
CASH SURPLUS/DEFICIT	480,256	821,187

REMARKS:

Net profit: 1st year $\frac{344,804}{1,978,024} \times 100 = 17,4\ \%$

3rd year $\frac{685,735}{1,978,024} \times 100 = 34,7\ \%$

Capital/Labour Ratio: 8,074 $ per capita

MACHINERY AND EQUIPMENT

Item	No.	Description	Unit Cost US $	Total Cost US $
A. Production tools and equipment				
radial drilling m/c	4	1/2"	11,000	44,000
dito	4	1"	13,000	52,000
drilling m/c pillar type	4		800	3,200
dito	4	1 1/2"	2,500	10,000
turning lathe	1	120 mm centre height, 4' bed heavy duty	5,000	5,000
dito	1	200 mm centre height	7,000	7,000
dito	1	250 mm centre height	8,000	8,000
turning lathe	1	120 mm centre height, 10' bed lead and feed screw, universal	9,000	9,000
dito	1	6' bed	7,500	7,500
dito	1	4'bed	6,000	6,000
capstan lathe	1	spindle bore 1"	7,000	7,000
dito	1	2"	10,000	10,000
cylindrical grinding m/c	2	1000 mm between centre	7,000	14,000
dito	2	500 mm between centre	5,000	10,000
copying drilling m/c	5	pentograph type vertical	10,000	50,000
boring m/c horizontal	5		50.000	250,000
milling m/c vert.	5		10,000	50,000
dito horizont.	2		13,000	26,000
shaping m/c	2	18"	6,000	12,000
grinding post	3		300	900
el. hand drill. machine	2		100	200
el. hand pushing machine	2		100	200
B. Fitting shop				
travelling crane	1		17,000	17,000
nut fastening m/c	2		100	200
el. hand drilling machine	2		100	200

MACHINERY AND EQUIPMENT

Item	No.	Description	Unit Cost US $	Total Cost US $
el. hand grinding machine	2		150	300
pillar drilling machine	1	1"	1,200	1,200
hand tools				3,000
C. Painting shop				
air compressor	2		700	1,400
spray guns	4		75	300
ventilating system cum blower	1		2,000	2,000
drying chamber	1		8,000	8,000
D. Foundry				
cupola with wind gauge and blower	2	2 1/2'	15,000	30,000
sand mixing m/c	1		10,000	10,000
core making m/c	2		7,000	14,000
travelling crane	2		16,000	32,000
annealing furnace	3		8,000	24,000
sand blasting m/c (whizzered) with suspension conveyor chain	1		13,000	13,000
el. lifting truck	2		5,000	10,000
mould boxes	400		10	4,000
weighing m/c	1		3,500	3,500
conveyor belt	1		1,200	1,200
E. Tool room				
tool room lathe with lead and feed screw	1	6'	8,000	8,000
dito	1	4'	3,500	3,500
universal milling m/c with all attachments	1		20,000	20,000
surface grind. m/c	1	4'	13,000	13,000
shaping m/c	1	24"	8,000	8,000
radial drilling m/c	1	1" DIA	12,000	12,000
drilling m/c, pillar type	1	1" DIA	2,500	2,500
drilling m/c, pillar type	1	3/4" DIA	900	900
dito	1	1/2" DIA	500	500

MACHINERY AND EQUIPMENT

Item	No.	Description	Unit Cost US $	Total Cost US $
dito	1	1/2" DIA table type	170	170
el. welding set	1		2,500	2,500
gas welding set	1		700	700
hand spindle press	1	2 t	600	600
el. forging furnace	1		1,700	1,700
el. annealing furnace	1		8,000	8,000
el. salt bath furnace	1		7,000	7,000
straight plate	1	2' x 3'	1,200	1,200
surface plate	1	2' x 2'	800	800
amboss	1		150	150
various measuring tools and hand tools				3,000 3,500
F. Quality control				
testing bay and equipment	1		7,000	7,000
hand testing instruments				1,500
G. Pattern shop				
wood hand saw	1		2,500	2,500
wood circular saw	1		1,300	1,300
wood planer	1		3,000	3,000
wood milling m/c	1		1,500	1,500
air compressor	1		700	700
spray guns	4		75	300
various hand tools			3,000	3,000
H. Packaging shop				
wood hand saw	1		2,500	2,500
wood circular saw	1		1,500	1,500
hand tools (various)				350
I. Furniture and fixture				
work benches, shelves, office furniture, office machines, air conditioners, fans, lighting etc.				120,000

MACHINERY AND EQUIPMENT

Item	No.	Description	Unit Cost US $	Total Cost US $
K. Transport equipment				
truck	1	3,5 t	10,000	10,000
truck	1	1 t	3,000	3,000
Pkw (passenger car)	1		2,000	2,000
scooter	2		500	1,000
bicycle	2		50	100
				1016,270

4.10 Cutlery and Scissors

1. Product description
Knives, forks, spoons and scissors of stainless steel in a simple standard finish.

2. Users
Households, restaurants, canteens; scissors are mainly used in offices and tailor's shops.

3. Market
is restricted to the local market.

4. Skill requirements
Foreign qualified personnel should be recruited for the positions of the manager, the designer as well as the foreman in order to guarantee a smooth production flow from the very beginning as well as thorough training of the local staff.

5. Raw material and operations
As cutlery and scissors have to be manufactured of stainless steel for reasons of corrosion, nickel chrome steel has to be imported in form of sheets and ingots.
The main operations are:

cutting
forging
hardening
grinding and
polishing.

6. Automation and Mechanization

Owing to the small scope of manufacture full automation would be uneconomical. On the other hand a high degree of mechanization and the use of high-grade machinery would be necessary to guarantee a smooth and continuous production.

7. Future expansion of production

Owing to the special type of technical works equipment a future expansion of production would only be advisable in case of cutlery and scissors production. Through the existence of deep drawing presses production could be expanded to household utensils such as pots, pans and dishes, for which in turn an enamelling plant will be required.

8. Capacity and sales price

The capacity of the factory is based on 85 t nickel chrome steel for processing purposes considering a 1-shift operation, which can, however, be expanded in case of need by means of introduction of a multi-shift operation and by lowering the number of serial products.

All sales prices are based on the standard products which are already manufactured in the respective countries.

ANNUAL PRODUCTION

Product	No.	t	Price per Unit US$	Total Price US$
knives	200,000	20	0,4	80,000
spoons, forks	1,300,000	45	0,2	260,000
scissors	150,000	15	0,5	75,000
Total		80		415,000

CAPACITY cutlery and scissors (80 t) p. a. 1-shift operation			US $
I CAPITAL REQUIREMENTS			
LAND 1 acre			2,000
BUILDING 50' x 150' incl. office			50,000
MACHINERY AND EQUIPMENT			
1 excenter press	700		
1 friction spindle press	10,000		
1 guillotine	1,500		
1 drop forging hammer	30,000		
1 forging furnace	10,000		
1 annealing furnace	5,000		
2 grinding machines (5,000 each)	10,000		
2 polishing machines (1,500 ")	3,000		
1 belt grinding machine	500		
1 blade hardening plant	10,000		
diff. forging dies	4,500		
1 air compressor	1,000		
diff. hand tools	1,500		
office machines and furniture	2,000	96,000	
+ 20 %		24,000	120,000
WORKING CAPITAL 25 % of annual turnover			103,750
TOTAL CAPITAL			275,750
OF WHICH LOCAL			103,875
II FINANCING			
EQUITY			155,750
LOAN			120,000

III PRODUCTION COST	NUMBER	UNIT COST	
RAW MATERIALS			
nickel-chrome-steel	85 t	1,500 $/t	127,500
grinding material		12,000 $	12,000
packaging material		8,000 $	8,000
			147,500
LABOUR			
manager (expatr.)	1	14,000	
assistant manager	1	3,600	
clerk, bookkeeper	2	2,040	
typist	2	2,040	
designer (expatr.)	1	8,400	
foreman "	1	8,400	
skilled labour	3	3,060	
semi-skilled labour	10	5,400	
unskilled labour	2	840	
watchman, cleaner	2	720	48,500

ELECTRICITY AND WATER			
connect load 60 kw, load factor 0,25		2,160	
water 6.000 m³		1,500	3,660
SPARE PARTS, MAINTENANCE ETC.			
spare parts	1,200		
lubricants	1,000		
cutting tools	5,000		
cleaning material	800		8,000
ADMINISTRATIVE COST			
3 % of annual turnover			12,450
DEPRECIATION			
10 % p. a. on machinery		12,000	
5 % p. a. on buildings		2,500	14.500
INTEREST ON LOAN			
8 % p. a.			9,600
TOTAL PRODUCTION COST			220,110
SALES RECEIPTS			415,000
GROSS PROFIT			194,890

IV CASH FLOW	1ST YEAR	3RD YEAR
SALES RECEIPTS		
EXPENSES	249,000	415,000
LABOUR	48,500	48,500
RAW MATERIAL	88,500	147,500
OTHER EXPENSES	14,466	24,110
TAXES	24,900	41,500
CASH AVAILABLE TO SERVICE CAPITAL	72.634	153.390
SERVICE OF LOAN		
LNTEREST	9,600	9,600
INSTALMENTS		24,000
CASH SURPLUS/DEFICIT	63,034	119,790

REMARKS:

Net Profit:

1st year $\frac{48,534}{275,750} \times 100 = 17,6\ \%$

3rd year $\frac{105,290}{275,750} \times 100 = 38,2\ \%$

Capital/Labour Ratio:

$\frac{275,750}{25} = 11,030$ US$

A N N E X III

(Tables III/1 - III/42)

Table III/1

Trend Projections 71, 72, 73 (t)

	64	65	66	67	68	69	64	65	66	67	68	69	64	65	66	67	68	69
	Division 71						Division 72						Division 73					
Ethiopia	11453	15350	14178	10879	14959	10376	6699	6013	5403	6982	6294	7000	10265	11622	13897	12866	13198	14650
Kenya	10341	10232	14608	24162	21304	20091	2888	3636	4068	5105	5156	5813	24001	19435	19960	51090	34702	33585
Uganda	6193	5599	8277	11354	9221	8240	2111	2877	2849	2275	2773	2353	8529	12236	14184	12665	12520	11238
Tanzania	7524	9500	10927	13361	13463	11142	2582	3079	3103	3363	3338	3091	10830	11817	17743	18911	25183	17728
Zambia	15559	20315	24208	29777	27803	28752	6403	13083	15339	16365	10670	11557	14852	25305	29878	58865	35875	31552
Malawi	1389	2028	4025	3025	5779	4775	594	1155	1976	1457	1259	1378	2955	4099	6717	5664	7057	6273
Madagascar	5274	5226	6117	6613	7235	12459	2860	2473	3377	2615	3135	4390	11036	8857	8005	10080	13247	21353
Mauritius	3416	2251	1093	1810	1798	1799	1605	1352	1046	1308	1263	1286	3057	2308	1467	1567	3287	1406
Total	61657	70804	93860	110984	101573	107550	25747	33691	37251	39610	33888	40600	85525	95679	111851	171648	145069	150900

Note: 1969 figures are adjusted 10 % upwards throughout to account for discrepancy due to provisional nature of statistical data

x	t	y	xy	x^2	
-2	61.7	100	-200	4	y = 78230 + 5740x
-1	70.8	115	-115	1	
0	93.9	152	0	0	
1	111.0	180	180	1	
2	101.6	165	230	4	
3	107.5	174	522	9	
3	-	886	617	19	

x	t	y	xy	x^2	
-2	25.7	100	-200	4	y = 33920 + 2390x
-1	33.7	131	-131	1	
0	37.3	145	0	0	
1	39.6	154	154	1	
2	33.9	132	264	4	
3	40.6	158	474	9	
3	-	920	561	19	

x	t	y	xy	x^2	
-2	85.5	100	-200	4	y = 119700 + 14500x
-1	95.7	112	-112	1	
0	111.9	131	0	0	
1	171.6	201	201	1	
2	145.1	170	340	4	
3	150.9	177	531	9	
3	-	891	760	19	

Projected figures and figures + 3 % to account for share of Somalia, Rwanda and Burundi

1975	130160	+3%	134100	1975	55430	+3%	57100	1975	250200	+3%	257700
1980	158860	+3%	163600	1980	67380	+3%	69400	1980	322700	+3%	332400
1985	187560	+3%	193200	1985	79330	+3%	81700	1985	395200	+3%	407100

III/2

Correlation between GDP/cap. and EGC/cap.

(country position for 1964 values, upper curve)

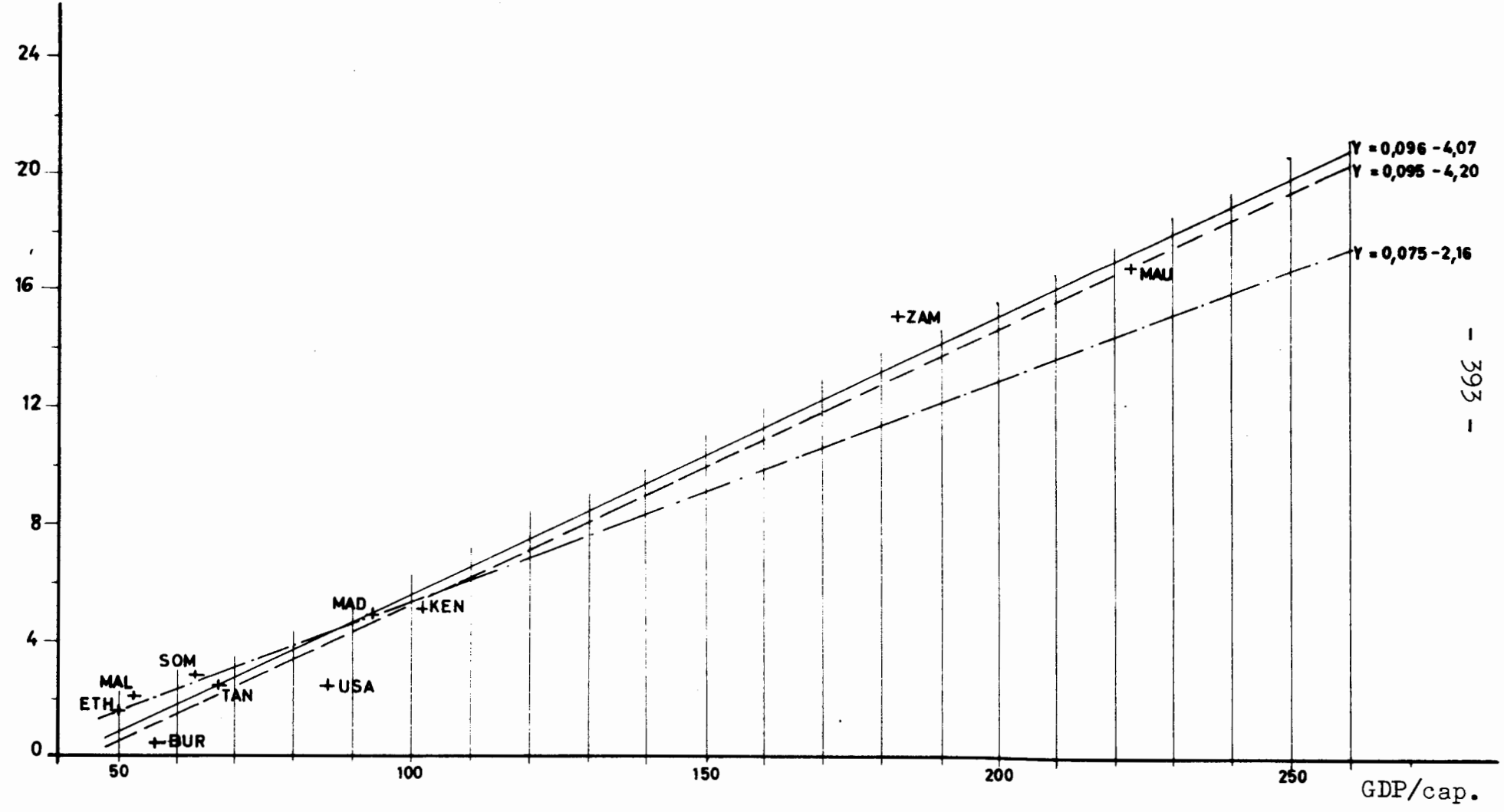


Table III/3

Projections of GDP at constant (1960) prices

	historic growth rate (%)	Basic value	Projection based on historic growth r.			Projection based on terminal target value									populat. growth rate (%)	Average p. cap. GDP growth rate %		
						5 %			6 %			7 %						
		1969	1975	1980	1985	1975	1980	1985	1975	1980	1985	1975	1980	1985		1975	1980	1985
Ethiopia	5.0	1574	2109	2692	3436				2136	2800	3725	2163	2911	4036	2.3	2.9	3.1	3.2
Somalia	2.5	98	114	128	145	117	142	179	119	148	194	120	154	210	2.7	0.3	0.7	1.1
Kenya	6.2	1004	1441	1947	2630							1455	2008	2803	3.3	2.9	2.9	2.9
Uganda	4.7	638	638	881	1333	844	1070	1363	856	1115	1480	865	1157	1601	2.8	2.2	2.4	2.6
Tanzania	4.5	805	1049	1307	1628	1055	1233	1569	1069	1386	1838	1082	1442	1992	2.8	2.0	2.3	2.5
Rwanda	1.8	204	227	248	271	237	283	354	241	296	386	243	306	417	3.1	-0.6	-0.1	0.4
Burundi	1.8	148	164	180	196	172	205	257	175	215	280	176	223	305	2.5	0.2	0.5	1.0
Zambia	6.0	994	1410	1887	2525				1410	1887	2525	1427	1961	2735	3.2	2.8	2.8	2.8
Malawi	5.3	197	257	348	452				271	357	476	274	371	515	2.8	2.6	2.7	2.8
Madagascar	1.8	660	743	820	906	772	925	1160	782	963	1258	792	1002	1364	3.0	-0.3	0.1	0.6
Mauritius	1.9	226	252	277	304	264	316	396	267	329	430	271	343	467	2.6	1.1	0.5	1.0
Subregion	-	6548				-	-	-	-	-	-	-	-	-	27.5	-	-	-

Remarks: Framed figures are those retained for subsequent calculations figures in millions of US$

Table III/4

Projection of GDP/cap and EGC/cap

	Basis Values 1969				1975			
	Populat.	GDP	GDP/cap	EGC/cap	Populat.	GDP	GDP/cap	EGC/cap
Ethiopia	24.60	1,574.0	63.98	1.98[1)]	28.20	2,135.8	75,73	3.02
Somalia	2.68	97.9	36.53	3.01[2)]	3.14	117.2	37.32	3.00
Kenya	10.50	1,004.3	95.65	7.16	12.76	1,440,7	112.90	8,71
Uganda	8.32	638.0	76.68	3.55	9.82	855.5	87.12	4.58
Tanzania	13.06	805.2	61.65	4.18[1)]	15.41	1,068.5	69.33	4.87
Rwanda	3.47	204.2	58.84	0.80[3)]	4.17	236.8	56.78	0.62
Burundi	3.48	148.1	42.56	0.62	4.04	171.7	42.50	0.62
Zambia	4.05	993.8	245.38	20.92	4.89	1,409.7	288.28	24.74
Malawi	4.36	196.6	45.09	4.06	5.14	270.5	52.63	4.74
Madagascar	7.30	659.7	90.37	4.59[1)]	8.72	772.1	88.54	4.43
Mauritius	0.81	225.6	278.52	10.15[1)]	0.97	246.0	272.16	9.85
Subregion	82.63	6,547.4	79.24	4.34	97.26	8,742.5	89.89	5.39

Remarks: 1) 1968 value 2) adj. 1968 value 3) estimate: population = millions; GDP = millions of US $; GDP/cap = US $; EGC/cap = kg

Cont.

Projection of GDP/cap and EGC/cap

	1980				1985			
	Populat.	GDP	GDP/cap	EGC/cap	Populat.	GDP	GDP/cap	EGC/cap
Ethiopia	31.60	2,799.8	88.60	4.18	35.40	3,724.7	105.22	5.67
Somalia	3.59	141.9	39.52	3.20	4.10	178.5	43.53	3.56
Kenya	15.02	1,946.5	129.59	10.22	17.64	2,629.6	149.07	11.97
Uganda	11.27	1,114.6	98.90	5.46	12.94	1,480.3	114.40	7.04
Tanzania	17.70	1,385.9	78.30	5.68	20.33	1,838.4	90.43	6.77
Rwanda	4.65	282.6	60.77	0.97	5.42	353.9	65.30	1.38
Burundi	4.57	205.0	44.85	0.83	5.15	256.6	49.82	1.28
Zambia	5.73	1,886.5	329.23	28.42	6.71	2,524.6	376.24	32.65
Malawi	5.91	356.8	60.37	5.44	6.79	475.5	70.03	6.31
Madagascar	10.10	925.3	91.61	4.70	11.71	1,159.9	99.05	5.37
Mauritius	1.07	316.2	295.51	11.95	1.22	396.3	324.84	14.58
Subregion	11.21	11,361.1	102.16	6.52	127.65	15.019.3	117.66	7.93

Remarks: 1) 1968 value 2) adj. 1969 value 3) estimate: population = millions; GDP = millions of US $; GDP/cap = US $; EGC/cap = kg

Table III/5

Projection of total EGC

(based on correlation between GDP/cap. and EGC/cap.)

	1969		1975		1980		1985	
	p.c. EGC	total EGC	p.c. EGC	total EGC	p.c. EGC	total EGC	p.c. EGC	total EGC
Ethiopia	1.98[1]	47500	3.02	85200	4.18	132100	5.67	200700
Somalia	3.01[2]	8100	3.00	9400	3.20	11500	3.56	14600
Kenya	7.16	75200	8.71	111100	10.22	153500	11.97	211100
Uganda	3.55	29500	4.58	45000	5.64	63600	7.04	91100
Tanzania	4.18[1]	54600	4.87	75000	5.68	100500	6.77	137600
Rwanda	0.80[3]	2800	0.62	2600	0.97	4500	1.38	7500
Burundi	0.62	2200	0.62	2500	0.83	3800	1.28	6600
Zambia	20.92	84700	24.74	121000	28.42	162800	32.65	219100
Malawi	4.06	17700	4.74	24400	5.44	32200	6.31	42800
Madagasc.	4.59[1]	35500	4.43	38600	4.70	47500	5.37	62900
Mauritius	10.15[1]	8200	9.85	9600	11.95	12800	14.58	17800
Subregion	4.34	364000	5.39	524400	6.52	724.800	7.93	1011800

Remarks: 1) 1968 value 2) adj. 1969 value 3) estimate pc.EGC=kg tot EGC=t

Table III/6

Projections of Gross Fixed Capital Formation (GFCF)
For Machinery and Transport Equipment (Div. 71, 72 and 73)

	Total gross fixed capital formation as % of GDP				GFCF of SITC div. 71, 72, 73 as % of total GFCF				ratio of GFCF div. 71,72,73		Projections (millions of US$)					
		Target values				Target values					1975		1980		1985	
	1968 [3]	1975	1980	1985	64-68 aver.	1975	1980	1985	actual	target	71/72	73	71/72	73	71/72	73
Ethiopia	13.0	15.0	18.0	20.0	30	40	45	50		60:40	76.9	51.3	136.1	90.7	223.5	149.0
Somalia	8.0 [1]	15.0	20.0	20.0	30 [1]	40	50	50		60:40	4.2	2.8	8.5	5.7	10.7	7.1
Kenya	15.3	20.0	20.0	20.0	53	50	50	50	60:40	60:40	86.5	57.6	116.8	77.9	157.8	105.2
Uganda	9.2	12.0	15.0	20.0	53 [4]	50	50	50	75:25	60:40	30.8	20.5	50.2	33.5	88.8	59.2
Tanzania	12.2	20.0	20.0	20.0	50	50	50	50	60:40	60:40	61.1	42.8	83.2	55.4	110.3	73.5
Rwanda	8.0 [1]	12.0	15.0	20.0	30 [1]	35	40	45		60:40	6.0	4.0	10.2	6.8	19.1	12.7
Burundi	8.0 [2]	12.0	15.0	20.0	30 [1]	35	40	45		60:40	4.3	2.9	7.4	4.9	13.9	9.3
Zambia	21.2	21.0	25.0	25.0	45 [4]	50	50	50	65:35	60:40	88.8	59.2	141.5	94.4	189.4	126.2
Malawi	11.5	20.0	20.0	20.0	60	50	50	50	65:35	60:40	16.3	10.8	21.4	14.3	28.6	19.0
Madagascar	8.8	15.0	15.0	20.0	40 [1]	45	50	50		60:40	31.3	20.8	41.6	27.8	69.6	46.4
Mauritius	10.2	12.0	15.0	20.0	40 [4]	45	50	50	70:30	60:40	8.6	5.7	14.2	9.5	23.8	15.8

Remarks: 1) estimate 2) estimate (1965:5,5) 3) figures from: "A Survey of Economic Conditions in Africa", Part I, UN 1971, p. 12 (except Somalia, Rwanda, Burundi) 4) 1964 - 1967

Table III/7

Projection of consumption of machinery and transport equipment based on Gross Fixed Capital Formation

	1975		1980		1985	
	div.71+72	div. 73	div.71+72	div. 73	div.71+72	div.73
Ethiopia	39.000	44.200	69.100	78.200	113.200	128.500
Somalia	2.100	2.400	4.300	4.900	5.400	6.100
Kenya	43.900	49.700	59.300	67.200	80.100	90.700
Uganda	15.600	17.700	25.500	28.900	45.100	51.000
Tanzania	31.000	36.900	42.200	47.800	56.000	63.400
Zambia	45.100	51.000	71.800	81.400	96.100	108.800
Malawi	8.300	9.300	10.900	12.300	14.500	16.400
Madagascar	15.900	17.900	21.100	24.000	35.300	40.000
Mauritius	4.400	4.900	7.200	8.200	12.100	13.600
Subregion	205.300	234.000	311.400	352.900	457.800	518.500
div. 71	147.800	-	224.200	-	329.600	-
div. 72	57.500	-	87.200	-	128.200	-

remarks: figures in t ratio div. 71/div. 72 = 72 : 28

III/8 Summary of Projections Divisions 71, 72 and 73

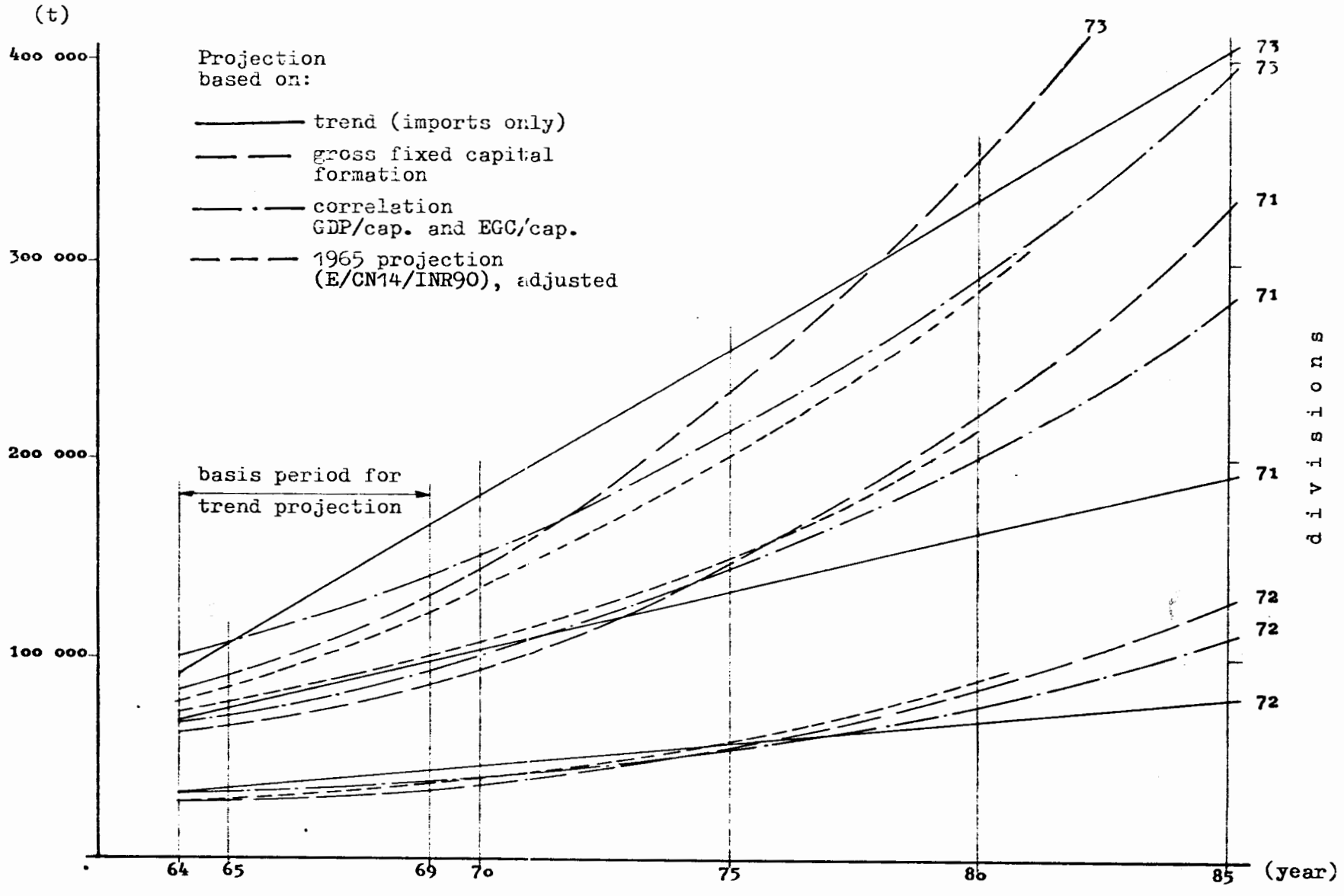


Table III/9

Basis Figures for Breakdown into Subdivisions of Projections for Divisions 71, 72 and 73

	1964/1966/1968 averages																	
t	711	712	714	715	717	718	719	722	723	724	725	726	729	731	732	733	734	735
Ethiopia	542	2473	103	107	1585	4853	3903	1640	342	3924	478	6	1743	871	9971	806	211	460
Kenya	3332	3605	201	548	875	3828	4109	531	957	467	710	10	1461	6834	16081	1473	132	1834
Uganda	191	1763	43	313	806	2768	1813	466	559	273	475	2	803	288	9573	1738	5	140
Tanzania	589	2891	56	246	1032	2450	3053	614	550	297	572	7	998	394	13847	2175	5	1500
Zambia	1329	5377	164	352	680	9015	9009	2292	4058	425	1138	7	2883	1563	21612	2899	78	716
Malawi	353	608	27	70	262	1579	902	278	373	109	143	2	374	983	3486	1026	3	120
Madagasc.	704	557	60	115	739	1488	2578	356	764	407	34	1	1571	1249	7929	724	163	698
Mauritius	271	594	20	37	59	253	868	144	355	114	82	5	604	35	5575	227	-	482
Subregion	5311	17868	674	1788	6038	26374	26295	6321	7858	4016	3632	40	10437	12117	88074	11068	597	5950

	1964/1966/1968 averages																	
%	711	712	714	715	717	718	719	722	723	724	725	726	729	731	732	733	734	735
Ethiopia	4.0	18.2	0.8	0.8	11.7	35.8	28.8	26.7	5.6	31.4	7.8	0.1	28.4	7.1	80.9	6.5	1.7	3.7
Kenya	9.1	24.8	1.4	3.8	6.0	26.3	28.6	13.2	21.2	11.6	17.6	0.3	36.2	25.9	61.0	5.6	0.5	6.6
Uganda	2.4	22.3	0.5	4.0	10.2	37.6	23.0	18.1	21.7	10.6	18.4	0.1	31.2	2.5	81.5	14.8	0.1	1.2
Tanzania	5.7	28.0	0.5	2.4	10.0	23.7	29.6	20.2	18.1	9.8	18.8	0.2	32.9	2.2	77.3	12.1	0.1	8.4
Zambia	5.1	20.7	0.6	1.4	2.6	34.8	34.8	21.2	37.6	4.0	10.5	0.1	26.7	5.8	80.4	10.8	0.3	2.7
Malawi	9.4	16.3	0.7	1.9	7.0	40.6	24.1	21.7	29.2	8.5	11.2	0.2	29.2	17.5	62.1	18.3	0.1	2.1
Madagasc.	10.7	8.4	0.9	1.7	11.2	22.6	39.1	11.4	24.4	13.0	10.9	0.1	50.1	11.6	73.7	6.7	1.5	6.5
Mauritius	12.9	28.3	0.9	1.8	2.8	12.0	41.3	11.0	27.2	8.7	6.3	0.4	46.3	0.6	88.2	3.6	-	7.6

Remarks: percentage figures add up to 100 % for each country within a division

Table III/10 a - c

Breakdown into Subdivisions of Projections, Divisions 71, 72 and 73

(t)

1975 (t)	711	712	714	715	717	718	719	722	723	724	725	726	729	731	732	733	734	735
ETHIOPIA	1200	4600	230	230	2300	7800	6700	3340	2180	3630	1310	30	4030	1970	22480	1970	280	1410
SOMALIA	180	460	20	30	140	580	890	130	180	70	70	5	260	-	3040	570	40	150
KENYA	2890	6940	300	1010	2020	6910	8810	1420	2050	1070	1420	30	2020	9000	35000	3000	500	2500
UGANDA	500	2770	130	500	1130	4790	2770	660	830	400	580	10	1100	860	13680	2050	170	340
TANZANIA	1470	5040	210	630	1890	5460	6300	1200	1260	660	1020	20	1840	1320	25740	3300	330	2310
RWANDA	60	140	10	20	40	180	270	50	80	30	30	5	110	-	880	170	10	40
BURUNDI	40	110	5	10	30	140	210	40	50	20	20	5	70	-	760	140	10	40
ZAMBIA	2710	8130	390	780	1160	13550	12000	2920	4820	1020	1900	30	3910	3560	40640	4570	510	1520
MALAWI	660	1190	70	130	400	2510	1650	420	540	200	260	10	570	1190	5950	1020	90	260
MADAGASCAR	1000	1500	100	200	1100	2200	3900	530	880	420	460	10	1220	1570	13050	1390	170	1220
MAURITIUS	260	530	20	40	70	400	880	200	390	150	120	10	640	40	3350	240	-	270
SUBREGION	10970	31410	1485	3580	10280	44550	44330	10930	13260	7670	7190	165	15780	19510	164570	18420	2110	10080

1980 (t)	711	712	714	715	717	718	719	722	723	724	725	726	729	731	732	733	734	735
ETHIOPIA	2320	7850	360	540	2860	11420	10350	4580	5630	3380	2250	70	6680	2610	34800	3480	440	2175
SOMALIA	280	620	30	90	270	840	810	160	200	80	80	5	280	-	3950	470	50	240
KENYA	4390	8780	400	1200	3600	8780	12770	2430	3050	1480	1850	40	3410	8290	51830	4840	690	3460
UGANDA	1070	3920	130	710	1420	7120	3380	1020	1280	610	770	20	1390	1940	19360	1940	240	730
TANZANIA	2250	5620	280	1120	2250	8430	8150	1600	2000	960	1200	25	2180	2650	34480	3540	440	3090
RWANDA	130	290	15	30	90	390	380	100	125	50	50	5	170	-	1510	180	20	90
BURUNDI	85	190	10	20	60	250	250	70	90	35	35	5	120	-	1180	140	15	70
ZAMBIA	5210	11460	520	1560	1560	18240	13550	3900	5850	1950	2930	60	4820	5470	54720	5470	880	2050
MALAWI	870	1740	90	170	520	3050	2260	520	650	310	390	10	710	1240	8460	1130	110	340
MADAGASCAR	1230	2460	120	250	1230	2710	4310	645	1080	520	645	15	1410	2140	16050	1500	210	1500
MAURITIUS	340	620	30	80	110	700	920	300	500	240	200	5	750	50	4510	370	-	370
SUBREGION	18175	43550	2035	5770	13970	61930	57130	15275	20485	9615	10400	260	21920	24390	230870	23060	2895	14115

1985 (t)	711	712	714	715	717	718	719	722	723	724	725	726	729	731	732	733	734	735
ETHIOPIA	5420	11920	540	1630	4340	17340	13010	6820	8530	4090	4090	100	10470	3970	52960	5300	660	3310
SOMALIA	350	770	40	110	210	1050	930	200	250	120	120	5	310	-	5040	600	60	300
KENYA	5490	12080	550	1650	4940	13730	16470	3380	4230	2030	2030	50	5190	11400	71250	6650	950	4750
UGANDA	2550	5610	260	770	2040	10200	4080	1460	1830	880	880	20	2240	2770	27680	2770	350	1040
TANZANIA	3850	8470	390	1160	3080	11550	10010	2220	2780	1330	1330	30	3410	3630	47190	4840	610	4240
RWANDA	210	460	20	60	130	630	590	160	200	100	100	5	250	-	2600	310	30	160
BURUNDI	150	330	20	50	90	450	420	120	150	70	70	5	180	-	2020	240	20	120
ZAMBIA	7010	15420	700	2100	2100	24540	18230	5260	6580	3160	3160	30	8070	7360	73600	7360	920	2760
MALAWI	1160	2550	120	350	700	4060	3250	680	850	410	410	10	1040	1650	11250	1500	150	450
MADAGASCAR	1640	3610	160	490	1640	4100	4760	1140	1430	680	680	20	1750	2830	21230	1980	280	1980
MAURITIUS	390	860	40	120	160	980	1370	560	700	340	340	10	860	70	6210	510	-	510
SUBREGION	28220	62080	2840	6860	19430	88630	73120	22000	27330	13210	13210	235	33770	33660	321030	32060	5030	19620

Table III/11 a - c

Breakdown into Subdivisions of Projections, Divisions 71, 72, 73

1975 (%)	711	712	714	715	717	718	719	722	723	724	725	726	729	731	732	733	734	735
ETHIOPIA	5.0	20.0	1.0	1.0	10.0	34.0	29.0	23.0	15.0	25.0	9.0	0.2	27.8	7.0	80.0	7.0	1.0	5.0
SOMALIA	8.0	20.0	1.0	1.5	6.0	25.0	38.5	18.0	25.0	10.0	10.0	0.3	36.7	-	80.0	15.0	1.0	4.0
KENYA	10.0	24.0	1.0	3.5	7.0	24.0	30.5	16.0	23.0	12.0	16.0	0.3	22.7	18.0	70.0	6.0	1.0	5.0
UGANDA	4.0	22.0	1.0	4.0	9.0	38.0	22.0	19.0	23.0	11.0	16.0	0.2	30.8	5.0	80.0	12.0	1.0	2.0
TANZANIA	7.0	24.0	1.0	3.0	9.0	26.0	30.0	20.0	21.0	11.0	17.0	0.3	30.7	4.0	78.0	10.0	1.0	7.0
RWANDA	8.0	20.0	1.0	1.5	6.0	25.0	38.5	18.0	25.0	10.0	10.0	0.3	36.7	-	80.0	15.0	1.0	4.0
BURUNDI	8.0	20.0	1.0	1.5	6.0	25.0	38.5	18.0	25.0	10.0	10.0	0.3	36.7	-	80.0	15.0	1.0	4.0
ZAMBIA	7.0	21.0	1.0	2.0	3.0	35.0	31.0	20.0	33.0	7.0	13.0	0.2	26.8	7.0	80.0	9.0	1.0	3.0
MALAWI	10.0	18.0	1.0	2.0	6.0	38.0	25.0	21.0	27.0	10.0	13.0	0.3	28.7	14.0	70.0	12.0	1.0	3.0
MADAGASCAR	10.0	15.0	1.0	2.0	11.0	22.0	39.0	15.0	25.0	12.0	13.0	0.2	34.8	9.0	75.0	8.0	1.0	7.0
MAURITIUS	12.0	24.0	1.0	2.0	3.0	18.0	40.0	13.0	26.0	10.0	8.0	0.4	42.6	1.0	86.0	6.0	-	7.0

1980 (%)	711	712	714	715	717	718	719	722	723	724	725	726	729	731	732	733	734	735
ETHIOPIA	6.5	22.0	1.0	1.5	8.0	32.0	29.0	20.0	25.0	15.0	10.0	0.3	29.7	6.0	80.0	8.0	1.0	5.0
SOMALIA	10.0	22.0	1.0	2.0	6.0	30.0	29.0	20.0	25.0	10.0	10.0	0.3	34.7	-	84.0	10.0	1.0	5.0
KENYA	11.0	22.0	1.0	3.0	9.0	22.0	32.0	20.0	25.0	12.0	15.0	0.3	27.7	13.0	75.0	7.0	1.0	5.0
UGANDA	6.0	22.0	1.0	4.0	8.0	40.0	19.0	20.0	25.0	12.0	15.0	0.3	27.3	8.0	80.0	8.0	1.0	3.0
TANZANIA	8.0	20.0	1.0	4.0	8.0	30.0	29.0	20.0	25.0	12.0	15.0	0.3	27.3	6.0	78.0	8.0	1.0	7.0
RWANDA	10.0	22.0	1.0	2.0	6.0	30.0	29.0	20.0	25.0	10.0	10.0	0.3	34.7	-	84.0	10.0	1.0	5.0
BURUNDI	10.0	22.0	1.0	2.0	6.0	30.0	29.0	20.0	25.0	10.0	10.0	0.3	34.7	-	84.0	10.0	1.0	5.0
ZAMBIA	10.0	22.0	1.0	3.0	3.0	35.0	26.0	20.0	30.0	10.0	15.0	0.3	24.7	8.0	80.0	8.0	1.0	3.0
MALAWI	10.0	20.0	1.0	2.0	6.0	35.0	26.0	20.0	25.0	12.0	15.0	0.3	27.3	11.0	75.0	10.0	1.0	3.0
MADAGASCAR	10.0	20.0	1.0	2.0	10.0	22.0	35.0	15.0	25.0	12.0	15.0	0.3	32.7	10.0	75.0	7.0	1.0	7.0
MAURITIUS	12.0	22.0	1.0	3.0	4.0	25.0	33.0	15.0	25.0	12.0	10.0	0.3	37.3	1.0	85.0	7.0	-	7.0

1985 (%)	711	712	714	715	717	718	719	722	723	724	725	726	729	731	732	733	734	735
ETHIOPIA	10.0	22.0	1.0	3.0	8.0	32.0	24.0	20.0	25.0	12.0	12.0	0.3	30.7	6.0	80.0	8.0	1.0	5.0
SOMALIA	10.0	22.0	1.0	3.0	6.0	30.0	28.0	20.0	25.0	12.0	12.0	0.3	30.7	-	84.0	10.0	1.0	5.0
KENYA	10.0	22.0	1.0	3.0	9.0	25.0	30.0	20.0	25.0	12.0	12.0	0.3	30.7	12.0	75.0	7.0	1.0	5.0
UGANDA	10.0	22.0	1.0	3.0	8.0	40.0	16.0	20.0	25.0	12.0	12.0	0.3	30.7	8.0	80.0	8.0	1.0	3.0
TANZANIA	10.0	22.0	1.0	3.0	8.0	30.0	26.0	20.0	25.0	12.0	12.0	0.3	30.7	6.0	78.0	8.0	1.0	7.0
RWANDA	10.0	22.0	1.0	3.0	6.0	30.0	28.0	20.0	25.0	12.0	12.0	0.3	30.7	-	84.0	10.0	1.0	5.0
BURUNDI	10.0	22.0	1.0	3.0	6.0	30.0	28.0	20.0	25.0	12.0	12.0	0.3	30.7	-	84.0	10.0	1.0	5.0
ZAMBIA	10.0	22.0	1.0	3.0	3.0	35.0	26.0	20.0	25.0	12.0	12.0	0.3	30.7	8.0	80.0	8.0	1.0	3.0
MALAWI	10.0	22.0	1.0	3.0	6.0	35.0	28.0	20.0	25.0	12.0	12.0	0.3	30.7	11.0	75.0	10.0	1.0	3.0
MADAGASCAR	10.0	22.0	1.0	3.0	10.0	25.0	29.0	20.0	25.0	12.0	12.0	0.3	30.7	10.0	75.0	7.0	1.0	7.0
MAURITIUS	10.0	22.0	1.0	3.0	4.0	25.0	35.0	20.0	25.0	12.0	12.0	0.3	30.7	1.0	85.0	7.0	-	7.0

Table III/12 a - c

Basis Figures and Breakdown into Subdivisions of Projections Divisions 69 (t and %)

	BASIS FIGURES				PROJECTIONS		
	(1) IMPORTS (t)	(2) LOCAL PROD.	(2) as % of (1)	total (1+2)	1975	1980	1985
ETHIOPIA	10900	4300	40	15200	21300	42300	64300
SOMALIA	2300	700	30	3000	3400	4200	5400
KENYA	15800	20500	130	36300	53500	73000	101700
UGANDA	7600	6500	85	14100	21700	30600	43900
TANZANIA	10900	12700	115	23600	32500	43800	59600
RWANDA	600	600	100	1200	1000	1800	3000
BURUNDI	700	700	100	1400	1600	2400	4200
ZAMBIA	11800	21000	180	32800	47000	63400	85400
MALAWI	5300	3200	60	8500	11700	15400	20500
MADAGASCAR	6700	4300	65	11000	12600	15500	20400
MAURITIUS	1700	1100	65	2800	3300	4500	6300
SUBREGION	74300	78800	106	153100	215400	296900	414700

	691		692		693		694		695		696		697		698	
1975	%	t	%	t	%	t	%	t	%	t	%	t	%	t	%	t
ETHIOPIA	22.0	6010	9.0	2460	19.0	5190	11.0	3000	9.0	2460	1.5	410	8.0	2180	20.5	5600
SOMALIA	22.0	750	9.0	310	19.0	650	11.0	370	9.0	310	1.5	50	8.0	270	20.5	700
KENYA	22.0	11770	9.0	4820	19.0	10170	11.0	5890	9.0	4820	1.5	800	8.0	4250	20.5	10970
UGANDA	22.0	4770	9.0	1950	19.0	4120	11.0	2390	9.0	1950	1.5	330	8.0	1740	20.5	4450
TANZANIA	22.0	7150	9.0	2930	19.0	6180	11.0	3580	9.0	2930	1.5	480	8.0	2600	20.5	6660
RWANDA	22.0	220	9.0	90	19.0	190	11.0	110	9.0	90	1.5	20	8.0	80	20.5	210
BURUNDI	22.0	350	9.0	140	19.0	300	11.0	180	9.0	140	1.5	20	8.0	130	20.5	330
ZAMBIA	22.0	10340	9.0	4230	19.0	8930	11.0	5170	9.0	4230	1.5	710	8.0	3760	20.5	9640
MALAWI	22.0	2570	9.0	1050	19.0	2220	11.0	1290	9.0	1050	1.5	180	8.0	940	20.5	2400
MADAGASCAR	22.0	2770	9.0	1130	19.0	2390	11.0	1390	9.0	1130	1.5	190	8.0	1010	20.5	2580
MAURITIUS	22.0	730	9.0	300	19.0	630	11.0	360	9.0	300	1.5	50	8.0	260	20.5	670
SUBREGION	22.0	47430	9.0	19410	19.0	40970	11.0	23730	9.0	19410	1.5	3240	8.0	17250	20.5	44210

	691		692		693		694		695		696		697		698	
1980	%	t	%	t	%	t	%	t	%	t	%	t	%	t	%	t
ETHIOPIA	20.0	8460	10.0	4230	18.0	7610	12.0	5080	10	4230	1.5	640	8.5	3600	20.0	8460
SOMALIA	20.0	850	10.0	420	18.0	760	12.0	510	10	420	1.5	60	8.5	360	20.0	850
KENYA	20.0	14600	10.0	7300	18.0	13140	12.0	8760	10	7300	1.5	1100	8.5	5210	20.0	14600
UGANDA	20.0	6120	10.0	3060	18.0	5510	12.0	3670	10	3060	1.5	460	8.5	2600	20.0	6120
TANZANIA	20.0	8760	10.0	4380	18.0	7880	12.0	5260	10	4380	1.5	660	8.5	3720	20.0	8760
RWANDA	20.0	360	10.0	180	18.0	320	12.0	220	10	180	1.5	30	8.5	150	20.0	360
BURUNDI	20.0	480	10.0	240	18.0	430	12.0	290	10	240	1.5	40	8.5	200	20.0	480
ZAMBIA	20.0	12680	10.0	6340	18.0	11410	12.0	7610	10	6340	1.5	950	8.5	5390	20.0	12680
MALAWI	20.0	3080	10.0	1540	18.0	2770	12.0	1850	10	1540	1.5	230	8.5	1310	20.0	3080
MADAGASCAR	20.0	3100	10.0	1550	18.0	2790	12.0	1860	10	1550	1.5	230	8.5	1320	20.0	3100
MAURITIUS	20.0	900	10.0	450	18.0	810	12.0	540	10	450	1.5	70	8.5	380	20.0	900
SUBREGION	20.0	59390	10.0	29690	18.0	53430	12.0	35650	10	29690	1.5	4470	8.5	24240	20.0	59390

	691		692		693		694		695		696		697		698	
1985	%	t	%	t	%	t	%	t	%	t	%	t	%	t	%	t
ETHIOPIA	20.0	12860	10.0	6430	18.0	11570	12.0	7720	10.0	6430	1.5	960	8.5	5470	20.0	12860
SOMALIA	20.0	1080	10.0	540	18.0	970	12.0	650	10.0	540	1.5	80	8.5	460	20.0	1080
KENYA	20.0	20340	10.0	10170	18.0	18310	12.0	12200	10.0	10170	1.5	1530	8.5	8640	20.0	20340
UGANDA	20.0	8780	10.0	4390	18.0	7900	12.0	5270	10.0	4390	1.5	660	8.5	3730	20.0	8780
TANZANIA	20.0	11920	10.0	5960	18.0	10730	12.0	7150	10.0	5960	1.5	890	8.5	5070	20.0	11920
RWANDA	20.0	600	10.0	300	18.0	540	12.0	360	10.0	300	1.5	50	8.5	260	20.0	600
BURUNDI	20.0	840	10.0	420	18.0	760	12.0	500	10.0	420	1.5	60	8.5	360	20.0	840
ZAMBIA	20.0	17080	10.0	8540	18.0	15370	12.0	10250	10.0	8540	1.5	1280	8.5	7260	20.0	17080
MALAWI	20.0	4100	10.0	2050	18.0	3690	12.0	2460	10.0	2050	1.5	310	8.5	1740	20.0	4100
MADAGASCAR	20.0	4080	10.0	2040	18.0	3670	12.0	2450	10.0	2040	1.5	300	8.5	1730	20.0	4080
MAURITIUS	20.0	1260	10.0	630	18.0	1130	12.0	760	10.0	630	1.5	90	8.5	540	20.0	1260
SUBREGION	20.0	82940	10.0	41470	18.0	74640	12.0	49770	10.0	41470	1.5	6210	8.5	35260	20.0	82940

Table III/13

Summary of Projections Divisions 69, 71, 72 and 73

t	Basis values				1975				1980				1985			
	Division				Division				Division				Division			
	69	71	72	73	69	71	72	73	69	71	72	73	69	71	72	73
Ethiopia	15200	12800	8100	15700	27300	23000	14500	28100	42300	35700	22500	43500	64300	54200	34100	66200
Total	51.800				92.900				144.000				218.800			
Somalia	3000	1200	600	3300	3400	2300	700	3800	4200	2800	800	4700	5400	3500	1000	6000
Total	8.800				10.200				12.500				15.900			
Kenya	36300	19600	6000	33800	53500	28900	8900	50000	73000	39900	12300	69100	101700	54900	16900	95000
Total	95.700				141.300				194.300				268.500			
Uganda	14100	8300	2400	11200	21700	12600	3600	17100	30600	17800	5100	24200	43900	25500	7300	34600
Total	36.000				55.000				77.700				111.300			
Tanzania	23600	15300	4400	24000	32500	21000	6000	33000	33000	43800	28100	8000	44200	59600	38500	60500
Total	67.300				92.500				124.100				169.700			
Rwanda	1200	800	300	1100	1000	700	300	1100	1800	1300	500	800	3000	2100	500	3100
Total	3.400				3.100				4.400				9.000			
Burundi	1400	500	200	800	1600	550	200	950	1400	850	350	1400	4200	1500	600	2400
Total	2.900				3.300				5.000				8.700			
Zambia	32800	27100	10200	35600	47000	38700	14600	50800	63400	52100	19500	68400	95400	70100	26300	92000
Total	105.700				151.100				203.400				273.800			
Malawi	8500	4800	1400	6200	11700	6600	2000	8500	15400	8700	2600	11300	20500	11600	3400	15000
Total	20.900				28.800				38.000				50.500			
Madagasc.	11000	8700	3000	15100	12600	10000	3500	17400	15500	12300	4300	21400	20400	16400	5700	28300
Total	37.800				43.500				53.500				70.800			
Mauritius	2800	1800	1300	3400	3300	2200	2500	3900	4500	2800	2000	5300	6300	3900	2800	7300
Total	9.300				10.900				14.600				20.300			
Subregion	149900	101600	37900	150200	215400	146600	55800	214600	296900	202300	78000	295300	414700	282000	110000	410400
Total	439.600				631.800				872.500				1.217.300			

Table III/14

Motor vehicles: actual fleet in 1963 and 1967 and projected fleet in 1975 and 1980[a)]

Country	Actual fleet				Projected fleet			
	Automobiles		Trucks and buses		Automobiles		Trucks and buses	
	1963	1967	1963	1967	1975	1980	1975	1980
Burundi	2302[b)]	(2302)	1520[b)]	(1520)	5204	7646	2621	3590
Ethiopia	14200	31598	7100	6224	45280	60313	12493	17441
Kenya	78000	45858	10200	38429	68250	92190	67520	101523
Madagascar	25000	37115	23000	26450	53594	77170	40890	55234
Malawi	7143	6436	4972	4581	9800	13490	9953	16045
Mauritius	12016	13168	3391	4925	19454	25066	7388	9840
Rwanda	1731[c)]	(1731)	966[c)]	(966)	3790	5620	1883	2628
Somalia	3500	4857	4500	7028	7175	9877	10540	14509
Uganda	23500	28030	10500	8667	42048	54690	21674	30404
United Republic of Tanzania	28722	26974	25494	32853	39550	50000	61707	89978
Zambia	36930	61064	11136	35119	88860	115580	83885	124393
Total	233044	259133	99777	165796	383005	511642	320564	465585

a) Figures in parentheses were used only to estimate the demand for motor vehicle tyres

b) 1965

c) 1966

Source: ST/ECA/40/Part IV

Table III/15

Demand for Passenger Cars, 1964 - 1966, and projected Demand for 1975 and 1980

Year	Burundi	Ethiopia	Kenya	Madagascar	Malawi	Mauritius	Rwanda	Somalia	Uganda	United Republic of Tanzania	Zambia	Total
1964-66	300	3410	5745	2837	1014	1363	235	795	4131	2623	6120	28573
1975	1454	8296	15174	5739	2828	3503	1251	2062	11118	6680	15444	73549
1980	3067	14480	27616	9757	5280	5745	2673	3833	19857	10564	25907	128699

Table III/16

Demand for Trucks and Buses, 1964 - 1966, and projected Demand for 1975 and 1980

Year	Burundi	Ethiopia	Kenya	Madagascar	Malawi	Mauritius	Rwanda	Somalia	Uganda	United Republic of Tanzania	Zambia	Total
1964-66	246	1128	1500	1561	643	228	151	509	1316	1807	2055	11144
1975	554	4135	4298	3535	2754	492	459	1100	5141	5900	10396	38764
1980	885	6862	8379	5572	5603	757	756	1775	8576	10377	18725	68267

Source: ST/ECA/40/Part IV

Table III/17

Projected Demand for Trailers in 1975 and 1980

Item	Burundi	Ethiopia	Kenya	Madagascar	Malawi	Mauritius	Rwanda	Somalia	Uganda	United Republic of Tanzania	Zambia	Total
Stocks of trailers, 1975	12	690	8884	1441	404	75	12	164	2147	4783	5770	24382
Demand for trailers, 1975	2	100	1350	210	61	11	2	25	316	717	877	3671
Demand for trailers, 1980	3	125	1740	263	77	15	3	32	397	916	1130	4701

Source: ST/ECA/40/Part IV

Table III/18

Eastern Africa - Agricultural Tractor Fleet

	Ken	Tan	Uga	Bur	Eth	Som	Zam	Mad	Mlw	Mau	Rwa	Total[a]
1963 - Total	6,111	4,200[c]	400[c]	15[c]	122[b]	120	2,760[b]	854[b]	210	280	12	15,084
Wheel	5,167	2,375	300[c]	19[c]	90[b]	90[c]	2,700	774[b]	210	35	7	11,767
1964 - Total	5,783	..	550[a]	..	..	..	..	1,770[a]	..	280	12	..
Wheel	4,976	2,575	..	..	..	..	..	..	..	35	7	..
1965 - Total	5,729	..	..	..	..	..	..	..	..	283	12	..
Wheel	4,886	2,567	441	..	400	92	3,158	885	..	40	7	..
1966 - Total	6,232	..	..	..	..	..	..	..	..	283	..	..
Wheel	5,420	..	..	..	..	..	..	..	..	40	..	..
1967 - Total	6,617	5,600[c]	1,000[c]	20[c]	1,200[c]	125[c]	4,800[c]	1,100	450	283	15[c]	21,210
Wheel	5,894	3,100[c]	800[c]	16[c]	1,000	100[c]	4,600[c]	1,000	400[c]	40	8[c]	16,958
Total imports 1964-67 (thousand)	3,647	2,127	1,503	..	..	..	..	824	..	121	..	..
Average renewal rate (%)	10,6	14.0	28.7					15.4		17.8		

Sources: ECA Statistical Division; ECA-CDPPP; FAO Production Yearbook

a) including tractors for non-agricultural use (earth moving)
b) 1962
c) estimated

Table III/18a

Eastern Africa - Imports of Tractors other than Road Tractors for Tractor-Trailer Combination (712,5 SITC Rev., Statistical Papers, Series M, No. 34) (units)

	Ken	Tan	Uga	Bur	Eth	Som	Zam	Mad	Mlw	Mau	Rwa	Total[a]
1962	416	281	61	..	..	..	..	191	..	59	..	1,008
1963	809	846	240	..	..	..	..	185	..	65	..	2,145
1964	790	596	397	..	..	..	450	239	-	82	..	2,104
1965	902	612	202	..	..	..	719	186	87	27	..	1,929
1966	1,078	399	618	..	..	18	689	226	99	8	..	2,329
1967	877	520	286	..	..	18	..	173	76	4	..	1,860
Average 1962-64	672	574	232	..	..	..	..	205	..	69	..	1,754
Average 1965-67	952	510	368	..	..	..	..	195	..	13	..	2,038
Average rate of growth (%)	12.2	-4.0	16.6	..	..	..	..	-1.7	..	-174.0	..	5.2

Source: FAO Trade Yearbook 1968

a) only for Ken, Tan, Uga, Mad., Mau

Table III/18b

Eastern Africa - Objectives for Expansion of Agricultural Mechanization[a)]

	Ken	Tan	Uga	Bur	Eth	Som	Zam	Mad	Mlw	Mau	Rwa	Total
Fleet 1965 (thousand)	6,400	2,600	600	15[b)]	600	120[b)]	2,750	1,750	300	280[b)]	12[b)]	15,427
1975 "	10,000	4,000	1,000	..	2,000	..	4,000	2,400	600	..	..	..
1985 "	15,000	6,000	2,000	..	4,000	..	6,000	3,500	1,000	..	..	..
Harvested Hectares p. Tract 1965	500	1,425	6,165	..	15,500	..	440	915	4,700	..	..	..
1975	360	1,275	4,800	..	5,900	..	425	830	3,300	..	..	..
1985	280	970	2,800	..	3,575	..	370	685	2,000	..	..	..
Average Yearly Demand for Tractors 1960-65 (thousand)	650	500	180	..	100	..	500	180	70	..	..	..
Demand 1975 - Total (thousand)	1,500	950	325	..	700	..	1,000	350	140	..	..	..
Replacement "	1,000	770	270		400		850	270	100			
Fleet increase "	500	180	55		300		150	80	40			
Demand 1985 - Total (thousand)	2,400	1,400	530	..	1,100	..	1,500	550	220	..	..	..
Replacement "	1,750	1,130	380		800		1,200	420	170			
Fleet increase "	650	270	150		300		300	130	50			
Average growth rate of fleet 1975-1985 (%)	4.2	4.2	7.2	5.0[c)]	7.2	3.0[c)]	4.2	3.9	5.2	3.0[c)]	5.0[c)]	..
Average growth rate of fleet demand 1975-85(%)	4.8	4,0	5.1	..	4.7	..	4.2	4.7	4.7	..	..	..
Fleet 1980 (thousand)	12,280	4,910	1,420	32	2,830	190	4,910	2,910	770	440	25	30,717
Demand 1980 "	1,900	1,160	420	8[d)]	880	43[d)]	1,230	420	180	101[d)]	6[d)]	6,798

a) C.Voss, FAO, July 1968 - b) From table 24 - c) estimated average growth rate in the period 1965 - 1968 - d) calculated on the basis of 20 % replacement and of the assumed growth rate of the fleet

Table III/19

Projected Demand for Car Batteries in 1975 ('000; '000 $, ex factory)

	Burundi	Ethiopia	Kenya	Madagasc.	Malawi	Mauritius	Rwanda	Somalia	Uganda	Unit. Rep. of Tanz.	Zambia	Total
For passenger cars												
Fleet a)	2.6	22.6	34.1	26.8	4.9	9.7	1.9	3.6	21.0	29.8	44.4	191.4
Value at $13/unit	34	294	443	348	64	126	25	47	273	257	577	2488.0
New cars b)	1.4	8.0	14.9	5.6	2.7	3.7	1.2	2.0	10.9	6.5	25.9	72.8
Value at $13/un.	18	104	194	73	35	48	16	26	142	84	207	946.0
For trucks & buses												
Fleet a)	1.3	6.2	33.8	20.4	5.0	3.7	0.9	5.3	10.8	30.9	41.9	160.2
Value at $40/un.	52	248	1352	816	200	148	36	212	432	1236	1676	6408.0
New trucks b)	0.6	4.1	4.3	3.5	2.8	0.5	0.5	1.1	5.1	5.9	10.4	38.8
Value at $40/un.	24	164	172	140	112	20	20	44	204	236	416	1552.0
For tractors												
Fleet a)	-	0.3	4.4	0.7	0.2	-	-	0.1	1.1	2.4	2.9	12.1
Value at $40/un	-	12	176	28	8	-	-	4	44	96	116	484.0
New tractors	-	0.1	1.3	0.2	0.1	-	-	-	0.3	0.7	0.9	3.6
Value at $40/un	-	4	52	8	4	-	-	-	12	28	36	144.0
Total number	5.9	41.3	92.8	57.2	15.7	17.6	4.5	12.1	49.2	66.2	116.4	478.9
Total value	128	826	2389	1413	423	342	97	333	1107	1937	3028	12022.0

a) One battery per two vehicles

b) One battery per vehicle

Ctd.: Projected demand for car batteries in 1980
(Thousands; thousands of dollars, ex factory)

	Burundi	Ethiopia	Kenya	Madagasc.	Malawi	Maurit.	Rwanda	Somal.	Uganda	Unit. Rep. of Tanz.	Zambia	Total
For passenger cars												
Fleet	3.8	30.2	46.1	38.6	6.7	12.5	2.8	4.9	27.3	25.0	57.8	255.7
Value at $13/unit	49	393	599	502	87	162	36	64	354	325	751	3324.0
New cars	2.8	12.3	26.1	9.2	4.4	6.5	2.3	3.4	18.3	11.2	27.7	124.2
Value at $13/unit	36	160	339	120	57	84	30	44	238	146	360	1615.0
For trucks & buses												
Fleet	1.8	8.7	50.8	27.6	8.0	4.9	1.3	7.3	15.2	45.0	62.2	232.8
Value at $40/unit	72	348	2032	1104	320	196	52	292	608	1800	2488	9312.0
New trucks	0.9	6.9	8.4	5.6	5.6	0.8	0.8	1.8	8.6	10.4	18.7	68.5
Value at $40/unit	36	276	336	224	224	32	32	72	344	416	748	2740.0
For tractors												
Fleet	-	0.4	5.7	0.9	0.3	-	-	0.1	1.4	3.1	3.7	15.6
Value at $40/unit	-	16	228	36	12	-	-	4	56	124	148	624.0
New tractors	-	0.1	1.7	0.3	0.1	-	-	-	0.4	0.9	1.1	4.6
Value at $40/unit	-	4	68	12	4	-	-	-	16	36	44	184.0
Total number	9.3	58.6	138.8	82.2	25.1	24.7	7.2	17.5	71.2	95.6	171.2	701.4
Total value	193	1197	3602	1998	704	474	150	476	1616	2847	4539	17799.0

Source: ST/ECA/40/Part IV

Table III/20

Starters and generators for motor vehicles and tractors: projected demand for 1975 and 1980 (thousands)

Item	1975	1980
Starters		
For new vehicles	80	136
For replacement	10	14
Total	90	150
Generators		
For new vehicles	80	136
For replacement	10	14
Total	90	150
Total starters and generators	180	300

Source: ST/ECA/40/Part IV

Table III/21 a and b

Radio Receivers: Output in 1966 and Projected Output in 1975 and 1980 ('000s of sets)

Country	1966	1975	1980
Ethiopia	3[a)]	7	12
Kenya	140	358	603
Madagascar	50	96	138
Malawi	15	38	64
Uganda	30	77	132
United Republic of Tanzania	40	98	200
Zambia	10	25	45
Total	288	699	1194

a) 1967

Radio Receivers: Demand in 1966 and Projected Demand in 1975 and 1980 ('000s of sets)

Country	1966	1975	1980
Burundi	10	45	92
Äthiopien	63	146	248
Kenya	170	435	784
Madagascar	85	164	277
Malawi	22	57	100
Mauritius	20	52	94
Somalia	12	30	55
Rwanda, Lesotho-Botswana, Swazi	25	123	251
Uganda	80	206	353
United Republic of Tanzania	67	161	285
Zambia	59	124	223
Total	613	1543	2762

Source: ST/ECA/40/part IV

Table III/22

Insulated wire and cable: demand in 1963 and projected demand for 1973 and 1980

(Thousands of dollars)

Year	Burundi	Ethiopia	Kenya	Mada-gascar	Malawi	Mauri-tius	Rwanda	Somalia	Ugan-da	United Repub-lic of Tanzania	Zam-bia	Other	Total
1963	30	256	560	540	148	465	29	17	310	416	751	64	3577
1975	123	935	1856	1330	628	1311	149	46	1261	1455	3506	269	12869
1980	219	1547	3330	2142	1178	2160	268	76	2106	2530	6234	470	22260

Source: ST/ECA/40/Part IV

Table III/23

Kenya: Projections for Engineering Industries in the Second Development Plan 1970 - 1974

Industrial Employment Projections +)

Industry	Product growth 1967-74 per cent	Employment growth 1967-74 per cent	Numbers employed 1967	Numbers employed 1974	Increase in employment 1967-74
Metal products	7.5	5.1	3140	4458	1318
Machinery	8.3	2.5	3946	4703	757
Transp.equipment	7.0	1.6	14487	14251	1764
Total manufactur.	8.9	3.7	65702	85000	19298

Projections of New Investment by Industry

Industry	Project increase in gross product 1967-74 +) K£'000	Incremental capital output ratio	New investment 1967-73 K£'000
Metal products	1380,9	1.58	2500
Machinery	2080,2	1.35	2800
Transport equipm.	4568,5	0.87	4000
Total manufact.	34431,1	2.30	79.300

+) excluding small rural establishments, the total product of which was estimated at £K 2.8 million in 1967 and is projected at K£ 5.3 million for 1974.

Projections[+] of Gross Product and Output by Industry

at 1967 prices

Industry	Gross prod.(value add.)			Gross output		
	1967 K£'000	Growth rate %	1974 K£'000	1967 K£'000	Growth rate %	1974 K£'000
Metal products	2395	7.5	3976	7509	7.5	12466
Machinery	2774	8.3	4854	5320	8.3	9310
Transport equipment	7489	7.0	12058	13111	7.0	21108
Total manufacturing	42372	8.9	76803	136555	8.4	239778

Ranking List of Industries by Gross Product, Output and Employment in 1967 and 1974

(Ranking Order)

	Gross prod.		Output		Employm.	
	1967	1974	1967	1974	1967	1974
Transport equipment	1	1	3	3	1	1
Food processing	2	2	1	1	2	2
Chemicals & petrol.products	3	3	2	2	8	9
Beverages and tobacco	4	4	4	4	7	7
Machinery	5	5	10	11	6	6
Publishing and printing	6	7	9	10	9	10
Non-metallic minerals	7	10	8	9	11	11
Metal products	8	9	5	6	10	8
Footwear and clothing	9	11	6	7	4	5
Textiles	10	6	7	5	3	3
Wood products	11	13	12	13	5	4
Furniture and fixtures	12	14	13	14	12	13
Pulp and paper products	13	8	11	8	14	12
Miscellaneous	14	15	14	15	13	14
Rubber products	15	12	15	12	16	16
Leather products	16	16	16	16	15	15

+) excluding small rural establishments, the total product of which was estimated at £K 2.8 million in 1967 and is projected at K£ 5.3 million for 1974

Table III/24

Madagascar: Engineering Industries proposed for Establishment during Second Plan Period (1970 - 1974)

Metallurgical and Mechanical Industries

(Value: mill. of const. FMG, quant.: tons if not otherwise indic.)

Activity	Present situation				Targets of 2nd Plan 1974						Remarks
	Product. 1966		Product. 1968		imports 1974	Product. 1974		Exports 1974	investm. 1970-74	employment creat	
	quant.	val.	quant.	val.	val. cif	quant.	val.	val.	val.		
Metallurgical industries:											
semi-finished products:											
sheet metal rolling mill	8400	545	10300	670	1260	15000	975	195	230	105	new galvanization line
with scrap melting	-	-	-	-	105 2)	20000	880	45	780	170	one project of rolling mill with scrap melting
wire drawing	-	-	-	-	140 3)	2000	95	-	35	15	1 project of mild steel wire
welded tubes	-	-	-	-	45	3500	340	105	180	40	drawing, and of tube weld.
sub-total semi-finished prod.	-	545	-	670	1550 + 1125 4)	-	2290	345	1225	330	
finished prod.:											
unspecialized activities	-	930	-	1030	50 5)	-	1350	-	100 6)	50 6)	existing production
household utensils	73	40	100	55	15	1200	270	10	130	115	new product. of enamel ware /galv. metal ware
fencing wire	-	-	-	10	90 15)	460	45	-	35	30	extension project
nails	200	10	1500	70	40	2000	90	-	-	-	existing production
metal containers	-	365	-	475	15	-	750 6)	-	50 6)	-	dito
agricultural machinery	-	50	-	100	105 9)	-	155	-	8)	-	dito
cutlery	-	-	-	-	70	-	50	-	25	35	new production
hardware	-	-	-	-	115	480	90	-	105	50	dito
sub-total finished production	-	1395		1740	500 + 1400 2)	-	2800	10	445	280	
Assembly industries											
cars	1515 17)	675	1930 17)	960 12)	3990 14)	3250 17)	1650	-	100 8)6)	50 6)	existing production
bicycles	600 1)	5			180 7)	15000 17)	150	50	15	20	1 new project
sewing machines	-	-	-	-	100 10)	10000 17)	120	-	15	25	1 new project
sub-total assembly	-	680	-	960	4270 + 7750 11)	-	1920	50	130	95	
total production ex factory	-	-	-	3370	-	-	7010	405	-	-	
intra sectoral consumption	-	-	-	-	-	-	260 13)	-	-	-	
total sector	-	2620	-	3370	16600	-	6750	405	1800	705	

1) Incl. sheets for local prod. particularly for galvanization and tubes
2) Without scrap for melting
3) Incl. material for wire drawing
4) Imports not included above, particularly non-ferrous metals
5) Estimate for metal furniture and structural parts
6) Summary estimate
7) Incl. bicycles with aux. motor and parts for bicycles
8) Investments just before 2nd plan period not included
9) Incl. carts and their parts
10) Incl. parts for local assembly
11) Imports not included above
12) Existing production discontinued
13)
14) Incl. c.k.d. cars for local assembly
15) Incl. wire netting
16)
17) All quantities in numbers of units assembled

Table III/25

Madagascar: Engineering Industries Proposed for Establishment during Second Plan Period (1970 - 1974) Electrical Industries

Quantity: mill. of pos., if not otherwise indicated; value: mill. of const. FMG)

Activity	Present situation				Targets of 2nd plan 1974						Remarks
	production 1966		production 1968		imports 1974	production 1974		Export 1974	Invest. 1970-74	Employment creat.	
	Quant.	Value	Quant.	Value	Value cif	Quant.	Value	Value	Value		
1. Accumulators	-	115	20	140	30[1]	27.5	195	-	-	-	
2. Assembly radio TV 3)	-	60	8	113	1000[2]	18	180	-	-	20	extension of radio assembly
3. Dry cell batteries	-	-	-	-	50	19500	395	160	150	110	new production
4. Pocket lamp cases	-	-	-	-	5	500	40	-	25	15	new production
5. Small electr. material	-	-	-	-	200[4]	-	30	15.	15	15	new production
6. Low tension cables and wires	-	-	-	-	160	4000[5]	85	40	50	15	new production
Total production ex factory	-	175	-	253	-	-	925	-	-	-	
Intra-sectoral consumption	-	-	-	-	-	- -	25[7]	-	-	-	
Total production of sector	-	175	-	253	3000[6]	-	900	215	240	175	

1) Parts for production
2) Incl. parts
3) Total value of production refers to value of sets, not cost of assembly
4) Incl. other materials
5) km of wire
6) Summary estimate of sectoral imports (incl. products not analysed above)
7) Accumulator plates

Table III/26

Division 69: Summary of Identified Projects

Subdivision	Items in subdivision suitable for	
	local production	(sub)regional prod.
691	light structural parts metal furniture	heavy structural parts
692	large tanks metal boxes and tins	gas cylinders
693	wire drawing (mild steel wire) for fencing wire gauze and netting	wire ropes
694	nails screws (wood) bolts and nuts rivets, washers	-
695	agricultural hand tools	other hand and machine tools
696	knives, spoons and forks scissors	-
697	enamel holloware buckets, pots, pans etc.	gas stoves and cookers
698	building hardware	-

Table III/27

Division 71: Summary of Identified Projects

Subdivision	Items in subdivision suitable for	
	Local production	(sub)regional production
711		steam generating boilers diesel engines
712		
714		typewriters, calculating machines, duplicating machines
715		sheet metal working machines, drilling, sawing, grinding machines, lathes, planing machines
717		sewing machines (domestic)
718	mining machinery (Zambia)	food processing machinery
719		air-conditioners, non-electric refrigerators, pumps for liquids, belt conveyors, weighing machines, valves

Division 72: Summary of Identified Projects

Subdivision	Items in subdivision suitable for	
	local production	(sub)regional production
722	-	Electric motors generating sets transformers
723	housewire	high tension insulators copper and aluminium wires and cables
724	radio sets (assembly of types not produced subregionally) TV-sets (assembly)	radio sets (transistor type) phonographs loudspeakers amplifiers
725		refrigerators fans boilers flat irons
726	some items as sidelines to other production	-
729	dry cell batteries car batteries	cases for car batteries starters and generators bulbs electricity and water meters radio component parts

Table III/29

Division 73: Summary of Identified Projects

Subdivision	Items in subdivision suitable for	
	Local production	Regional production
731	-	railway freight cars
732	-	trucks, buses (chassis with engines mounted)
733	bicycles trailers (small)	trailers (large)
734	-	-
735	-	lake fishing and transport boats (Lake Victoria) inshore and deepsea fishing boats

Table III/30

Summary of Identified Projects

a) Industries which should be continued (if already existent) or established on a national basis

		Item	Remarks
69	691	light structural parts metal furniture	production facilities exist in all or most countries (metal furniture), generally with excess capacities
	692	large tanks metal boxes and tins	production of large tanks in all countries, viability of tins production depends on expansion of fruit etc. processing industry
	693	wire drawing wire gauze and netting	production exists in some countries, minimum capacities below 100 t p.a.
	694	nails, screws, bolts, nuts, rivets, washers etc.	production of nails in some countries, minimum capacity p. a. abt. 150t (screws), 500t (bolts)
	695	agricultural hand tools	production existing or planned in all countries, specialization is proposed for certain lines
	696	knives, spoons, forks, scissors	minimum capacity for knives, spoons and forks abt. 80t p. a.
	697	enamel hollow-ware	production exists in some countries, minimum capacity abt. 250t p. a.
	698	building hardware	production exists in some countries, minimum capacity abt. 200 t p.a. (locks, padlocks etc.)
71	718	mining machinery (Zambia)	chute boxes, rockdrill stems, ore dressing, filtration and flotation equipment, crushing mills
72	723	housewire	production exists in some countries, new plants proposed for Tanzania (400t) and Madgascar (500t)
	726	some items as sidelines to other productions	as detailed in 3.3.5
	729	dry cell batteries car batteries	production exists in most (car batt.) or some (dry cell) countries minimum capacity abt. 8000 and 6.000.000 units respectively
73	733	bicycles small trailers	production of trailers in most countries in connection with 732, min. cap. for bicycles abt. 15.000

Table III/31

b) Industries which should be established on a (sub)regional basis

Div.	Sub-div.	Item \ Priority	1st Priority	2nd Priority	3rd Priority	Link
69	691	heavy structural parts	1 10000 t 2 3 4 Tanzania (1) 5 expansion			
	692	gas cylinders	1 3000 t 2 519,000 US$ 3 34 4 Uganda (2,3,4) 5 new			697
	693	wire ropes		1 6-8000 t 2 3 4 Zambia 5 expansion	1 6-8000 t 2 3 4 Kenya 5 new	719
	695	hand and machine tools	1 3000 t 2 5,500,000 US$ 3 440 employees 4 Ethiopia (3,4) 5 expansion			715
	697	gas stoves and cookers	1 3000/3000 units 2 396,000 US$ 3 35 employees 4 5	1 3000/3000 units 2 3 4 Malawi (2,3,4) 5 new		
71	711	diesel engines	1 35-40000 units 2 . 3 4 Kenya (2,3) 5 new			719 722 732
		steam generating boilers		1 2000 t 2 3 4 Kenya (1) 5 new		
	714	typewriters		1 60000 units 2 3 4 Mauritius (5,6) 5 new		
		calculating machines		1 55000 units 2 3 4 Madagascar (5,6 5 new		
		duplicating machines			1 20000 units 2 3 4 Madagascar(5,6) 5 new	
	715	sheet metal working machines	1 500 t 2 3424,000 3 280 4 Tanzania(1,2,3) 5 new			69 71 72 73

Cont. I

Div.	Sub-div.	Item \ Priority	1st Priority	2nd Priority	3rd Priority	Link
71	715	lathes	1 s. fact sheet 2 3,424,000 US$ 3 275 employees 4 Kenya (1,2,3) 5 new			69 71 72 73
		milling and drilling machines	1 s. fact sheet 2 3,424,000 US$ 3 280 4 Kenya (1,2,3) 5 new			69 71 72 73
		hydraulic and excenter presses	1 s. fact sheet 2 4,243,000 US$ 3 280 4 Uganda (1,2,3) 5 new			69 71 72 73
		shaping and planing machines	1 s. fact sheet 2 4,156,000 US$ 3 330 4 Uganda (1,2,3) 5 new			69 71 72 73
	717	domestic sewing machines	1 30-35000 units 2 3 4 Malawi (3,4) 5 new			
	718	food processing machines		1 2000 t 2 3 4 Ethiopia(2,3,4) 5 new		
	719	air-conditioning machines	1 8000 units 2 3 4 Burundi(3,4,5) 5 new			
		non-electric refrigerators	1 abt. 5000 units 2 3 4 Malawi (3,4,5) 5 expansion			
		pumps for liquids	1 16000 units 2 1,980,000 US$ 3 245 4 Rwanda (3,4,5) 5 new	1 15000 units 2 3 4 Zambia (3,4,5) 5 new		
		belt conveyors		1 500 units each 2 3 4 Ken/Tan/Zam 5 new		
		weighing machines		1 6-800 units 2 3 4 Ethiopia(3,4,5) 5		

Cont. II

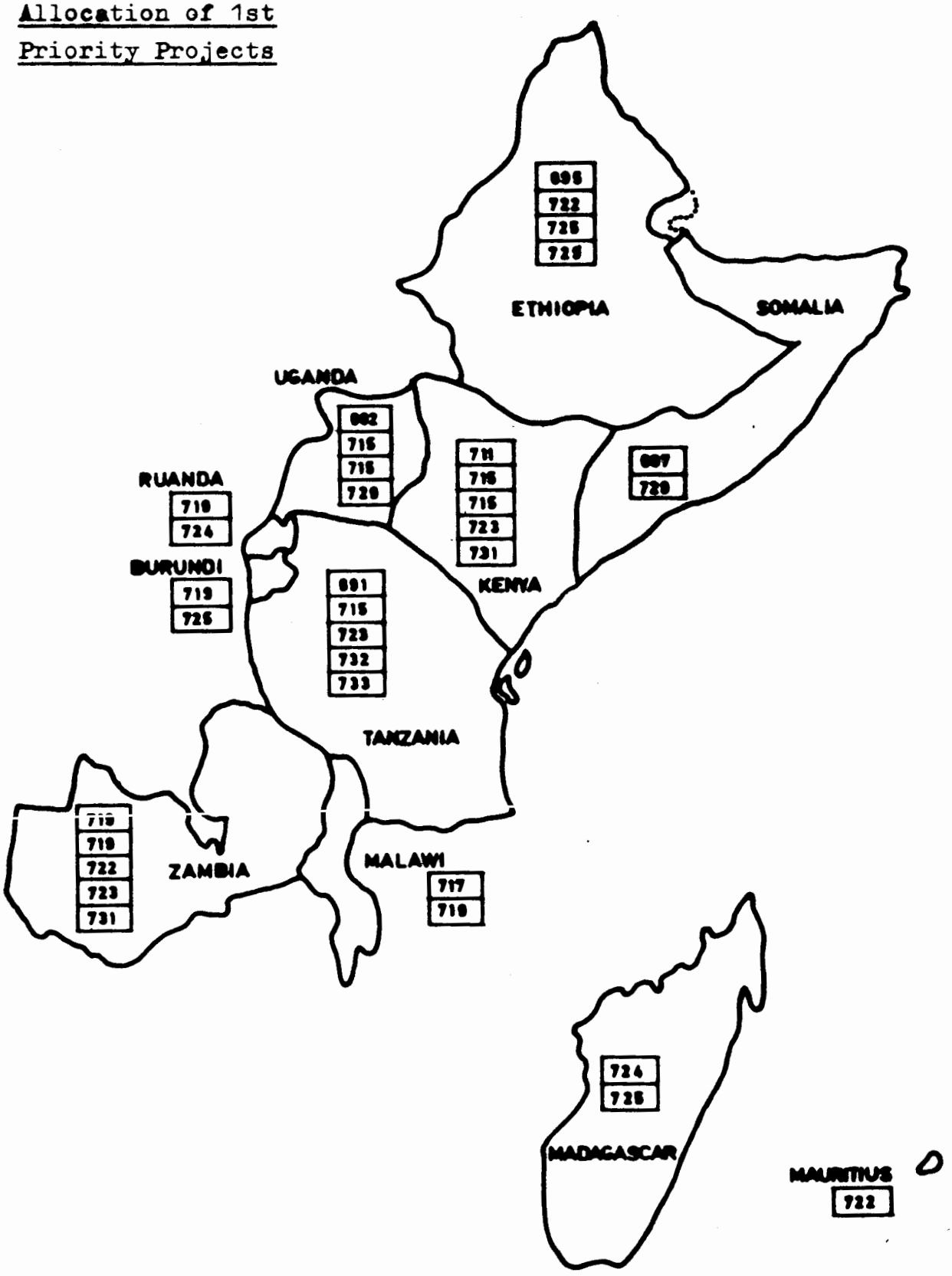
Div.	Sub-div.	Item \ Priority	1st Priority	2nd Priority	3rd Priority	Link
71	719	valves	1 1500 t 2 3 4 Zambia 5 new			692 697 711 718
	722	electric motors	1 abt.20,000 units,each 2 3 4 Mauritius + Mad. 5 new	1 6-8000 units 2 3 4 Ethiopia (4,5,6) 5 new		715 718 719 725
		generating sets		1 abt. 3000 units 2 3 4 Ethiopia 5 new		
		transformers	1 30-40000 KVA 2 3 4 Zambia 5 expansion			
	723	high tension insulators			1 2-2500 tons 2 3 4 near raw mat. 5 new	
		copper and aluminium wires and cables	1 copper 3500t each 2 3 4 Zam/Ken 5 expansion	alum.1500 t each Zam/Tan expansion/new		71 72
	724	radio sets	1 4-500000 units 2 3 4 Rwanda 5 expansion	5-600000 units Madagascar expansion		
	725	refrigerators	1 20000 units 2 3 4 Burundi (3,4) 5 new	1 10000 units 2 3 4 Uganda (3,4) 5 expansion		
		fans	1 15000 units 2 3 4 Ethiopia (4,5,6) 5 new	1 10000 units 2 3 4 Mad (4,5,6) 5 new		
		boilers			1 10000 units 2 3 4 Somalia (2,3,4) 5 new	
		flat irons		1 20000 units 2 3 4 Malawi(3,4,5) 5 new		

Cont. III

Div.	Sub-div.	Item / Priority	1st Priority	2nd Priority	3rd Priority	Link
72	729	cases for batteries	1 3-400000 units 2 3 4 Eth (3,4,5) 5 new			
		starters and generators	1 35000 units each 2 3 4 Somalia(2,3,4) 5 new			
		electric bulbs	1 10 mio units 2 3 4 Uganda 5 new			
		electricity and water meters		1 subj. to study 2 3 4 Burundi (3,4,5) 5 new		
		radio component parts	1 linked to 724 2 3 4 Rwanda (3,4,5) 5 new			724
	731	railway freight cars	1 abt. 3-400 units 2 each 3 4 Kenya/Zambia 5 expansion			
	732	trucks, buses	1 30-35000 units 2 3 4 Tanzania (1,2,3) 5 new			
	733	trailers	1 abt. 1000 units 2 3 4 Tanzania (1,2,3) 5 expansion			
	735	lake fishing and transport boats		1 subj. to study 2 3 4 Uganda 5 expansion		
		Inshore and deepsea fishing boats		1 subj. to study 2 3 4 Tanzania/Maurit. 5 expansion		

III/32

Allocation of 1st Priority Projects



III/33

Allocation of 2nd and 3rd Priority Projects

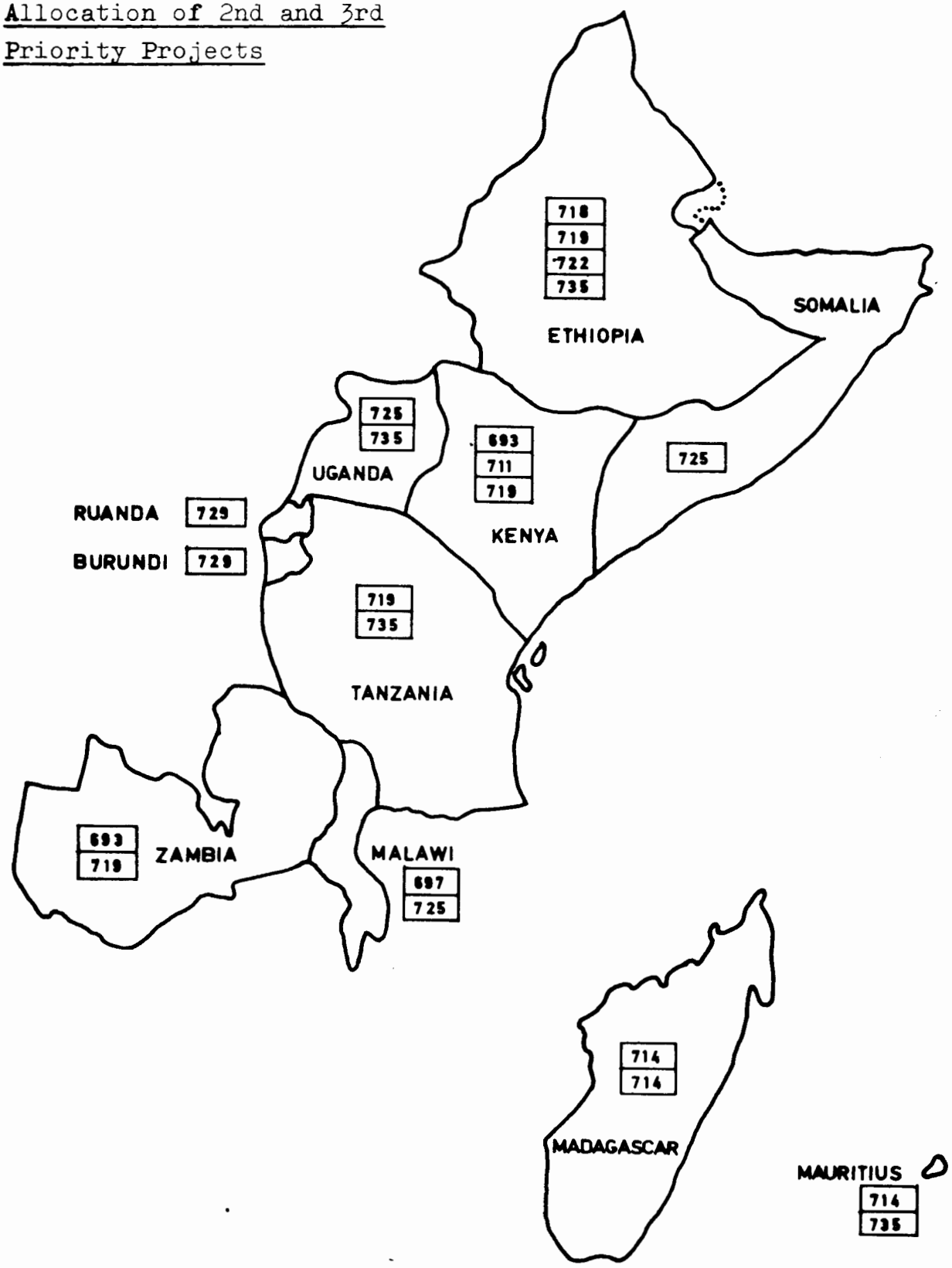


Table III/34

Prices (cif)

Material	Type		Measurements	Price
sheet iron	cold-rolled,	ST37	1 mm	165 $/t
	hot-rolled,	ST37	1.5-2.9 mm	165 $/t
		ST50/2		185 $/t
medium plate	hot-rolled,	ST37	3.0-4.75 mm	170 $/t
	" " ,	ST50/2	3.0-4.75 mm	175 $/t
	" "	ST50/3	3.0-4.75 mm	185 $/t
heavy plate	hot-rolled,	ST50/2	4.76 mm	175 $/t
	" "	ST50/2	6-80 mm, 150and more wide,4-20 mm	165 $/t
coils	cold-rolled,		1 mm	
	hot-rolled,		1.0-2.5 mm	145 $/t
bars and rods		C10	20', ⇦ and ϕ	175 $/t
		C15		175 $/t
		C45		180 $/t
		C60		185 $/t
		St50/2		175 $/t
copper pipes			20' x 1/2"	3.50 $/unit
			20' x 3/4"	6.00 $/unit
			20' x 1"	8.30 $/unit
material for foundry				
pig iron (hemat)				140 $/t
steel and iron scrap	local			25 $/t
coke				80 $/t
limestone	pre-crushed			5 $/t
moulding sand				7 $/t
core sand				10 $/t
castings	burred, sandblasted			600 $/t
other material				
aluminium	pure			650 $/t
aluminium	different alloys			500-600 $/t
fuel oil	bunker oil			90 $/t
paint				8 $/gal.
packaging material	corrugated cardboard (g)			1.50 $/unit
	wooden crates			1.00 $/unit

Table III/35

Electricity Tariffs

Country	Industrial use rates	mils/kWh
Kenya	(a) Fixed charges: Under 50 kVA, $52.1/kVA/annum; 51-200 kVA, $44.5/kVA/annum	
	(b) Energy price	10.8
Uganda	High voltage	
	(a) Fixed charges: Under 50 kVA, $51.8/kVA/annum; 51-300 kVA, $50.0/kVA/annum; Over 300 kVA, $ 47.5/kVA/annum	
	(b) Energy prices: Under 200 kWh/month	19.0
	201-360 kWh/month	16.7
	Over 360 kWh/month	14.6
United Republic of Tanzania	(a) Fixed charges: For the first 40 kVA, minimum charge $143.0 per annum; Each additional kVA in excess of 40 kVA $28.6/kVA/annum	
	(b) Energy prices: Under 10,000 kWh/month	15.7
	10,001 - 20,000 kWh/month	14.3
	Over 20,000 kWh/month	12.9
Somalia	Southern region	85.0
	Northern region	63.0
Rwanda (1966)	High voltage	
	(a) Fixed charges: Under 80 kW, $30/kW/annum; Over 80 kW, $24/kW /annum	
	(b) Energy prices: Under 125 kWh/month	15.0
	126-250 kWh/month	10.0
Ethiopia (1967)	(a) Fixed charge, $24/kW/annum	
	(b) Energy prices: Under 1,000 kWh/month	40.0
	Over 1,000 kWh/month	20.0
Malawi (1967)	Large consumers	
	(a) Fixed charge, $59.0/kW/annum	
	(b) Energy price	2.8
Zambia (Lusaka, 1966)	Light industrial tariff (20 to 100 kW)	
	(a) Fixed charge, $29.4/kW/annum	
	(b) Energy price	10.8
	Heavy industrial tariff (Over 100 kW)	
	(a) Fixed charge, $25.9/kW/annum	
	(b) Energy price	9.7

Mauritius:

Industrial Flat Rate

Tariff 310 - Tariff applicable to industrial consumers whose total connected load does not exceed 30 kW:

Running charge	19.8 cents per KWH
Minimum charge	Rs 4.40 per month per kilowatt or fraction thereof of the total connected load subject to a minimum of Rs 4.40 per month

Industrial Maximum Demand Type

Tariff 311 - Tariff applicable to industrial consumers whose total connected load exceeds 15 KW:

Demand charge	Rs 8.58 per KVA of maximum demand, together with a
Running charge	7.15 cents per KWH
Minimum charge	A sum equal to the highest demand charge paid in any one of the preceding six months of account.

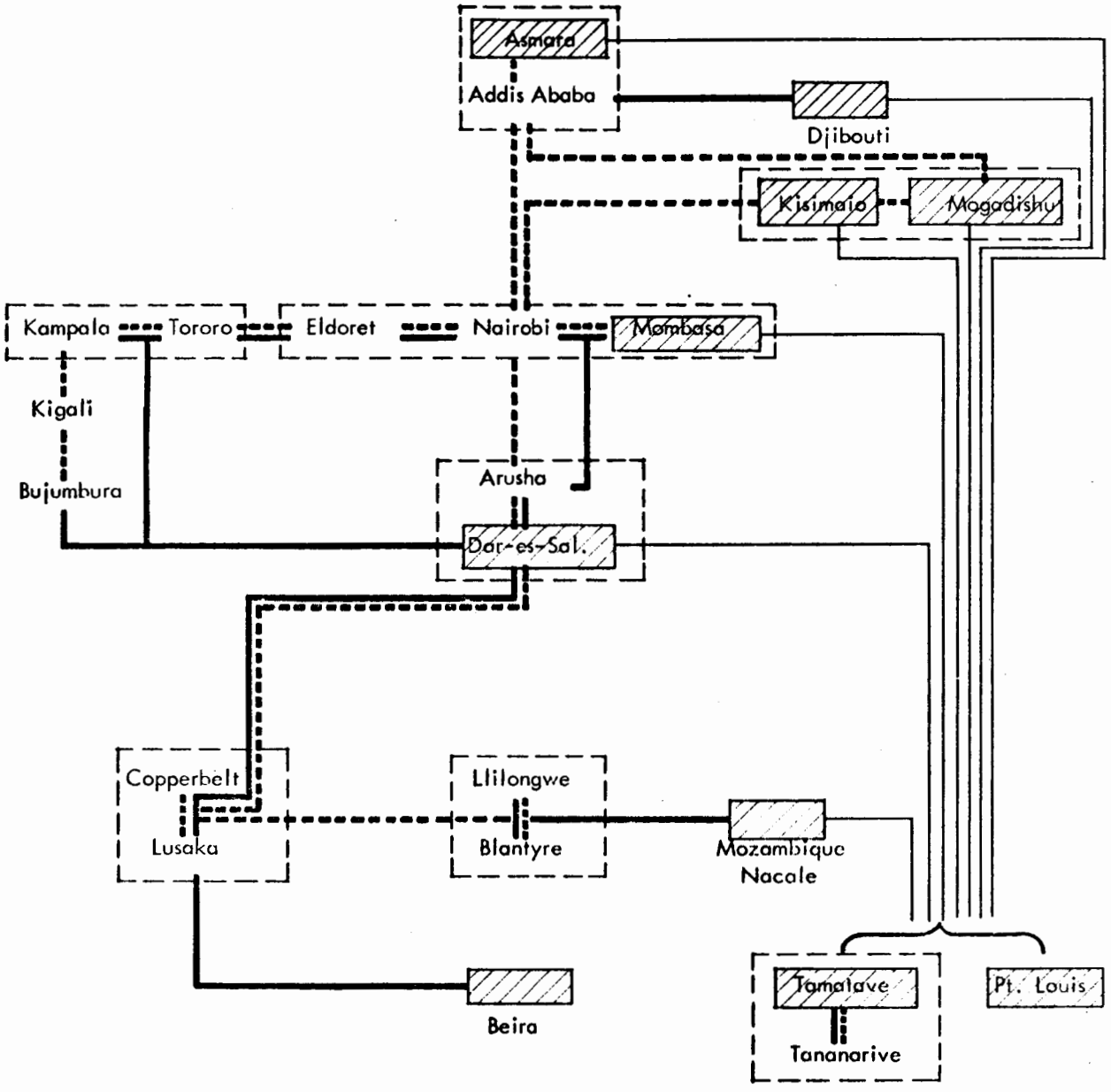
In addition, special tariffs are applicable to bulk consumers, to industrial consumers on a "restricted hour supply", to off-peak, high-load factor users and to Town Councils and Village Councils for street lighting purposes.

Source: National statistics for Mauritius, all others ECA figures.

Table III/36

Distances between Principal Demand Centers (and possible sitings of industries) in the East African Subregion

Asma																				
800	A.A.																			
3.000	1.500	Maga.																		
3.400	1.900	400	Kisim.																	
3.700	1.900	950	500	Momb.																
4.200	1.400	1.200	800	500	Nair.															
4.500	1.700	1.500	1.100	800	300	Eldo.														
4.800	2.000	1.800	1.400	1.100	600	300	Toro.													
5.000	2.150	1.950	1.550	1.250	750	450	200	Kamp.												
5.400	2.600	2.500	2.000	1.700	1.200	900	600	450	Kiga.											
5.800	2.800	2.700	2.200	1.900	1.400	1.100	800	650	200	Buju.										
4.500	1.650	1.700	1.400	400	250	550	850	900	1.500	1.800	Arus.									
4.000	2.150	1.200	900	350	750	1.050	1.200	1.400	1.500	1.300	500	Dar.								
6.200	4.350	2.400	3.100	3.100	2.950	3.250	3.400	3.600	3.300	3.300	2.700	2.200	Lusa.							
6.100	4.250	3.300	3.000	3.000	2.850	3.050	3.300	3.500	3.400	3.200	2.600	2.100	300	Copp.						
5.400	5.000	2.700	2.400	1.600	2.100	2.400	2.700	2.900	3.200	3.000	2.200	1.700	800	1.100	Blant.					
5.700	5.300	3.000	2.700	1.900	2.400	2.700	3.000	3.200	3.500	3.300	2.500	2.000	900	900	300	Uil.				
5.200	5.500	2.700	2.700	2.600	3.100	3.400	3.700	3.850	4.300	4.500	3.000	2.500	3.800	4.600	3.200	3.600	Tana.			
4.900	5.200	2.400	2.400	2.300	2.800	3.100	3.400	3.550	4.000	4.200	2.700	2.200	3.500	4.300	3.000	3.200	300	Tama.		
5.200	5.400	2.900	2.800	2.800	3.300	3.600	3.900	4.000	4.500	4.700	3.100	2.600	4.000	4.400	3.500	3.800	1.300	900	P.L.	



Existing and proposed surface transport network in the East African Subregion

rail links

road links

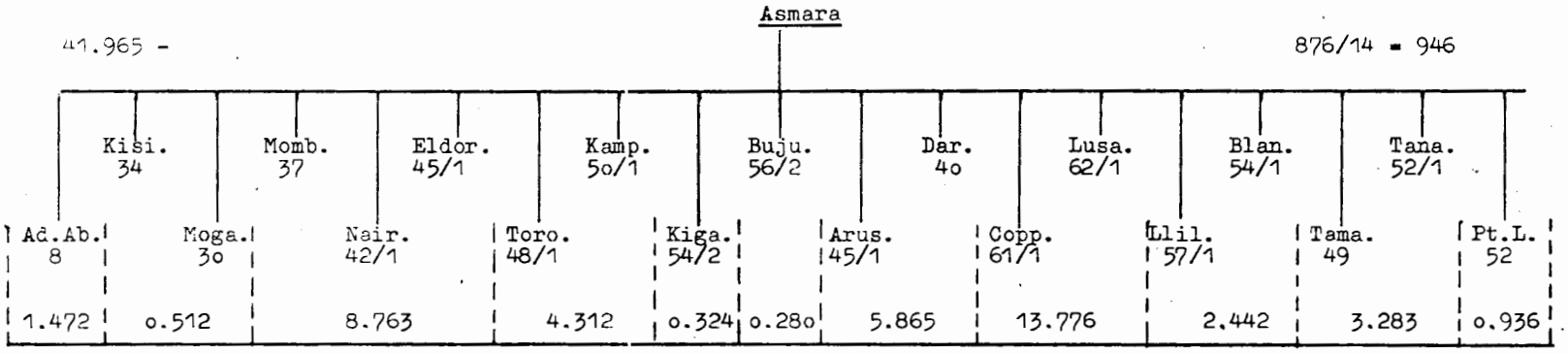
waterways

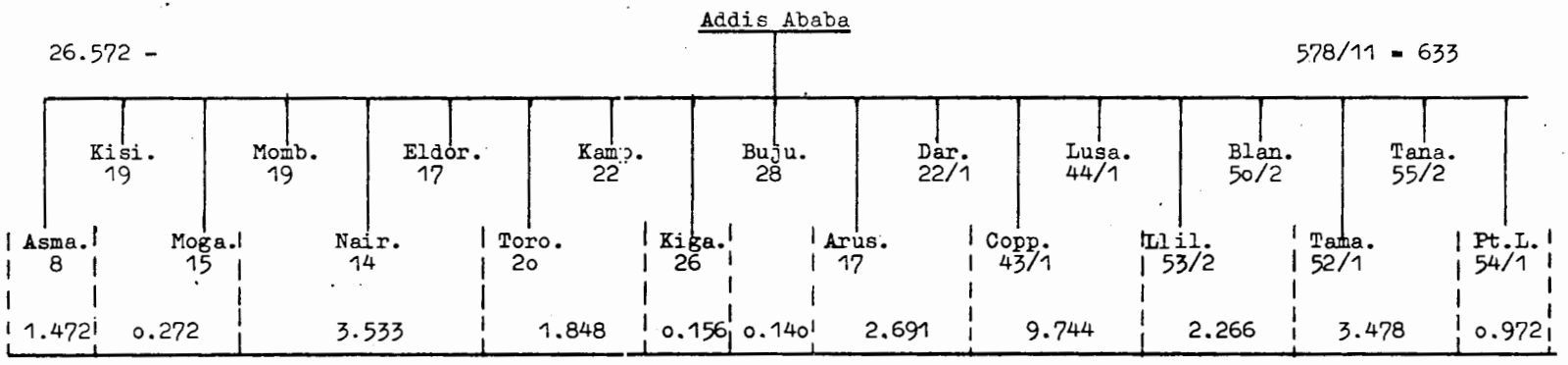
Asmara — port within subregion

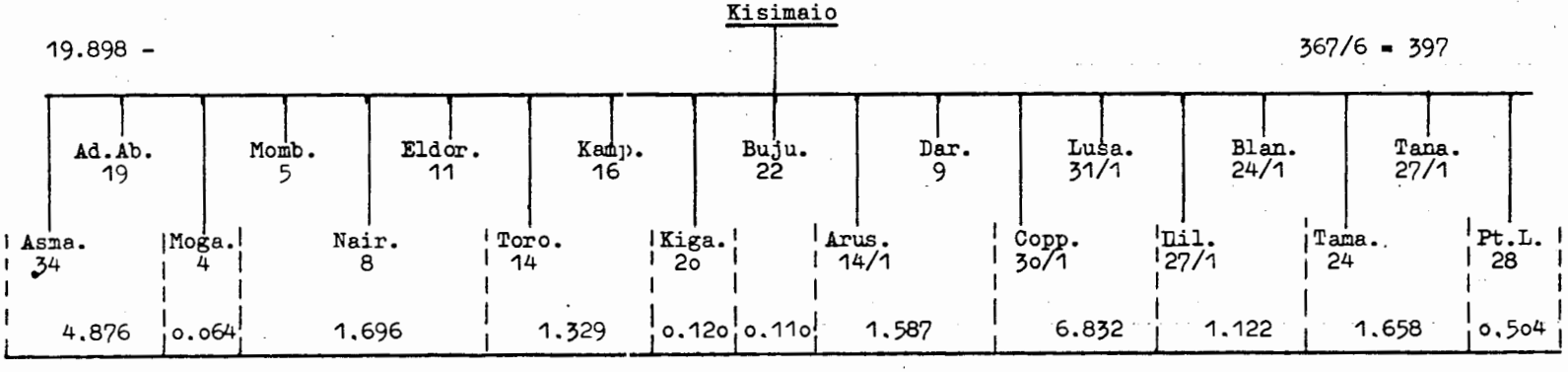
Beira — port outside subregion

Table III/38

Indices of Transport. Cost between Principal Demand Centers of the Subregion







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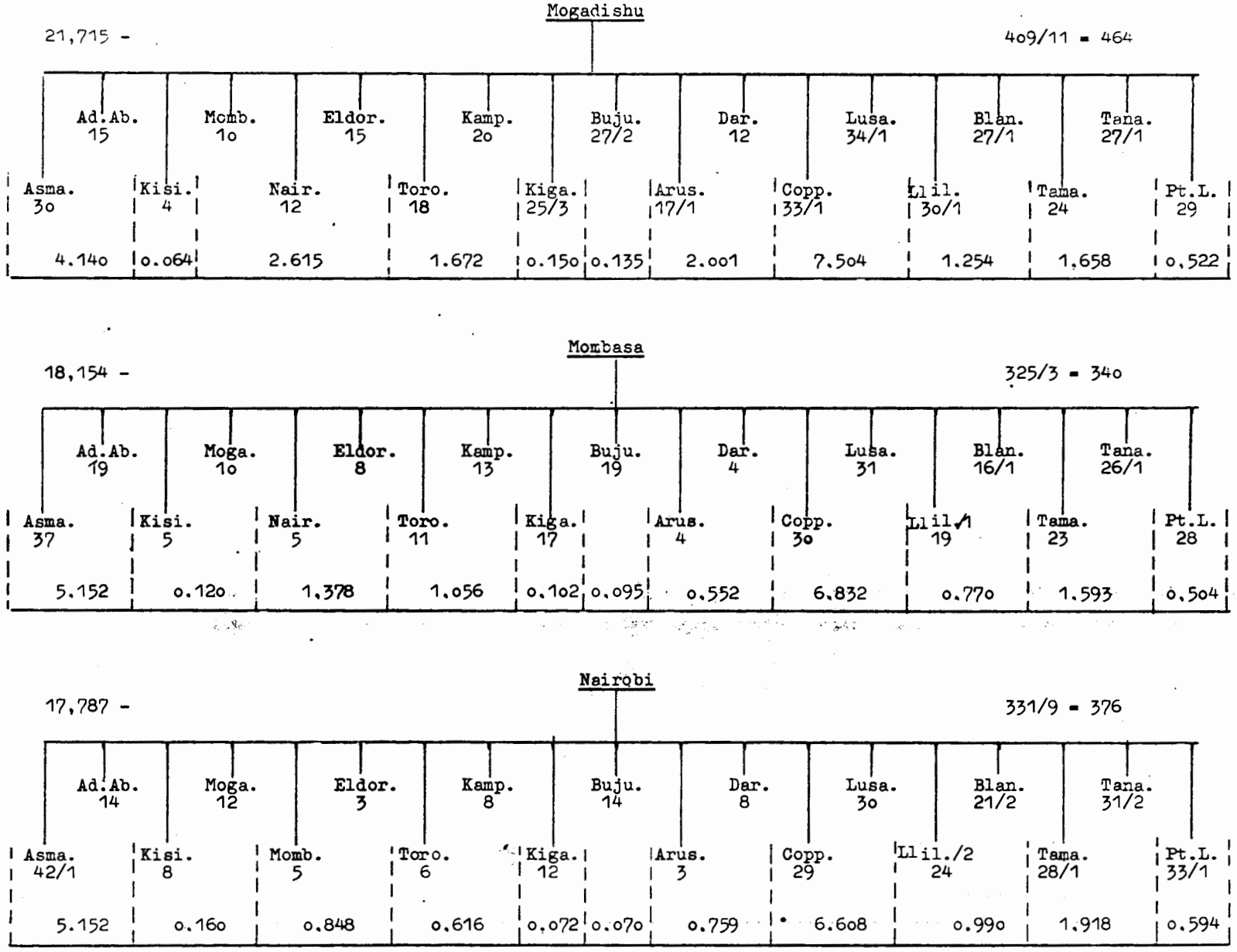

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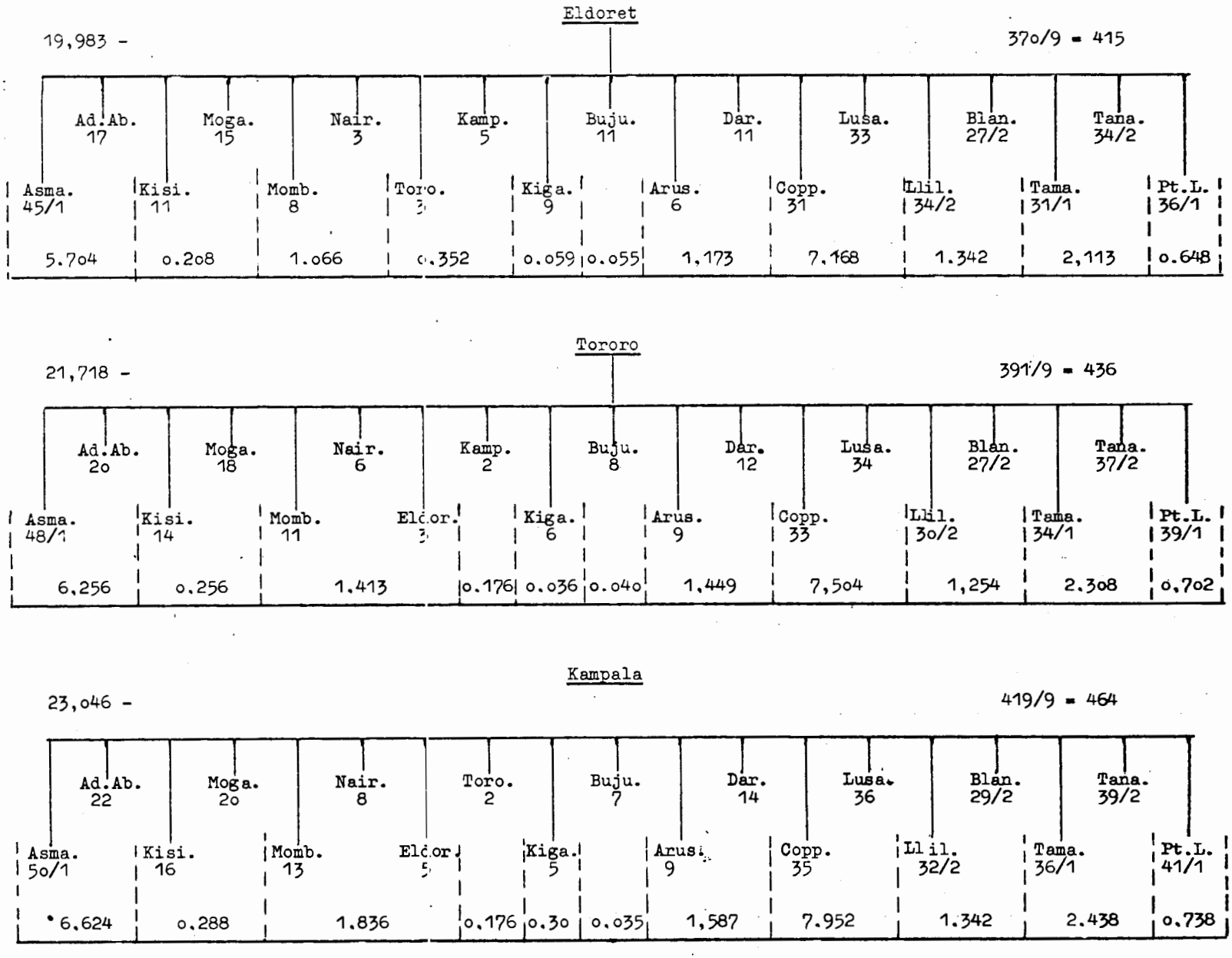

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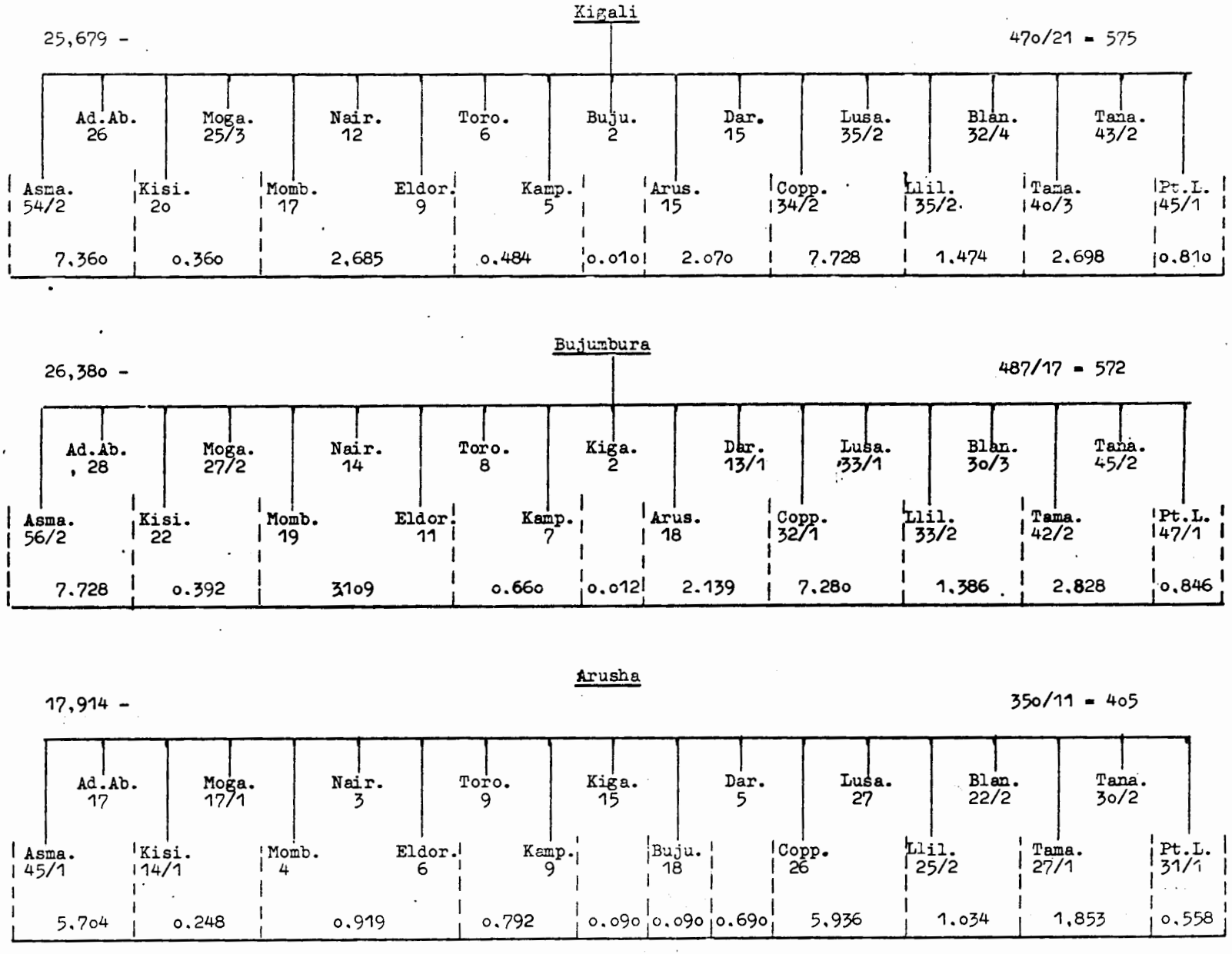

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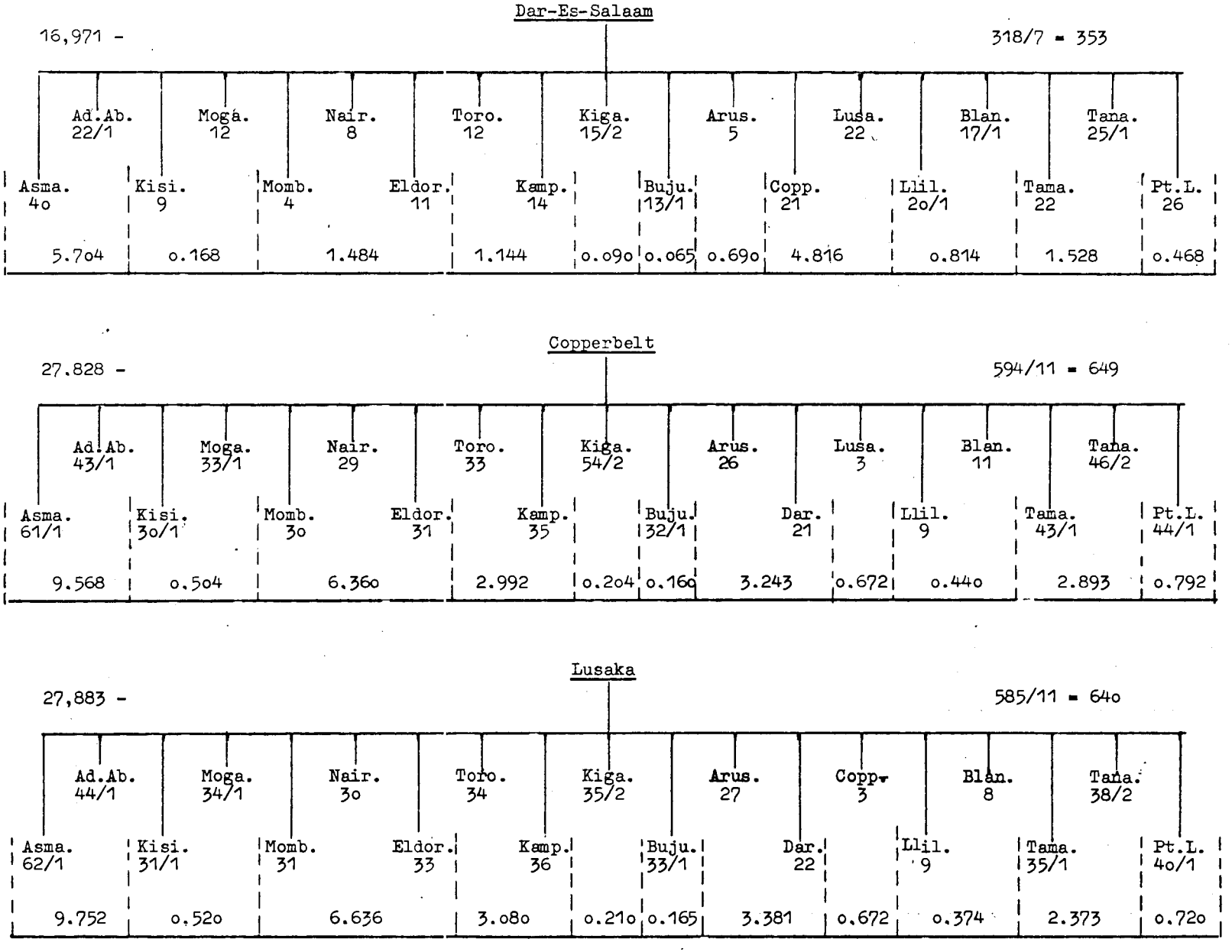

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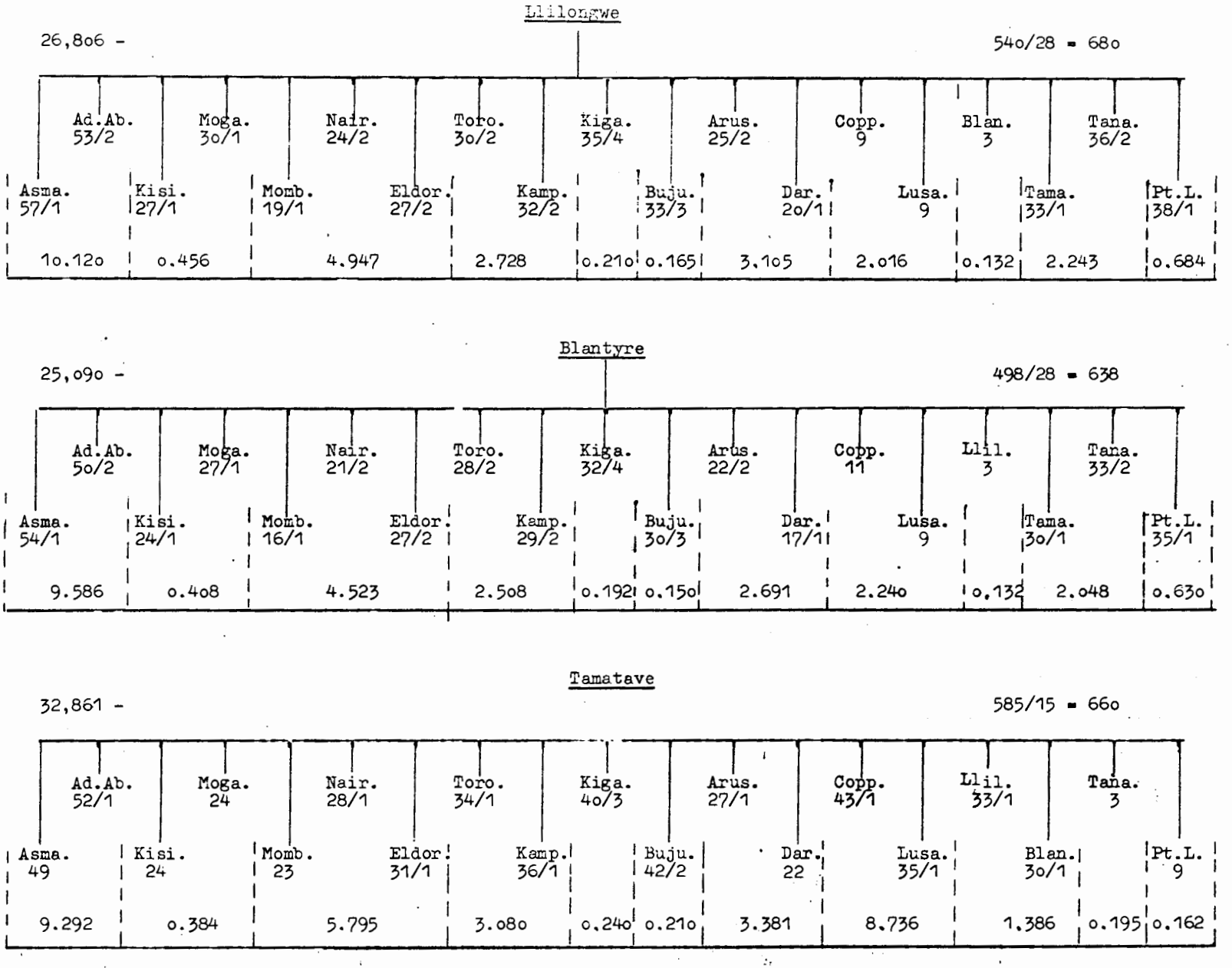

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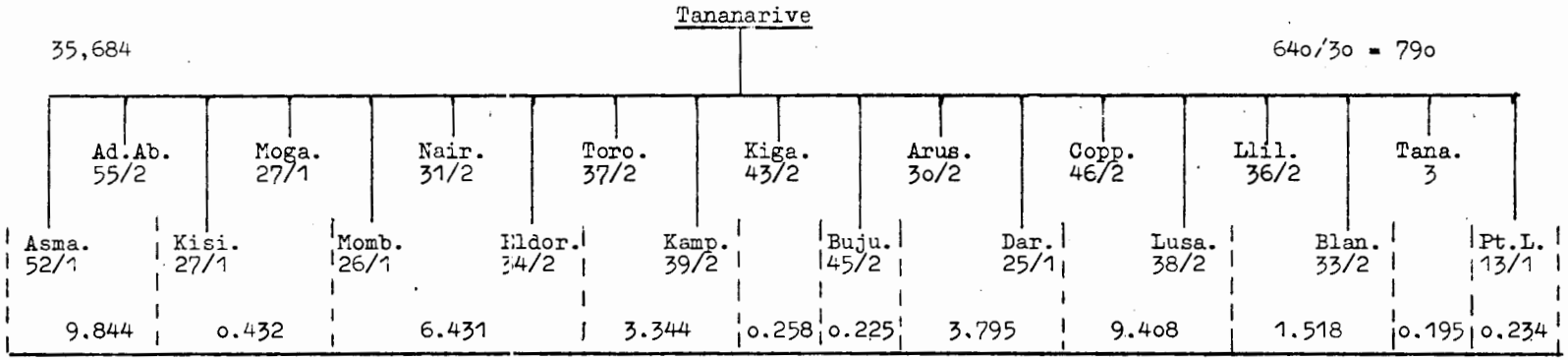


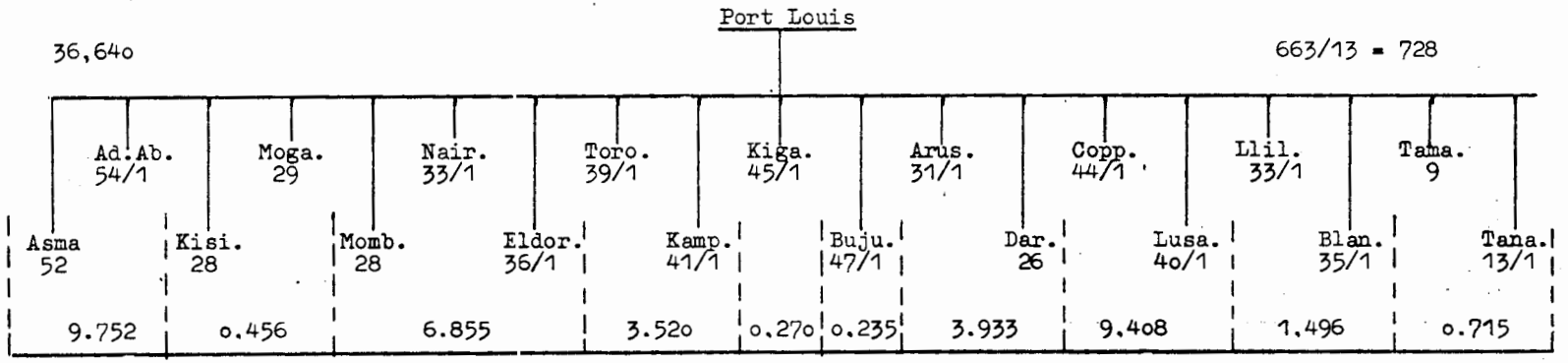


Table III/39

Order of proposed locations according to distribution cost sensitivity

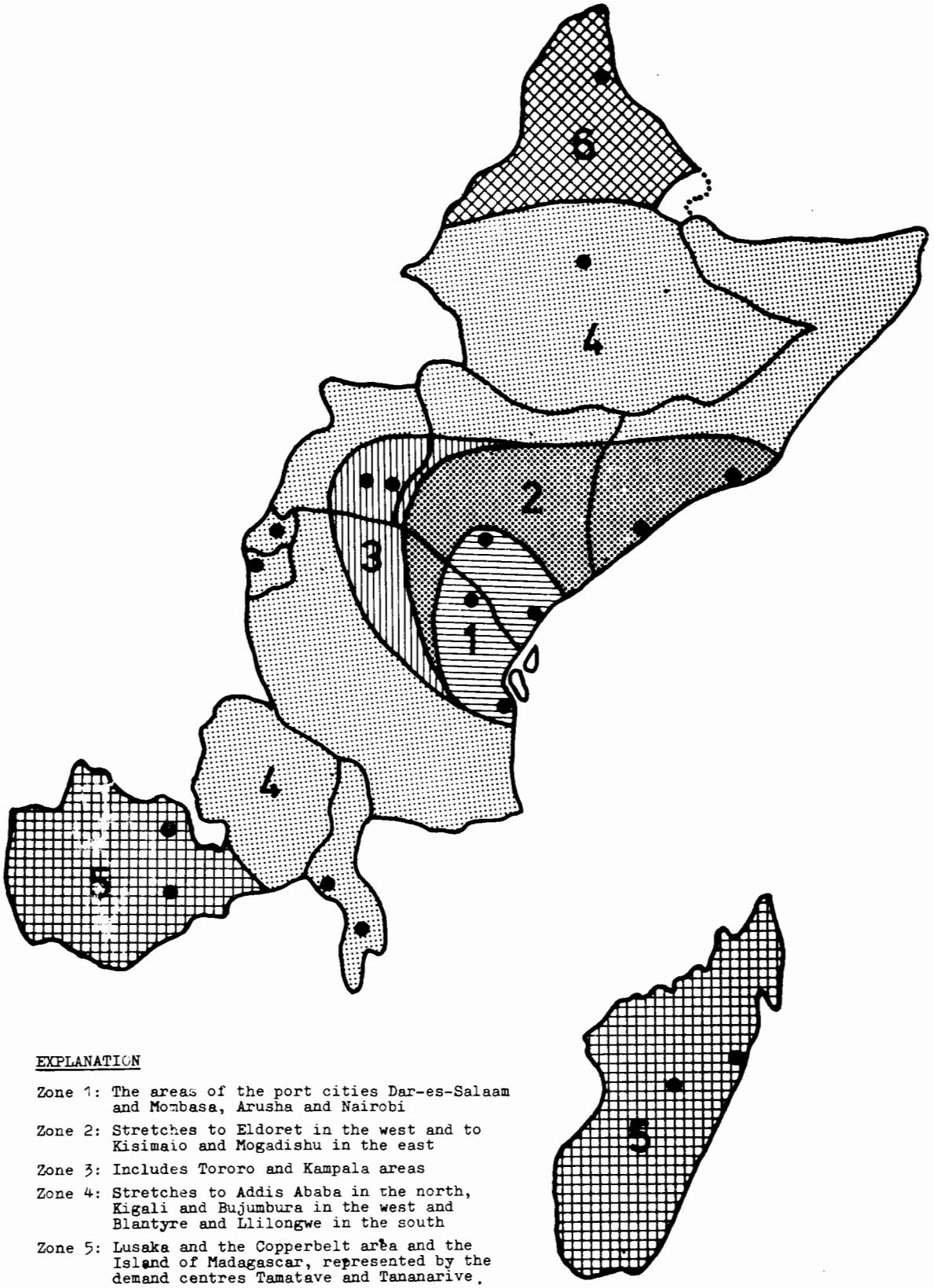
(1)	(2)	(3)
Location	Order	Order weighted
Asmara	2o	2o
Addis Ababa	12	13
Kisimaio	4	5
Mogadishu	9	7
Mombasa	1	4
Nairobi	3	2
Eldoret	6	6
Tororo	7	8
Kampala	8	9
Kigali	11	11
Bujumbura	1o	12
Arusha	5	3
Dar-es-salaam	2	1
Copperbelt	15	15
Lusaka	14	16
Llilongwe	17	14
Blantyre	13	1o
Tamatave	16	17
Tananarive	19	18
Pt. Louis	18	19

Table III/40

Share of the countries of the subregion in EGC (1980)

Country	EGC (1980)	%
Ethiopia	132.100	18.4
Somalia	11.500	1.6
Kenya	153.500	21.2
Uganda	63.600	8.8
Tanzania	100.500	13.8
Rwanda	4.500	0.6
Burundi	3.800	0.5
Zambia	162.800	22.4
Malawi	32.200	4.4
Madagascar	47.500	6,5
Mauritius	12.800	1.8
	724.800	100.0

Zoning of the Subregion according to Distribution Cost Advantage



EXPLANATION

Zone 1: The areas of the port cities Dar-es-Salaam and Mombasa, Arusha and Nairobi

Zone 2: Stretches to Eldoret in the west and to Kisimaio and Mogadishu in the east

Zone 3: Includes Tororo and Kampala areas

Zone 4: Stretches to Addis Ababa in the north, Kigali and Bujumbura in the west and Blantyre and Llilongwe in the south

Zone 5: Lusaka and the Copperbelt area and the Island of Madagascar, represented by the demand centres Tamatave and Tananarive.

Zone 6: Includes the extreme areas of the subregion, represented by Asmara in the north and Pt. Louis in the south-east

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Grouping of Proposed Industries According to Transport Cost Sensitivity of Products and Type of Goods

transp.cost sensitivity	consumer goods	consumer + capital goods	capital goods
high			heavy structural parts belt conveyors railway cars boats steam generating boilers insulators
medium	gas stoves + cookers boilers (houshold) sewing machines (house- bulbs hold)	gas cylinders wires and cables non-electric refrigera- tors electric refrigerators tools for hand + machine use	trailers, trucks + buses wire ropes diesel engines machine tools food process. machines transformers valves cases for batteries
low	radio sets flat irons fans	typewriters air-conditioners weighing machines pumps for liquids	calculating machines duplicating machines electric motors generating sets starters + generators electric + water meters radio component parts

type of goods