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INDUSTRIAL GROWTH IN AFRICA

A SURVEY AND OUTLOOK

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PREFACE

The Economic Commission for Africa, at its fourth session, adopted a resolution setting up a Standing Committee on Industry and Natural Resources ^{1/}. This resolution was, in the first instance, an expression of the desire of African governments that high priority should be given in the Commission's work programme to activities in the field of natural resources and industrialization, and of their recognition of the increasing importance of industrial development of the African region.

The terms of reference of the Committee include advice on ECA's annual work programme in this field, initiation and encouragement of studies and meetings and advising the Commission on steps to promote industrialization. The resolution also requested that a study should be undertaken of industrial investment opportunities in Africa. The work programme of the ECA in the field of industry, also adopted at the fourth session, include items on industrial surveys and industrial planning and the study of individual industries and groups of industries.

This study is a modest first response to the resolution and to the carrying out of these items in the work programme. Despite its wide scope it is essentially a preliminary study and should be regarded as in the nature of a working paper prepared for the first session of the ECA Standing Committee on Industry and Natural Resources. It should be recalled that a real start in the building-up of the Division of the secretariat which has prepared this study was made only in the early part of 1962 and that this Division is still well short of its authorized strength. New members have, in fact, joined during the preparation of the study. There has been little opportunity for enquiry in the field. Much of the information which would have been desirable was not available. Above all, there are serious deficiencies in both the coverage and the quality of the statistics available. Deliberate risks have therefore been taken in the statistical analysis.

The study should not be regarded as the first draft of a publication, although it is intended to contribute articles to the Economic Bulletin for

^{1/} Resolution 43(IV).

(ii)

Africa based on the material therein. Its basic objectives are two-fold: to survey broadly trends in industrialization and to point out to the ECA's Standing Committee the enormous and concrete possibilities of industrial development in Africa in the next decade; and, secondly, to suggest the lines of a detailed programme of work by the ECA.

The study has six chapters. After outlining in the first the economic setting in Africa, the second examines the present state of industrial growth in the light of trends in the last decade and shows, in broad outline, future possibilities. The third chapter discusses industrial planning in Africa. The fourth considers demand and supply perspectives in more detail, concentrating mainly on five industries or groups of industries. The fifth and sixth chapters discuss briefly national and international policies with emphasis on the future role of ECA. It is emphasised that ECA's work on industrial development must go hand in hand with its efforts in other fields, particularly development planning, trade, agriculture, natural resources and transport. Stress is laid on the importance of all who are concerned with industrial development in Africa, whether at the national or international level, joining forces and co-ordinating their efforts. In this context the establishment of the United Nations Industrial Development Centre is a major step forward.

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CHAPTER I

THE ECONOMIC SETTING IN AFRICA

Africa in the World Economy

1. Africa embraces nearly one-fourth of the land surface of the world. Its 240 million people account for about 8 per cent of the world's population. Compared with the industrial countries in Western Europe, the area of land under cultivation per head of the entire population in the continent is three times as high; livestock units per capita nearly twice as high; and the grazing area per unit of the livestock nearly seven times as high. Even the very inadequate surveys of its other natural resources suggest a vast potential. The continent already produces nearly one-seventh of the world's mineral output - much more if coal is excluded. Its energy resources - principally coal in the south, hydropower in the centre and oil and gas in the north - are considerable.

2. But owing to the delayed adoption of high labour productivity techniques, the continent's share in world output is only two per cent. The net value of its annual output may be estimated to be 26 million dollars - or about one-half of that of the United Kingdom and almost equal to that of Italy. Per capita income at \$110 per year is less than one-tenth of that in the industrial countries.

3. Owing to special characteristics of its economic development, Africa's share in world exports - at about 5 per cent - is much higher than in world income. Africa exports annually commodities worth 6.6 billion dollars. Its imports almost approximate 8 billion dollars. Per capita^{1/} level of foreign trade comes to \$29 for exports and \$35 for imports. Exports are thus about one-fourth and imports one-third of its output. Its foreign trade dependence is considerably greater even than that of the United Kingdom, where exports and imports form 18 and 22 per cent respectively of national output. Since nearly one-third of the continent's output originates in subsistence agriculture, its relative dependence on foreign trade is even greater than indicated by

^{1/}Per capita is used in this paper to refer to the whole population, not just to those engaged in the sector or activity in question.

these shares.^{1/}

4. The data in Table 1 give only an inadequate, and in many respects a misleading, picture of the African economy. One country, the Republic of South Africa, accounts for nearly one-fifth of its total output, although its share in the continent's population is only 6 per cent. If it were excluded, the income of the rest of Africa would be about 21 billion dollars. The per capita income would be approximately \$90 per year, or not much different from that in most of South-East Asia. As can be seen from Table 1, there are significant differences in income levels in Africa. The group of countries in North Africa have twice as high a per capita income as in South and East Africa (excluding the Republic of South Africa), whereas the West African countries are in between these extremes.

Long-term Changes

5. The main currents of industrial growth over the last century have so far had relatively little impact on this continent south of the Mediterranean. The output per head of subsistence farmers may be assumed not to have changed much during these years. There has been considerable expansion of commercial crops and of mineral output for export and also of manufacturing output, particularly in recent years. But much of it has been concentrated in a few countries. Moreover the share of these sectors in total output in Africa (excluding South Africa) is still small.

6. During this period the economic landscape in the countries north of the Mediterranean has radically altered. Halfway through the nineteenth century, the average per capita income in Western Europe was around \$150-170^{2/}, or one and a half times that in Africa now. Part of this

1/ See Chapter II, "Industrialization and Foreign Trade", para. 54 et seq.

2/ Estimate derived by regression (growth backward) of per capita income and known growth rates of these countries, and by using a weighted average and straight-line extrapolation in time. See Simon S. Kuznets, Six Lectures on Economic Growth, (Glencoe, 1959), p.27.

TABLE 1
Selected Economic Indicators in Africa

Region or Country ^{a/}	Popu- lation	Per capita				Gross domestic product			
		Ex- ports	Im- ports	Na- tional income	Total	Agri- cul- ture	Min- ing	Man- ufac- turing	Rest
		in million US \$				in billion US \$			
North Africa	63	24	45	130	8.15	2.65	0.25	0.95	4.31
West Africa	65	22	27	110	7.25	4.35	0.15	0.60	2.15
S. and East Africa ^{b/}	89	21	20	65	5.56 ^{a/}	2.23	0.48	0.48	2.12
Total above ^{a/}	217	22	29	95	20.96	9.23	0.88	2.03	8.58
R. of S. Africa	14	130	112	360	5.05	0.60	0.60	1.20	2.80
Total Africa	231	29	35	110	26.01	9.85	1.50	3.25	11.20
Former Fr. W. Africa	19	14	18	144	2.73	1.64	0.03	0.34	0.73
UAR (Egypt)	28	18	23	95	2.62	0.87	0.03	0.32	1.42
Algeria	10	38	127	250	2.50	0.55	0.08	0.28	1.59
Nigeria	32	14	19	70	2.26	1.42	0.03	0.06	0.76
Morocco	10	30	36	154	1.54	0.52	0.09	0.28	0.65
Rhodesia & Nyasal.	8	67	55	155	1.23	0.23	0.26	0.12	0.62
Ghana	5	64	72	245	1.22	0.73	0.02	0.10	0.37
Congo (Leo'ville)	14	35	25	85	1.17	0.30	0.19	0.14	0.54
Total above ^{b/}	126	26	36	121	5.27	6.26	0.73	1.64	6.68
Rest of Africa ^{b/}	91	16	21	62	5.69	2.97	0.15	0.39	1.90

Source: See Appendix I for details.

Note: Gross domestic product figures, for the latest year available, rounded to the nearest 5 or 10.

a/ Arranged in descending order of total national income.

b/ Excluding the Republic of South Africa.

c/ Income of Ruanda Urundi not distributed by sector of origin.

difference may be attributed to higher economic values for the larger requirements of food, shelter and clothing in the colder climate. Economic setbacks caused by wars and depressions notwithstanding, per capita real income in the industrial countries increased by about 1.8 per cent per year. The real output per person expanded seven fold over the last century - or by more than in the entire preceding history of mankind. In the process, the age-old affliction of poverty and want was swept away, except in some sections of the population and some depressed areas. Poverty, as a pressing problem, moved from the centre to the fringe.

7. The economic distance between the continents separated by the Mediterranean has widened faster during the last century than ever before. Its origin lay in a steady growth of per capita income by 1.8 per cent per year in most of western Europe compared with a very much slower rate in Africa. This century-old process appears, as can be seen from Table 2, to have continued over the last two decades.

8. Per capita output in Africa (excluding the Republic of South Africa) increased by perhaps 10 to 20 per cent over the last two decades (see Table 2). In the industrial countries, on the other hand, it is now over 60 per cent above the pre-war level.^{1/} Even the limited expansion in Africa seems to have been concentrated largely in the sectors catering to foreign trade, a substantial portion of the income from which goes to peoples of non-African origin. The real average income-level in Africa has changed but little. The economic trends in Africa are thus not altogether different from those in other under-developed countries. The economic distance that divides the rich and the poor countries has continued to lengthen in this continent as elsewhere.

9. This is the setting for the world-wide concern for future economic growth in Africa as well as elsewhere. If political independence has been the watchword in Africa for the last ten years, rapid economic growth will no doubt be the overriding pre-occupation for the years to

^{1/} See "Development Problems in Southern Europe and Ireland" in ECE's Economic Survey of Europe in 1959, Chapter VII, pp 2.- 4.

TABLE 2
Major Economic Changes in Africa^{a/}, Pre-War to 1960

Item	Index Numbers : 1938 ^{b/} = 100		Annual compound percentage change	
	1950	1960	Pre-war to 1960	1950 to 1960
Population ^{b/}	115	140	1.7	1.9
Agricultural Output ^{b/}	130	150	1.8	1.4
Industrial Output	220	345 ^{c/}	6.7 ^{c/}	6.5 ^{c/}
Total Commodity Output ^{d/}	130	160	2.1	2.1
Per capita Commodity Output	112	115	0.6	0.2
Quantum of exports	125	195	3.0	4.7
Quantum of imports	145	234	3.9	5.0

Source: United Nations, Economic Survey of Africa since 1950

United Nations, Statistical Yearbook 1961

United Nations, Demographic Yearbook 1960-1961

United Nations, FAO Production Yearbook 1958, 1960

^{a/} Including the Republic of South Africa

^{b/} Base years for index of population is 1940, and of agricultural output average for 1934-38.

^{c/} Terminal year is 1957.

^{d/} Derived by combining, as a weighted basis, the index numbers of agricultural and industrial output; the output of small-scale industry assumed to have changed in line with population.

come. The disparity in the rates of economic growth of different areas persisted at a time when stagnation or slow growth was unquestioningly accepted. But the newly-independent states of Africa are now shaping an image of the continent from which poverty and economic backwardness would be eliminated as rapidly as possible. The aspirations, vague in the early stages, are rapidly being translated into concrete plans.

10. More than ever before, governments are formulating plans, programmes and projects aimed at bringing about the economic transition from poverty to relative well-being. There is thus a continuing need for assessing the progress already made and the problems and perspectives for the future. This study attempts to review the state of industrial growth in Africa and to indicate the broad contours along which it might proceed in future.

Structure of the African Economy

11. The statistical information so far available for Africa is inadequate to define precisely its economic structure. Some of the general characteristics of the African economy may, however, be suggested. Although the picture is only approximate, it may serve as a useful analytical tool. The over-all picture for Africa as a whole can hardly be expected to correspond to the economic reality in each of the countries in the continent.

12. A comparison of the structural characteristics of Africa with those of the industrial countries may be helpful in giving some idea of the economic distance that separates them. It could also suggest the main lines along which the African economies might advance in the years to come. The pattern of economic development of one country at one time can hardly be repeated in the same fashion in another place at another time. Africa need not follow religiously the economic trail traversed by the industrial countries. Nor is it necessary that the economic image of future Africa be merely a carbon copy of the industrial countries today. The tempo of growth may differ. Africa's particular cultural, political and social traditions and natural endowments would no doubt

leave their special imprint on its future economic development. And yet, it is reasonable to suggest that economic growth in Africa would involve an increase in the output of goods and services which advances in science and technology have made possible in the industrial countries.

13. The data assembled in Table 3 attempt such a comparison. It may be emphasized again that the magnitudes are illustrative - adequate only for assessing the broad order of differences and indicating the main direction of change. Despite their approximate character, they suggest at once a number of observations.

14. The average per capita income in Africa (excluding the Republic of South Africa) is under one-twelfth of that in the industrial countries combined as a group. But it is being increasingly recognized that the estimates of per capita incomes for areas with significantly different output structures and price relatives cannot be readily used for comparative purposes. Many authors have suggested that the per capita incomes in poor countries have to be raised significantly upwards to assure a measure of realistic comparison.^{1/} The adjustments in Table 3 are rough and ready, meant only to serve as broad indicators rather than precise measurements.

15. Over forty per cent of the income in Africa (excluding South Africa) originates in agriculture. The comparative proportion for the industrial countries is only about ten per cent. Agricultural output on a per capita basis for the whole population would amount to about \$40 in Africa and \$120 in the industrial countries. The prices at which the contribution of agricultural output (particularly of subsistence agriculture) is computed are usually lower than in the industrial countries.

1/ For details see S.S.Kuznets, "National Income and Industrial Structure" in Economic Distance, Vol.XVII, supplement, July 1949; p.209; Gilbert and Kravis, Comparative National Products and Price Levels (OECD Paris) National Bureau of Economic Research, Problems in the International Comparison of National Accounts (Princeton, 1957) p.384; Harry Starks, Infirmities of per capita Income Estimates (University of Miami).

TABLE 3

Illustrative Measurement of the Economic Distance
between Africa^{a/} and the Industrial Countries, 1960

Output by Industrial Origin	AFRICA		Industrial Countries	Ratio of per capita ^{c/} output in industrial countries to that in Africa (c)÷(b)	Rates of growth and period needed by Africa to reach the level (1960) in indus- trial countries	
	In African prices	In US re- lative prices			Annual per capita ^{c/} rate of growth in %	Years
	(a)	(b)	(c)	(d)	(e)	(f)
Agriculture	40	60	120	2	1.5-2	40-50
Industry	<u>15</u>	<u>20</u>	<u>480</u>	<u>25</u>	<u>7-8</u>	<u>40-50</u>
Commodity Output	55	80	600	8	5	40-50
Other sectors	<u>35</u>	... ^{b/}	<u>600</u>	...	?	?
Total Output	90	(150) ^{b/}	1,200	(8)	(5)	(40-50)

Note: The figures, based on domestic product at factor cost, are very crude and have therefore been rounded to the nearest 5 or 10. Adjustments in column (b) are purely notional in character.

Source: Computed from Surendra J. Patel's study, Economic Distance between Nations: Its Origin, Management and Outlook.

a/ Excluding South Africa

b/ Relative prices in the service sector are difficult to compare nearly everywhere, but more so in Africa where, owing to the pre-dominance of the non-African population in this sector, the remuneration is relatively high. The figure for total output in column (b) is therefore purely arbitrary.

c/ Of the whole population, not according to sectors.

16. If African agricultural output were to be expressed in the relative prices of industrial countries, it would require a marked upward revision. With an upward adjustment by about one-half (column (b) in Table 3), the per capita net agricultural output in the industrial countries would be only twice as high as in Africa for the population as a whole. The comparison of per capita industrial production in Africa and in the industrial countries, however, reveals a very wide gap indeed. Its level in the industrial countries is nearly 25 times as high as in Africa. Without any price adjustments, these ratios would be 3:1 for agricultural and over 30:1 for industrial output, for the population as a whole.

17. The service sector is the most difficult to adjust for comparative purposes. The usual difficulties are magnified in Africa where the non-African population has an unusually high weight in this sector. Its scale of remuneration is often higher than in its country of origin. Only fragmentary indicators are available for income distribution between the African and the non-African population. They suggest that the latter account for a little over one per cent of the population in Africa (excluding the Republic of South Africa), but nearly 20 to 25 of its output.^{1/} The adjusted figure for the total per capita output in Table 3 is therefore purely arbitrary in character.

18. The statistical foundation of the adjustments in Table 3 is undoubtedly weak. But it is less likely that any improvements in statistics would alter significantly the broad relationships outlined above - that is, the agricultural distance between countries in Africa and the industrial countries is of the order of 2 to 1, whereas the industrial distance is about 25 to 1. The distance is not as incredible as it may appear at first sight. The demand for food is largely limited by the size of the body, climatic conditions, levels of activity and variety of

^{1/} Estimate based on information in United Nations, Economic Survey of Africa since 1950, (New York 1959), p. 87.

the diet, while the demand for industrial raw materials is likely to be less than that for food. But when these are taken into consideration, it would seem that a doubling of per capita agricultural supplies in Africa for the whole population would bring it near the level in the industrial countries.

19. At this point, it should be made clear that per capita output is used here as a broad guide to both total agricultural output and total industrial output. Per capita output refers to the output per head of the whole population and must be distinguished clearly from labour productivity in agriculture or labour productivity in industry, which are measured by dividing total output in the sector concerned by the labour force employed in that sector. Comparative figures of labour productivity are not readily available, but it is evident that the gap between labour productivity in the two continents is very much greater than 2:1. It is outside the scope of this report to argue the need for an increase in labour productivity in agriculture in Africa of the order of 20-fold. An increase in agricultural production is clearly necessary as a means of releasing labour from agriculture for employment in industry, as a source of capital for investment in the economy and to increase purchasing power for the products of industry.

20. The dimension of agricultural growth in the industrial countries over the last century was in fact not altogether dissimilar. During this period, the population of these countries increased a little under three fold and total agricultural output four to five fold. Per capita agricultural output thus rose by only a little over one-half. Industrial output, on the other hand expanded during these years

over forty-fold, or nearly fifteen-fold on a per capita basis.^{1/}

^{1/} Based on Surendra J. Patel's study, Economic Distance between Nations: Its Origin, Management and Outlook.

The following annual compound growth-rates (in percentages) for the industrial countries as a group could be derived from it for the period 1850 to 1960:

	Per capita	Over-all
National Income	1.8	2.7
Agricultural Output	0.5	1.4
Industrial Output	2.6	3.5

These growth rates appear modest. But they bring about the massive expansion, indicated in the paragraph above, when cumulated over a long period. This is because of the relentless force of growth at compound rates over a period of time - particularly towards the end of the period.

The table below gives an illustrative idea of the possible expansion in initial output (taken as 1) if it grows at rates varying from 1 to 10 for years indicated.

Period in years	Annual compound percentage rate of growth									
	1	2	3	4	5	6	7	8	9	10
10	1.10	1.22	1.34	1.48	1.63	1.79	1.97	2.16	2.37	2.59
20	1.22	1.49	1.8	2.2	2.7	3.2	3.9	4.7	5.6	6.7
50	1.6	2.7	4.4	7.1	11.5	16	30	47	74	120
100	2.7	7.2	19	50	130	340	870	2200	5530	14000

Drawing attention to the staggering increase involved in compound rates of growth, Keynes once illustrated this by the probable growth of the treasure of £40,000 - the prodigious spoils of the Golden Hind - with which Captain Drake returned to England in 1580. "Now it happens", he wrote, "that £40,000 accumulating at $3\frac{1}{2}$ compound interest approximately corresponds to the actual volume of England's foreign investments at various dates, and would actually amount today to the total of £4,000,000,000 which I have already quoted as being what our foreign investments now are. Such is the power of compound interest!" See his "Economic Possibilities for our Grandchildren (1930)" in Essays in Persuasion (London 1931), p.362.

Economic Image over the Decades to Come

21. The main content of economic growth in any country has always been to increase the supply of goods and services available for present consumption and of investible resources to assure future development. In this respect, the experience of the industrial countries has considerable relevance for Africa. The indicators put together in Table 3 could be used as general guideposts - but no more than that - to outline the broad contours of Africa's future growth. The indicators for Africa as a whole would of course have to be adjusted to fit the economic structure and potential of each individual country.

22. To raise the low per capita output in Africa and other industrially less developed areas to that in the industrial countries is now generally accepted as a long-term objective of economic development. What such a transition would involve is therefore a question of considerable operational significance. The approximate indicators in Table 3 could be used to suggest the dimensions of time and pace that such an economic transition would entail.

23. Many of the countries in Africa are now in the process of formulating economic plans. In any such formulation, the characteristics and resources of each individual country would no doubt play a decisive role. Some of the comparative data presented here may serve as useful economic background for setting concrete targets for the expansion of each sector. Stated in a summary fashion, the economic transition in Africa would involve increasing the output of two major sectors roughly by these orders: doubling of agricultural output and a 25-fold increase in industrial output per capita for the whole population. These dimensions suggest at once the sector where the leeway between Africa and the industrial countries is the greatest. A very rapid industrial expansion would have to form the core of any programme for raising the income level in Africa to that in industrial Europe,^{1/} assuming that

^{1/} In the early stages of industrialization, agriculture contributed twice as much as industry to total output in the industrial countries. But its share in the increase of commodity output in these countries over the following hundred years was only about one-sixth.

industrial production and incomes per worker in Africa would be much higher than production and incomes in agriculture. More than doubling per capita agricultural output without a simultaneous expansion of industries as suggested above would create problems of marketing for which solutions are not readily foreseeable at present.

24. How rapidly could this economic distance be covered? The answer would obviously depend on the pace of economic growth. As shown above, the process took on the whole about a century in the industrial countries - as an annual growth rate of per capita output by 1.8 per cent. Whether it would be faster in Africa is a question that can only be decided at the national level.

25. The pace of economic growth has generally quickened for each of the new entrants into the field of industrialization. There are many reasons for this. But the most important one among them is the possibility for the late-comers to benefit from the vast accumulation of technical knowledge. Their pace need not be cramped by the tempo of technical development or hampered by economic fluctuations. They can readily draw upon the treasure-house of world technical knowledge. The rate of their economic growth would thus depend mainly on the ability and speed with which they assimilate, adapt and spread modern knowledge and scientific outlook among their people.

26. The righthand columns in table 3 give an illustrative idea of the dimensions of time and pace that such a transition could involve. The economic distance that separates Africa from the industrial countries could be covered in 40 to 50 years if per capita output could be increased at 1.5 to 2 per cent for agriculture and 7-8 per cent for industries.^{1/} These dimensions are not meant to be taken literally. But they do indicate that, given such growth rates, the economic

^{1/} Agricultural growth potential is not the subject of this study. For a discussion of the feasibility of a high rate of agricultural growth see ECE, Economic Survey of Europe in 1959, Chapter VII, pp.7-23 and 46 - 50.

transitions need not require endless centuries. These growth rates are indeed higher than those that prevailed during the century of industrialization in Western Europe.^{1/} But even at West European growth rates, economic transition in Africa would need no more than a century, to reach the present level of Western Europe.

27. In recent decades many countries have experienced much higher growth rates for fairly long periods of time. If these could be attained in Africa and maintained for 3-5 decades (preferably higher in the earlier period and somewhat lower later on), then the transformation of Africa from an industrially backward economy to an advanced one could be shortened to half a century.

^{1/} The economic growth over this century was not continuous. It was often interrupted or even reversed by wars and depressions. The industrial countries had faced during these hundred years 6 to 7 business cycles, one major agricultural depression, the Great Depression and two World Wars.

CHAPTER II

PRESENT STATE OF INDUSTRIAL GROWTH

Introduction

28. The need for a rapid rise in the low level of per capita income in Africa, as elsewhere, has now been universally recognized. How this is to be brought about has been a subject of discussion among economists and policy-makers during the post-war period. The discussion has served to focus attention on a number of important questions. Should economic growth centre on the development of agriculture or industries? How rapid should be the growth of each of these sectors? Are there any ceilings to their eventual expansion? Are there any fixed relationships, which may be used as rules of thumb, between their growth rates? What kind of industries should be established in the initial stage? In what manner should the composition of industrial output alter so as to assure uninterrupted growth?

29. At a time when economic growth was largely the result of decisions of individual entrepreneurs, few of these questions were pertinent. The answers to them were given by trial and error, leading to certain ventures being profitable or otherwise. An entrepreneur pursued the avenues where prospects of profits were most promising. How far he would go in these pursuits was determined by the economic results of his undertaking. Some made good on their earlier expectations, amassed fortunes and explored new lines. Other, less successful, failed. Guided by the "invisible hand", underlined by Adam Smith, individual actions led to a varying degree of economic development in different countries.

30. But now, nearly on the second centenary of Adam Smith's magnum opus, Wealth of Nations, many countries are setting up planning agencies, committees and other organizations to chart in advance the course of national economies. They are setting concrete goals and targets and trying to guide their economies toward them. Working answers to the questions posed in the opening paragraph have now assumed considerable operational significance. If they correspond reasonably well to the economic structure of a country and to the requirements of its future economic growth, they could help avoid the losses and delays involved in

the trial and error" approach. Economic growth could consequently avoid the frequent ups and downs which were its characteristic features in the past. It could perhaps be quickened also.

31. The importance of rapid industrialization has now been widely accepted. Without it, under-employment - both rural and urban - cannot be overcome. Nor can the vulnerability of the economy to sharp fluctuations in the availability of crops and their price be reduced without widening the base of economic activities. The income per head in industry is generally higher than in agriculture. An expansion in industrial employment could thus raise the average level of output. Industrialization also provides the basis for increasing productivity and income in agriculture as well as the rest of the economy by absorbing labour and by expanding domestic demand for agricultural products. Moreover, exports from Africa still consist predominantly of primary products, the import demand for which is expanding relatively slowly.^{1/} If these economies are to benefit in the future from specialization and expanding international trade, the diversification of their production and the development of industrial exports is plainly necessary.

^{1/} Till the Second World War the exports of manufactured goods and primary products increased at about the same rates. But owing to a fundamental shift in the import demand of the industrial countries, the exports of primary products have expanded since then only at one-half the rate of growth of exports of manufactures.

(a) Excluding Eastern Europe, the Soviet Union and mainland China. Annual percentage rates of growth of world (a) industrial production and exports of manufactured goods and primary products since 1878.

	1878- 1958	1878- 1913	1913- 1937	1937- 1958	1948- 1958
World manufacturing output	3.6	4.0	2.6	4.2	4.8
Quantum of world exports	2.3	3.4	0.2	2.9	6.3
of which:					
Manufactured goods	2.4	3.3	-0.3	4.2	7.4
Primary products	2.2	3.4	0.7	2.0	5.3

Source: ECE, Economic Survey of Europe in 1959, Chapter VIII, p.10; also see Economic Survey of Europe in 1957, Chapter IV, Section 3.

32. Above all, the demand for food is limited by what a person can consume and the variety of his diet. Concentration on agricultural development alone would soon lead to agricultural surpluses.^{1/} Without a sharp expansion in industries, even a doubling of per capita agricultural output would barely raise the present low per capita incomes in Africa by more than one half. As is amply demonstrated by the experience of the industrial countries, there is no such relative limit to the expansion of industrial output.^{2/} Rapid industrial expansion is therefore being accepted as the major means of economic growth of the under-developed countries. It is against this setting that this chapter reviews the trend and the structure of recent industrial growth in Africa. The review may also form a background for assessing the policies for future growth.

The Rates of Industrial Expansion

33. Any survey of industrial growth in Africa is severely handicapped by the limited availability of statistics. By using certain selected indicators, however, the broad sweep of its movement over the last two decades may be implied. The disruption of normal channels of international trade during the war acted as a protective umbrella for the

1/ As shown in Chapter I, para. 5 et seq., a doubling of per capita agricultural output would lead to close to a point where there would be a change of surpluses. Agricultural exports could hardly absorb a surplus. Even in the countries which are well-known as the world's major exporters of agricultural products, the share of agriculture in national output is considerably smaller than that of industry.

<u>Country</u>	<u>Year</u>	<u>Share in Percentages</u>	
		<u>Agriculture</u>	<u>Industry</u>
Canada	(1960)	7	37
Denmark	(1960)	15	37
Netherlands	(1960)	11	42
New Zealand	(1954)	22	30

Source: United Nations, Statistical Year Book

2/ See Chapter I, "Long-term Changes", para. 5 et seq. and "Structure of the African Economy", para. 11 et seq.

TABLE 4

Changes in Industrial Output, Pre-War, 1950 - 1960

Item and Area	Index 1953 = 100				Annual Compound Percentage Change	
	1938	1948	1957	1960	'38 to '60	'48 to '60
<u>Mining</u>						
World	63	80	120	132	3.4	4.3
Industrial countries	66	85	114	112	3.3	2.3
Africa (excl.S.A.)	47	65	115	141	5.1	6.7
Africa total	69	73	123	150	3.6	6.2
<u>Manufacturing</u>						
World	50	72	121	140	4.8	5.7
Industrial countries	47	73	116	131	4.8	5.0
Africa (excl.S.A.)	29	74	140	...	8.6	7.3
Africa total	30	67	127	...	7.9	7.4
<u>Industry Total</u>						
World	52	73	121	139	4.6	6.5
Industrial countries	49	74	116	129	4.5	4.8
Africa (excl.S.A.)	34	71	133	...	7.4 ^{a)}	7.2 ^{a)}
Africa total	42	69	126	...	6.0 ^{a)}	6.9 ^{a)}

Source: United Nations, Statistical Yearbook
See Appendix II for details.

a) Up to 1957 only

development of a number of new industries. By 1948, industrial output in Africa (excluding the Republic of South Africa) was already twice as high as in 1938. Since then expansion has continued at about the same pace. Compared with the pre-war period, mining output now is about three times as high and manufacturing nearly five times. Between 1951 and 1960, supplies of energy increased from 31 million tons (coal equivalent) to 63, or more than doubled. A rough and ready combination of the index numbers of mining and manufacturing indicates that the volume of total industrial output in Africa now is over four times higher than in 1938. The annual compound growth rate was 7.4 per cent (see Table 4).

34. By any standards, this growth rate is indeed impressive.^{1/} Industrial output in Africa expanded more rapidly than in many other parts of the world. It has increased in the world as a whole, as in the industrial countries, two and a half times since pre-war - or at a rate of 4.6 per cent per year.^{2/} The growth rate in Africa was then nearly 60 per cent higher than in the industrial countries.

^{1/} In the period of rapid industrialization of the comparative newcomers to the ranks of industrial countries, the following rates of industrial growth took place:

<u>Annual percentage growth</u>		
Sweden	(1880 to 1900)	8.1
Italy	(1900 to 1913)	5.2
Russia	(1880 to 1900)	6.4
Japan	(1913 to 1938)	7.0

Source: United Nations, Industrialization and Foreign Trade Geneva 1954 and OEEC, Industrial Statistics 1900 - 1957 Paris 1958.

^{2/} Based on the United Nations index of industrial production, which does not cover the Soviet Union, Eastern European countries and mainland China. If these countries with relatively very high growth rates for industrial output are included in the index, the rate of growth for the world as a whole would be higher.

35. Despite this brisk pace, industrialization in Africa is yet in its infancy. The Republic of South Africa is the only country in the continent which is industrially relatively advanced. With six per cent of the continent's population, it accounts for two-fifths of its industrial output. Its share in mining is somewhat higher than in manufacturing. For the rest of Africa, the net value of total industrial output is under \$3 billion - or less than in a small country like Sweden. As shown in Chapter I, the level of industrial output per head of population in the industrial countries as a group is about 25 times higher than in the rest of Africa.

36. The contribution of industrial output to national income in Africa (excluding South Africa) is only 14 per cent (see Table 5). In contrast, it accounts for 40 to 50 per cent of a much higher level of national income in the industrial countries. As is to be expected, industrial development in some countries in Africa is more advanced than in others. This may be judged by the differences in the share of industrial output in the generation of national income.

37. This share approaches one-third of the total in the Federation of Rhodesia and Nyasaland and around one-fifth in the Congo (Leopoldville). But as can be seen from Table 5, two-thirds to three-fourths of the industrial output in these countries is accounted for by mining, which is almost entirely export-orientated. The very high figure - 24 per cent - for Morocco as well as the very low figure for Nigeria - 3 per cent - may perhaps be the result of weaknesses of statistical coverage. At the other end of the spectrum are the majority of the countries in which the share of industries in national output is about one-tenth, and, in many of them, even lower. Somewhere in between these extremes are Egypt, Algeria and many of the countries in West Africa. Owing to the limited development of mining, their industrial output consists, as in most of the countries of the world, mainly of manufactures.

38. The rapid rate of industrial growth over the last two decades has so far hardly had any effect towards bringing about the structural transformation of the African economies. In the industrial countries,

for instance, economic growth over the last century involved a major shift in the relative contribution of agriculture and industry with the service sectors showing no clear trend. At the beginning of their industrialization, agricultural output was three to four times as high as industrial output - a proportion which was almost reversed during the process of economic growth. Africa has barely taken even the first hesitant steps towards such reversal, which is perhaps the most important feature of economic growth.^{1/} Despite the rapid industrial growth since pre-war, agriculture in Africa still continues to contribute three to four times as much to national output as industry.

39. Nor have these growth rates been of any great significance in providing employment for the natural increase in population and for the under-employed persons in agriculture. The total employment in mining and manufacturing in Africa (excluding South Africa) at present is estimated to be a little over 1.5 million persons. Even assuming no increase in average productivity, it would imply that over the

1/ The economic growth of most nations is strikingly mirrored in the complete reversal of the shares of agriculture and industry, with the service sector contrary to some expectations, showing no clear trend. Professor S.S.Kuznets has shown this from his empiric analysis of the rise of per capita real incomes, whether in the same country over a period of time or in many countries at a point of time. Referring to trade, banking, other financial and remaining service divisions ranging from professional personnel and business to government, he concluded: "Their shares in the national product are about the same in the high and in the low income countries, in the developed and the underdeveloped... The movement of the share of the T (transport and communication) division is very much like the share of the M (manufacturing and mining) sector". See his Six Lectures on Economic Growth, (Glencoe 1959), p.49; also his "Quantitative Aspects of the Economic Growth of Nations" II, Industrial Distribution of National Product and Labour Force" in Economic Development and Cultural Change, Supplement to Vol.V no.4; July 1957, p.70. Kuznets' observations are borne out by the data for Africa also (see Table 1). For Africa (excluding the Republic of South Africa), the "rest" (service) sector of the economy accounts for over 40 per cent of national income; within the commodity sector mining and manufacturing constitute one-fourth of the total. But whereas in the Republic of South Africa, which is industrially more advanced, mining and manufacturing accounts for three-fourths of the commodity output.

TABLE 5
Share of Industry in National Income in Africa

Area or Country	National Income			Share of Industry in National Income		
	Total	Min- ing	Manu- factu- ring	Min- ing	Manu- factu- ring	Industry
<u>Regions</u>	in million dollars			percentages		
North Africa	8,150	230	950	3	12	15
West Africa	7,240	145	590	2	8	10
S.E. Africa ^{a/}	5,550	480	480	9	9	18
Total above ^{a/}	20,940	855	2,020	4	10	14
Republic of S. Africa	5,030	630	1,210	13	24	37
Total Africa	25,970	1,485	3,230	6	12	18
<u>Countries^{b/}</u>						
Rhodesia & Nyasal.	1,230	260	125	21	10	31
Morocco	1,535	90	275	6	18	24
Congo (Leo'ville)	1,170	185	40	16	3	19
Algeria	2,500	80	280	3	11	14
U.A.R. (Egypt)	2,620	25	315	1	12	13
Former Fr.W. Africa	2,730	30	335	1	12	13
Ghana	1,215	25	95	2	8	10
Nigeria ^{c/}	2,260	25	55	1	2	3
Total above	15,265	725	1,520	5	10	15
Rest of Africa ^{a/}	5,675	130	500	2	9	11

Source: See Appendix II for details. The data, rounded to the nearest 5 or 10, refer to recent years for which estimates are available.

a) Excluding the Republic of South Africa

b) Countries arranged in descending order of share of industry in total output.

c) Nigerian figures for share of industry appear to be an underestimate.

last two decades industrial employment has increased roughly by about one million persons. But during this period nearly 25 million persons of working age were added to the labour force. Thus, although the pace of industrial expansion in Africa has been rapid, it has so far had only a limited influence in raising the level of per capita incomes, or transforming the economic structure, or providing new employment.

40. Industrial output in Africa has certain characteristic features. The share of mining in industrial output is much larger than in most other countries. It is ten per cent for the world as a whole (see Table 6) but as high as one-third in Africa - an economic reflection of the readiness with which foreign capital developed primary production for export to metropolitan countries. Even the remaining two-thirds of industrial production cannot be considered modern manufacturing output. A significant part of it - in most cases equal to one-half or more - originates in small-scale handicraft units where both productivity and the amount of capital used are low. Data on the output and employment in this sector and their growth rates over time are generally lacking for most countries.^{1/} Manufacturing on modern lines would thus seem to represent only about one-third of the industrial output in Africa (excluding the Republic of South Africa).

41. These characteristics of industrial structure in Africa have some significance for future growth rates. External demand has so far been the major determining factor of expansion in mining. Since pre-war, the expansion in mining has been lower usually than in manufacturing (See Table 3). But it may be expected that the role of domestic demand will increase as industrialization advances in Africa. Moreover, recent discoveries of oilfields suggest that this sector would grow fairly rapidly over the years to come.

^{1/} When attention is drawn to growth rates of industrial output, the developments in this sector are obviously not included.

42. A study being prepared on the potential of energy supplies in Africa^{1/} suggests that they could be raised from 63 million tons of coal equivalent in 1960 to 220 million tons in 1970 - or three and a half times in ten years. The growth potential of the small-scale sector is not easy to assess owing to limited knowledge of it. In the light of the above, the expansion of the remaining one-third (the modern manufacturing sector) assumes special significance in raising domestic income levels.

43. If it is assumed that the rate of growth current during the last two decades could be maintained over the years to come the volume of industrial output would double in ten years and quadruple in twenty years. But the recent growth rate of 7.4 per cent was attained almost inadvertently. It involved relatively limited stimulation, guidance and assistance from the governments.

44. African countries are now setting up planning commissions and agencies to guide their economies. It may well be that they will try not only to maintain the past rate but to raise it. During the last decade industrial output in many countries in the private enterprise economies and most of the centrally planned economies has expanded annually at 10 per cent or even faster. Owing to the very narrow industrial base in Africa, a relatively high growth rate would be comparatively easy to attain. At an annual expansion of 10 per cent, industrial output could double in seven years, quadruple in fourteen and increase eight-fold in twenty-one years. Such growth in any country in Africa would mean that it had taken a giant stride forward in catching up with the industrial economies. It could raise its low per capita industrial output to nearly one-fifth of the present level in the industrial countries, or approximately to the level where it was at the time of the last century. This would indeed be no mean achievement.

^{1/} In the course of preparation in the ECA Industry, Transport and Natural Resources Division.

45. The future growth rate in any particular country in Africa obviously depends on a number of factors which require close analysis at the country level. Their influence would be reflected in the differences in the pace of actual industrial growth in different countries. In some, it would grow faster than in others. It can only be emphasized here that a relatively rapid rate of industrial growth is now no longer an entirely new economic recipe to be tried in Africa. Advances at such pace have taken place in many countries over varying periods and they are well within the realm of economic feasibility. The chapters that follow are devoted to spelling out, in as concrete detail as possible at this preliminary stage of analysis the economic implications of rapid industrial growth - the particular industries that might be expanded, the sites where they might be located, the inter-regional co-operation which this would demand and the approximate capital and labour supplies that it would necessitate.

Changes in the pattern of industrial growth

46. Governments in Africa are increasingly undertaking the responsibility of guiding the development of their economies. The problem of allocating investment has consequently assumed great practical importance. Which industry to establish and how much and how fast it should grow are questions that are no longer left to be determined by the operation of market forces. In most, the endowment of natural resources and other technical considerations play a decisive role in determining answers to these questions. On the other hand, recent advances in technology and transport facilities have added to the locational flexibility of a number of industries. Countries - for instance, Italy and Japan - which had neither iron ore nor coal have established steel industries. Even then a study of the development of any particular industry in one country can hardly offer a useful guide to determining investment priorities in another where the resource structure may be entirely different. But the evolution of the broad sectoral pattern in many countries may be of considerable help in assessing the long-term relationship which has prevailed between the major sectors.

47. It is not easy to classify hundreds of industrial undertakings into a few major sectors. Such broad classification has usually been in terms of consumer and producer goods, Group I and Group II, or heavy manufacturing and light manufacturing. Although neither of these definitions is fully satisfactory for analytical purposes, they all, broadly speaking, refer to nearly identical industrial groups. A recent United Nations study, Patterns of Industrial Growth 1938 to 1958, has subdivided industrial output into three main categories: mining, heavy manufacturing and light manufacturing^{1/}. The sum of the first two roughly corresponds to the definition of producer goods, whereas the last one to that of consumer goods.

^{1/} In the study, the sector light goods industries included: food, textiles, leather, rubber and related products and printing and publishing; and the heavy goods industries covered the paper, chemicals, non-metallic and metal products. See United Nations, Patterns of Industrial Growth 1938 to 1958, p.33.

TABLE 6

Trends in the Pattern of Industrial Output 1938, 1948, 1958

Item and area	Share in percentages			Annual compound percentage change	
	1938	1948	1958	1938 to 1958	1948 to 1958
World					
Mining	12	11	10	3.3	4.2
Heavy manufacturing	40	47	54	5.8	6.1
Light manufacturing	48	42	36	3.0	3.1
Total industry	<u>100</u>	<u>100</u>	<u>100</u>	<u>4.4</u>	<u>4.7</u>
Industrial Countries					
Mining	12	10	8	2.5	2.3
Heavy manufacturing	41	50	57	5.9	5.3
Light manufacturing	47	40	35	2.8	2.8
Total industry	<u>100</u>	<u>100</u>	<u>100</u>	<u>4.3</u>	<u>4.0</u>
Under-developed countries^{a/}					
Mining	19	18	23	6.2	9.0
Heavy manufacturing	18	21	28	6.9	9.7
Light manufacturing	63	61	49	3.1	4.6
Total industry	<u>100</u>	<u>100</u>	<u>100</u>	<u>4.6</u>	<u>6.7</u>
Africa^{b/}					
Mining	48	45	51	3.8	18.7
Heavy manufacturing	24	28	28	6.1	13.1
Light manufacturing	28	27	21	4.6	7.6
Total industry	<u>100</u>	<u>100</u>	<u>100</u>	<u>4.4</u>	<u>14.6</u>

Source: United Nations, Patterns of Industrial Growth 1938 to 1958, Tables 5 and 10.

^{a/} Countries in Group IV, classified in the study as those at the lowest level of industrial growth.

^{b/} Including Middle East; the terminal year for all data for this area is 1953 rather than 1958.

48. After analysing the growth rates of these two sectors for various periods between 1938 and 1958 and for various groupings of countries (see Table 6) this study concluded that:

"Among the manufacturing industries of the world, the heavy goods industries ... made the greatest gains in output between 1938 and 1958 and during each of the three periods into which these twenty years have been sub-divided. This was also the case, in general, for each area of the world and each class of degree of industrialization ... Between 1938 and 1958, the volume of production of heavy manufacturing expanded twice as fast, in general, as the output of light manufacturing ... In the world as a whole, for example, average rates of growth for heavy and light manufacturing were about six and three per cent per year respectively." ^{1/}

49. Since the countries in Africa and the Middle East were grouped together in this study, it is not possible to show (at this time) separate data for Africa alone^{2/}. Nor can the direction of change since 1953 be indicated. Yet it is fairly obvious from the data shown in Table 6 that these countries have also followed a broadly similar pattern: the heavy industries expanding one and a half to two times as fast as the light industries.

50. This particular relationship between the expansion of the light and the heavy manufacturing industries is not restricted to the last twenty years only. It is indeed striking that in nearly all the major industrial countries heavy industry grew over a fairly

^{1/} United Nations, Patterns of Industrial Growth 1938 to 1958 (New York 1960), p.33.

^{2/} If the few countries specializing in the production of crude petroleum and minerals are excluded from the total of Africa and Middle East, it would seem that the pattern in Africa would nearly correspond to that shown for the under-developed countries as a whole in Table 6.

long period one and a half to two times faster than light industry^{1/}. As a result, the share of light industry in total industrial output has continued to fall and that of heavy industry to rise. At the beginning of industrialization consumer goods or the light industries usually accounted for two-thirds or more of total industrial output. But

^{1/} This relationship was observed, as can be seen from the data below, during almost the entire process of industrialization.

<u>Country</u>	<u>Period</u>	<u>Industrial output</u>	<u>Consumer goods output</u>	<u>Producer goods output</u>	<u>Ratio of producer to consumer goods output</u>
		<u>per cent per year</u>			
		(a)	(b)	(c)	(c) + (b)
<u>Great Britain</u>	1812 to 1851	3.4	3.1	4.0	1.3
	1851 to 1881	2.7	2.0	2.8	1.9
	1881 to 1907	1.8	1.5	2.0	1.3
	1907 to 1935	1.0	0.8	1.2	1.5
<u>France</u>	1861-65 to 1896	2.4	1.2	3.3	2.7
	1896 to 1921	0.5	..	1.1	..
<u>Germany</u>	1860 to 1880	2.9	1.8	3.9	2.2
	1880 to 1900	5.0	3.7	5.4	1.5
	1900 to 1913	3.4	2.5	3.7	1.5
<u>United States</u>	1880 to 1900	4.5	3.2	5.1	1.6
	1900 to 1927	4.2	3.9	5.5	1.4
<u>Italy</u>	1896 to 1913	5.4	3.5	8.7	2.5
<u>USSR</u>	1928 to 1940	17.0	12.0	21.2	1.8
	1940 to 1955	8.1	6.1	9.1	1.5
	1958 to 1965 (plan)	8.8	7.3	9.3	1.3

For sources, methods and notes see Surendra J. Patel, "Rates of Industrial Growth in the last century, 1860 to 1958", in the Economic Development and Cultural Change, Vol.X, No.3, April 1961, pp.321-325.

owing to their relatively low rate of growth,^{1/} their share fell to a point where the previous relationship was completely reversed: from two-thirds or more of total industrial output in the initial phase to one-third or less of the total in the advanced stage of industrialization^{2/}. Only when such a transformation of the industrial structure has been completed does the disparity in the relative rates of growth of these two sectors begin to narrow.

51. The reversal of the relative position of these sectors has been a characteristic feature of industrial growth in nearly all the industrial countries - just as the reversal of the relative shares of agriculture and industry was also the characteristic feature of economic growth everywhere (see Section (b) above). This universal pattern cuts across so many real differences among countries in their natural resource endowment; in the size of the country and its population; in the stage, the speed and period of their economic growth; in their attitude and actual experience regarding international trade and capital movements; in the proportion of producer goods output in their foreign trade; in the fiscal and other forms of policies pursued; and in the manner in which industrial growth was promoted - through private enterprise (and therefore without a strict predetermination of sectoral priorities) or through state encouragement and central planning. Despite these and other manifest differences, there was

1/ During the last century, the rates of growth of the broad industrial sectors in the industrial countries might be estimated as follows:-

	<u>Annual compound percentage rate of growth</u>	
	<u>per capita</u>	<u>overall output</u>
Total industry	2.6	3.5
Light industry	2.0	2.9
Heavy industry	3.3	4.2

2/ See W. Hoffmann's British Industry 1700-1950 (Oxford 1955), p.73, and Stadien und Typen der Industrialisierung (Jena 1931), later published in a revised and expanded version, in English under the title The Growth of Industrial Economies (Manchester, 1958), p.p.2-3, 8-17, and Chapter IV.

a striking uniformity in the evolution of their sectoral pattern of industrial growth. A more rapid increase of heavy industries thus appears to be simply a characteristic feature of industrial expansion everywhere.

52. A more rapid growth of the heavy industries than of the consumer goods industries seems on close examination to be only a common sense proposition. In the very early phase of industrialization, the heavy industry is the least developed sector. Its output is relatively small. But as economic growth proceeds, the share of investment in total expenditure and of the machinery and equipment component in investment usually rises, thus calling for a relatively rapid expansion of the supplies of the producer goods. Moreover the output of a whole new series of intermediate goods such as cement, fertilizers, various chemicals, plastics etc. rises as industrialization advances. These goods are not directly purchased by the consumer. Their output represents a proliferation of the industrial base, an important element in the spread of division of labour and specialization. As a result, the share of heavy manufacturing in total industrial output generally increases in all countries, large or small^{1/}.

53. Although the experience outlined above is nearly universal, there may be special cases where its relevance would be limited^{2/}. Each country would have to look closely into its own resource structure and requirements of sustained growth to set its own sectoral targets and investment priorities. Some of the considerations discussed here may however serve

^{1/} This pattern of industrial growth is not restricted to the major industrial countries only. Hoffmann's studies show that it applies to both the large and the small industrial countries. See his The Growth of Industrial Economies, p.p.2-3, Chapter IV.

^{2/} For instance, a country might simply lack the raw material and other natural resources; or its export proceeds might be sufficiently large and expanding fast, so that the rapidly rising requirements of the output of heavy goods industries for domestic investment could be met by importing them; or it may be an important agricultural producer (e.g. Denmark, Australia, New Zealand, etc.) exporting its products to an industrial country in exchange for the products of heavy manufacturing.

as useful economic background against which particular national development targets may be assessed.

Industrialization and foreign trade

54. Africa,^{1/} as suggested earlier, is one of the most trade-dependent areas of the world. With an annual output of about 21 billion dollars, it exports goods worth 4.8 billion dollars and imports goods worth 6.4 billion dollars. Its exports and imports, expressed as percentages of its overall output, come to 23 and 30 per cent respectively. These shares are much higher than for most countries. The comparable shares are 18 and 22 in the United Kingdom and only 5 and 7 respectively in India. For each of its inhabitants, Africa exports goods worth 22 dollars, and imports goods worth 29 dollars. The comparable figures for India are 3 and 4.5 dollars respectively.

55. A direct comparison of net national output and foreign trade needs modification owing to two important reasons. In the first place part of the net national output originates in the service sector which does ~~not~~ cross national boundaries and enter into international trade. The relevant comparison would therefore have to be not with total net national product, but only with commodity output. In the second place, there is the problem of valuation. In national accounting, commodity output is usually valued in terms of the net contribution of that sector to national output. Exports and imports on the other hand are valued in gross terms. A proper comparison of national products with foreign trade would therefore necessitate converting the net value added in the commodity sector to estimates of gross value.

56. Statistical information now available for Africa is inadequate for such a comparison. But estimates for other countries suggest that the gross value is about one-fourth higher than the net value in agriculture

^{1/} The Republic of South Africa, a relatively industrially advanced country, is not included in the discussion throughout this section, unless specifically mentioned.

and two and a half times in industry. If these rough and ready deflators are applied to commodity output for Africa (see Table 1), its trade dependence would be about 25 per cent for exports and 33 per cent for imports - or somewhat higher than indicated above. If the gross commodity output in the United Kingdom is estimated in a similar manner, its trade dependence would be only about 13 per cent for exports and 16 per cent for imports - almost one half the proportions for Africa. The degree of foreign trade dependence of Africa is thus much higher than even in a heavily trade-dependent country such as the United Kingdom.

57. Such heavy trade dependence is in part a result of the small size of these countries which can hardly be as self-sufficient as a large sub-continent like India. But it is mainly a reflection of a particular type of economic evolution in these countries. A comparison of the structure of output with that of imports and exports reveals some interesting characteristics (see Table 7). Exports consist mainly of primary products and imports of manufactures. Almost the entire output of the mining sector is exported. Manufacturing contributes only a small share to national output; and nearly half of it originates in small-scale units. Thus, the modern manufacturing sector produces goods worth \$1 billion on net value added basis, and perhaps 2 to 2.5 billion dollars on gross value basis. Imports of manufactures come to over 5 billion dollars, or two to two and a half times the volume produced domestically^{1/}.

58. An important feature of the present structure of output and foreign trade for Africa is that they are entirely complementary or non-competitive in character. Primary products are exchanged against manufactures. But one of the major elements in economic growth of the industrial countries has been a structural transformation of their output and foreign trade - away from primary products to manufactures. Trade among industrial countries, amounting to over two-thirds of the world total, consists chiefly

^{1/} An estimate prepared on a similar basis for India shows the domestic output of manufactures to be four to five times higher than imports.

of manufactured goods. Trade relationships among them are thus competitive rather than complementary. Such competition has been a spur to deriving the maximum benefits through a high degree of specialization of various manufacturing products. Industrialization of Africa, as that of the industrial countries earlier, can hardly leave unaltered the present pattern of output and trade. The existing international division of labour under which Africa produces and exports primary products and buys manufactures from abroad would in the process undergo a major change.

59. Industrialization of any country involves an increase in the output of goods already available on the domestic market as well as of entirely new goods. It has been the general experience that among the first industrial ventures have been those aimed at substituting goods either produced by cottage industries or imported from abroad. Establishment of such industries is usually made easier by the fact the extent of the market as well as the price range for the products is already known.

60. As indicated earlier, imports of manufactured goods are nearly two to three times as high as domestic output in Africa. An illustrative exercise may help indicate the size of potential import substitution. If all the items imported at present were to be produced domestically, the volume of manufacturing output could increase three to four times. Even such a sharp increase would not involve an expansion in the total availability of any of these products, nor would there be any addition to the range of goods available. Imported products would be merely manufactured within the continent. It is of course neither economically sound nor often possible to manufacture domestically everything that is being imported. But even this illustrative exercise has considerable significance. It may be brought out more clearly by comparison with another country, India. The volume of domestic manufacturing output (excluding handicraft products) is four to five times higher than imports of manufactures. Industrial expansion through mere substitution of imports in India is thus severely limited - amounting to only a fourth or a fifth of the present output. In Africa, on the other hand, the

TABLE 7

Relation between Industrial Output and Imports and Exports of Africa 1960

Item	North Africa	West Africa	South & E. Africa ^{a/}	Total ^{a/}	Republic of S. Africa	Africa Total
I. OUTPUT			in million US dollars			
National Income	8,150	7,240	5,550	20,940	5,030	25,890
Manufacturing (value added)	950	590	480	2,020	1,210	3,230
I. IMPORTS: TOTAL	<u>2,865</u>	<u>1,780</u>	<u>1,766</u>	<u>6,410</u>	<u>1,555</u>	<u>7,965</u>
(1) Consumer goods: Total	<u>1,408</u>	<u>1,084</u>	<u>817</u>	<u>3,309</u>	<u>741</u>	<u>4,050</u>
Food, beverages & tobacco	569	314	230	1,113	82	1,195
Textiles	193	271	210	674	202	876
Passenger cars	67	126	76	269	197	466
Other manufactures	579	373	301	1,253	260	1,513
(2) Intermediate goods: Total	<u>878</u>	<u>405</u>	<u>483</u>	<u>1,766</u>	<u>386</u>	<u>2,152</u>
Fuel	212	107	138	457	101	558
Basic materials	179	21	26	226	93	319
Chemicals	200	109	135	444	114	558
Metals	287	168	184	639	78	717
(3) Machinery & transport Equipment	<u>579</u>	<u>291</u>	<u>466</u>	<u>1,336</u>	<u>40</u>	<u>1,376</u>
Machinery	359	166	222	747	307	1,054
Transport equipment ^{b/}	220	125	244	589	121	710
I. EXPORTS: TOTAL	<u>1,535</u>	<u>1,428</u>	<u>1,824</u>	<u>4,787</u>	<u>1,838</u>	<u>6,625</u>
(1) Food, beverages & tobacco	433	345	391	1,169	252	1,421
(2) Agricultural raw materials	586	447	414	1,447	208	1,655
(3) Ores and raw minerals	101	122	144	367	271	638
(4) Metals	5	55	386	446	862	1,308
(5) Manufacturing goods	410	459	489	1,358	245	1,603

Source: United Nations, Yearbook of National Accounts.

United Nations, African Statistics, June 1962.

United Nations, Statistical Yearbook 1960.

National publications.

^{a/} Excluding the Republic of South Africa.

^{b/} Excluding passenger cars which are shown separately.

position is almost the reverse, since domestic output amounts to only a half or a third of imports.

61. The type and extent of the goods for which import substitution might be undertaken in African countries would have to be decided at the national or inter-regional level. Here it only need be emphasized that its potential is considerable in Africa. Industrialization of Africa would have to aim obviously beyond mere import substitution, which for years to come will mean simply a change in the import structure and not a fall in the import level.

62. Since import substitution has such a relatively high potential in Africa, some of the major considerations affecting it should be set out here. A private importer's decision to import one particular item rather than another is guided by his own short-term estimate of profit ability. But such a private evaluation can hardly be expected to be identical with social evaluation based on longer-term considerations of economic growth. A trader might wish to import certain consumer goods; but it may well be that the overall growth of the economy would require these foreign exchange resources to be used for imports of machinery and equipment, or other necessary intermediate products.

63. Considerable progress in the direction of changing the structure of imports has already taken place in Africa. As can be seen from Table 8, the share of consumer goods has fallen over the last ten years from two-thirds of total imports to one-half, and that of intermediate goods and machinery and equipment has correspondingly risen. Machinery and equipment formed only 3 per cent of imports in 1950. Ten years later, its share rose to 12 per cent of the total, and its absolute volume about seven-fold - a clear indication of a significant expansion in the level and content of investment in these economies. The present composition of imports suggests that there is still considerable scope for continuing this change by increasing further the imports of items which are important for accelerating economic growth. The present heavy import dependence of Africa is thus a double-edged advantage. It indicates a large potential

for import substitution, and at the same time furnishes in the form of foreign exchange the very resources for carrying it out.

64. This favourable position in Africa may again be emphasized by contrasting it with India, where imports per capita amount to only 4.5 dollars. Even in the (extremely unlikely) hypothetical case of devoting all the foreign exchange to imports of machinery, equipment and other goods directly facilitating economic growth, India has a limited upper ceiling: 4.5 dollars per capita. In Africa, on the other hand, with per capita imports amounting to 29 dollars, the ceiling is obviously much **higher**. With proper management of the import structure, away from consumer goods and towards capital goods, the potential for economic growth based on imported capital goods is enormous in Africa. Far-sighted management of the import structure is thus of crucial importance.

65. The importance of the wise management of the import structure may be highlighted by indicating the nature and extent of foreign exchange savings that may be brought about by a far-sighted policy of industrialization. Restrictions of imports of certain luxury goods can save foreign exchange which can then be used for importing capital goods and intermediate products which cannot be produced domestically at all, owing to natural and climatic endowments, or which cannot yet be produced at reasonable cost. But such saving has a once-for-all effect. The foreign exchange cost of establishing a new industry is non-recurrent; whereas in the absence of domestic output imports have to be paid for every year. The plans for the economic development of a number of countries bring this out clearly.

66. As an example, the five-year programme for Greece (1959-1963) indicates that the total foreign exchange cost of establishing a number of new plants is only slightly higher than the annual foreign exchange savings that the full-scale production in these plants would make possible. Annual saving even in the least favourable cases, such as nitrate fertilizers and steel, is still nearly three-fifths of the initial cost.

TABLE 8

Changes in the Structure of Imports in Africa^{a/} 1950 to 1960

Item	Value in million \$		Percentage change	Share in percentage in total	
	1950	1960		1950	1960
IMPORTS: TOTAL	<u>3,368</u>	<u>6,410</u>	<u>90</u>	<u>100</u>	<u>100</u>
1. <u>Consumer goods: Total</u>	<u>2,340</u>	<u>3,309</u>	<u>41</u>	<u>70</u>	<u>52</u>
Food beverages, tobacco	616	1,113	80	18	17
Textiles	501	674	34	15	11
Passenger cars	90	269	199	3	4
Other manufactures	1,133	1,253	12	34	20
2. <u>Intermediate foods: Total</u>	<u>589</u>	<u>1,766</u>	<u>200</u>	<u>17</u>	<u>28</u>
Fuel	185	457	147	5	7
Basic materials	126	226	79	4	4
Chemicals	101	444	339	3	7
Metals	177	639	261	5	10
3. <u>Machinery & transport equipment</u>	<u>440</u>	<u>1,336</u>	<u>204</u>	<u>13</u>	<u>21</u>
Machinery	107	747	598	3	12
Transport equipment ^{b/}	333	589	76	10	9

Source: United Nations, African Statistics, Vol. II, No. 1, Jan. 1962.
United Nations, Yearbook of International Trade Statistics.
National publications.

^{a/} Excluding the Republic of South Africa.

^{b/} Excluding passenger cars, which are shown separately.

TABLE 9

Import Saving in the Greek Five-Year Development Programme

in million dollars

	Cost of establishing the industry		Net annual saving in foreign exchange corresponding to domestic output ^{a/}	Percentage of (c) to (b)
	Total (a)	Foreign exchange (b)	(c)	(d)
Sugar refineries	24 -	14	12	86
Fertilizer, nitrogenous	35	27	15	56
Superphosphates	7	5	5	100
Iron alloys industry	15	9	5	56
Steel industry	40	27	15	56
Soda industry	5	3	2	67
Cellulose industry	2	1.7	3	176
Total	128	87	57	66

Source: Preliminary Five-Year Programme for the Development of Greece, Athens, April 1959, Table XII, pp.41, 70 and 71.

^{a/} i.e. after allowance for increased imports of current input.

67. Another example is Turkey, where estimates for twenty-one projects financed by the Industrial Development Bank in 1958 show that by investing \$3.2 million of initial foreign exchange, it would be possible to save or earn annually \$11.5 million worth of foreign exchange^{1/}.

68. Estimates have also been made in India covering many sectors of the economy^{2/}. If grain were to be imported to feed all the additions to India's population, the foreign exchange cost over five years would be about \$950 million. But the cost of importing fertilizers to produce the needed grain was estimated to be only \$280 million. If a new fertilizer factory was established every year to produce 350,000 tons of ammonium sulphate, the foreign exchange cost could be reduced to only \$105 million. But the foreign exchange cost of a heavy-machine building factory to manufacture machinery to be installed in such a fertilizer plant every year would be about \$21 million. "Wise utilization of \$21 million of foreign exchange once-for-all can lead, in time, to a saving of \$945 million in imports of food grains over a period of five years... Similar considerations hold good in other crucial sectors. An investment of \$315 million, including \$168 million of imported machinery, would be required to install a million-ton steel plant with a product value of \$84 million. A heavy machine building factory with an investment of \$168 million, with foreign imports worth about \$105 million, would produce every year machinery worth roughly \$168 million or the equivalent of imported machinery needed to set up a million-ton steel plant. Once such a heavy machinery factory gets into production, it would be possible to start a new million-ton steel plant every year out of our own resources. An investment of \$63 million in a plant to manufacture mining machinery would produce goods worth about \$63 million per year. An investment of \$210 million in heavy electrical equipment (generators, switchgear, heavy motors, rectifiers, transformers,

1/ See ECE, Economic Survey of Europe in 1959, Chapter VIII, footnote 29.

2/ Cited in ECE, Economic Survey of Europe in 1959, Chapter VIII, p.13.

etc.) would give products of the value of about \$147 million per year; and so on."^{1/}

69. The estimates in the preceding paragraphs compare the relative costs of foreign exchange alone. As such they are wholly inadequate to indicate the full extent of benefits that could follow from the establishment of a new plant. Output of the new plant adds to the total of incomes within the economy. These incomes help toward the expansion of other subsidiary activities which in turn again stimulate other branches of the economy. The initial stimulus given by an individual plant thus spreads in a cumulative development of many other forms of economic activities. Any assessment of the initial cost, foreign exchange as well as domestic, will therefore have to take into consideration its spread beyond the limits of the first impulse. Moreover, the benefits are not restricted to the field of economic calculations alone. They include the training of manpower that is made possible; the new skills which could hardly be acquired without actually working on the job; and the broader outlook which a new type of economic activity generates. The significance of these social benefits can hardly be compressed into a neat economic balance sheet.

^{1/} ECE, Economic Survey of Europe in 1959, Chapter VIII, p.13

CHAPTER III

INDUSTRIAL PLANNING IN AFRICA

Introduction

70. A conscious policy of promoting industrial development could be implemented in one or both of two ways. First through co-ordinated industrial planning, and secondly through an industrial policy intended to create conditions favourable to new investment.

71. Little evidence of industrial planning has been seen in Africa over the past decade or so. By contrast, governments have made generous use of the various instruments of policy aimed at stimulating industrial investment. This situation could be said to stem from the relative simplicity of following the latter as against the former approach. But behind this apparent preference for a policy whose administrative and technical requirements are within easy reach lie basic factors which have precluded the use of industrial planning as a tool of government policy.

72. In the face of so many rapid changes currently sweeping through the continent, it would not be surprising if some of these factors are being rendered out-of-date; and this is a welcome development. But to study the past is no less important than to be aware of current developments. Not only is this important in itself, but in as much as present social and economic conditions are a legacy of the past (perhaps much more so here than elsewhere in the under-developed world) and in as much as these conditions have to be radically altered, an examination of past events becomes indispensable.

73. There is further an important reason for taking a brief look at the past. Any reasoned guess of the prospects of industrial planning in the immediate future would depend on an appreciation of the forces which have held it back. These forces may or may not operate in the future, and correspondingly the case for industrial planning may or may not be strengthened. Guesses on the fate of some or all of these forces

may go wrong. But it is less important that such wrong guesses are made than that the operating forces are identified and fully appreciated.

74. However, there is also a fair chance that some of these forces hold true even today. Because of the preliminary nature of this chapter it may not always be possible to distinguish these from the others which are out-of-date. For the same reason it may not be possible to indicate the extent to which the study applies to conditions in those countries on which data have as yet not been gathered. These drawbacks do not, however, diminish the importance of taking a brief glance into the past.

75. In the following pages a few of the more important causes for the somewhat embryonic state of industrial planning in Africa today will be given. This will be followed by a brief review of the current industrial plans of a few countries. In the concluding section certain probable future developments will be considered.

76. Broadly speaking, there was little industrial planning in the 10 or 15 years preceding 1960. A number of factors combined to bring this about. The first concerns the type of planning that was pursued.

77. Despite the fact that the beginnings of economic planning in Africa go back to early post-war years, it has remained an ineffectively medium of government policy. Technically little advance was made in applying the newer tools of economic analysis which were well suited for measuring

1/ The paper is based largely on the current development plans of the UAR (Egypt), Ethiopia, Nigeria, Sierra Leone, Tanganyika, Kenya, the Federation of Rhodesia and Nyasaland, Guinea and Senegal.

aggregate magnitudes and widespread repercussions^{1/} - problems quite intimately related to comprehensive economic planning. On a more modest level co-ordination was almost absent. This was necessary in both the formulation and administration of plans. The functions of many of the public or semi-public bodies executing government policy should have been harmonized. Furthermore, projects should have been drawn up with a view to how well they related to one another and to the government's over-all economic purposes. These considerations hardly seemed to weigh with planners. Even the very basic element in planning, namely the size of the available resources, appears to have received very little attention. Economic planning in all these years remained rudimentary.

78. An even more serious shortcoming is that planning has had little to do with the actual course of economic development. In one West African country, for instance, "what was planned and what was done after bore no discernible relation to each other".^{2/} And "The most important economic expansion of East Africa occurred independently of these (development) plans and owes nothing to them."^{3/} These statements apply to many more countries.

1/ "When we come to composition (of plans), it appears that economic analysis could really come into greater play. For the techniques of input-output analysis and possibly linear programming are well designed for the calculation of total repercussions, both on the supply and demand side, following expansion in each individual sector. It is not denied that serious problems need to be overcome in the use of these techniques in under-developed countries. But what is important is that if they are not faced, so that the total repercussions are not known, the planners are likely to find incomplete achievements of projects occurring through problems on the supply side and/or incomplete utilization through inadequate analysis on the demand side". D. Dosser - "The Formulation of Development Plans in the British Colonies", The Economic Journal, June 1959, pp. 255-256.

2/ S.P. Schupitz, "The Influence of Planning on Development: The Nigerian Experience", Social Research, 1960.

3/ Report of the East African Royal Commission, 1953-1954, p. 95.

79. In short, economic planning in Africa had unsatisfactory implementation even in its most rudimentary form. And because it was deliberately limited to the public sector it rarely affected the area of industrial growth in any direct manner. Small wonder that industrial planning has remained largely a neglected tool of government economic policy.

80. But this is not the fundamental explanation. One has to look elsewhere to discover the major deterrents to industrial planning. Two powerful forces could be identified in this respect.

81. The first concerns the widespread belief that the primary and logical step towards economic development in under-developed countries should be a rise in agricultural productivity. The second arises from a commitment to the free enterprise system as the most desirable means of bringing about economic and social development.

82. Many of the arguments adduced in favour of giving priority to agricultural development bore a clear implication for industrial planning. A brief summary might therefore be justified.

83. The overwhelming majority of the population in under-developed countries, as it has been argued, is engaged in agricultural occupation, and agriculture constitutes by far the greatest bulk of the nation's wealth. Any move to set such countries along the path of lasting development must therefore start with the development of agriculture.

84. A rise in agricultural productivity tends to set in motion a number of forces which generate economic growth. With this rise comes, first, an increase in purchasing power. The very size of the population makes it necessary that products for which demand has been so created should be produced on a larger scale. Thus the manufacturing of such items as textiles, matches, soap, beer etc. becomes feasible. And, in this way, the small size of the market, one of the most powerful impediments to economic growth, is increased.

85. It has further been said that the rise in agricultural productivity reduces the amount of labour needed for a given unit of output. In most

under-developed countries there is a considerable amount of disguised unemployment on the land, so that a certain amount of labour could be removed without affecting total production. Apart from its doubtful feasibility, this is a relatively short-term phenomenon, and cannot be relied upon to satisfy the long-term labour requirements of a growing economy. It is the continued rise in productivity which will release a substantial amount of labour force for the growth of manufacturing, mining, transport and communications, construction, etc. Here then is one of the most potent forces that provides an indispensable means of lasting growth.

86. Agriculture offers yet another fundamental element for economic growth: capital. Again because the overwhelming majority of the population is in agriculture and because the material resources of under-developed countries are largely concentrated in that sector, by far the greatest part of domestic capital is to be found there.

87. Other less impressive arguments have also been brought forth to demonstrate agriculture's decisive role in development. It has been said, for instance, that the comparative advantage of under-developed countries lies in agricultural production. Only through specializing in primary products can they take advantage of their position as cheap producers of these commodities. This is the most efficient way of allocating the limited resources at their disposal. This line of thinking was sometimes supplemented by the contention that, in terms of costs, agricultural investment demands less than non-agricultural, but brings relatively more returns.

88. The upshot of all this is that agriculture rather than industry was the overriding pre-occupation of African governments and agricultural development was regarded as the precondition for general economic expansion. "A concentration on agricultural development for a number of years", said the Development Programme for Kenya for 1957/1960, "should allow time for the country to build up a reservoir of skilled manpower for non-agricultural

development at a later date." A report of the Uganda Economic Development Committee arrived at the same conclusion when it said in 1959 that "the most effective steps which can be taken to secure development of manufacturing industry in Uganda, paradoxical though it may seem, are steps which will have the effect of increasing agricultural production."

89. The second deterrent to overall economic planning in general, but more specifically to industrial planning, was the strong belief in laissez-faire economic policy. Arguments marshalled against any appreciable degree of government intervention are well-known and need no repetition. The point is that industrial planning would have called for a considerable amount of guidance and some degree of control by the government, neither of which could be accepted by private business nor indeed by governments themselves. The trouble was that not only was planning associated with an undesirable economic policy but with radical political thought; and under the circumstances this could not be tolerated.^{1/}

90. There are two additional factors which have precluded effective industrial planning in the past and which still engage the attention of planners and policy makers.

91. First, the widely familiar difficulty of inadequate statistical data. Even today, national accounts are mostly in their embryonic stage in Africa^{2/} and rarely go beyond estimates of national income and (at times) capital formation. The reliability of these estimates is another problem again. The weight of the problem may vary from country to country; in one country there may be no population census or a reliable estimate while in another the difficulty may be the relatively more sophisticated one of inadequate data on the savings and consumption pattern. But on whole the problem remains formidable. "In Tanganyika", for example, "it has not proved possible to follow the 'programming' approach which starts from over-all targets of gross domestic product and estimates subsequently

^{1/} See, for instance, "Development Plans versus Development Policies: Discreditable Notions", The Central African Examiner, June 1962, p.17 et seq.

^{2/} See "National Accounts in Africa and relevant ECA Statistics", Economic Bulletin for Africa, June 1961.

the resulting levels of consumption, imports, exports, capital formation and other relevant aggregates. The work of Tanganyika's national accounts is in its early stages. Although annual series of gross domestic product and capital formation are regularly computed, there is little or no reliable information on personal consumption and other expenditure aggregates. Similarly, it proved impossible to arrive at the reliable estimate of a multiplier or of other relevant co-efficients of the economy or to prepare a satisfactory forecast of all resources.^{1/} And while both the public and private sectors are affected, it is the latter on which data are especially scarce. "Though development planning is reputed to have started in this country since 1945-46" says the current plan of Western Nigeria, "the planning techniques and experience have not reached the stage of venturing into the private sector. Fundamentally, the essential data needed for planning such a sector are not available and private businessmen and producers are only just being educated to provide essential returns and cultivate a co-operative attitude towards Government planning efforts. Planning for a sector where the majority of the participants keep no records of production, sales and purchases and where demand for financial statements is suspect, is nothing short of a wild goose chase."^{2/}

92. The second concerns the under-developed stage of social and economic overheads. Tables 10 and 11 give a rough indication of the nature of the problem.

93. Table 10 brings out two points. In the first place, both Asia and Africa show a distinctly similar pattern in their allocation of public investment. By far the bulk of this goes to infrastructure. As transport and communications, construction, health and education do not exhaust items that fall under infrastructure, a sum total of columns (1), (2) and (3) would tend to underestimate the magnitude of infrastructural investment, although by how much it is difficult to say. Even with this possibility of understatement, the figures are remarkably high. For the few selected African countries they range from 61 per cent to 78 per cent

1/ Tanganyika, Development Plan (1961/62 - 1963/64), p.1.

2/ Western Nigeria, Development Plan, 1962-68

and for the Asian from 51 per cent to 64 per cent. This brings in a related point. Broadly speaking, the six countries of Asia invested relatively less on transport and communications, construction, health and education in 1950-1959 than the five African countries, but more on industry and agriculture. Evidently, there must have been a number of factors which caused this. One which suggests itself is the difference in the level of economic and social development between Asia and Africa

TABLE 10
Percentage Distribution of Public Investment 1950-1959

	Trans- port & Communi- cations (1)	Const- ruction (2)	Health & edu- cation (3)	Agri- culture (4)	Industry (5)	Other (6)	Total (7)
AFRICA							
1. Congo (Leo.)	42	26	10	5	-	17	100.00
2. Ghana	36	22	21	5	5	11	100.00
3. Nigeria	48	16	8	-	1	27	100.00
4. Sudan	29	10	22	15	1	23	100.00
5. South Africa	49	-	14	14	8	15	100.00
ASIA							
1. Burma	30	16 ^{a)}	5 ^{c)}	15	16	18	100.00
2. Ceylon	22	13	11	35	3	16	100.00
3. India	32	-	16	29	13	10	100.00
4. Iraq	21	30 ^{b)}	...	34	11 ^{d)}	4	100.00
5. Philippines	40	3	15	22	6	14	100.00
6. Thailand	43	9	12	19	4	13	100.00

a) Including education and health

b) Including energy, education and health

c) Social services only

d) Including energy

Symbols: - indicates amount which is nil or negligible

... indicates data not available or not separately reported

Source: UN World Economic Survey 1959, p. 85

Though both are under-developed vis-a-vis the industrial nations, they are not identically so. Asia would seem to be better off in terms of both social and economic overheads than Africa, so that governments could spare more money for investment in the more directly productive sectors - industry and agriculture.

94. Table 11 shows that although the industrial and agricultural public investment of African countries seems to have gone up compared with the figures of Table 1, the preponderance of infrastructure basically remains unchanged. This varies from 15 per cent in Morocco to 93 per cent in the Federation of Rhodesia and Nyasaland. Again there are good grounds for believing that many of the figures are understated: for under the heading of infrastructure are included only the following items^{1/} electricity, transport and communications, education, health. These are indeed the major items, but they do not cover everything. Government expenditure on community development programmes, on public buildings, on town planning etc. has not been included. Nonetheless the figures are by no means low.

95. It was seen in Table 10 that the Asian countries which have a higher level of economic and social overheads invested less in infrastructure and more in industry than the African countries. Some indication of this relationship exists within Africa itself. In Table 11 Morocco and the UAR come last in the relative size of their investment in infrastructure but are on top in industrial investment. Could the same inference be made here as that made from Table 10 with regard to Asia and Africa? - namely, that the UAR and Morocco have a more developed infrastructure and are thus relatively freer to channel more money into industrial investment. This is definitely the case with the UAR.^{2/} Egypt

^{1/} Only in the case of Tanganyika have some additional items been included.

^{2/} Care must be taken, however, in interpreting the high figure of investment in infrastructure for the Federation of Rhodesia and Nyasaland. It reflects not so much the under-developed stage of the country's infrastructure as its policy of directing public investment towards the services sector rather than towards the more productive sectors.

is a country which has, for instance, one of the highest figures of per capita total energy consumption and one of the most extensive railway and road networks in Africa. The fact that the transport facilities, like population, are heavily concentrated along the Nile because of the country's large desert area only gives added emphasis to the developed state of its transport system. In Morocco, too, infrastructure is more developed than in many other countries, but not markedly so. Here it is the policy of rapid industrialization to reduce the pressure of unemployment that explains the relatively high level of industrial investment.

TABLE 11
Percentage Distribution of Government Capital Expenditure

Country	Plan Period	Industry	Agri-culture	Infrast-structure	Other	Total
1. Fed. of Rhodesia & Nyasaland	57-63	-	2	93	5	100.00
2. Ethiopia	57-61	10	7	73	10	100.00
3. Ghana	59-64	8	7	68	17	100.00
4. Congo (Leo.)	50-59	-	6	62	32	100.00
5. Cameroun	60-65	-	32	60	8	100.00
6. Tanganyika	61/62-63/64	4	26	58	12	100.00
7. Uganda	" "	-	15	53	32	100.00
8. Senegal	61-64	4	12	50 ^{a)}	34	100.00
9. Ivory Coast	58-62	3 ^{b)}	33	48	16	100.00
10. Guinea	60-63	21	26	32	21	100.00
11. Kenya	57-60	-	38	28	34	100.00
12. UAR (Egypt)	60-65	23	23	24	30	100.00
13. Morocco	60-64	28	32	15	25	100.00

a) Transport and communications, education and health only.

b) Expenditure on mineral prospecting.

Source: United Nations Economic Bulletin for Africa, Vol. II No.2, p. 22;
Senegal, Development Plan 1961-1964

96. All this does not prove that industrial planning will accompany a higher level of industrial investment. What it implies is that, as the expansion of social and economic overheads rather than investment in industry has been the major concern of governments, industrial planning could hardly appear to be a pressing issue.

Industrial Planning at Present

97. Yet signs of change have set in. The 1960-65 plan of the UAR (Egypt) is one example. It provides evidence of industrial planning which involves basic alterations in the level and structure of industrial production. Table 12 brings out a number of relevant points in this respect.

TABLE 12
Gross Value of Industrial Production

	£E million	%	£E million	%
1. Mines & Quarries	22.0	2.0	74.4	4.1
2. Electricity	18.3	1.7	35.1	2.0
3. Manufacturing, of which				
a) Food, beverages, tobacco	486.1	44.3	639.0	35.2
b) Processing of non-food agricultural products	394.0	36.0	574.8	31.7
c) Oil, chemical, metallic, non-metallic & machine products	155.8	14.3	470.6	26.0
d) Miscellaneous	18.0	1.7	20.0	1.0
Total	1094.2	100.00	1813.9	100.00

Source: General Frame of the 5-Year Plan for Economic & Social Development
July 1960 - June 1965, Cairo 1960 p. 45.

98. Firstly, there is the target figure of £E1813.9 million for over-all industrial production for 1965. This assumes an impressive rate of growth of about 11 per cent per annum (compounded). Even more striking, however, is the growth of one of the most crucial branches, namely 3(c)

in the table. This comprises the production of electric and non-electric machines, various oil products, means of transportation, chemicals, metallic and non-metallic products. Basic metallic industries also fall with this group. The aggregate target for these is £E470.6 million at the end of the first five-years (i.e. 1964/65). To reach that level the initial total figure of £E155.8 million (1959/60) would have to grow at an annual compound rate of 24.7 per cent. Much of this sharp rise is accounted for by the even more impressive growth of three industries - oil refinery, chemicals, and basic metallic industries. In 1959/60 production in each of these industries stood at £E43.3 million, £E31.2 million and £E18.8 million respectively. By 1964/65 these figures are to go up to £E98.9 million, £E107.7 million and £E124.4 million respectively. So great is this expansion that one would hesitate to express it in terms of growth rates. Oil goes up more than twice, chemicals more than three times and basic metals rise almost seven times.

99. It is true that one must guard against laying overemphasis on this type of expansion, as it starts from a rather low level and as growth rates in the initial stages of any economy are bound to be quite high. What is significant, however, is not merely the rapid increase of production but rather the types of products upon which emphasis is placed.

100. If comparison is made between the structure of industrial production at the beginning and at the end of the plan period, this emphasis comes out clearly. In Table 12 two things stand out. The first is the relative decline in the production of food, beverages and tobacco from 44.3 per cent to 35.2 per cent of the gross value of industrial production. The second is the growth in the share of oils, chemicals, metals etc. from 14.3 per cent to 26.0 per cent. This shift has an important implication for economic development. It means that the foundations for growth are being laid, that industrialization is being tackled at its roots and that the dynamic forces now being created will eventually make the economy self-generating and self-reliant.

101. Table 13 substantiates these points, but from a different angle.

TABLE 13
Industrial Production

	59/60 %	64/65 %	69/70 %
1. of a predominantly productive nature	16.5	30.9	33.6
2. of a predominantly consumptive nature	83.5	69.1	66.4

Source: General Frame of the 5-Year Plan for Economic & Social Development July 1960 - June 1965, Cairo 1960, p. 46

It shows that over the ten-year period 1959/60 - 1969/70, Egyptian economy is to undergo a transformation such that industries of a predominantly productive nature will claim more of the nation's resources than these of a general consumptive nature. This again has a significant meaning for an under-developed economy. The whole apparatus of production, which has always had an upper limit to its output, is to be expanded and made to provide more goods.

102. Table 14 shows the net effect of all this. The contribution of agriculture to the national economy goes down relatively

TABLE 14
Percentage Income Contribution of the Various Sectors

	1959/60	1964/65
1. Agriculture	31.2%	28.5%
2. Industry	21.3%	30.1%
3. Construction	4.1%	2.8%
4. Services	43.4%	38.8%
Total	100.0%	100.0%

Source: General Frame of the 5-Year Plan for Economic & Social Development July 1960 - June 1965, Cairo, p. 42.

from 31.2 per cent to 28.5 per cent, that of industry increases from 21.3 per cent to 30.1 per cent. This is in line with one of the basic characteristics of a growing economy involving industrialization - an increasing predominance of industry as against a relatively diminishing hold of the agricultural sector. It is, of course, also the long-term objective of many an under-developed country.

103. An important fact is the share of industrial production in the additional volume of output generated between 1959/60 and 1964/65. Output between the two periods goes up by ££1,076 million, of which industrial production accounts for ££648 million. 3/5 of the growth of the economy thus comes directly from the industrial sector; and this is to take about 23% of the total investment envisaged for the whole plan.

104. Quite obviously, all this says nothing about how the plan is to be put into effect. Every plan has a good deal of uncertainty about it - various forecasts might go wrong, new resources might be discovered or expected resources might not be forthcoming, social and political conditions might change etc. But the possibility seems to exist for the government to detect and control in good time major unfavourable digressions. First, there is a system of following closely the progress of the plan. Planning units in the major ministries send periodic reports to the National Planning Commission which form the basis for assessing the degree of implementation. Secondly, and perhaps more importantly, the UAR now directly controls much more of the national economy than it did when the plan was launched in 1960.

105. In a series of decrees issued between June and September 1961 the Government substantially broadened the span of the public sector and strengthened its hold over the economy as a whole. The decrees fall into six major parts, only four of which directly concern the industrial sector. The first part involves direct nationalization of industrial and financial establishments. All banks and insurance companies as well as timber, cement, chemical and a number of metal producing firms were nationalized. Along with these, the decrees covered all cotton pressing

establishments, the export of cotton and imports of a large number of articles. The Government announced that compensation for these would be made in the form of 15-year state bonds bearing 4 per cent interest. Secondly, 83 establishments were required to surrender 50 per cent of their shares to the government - again for 15-year bonds at 4 per cent interest. These included engineering, construction, transport, cotton ginning, oil, glass producing and a number of trading firms. Thirdly, 145 companies were brought under the decree which required the transfer to the government (for the same compensation mentioned above) of all shares in excess of £10,000 owned (by persons national or juridical). Finally, an important law was passed in accordance with which no company with public participation of 25 per cent or more may assign general contracts or public works with more than £30,000 to a private firm. Only through a presidential decree can this be waived. Thus "The Government now controls most of the Egyptian economy, apart from a number of medium and small-sized companies and most of the distribution trades."^{1/}

106. As a result of this expansion of the public sector, the chances of the five-year plan being implemented appear to be better today than they were before June 1961.

107. The four year plan of Senegal (1961-1964) provides another example of departure from past practice. It is comprehensive in both approach and content, aiming as it does at co-ordinated social and economic development. As Table 15 shows, a general plan is drawn up for the industrial sector. Industrial production is to increase at an annual rate of about 13 per cent. Over-all investment requirements come up to 27,000 million francs, or 4 per cent of the figure for the whole plan. And of this, the government's share is 2,000 million francs, or 7 per cent.

108. The demand for agricultural raw materials and for skilled labour created by the Plan and its implications for employment, the location of industries and for an expanding market are all carefully examined.

^{1/} The Three-Monthly Economic Review, No. 35, October 1961.

TABLE 15

Senegal: Targets for Industrial Production by Branches (in millions of F).

Branches (b)	Value of Production		Index 1959=100	1961 - 1964		Employment 1959
	1959	1964 (a)		Net investment	new jobs created	
1. Electricity (c)	1,900	2,600	137	1,400	150	860
2. Water(-)	600	760	127	...	100	900
3. Petroleum	200	12,600	6,300	5,000	510	30
4. Mining, quarrying and salt production	750	5,000	733	2,000	150	1,100
5. Metal industries, electrical construction	3,400	6,600	194	1,300	1,200	3,200
6. Glass industry, building materials	1,300	1,900	146	200	200	700
7. Chemical and fertilizer industries	600	2,800	466	1,500	430	250
8. Tobacco, matches	1,800	2,200	122	200	-	530
9. Fats, soap	25,000	34,000	136	1,000	500	2,500
10. Grain & flour	3,500	4,400	126	100	50	560
11. Bakeries & biscuit factories	3,300	4,300	130	200	550	1,900
12. Sugar refinery, beverages & milk products	1,700	2,300	135	200	100	600
13. Food preserving and canning	600	3,800	633	400	1,000	600
14. Miscellaneous food industries, refrigeration	950	1,300	137	350	90	360
15. Textiles	2,250	5,000	222	3,000	2,500	2,000
16. Footwear & manufacturing of plastic materials	800	1,600	200	300	350	700
17. Wood, furniture	600	700	117	50	50	500
18. Paper and paper-board	190	350	184	50	30	80
19. Printing & publishing	600	780	130	50	50	350
Total	50,040	92,990	186	17,300	8,010	17,720
20. Building and civil engineering	11,000	15,600	143	2,	2,000	17,000
21. Mineral & petroleum prospecting	-	-	-	6,000	-	-

- (a) At 1959 prices
 (b) Industries are classified according to the main activity of the company in question. Investments do not include the low tensions lines or the water-supply works.
 (c) Classified under heading VII, Housing and Municipal Administration.
 (d) Not included in the table on railway workshops.

Source: Senegal, Development Plan (1961-1964), p. 107

It is admitted, for instance, that it would not be possible to supply all the skilled labour required by the industrial sector at the end of 1961. Increased productivity is seen as a way out, but at the same time the limitation put on this by sociological factors is taken into account. Overcrowding of industrial centres is guarded against and locations cited for the distribution of industrial establishments.

109. The overall effect of the Plan on the structure of the national economy is shown in Table 16.--The economy becomes more industrialized

TABLE 16

Senegal - Contribution of the various sectors to national
income - 1,000 million francs

	1959		1964	
	Value	%	Value	%
1. Rural production ^(a)	32.2	27.7	43.5	25.3
2. Industry and power	17.1	14.7	31.0	18.0
3. Building & public works	6.3	5.4	9.0	5.2
4. Handicrafts ^(b)	4.3	3.7	5.6	3.3
5. Transport	6.6	5.7	9.8	5.7
6. Trade ^(c)	46.2	39.8	68.4	39.8
7. Other services	3.5	3.0	4.7	2.7
Total	116.2	100.0	172.0	100.0

(a) Including subsistence production.

(b) Excludes rural skilled workers, fishermen, and those workers engaged in transport.

(c) All trade margins, including indirect taxes, have been included here.

Source: Senegal, Development Plan (1961-1964), pp. 205 - 206.

as industry's contribution to national income goes up from 14.7 per cent to 18.0 per cent. The table again illustrates the role of industrialization in a developing economy. Value added increases from 116,200 million francs in 1959 to 172,00 million francs in 1964; of this increment of about 56 million, industry accounts for about 14 million, or 25 per cent.

110. Senegal's plan also provides for changes in the administrative machinery to meet the demands of a planned and growing economy. These changes affect both the central and the provincial administrations.

111. The plans of Nigeria, Tanganyika and Guinea differ somewhat from the preceding two. They represent the project approach to development planning. But here again there are definite signs of changes.

TABLE 17

Nigeria - Summary of Capital Expenditure on Trade and
Industry 1962-1968

<u>A. Federal</u>	<u>£ '000</u>	
1. Iron and Steel Industry (Fed. & Reg.)	30,000	
2. Petroleum Refinery (Federal share)	2,000	
3. Coal Corporation	500	
4. Direct Investment in Industry	5,000	
5. National Development Bank	4,000	
6. Insurance Company	1,000	
7. Federal Loans Board	500	
8. Federal Institute of Industrial Research	330	
9. International Trade Fair	400	
10. Mint & Security Printing	300	
Total	44,030	

TABLE 17 (continued)

<u>B. Western Region</u>		£ '000	
1. Cottage & Rural Industries		235	
2. Small-Scale Industries		1,372	
3. Integrated Rural Development		500	
4. Large Scale Industries		10,000	
5. Industrial Credit Facilities		1,800	
6. Industrial Estates		3,333	
	Total	17,240	
<u>C. Eastern Region</u>			
1. Trans-Amadi Industrial Layout		1,304	
2. Other Industrial Layouts & Estates		500	
3. Industrial Production		10,000	
4. Industrial Institutes & Centres		494	
5. Small Industry Loan Scheme		500	
6. Trade Divisions		140	
7. Miscellaneous Investigations		60	
8. Cooperatives		520	
	Total	13,518	
		Government Investment	Government and Private Invest.
<u>D. Northern Region</u>		£ '000	£ '000
1. Textiles		1,500	9,000
2. Other Cotton Goods		300	1,400
3. Tanning		200	1,000
4. Cement		1,000	5,000
5. Iron & Steel		1,000	29,000
6. Fibre (Sacks)		800	2,400
7. Oil Seed crushing		600	3,000
8. Starch		10	50
9. Paper		600	3,000

TABLE 17 (continued)

D. Northern Region (continued)	Government Investment	Government & Private Investment
	£ '000	£ '000
10. Abattoirs	80	400
11. Oil Refinery	1,000	12,000
12. Sugar	385	3,750
13. Matches	-	250
14. Hotel	800	800
15. Miscellaneous	1,000	5,000
Total	8,735	76,050

Sources: Nigeria, Federal Development Plan (1962-68), p. 15
 Nigeria, Western, " " " p. 27
 Nigeria, Eastern, " " " p. 36
 Nigeria, Northern, " " " p. 38

112. The emphasis on industrialization in the Federal as well as in the regional plans is clear. Capital expenditure on industry is about 10 per cent in the Federal Plan, 8 per cent in the Northern, 12 per cent in the Eastern and 23 per cent in the Western. Each plan further makes statements of policy on the Government's commitment to a programme of industrial development. Another new feature shows itself in the evaluation of projects. One of the most important projects of the Federal Government, for instance, is an iron and steel industry whose capacity is estimated at between 120,000 and 250,000 tons per annum and which is to come into operation about 1966. The project was in its early stages at the time the plan was drawn up and no exact profitability calculations could be made. But tentative figures were given for the major indirect effects which the steel complex would give rise to throughout the economy. "The production of 125,000 tons of steel," says the plan, "will require no less than 242,400 tons of iron ore, 75,200 of limestone, and 110,000 tons of coal. If the complex is located in the Ouitsha or Lokoja areas, it would add

about 53 million ton-miles to river traffic, an increase of nearly 45 per cent over the traffic carried in 1960. The mill will require about 13 per cent of the installed electric generating capacity of the Kainji Dam and will add about 27 per cent to the electricity demand expected in 1971/2. Direct employment will be provided for about 1,500 people. A larger steel complex will raise these figures.^{1/} The plan for Northern Nigeria goes beyond estimates of capital expenditure on industry and makes projections of total production for selected agricultural commodities (Table 18). It further gives estimates of how much of each of these commodities is to be processed domestically at the end of the plan period. This again is a new element in this type of planning.

^{1/} Federal Government Development Programme, 1962-1968, p. 13

TABLE 18

Northern Nigeria - Locally Processed Commodities

Product	1962		1968	
	Produced	Processed	Estimated Production	Processed
1. Cotton (bales)	300,000	7%	600,000	20%
2. Groundnuts (tons)	600,000	25%	950,000	42%
3. Cotton seed (tons)	30,000	-	140,000	70%
4. Soya beans (tons)	13,000	-	27,000	40%
5. Hides (tons)	700,000	4%	700,000	64%
6. Skins (cwt)	60,000	11%	60,000	50%
7. Benniseed (tons)	27,000	-	29,000	34%

Source: Northern Nigeria, Development Plan (1962-1968), p. 39.

113. Tanganyika's plan also shows certain new features. A mere glance at the industrial plan (Table 19) may not show that many factors were taken into consideration before the figures were arrived at.

"...Although Tanganyika's plan is not a comprehensive one" says the opening page of the current development plan, "it would be misleading to call it a public capital expenditure programme in the old sense of the concept. The plan is based on an extensive survey of the economy prepared by the World Bank Mission and on several subsidiary economic and statistical studies carried out by the Territory's Economic and Statistical Services. The general directives had been determined and an assessment of resources, including the effect on recurrent budgets, sources of finance and manpower requirements, had been made. Within the group of economic projects plans of the Ministries responsible have been co-ordinated."

TABLE 19

Tanganyika - Expenditure on Trade and Industry - 1961/64

Project No.	Group	£
1	Development Corporation	300,000
2	Dar es Salaam Hotel	300,000
3	Basic Geological Mapping	146,955
4	Housing (African Participation in Trade & Ind.)	26,400
5	Prospectors' Courses	36,327
6	Mineral Reconnaissance Survey	124,784
7	Surveys (Trade, Market etc.)	15,000
8	Participation in Trade Shows	19,500
9	Tourist Amenities	30,000
10	Trade Representatives Abroad	6,000
11	Industrial Estates Fund	30,000
12	African Loans Fund	50,000
13	Permanent Hall for Trade Exhibitions	10,000
	Total	1,094,966

Source: Tanganyika, Development Plan (1961/2 - 1963/4), p.75.

114. The plan calls for an expenditure of £24 million, an average of £8 million per annum. Of this, industry's share is about £1 million, or 4 per cent.

115. Guinea's industrial plan may also give the impression of being an unconnected collection of projects inserted in the overall development plan. Yet this is not the case. In the first place, the entire 3-year programme (1960-1963) is the beginning of what is to be a long-term and more thorough development plan. Secondly, the industrial projects are the outcome of the belief that what the country ought to do at this stage of its planning is not to launch a programme of heavy industries,

but rather to concentrate on the processing of domestic agricultural raw materials and also on import replacement. Here again (as in Nigeria & Tanganyika) the general objective is to lay the foundations for future growth.

116. The following is a list of the more important industrial projects given in the plan:

1. A plant for agricultural implements. Capacity: 400,000 per annum.
2. A plant for the production of wheel-barrows and carts. Capacity: 50,000 per annum.
3. A plant for the manufacture of kitchen utensils. Capacity: 250,000 per annum.
4. A furniture plant producing 60,000 units per annum.
5. A plant manufacturing 600 tons of nails per annum.
6. Two oil mills and two scap-works.
7. Plants for canning fruits and preparing fruit juice.
8. One shoe factory and one cigarette factory.
9. Five abattoirs.
10. A rice mill.

117. 5,000 million francs are to be spent on all the industrial projects; this represents 13 per cent of the total figure (39,000 million) for the entire plan.

Prospects for the Future

118. The state of industrial planning in Africa leaves much to be desired. This is a legacy of the past which has been examined at some length. But is the future going to be significantly different?

119. As the preceding section broadly suggests, there are indications that the obstacles met with in the past will in the future be reduced considerably, if not removed altogether. In the first place, there seems to be a growing awareness that the preoccupation with agricultural development as the single overriding objective for a developing country is

unwarranted. This is firstly due to political developments which have not been accompanied, as many would have liked, by corresponding changes on the economic front. As more and more states have regained their independence, disillusionment has been voiced on the continued economic dependence on former metropolitan powers. Hence the widespread feeling that, without a substantial degree of economic self-sufficiency, very little meaning can be attached to independence. As this dependence on former metropolitan and other powers mainly concerns manufactures, both of capital equipment and of consumer goods, the desire to lessen it and consolidate independence has been translated into a policy of industrialization. The Senegal plan has this in view when it says: "The priority to industry which was given in the first Plan is proof of the Government's desire to take advantage of what had already been achieved and to reinforce the economic independence of the nation." Guinea's plan makes the same point. "It (industrialization) is the basis of her (Guinea's) economic independence. It is also a sure way to progress, because it is in that sector that the productivity of labour is highest. It is therefore industrialization which will facilitate a rapid development of the country's wealth, without which the nation would be condemned to stagnation." Other countries have made similar statements of policy at various times. In the second instance, the inclination towards redressing the balance of emphasis in favour of industry may also be due to the realization that neither logically nor on the basis of relevant historical experience in other continents can the past preoccupation with agricultural development be justified. The argument that a rise in agricultural productivity provides the capital, the labour and the market for a growing economy cannot be construed to mean that industrial expansion must be preceded by agricultural development. Indeed the development of agriculture itself presumes a concomitant growth of the industrial sector. Unless home industries provide both the required consumer goods that would follow increases in rural incomes and in the long-run the "technical wherewithal" needed for a rapid rise in agricultural productivity, the only alternative to turn to would be foreign trade. Both consumer and capital goods would have to be imported

on a large scale to meet the demands of a developing agriculture. But that is precisely the situation which, if it continues, in the long-run vitates self-generated and self-sustained growth, and one which an increasing number of countries would like to eventually remove. If it is admitted that the aspiration of African countries is to build economies which contain themselves forces for sustained growth, the conclusion is inescapable that they must aim at a simultaneous development of both agriculture and industry, and thus break through the apparent vicious circle of agricultural versus industrial development. The history of the economic development of Japan and the Soviet Union (two countries whose experience is relevant for the under-developed countries of today) bears this out. Both went through periods of rapid agricultural and industrial development during the critical years of their economic development - and not through one where agricultural development preceded industrialization. India today is placing major emphasis on both agriculture and industry.

120. On occasions, the argument is also put forward that not merely should more balance be brought to government policy agriculture and industry in favour of the latter, but that prime emphasis must be placed on industrialization. As there is a wide margin of non-utilized resources in agriculture (land, labour) large increases in production could be realized without an appreciable rise in the level of agricultural investment; so that industry could be provided with raw materials at minimum cost. Such growth in industry would in turn have the effect of generating growth in agriculture.

121. A new trend in economic policy embracing the twin objectives of industrial and agricultural development is thus visible. The latest development plans of Nigeria (both federal and regional), Senegal and Guinea as well as the growing importance given to the subject at African international conferences (e.g. the fourth session of ECA) are evidence of this new trend.^{1/}

^{1/} New plans are being prepared for Ghana, Ethiopia, Somalia, Sudan, Congo (Brazzaville) and Dahomey. It will be interesting to look for this new trend in them.

122. Furthermore, the public sector is becoming more active than it has been in the past and the likelihood is that it will play an even more decisive role in coming years. As was noted earlier, by and large the commitment to laissez-faire may be more the slowing momentum of a historical force rather than a living philosophy with passionate adherents in key positions of policy; and being a momentum, it will come to a stop. This is not to say that the private sector will wither away, but rather that economic policy will be subject more and more to the exigencies of a given situation rather than to the dictates of an outmoded dogma. Already it has become a characteristic feature of many development plans to state that if the private sector does not take interest in a given project, the government will step in.

123. It is also reasonable to expect that comprehensive planning will gain more ground in the future. If planning is to be rational, if it is to mobilize the resources of a whole nation and in this way take the economy along a desired path, its scope cannot be restricted to a particular sector. It must cover the whole of the national economy. Ghana has made a definite break with the past in favour of this type of planning. The UAR (Egypt), Morocco and a number of French-speaking countries are already planning comprehensively. Sierra Leone has also joined this group. As time goes on, the numbers will very probably increase. And this will in turn strengthen the case for a more determined effort to accumulate extensive data for planning.

124. It is the under-developed state of Africa's infrastructure which will probably remain the centre of much attention in years to come. And investment will in all probability continue to be concentrated here. But, of course, this is not to be taken as an obstacle to industrialization or as a competitor to industrial investment. It is, on the contrary, the basis of all growth, and more money going into it will eventually provide the necessary framework for industrialization. It is, therefore, justifiable to say that all the major deterrents to industrial planning which have been mentioned are likely to lose their hold over policy making, and, correspondingly, integrated economic and industrial planning stands to gain.

125. Apart from this, there is a new situation which will favour overall economic planning - i.e. the need for sub-regional co-operation to further economic development. More and more countries are showing a willingness to place these over purely nationalistic tendencies. The current Senegal plan says that "the Government intends to foster collaboration in the field of development with the other West African States and is bent on seeking with these countries a co-ordination of industrial policy. The operations envisaged have been planned with this in view." Sierra Leone's ten-year development plan is partly inspired by the belief that the economic destiny of the nation "is rooted in active trade and industrial relations with African countries" as well as with others. Guinea and Ghana are supporters of the principle of intra-continental co-operation. And many more countries came out in favour of this principle at the fourth session of the Economic Commission for Africa where "the delegates restated their unanimous view that increased co-operation among African states was required in order to promote intra-African trade, industrialization and economic development in general..."^{1/}

126. These sentiments are rooted in something more substantial than just the spirit of comradeship of peoples who have undergone similar trying historical circumstances. They are an expression of the more formidable obstacles that make it difficult for many countries to build viable economies within the strict confines of their boundaries. A glance at the size of national populations in Table 20 shows how narrow each country's manpower base is for an economy that could stand on its own feet. Of the forty odd countries and major territories in Africa, twenty-three have populations of four million or less each and eighteen less than three million each. All but four are below 640,000 square miles in area.

127. An inter-continental comparison throws more light. As Table 21 indicates, Africa has the largest number of countries and territories in comparison with Asia and South America and within a relatively smaller area.

^{1/} Draft Report of the fourth session, E/CN.14/L.122, paragraph 263.

TABLE 20

Population and Area of Selected African Countries

Country	Population in millions (figures for 1959 unless otherwise stated)	Area ('000 sq. km)
1. Tunisia	4.0	125
2. Cameroun ^{a/}	3.8	433
3. Upper Volta	3.5	274
4. Ivory Coast (1960)	3.2	322
5. Guinea (1960)	3.0	245
6. Niger (1960)	2.9	1189
7. Chad	2.6	1284
8. Sierra Leone	2.4	72
9. Ruanda }	4.8	54
10. Burundi }		
11. Somalia	2.0	637
12. Dahomey (1958)	1.7	116
13. Togo	1.4	57
14. Liberia (1956)	1.3	111
15. Libya	1.2	1760
16. Central African Republic	1.2	617
17. Congo (Brazzaville)	0.8	342
18. Mauritania	0.7	1085
19. Portuguese Guinea	0.6	36
20. Gabon	0.4	238
21. Gambia	0.3	10
22. Zanzibar and Pemba	0.3	2.6
23. French Somaliland	0.1	22

^{a/} Former Trust Territory only.

Source: UN Demographic Yearbook, 1960.

TABLE 21

Area, Population and Number of Countries in Africa, Asia
and South America

Continent	Area (¹ 000 sq. miles)	Number of countries & major territories	Population (million)
1. Africa	11,635	43	237
2. Asia	17,035	38	1622
3. South America	6,860	13	137

Source: UN Demographic Yearbook, 1960 and Goode's World Atlas, 1957.

The average size of an African country is about 271,000 sq. miles, while for Asia and South America it is 448,000 sq. miles and 528,000 sq. miles respectively. In terms of population Africa has an average of about 6 million inhabitants per country and territory, South America about 11 million and Asia about 43 million. The area figures do not take into account desert regions. While this is admittedly an important omission, it does not seem to alter the nature of the comparison, as Africa has its own good share of deserts in the Sahara and Kalahari.

128. If Gabon, Mauritania, Liberia, Togo, Somalia, Guinea and Mali, to mention only a few, with populations of 0.4 million, 0.7 million, 1.3 million, 1.4 million, 2.0 million, 3.0 million, 4.3 million respectively, and with what cannot be mere than a modest endowment of natural resources taken individually, are to remove the limitation put on self-sustained growth by a narrow base of material and human resources, there is an obvious choice of alternatives: they must either jointly build their economies, or else seek to widen that base through extra continental relations.^{1/} It is true that already a number of African countries have established economic relations

^{1/} It is understood that these two are alternatives only in the sense that one predominates over the other as a general guide of policy, not in the sense that one displaces the other completely, because this does not normally happen.

with countries outside the continent. This relationship does not, however, appear to be envisaged as a permanent substitute for intra-African co-operation.^{1/} Hence, the long-term economic interests of each country demand intra-continental co-operation of some kind. If that is accepted as a reasonable proposition, then it follows that the best way to do this is to plan for a group of countries forming a unit or, as a minimal measure, to co-ordinate national development plans to use resources as efficiently as possible. This would provide a favourable climate for over-all economic and industrial planning.

129. It is not enough to say that the future looks brighter. It is essential to have as clear a vision as possible of the future course of economic planning - not only of the direction which it is likely to take but also of the direction it should be encouraged to take.

130. The problem can be tackled only on a general level. Conditions always vary from country to country and it would be unrealistic even to attempt to prescribe a detailed course of action without weighing the resources against the needs of each country or a sub-region. As a broad guide of policy, however, encouragement should be given to the type of planning which best meets the requirements of each individual situation.

131. For obvious economic, social, and political reasons (and barring unforeseen fundamental changes) planning which involves strict and over-all physical controls over resources and which lays down specific targets of a fairly mandatory nature (though subject to periodic revisions) would be most unlikely to appear in most of Africa. On the other hand, the type of planning which has restricted itself primarily to the public sector does not hold much promise for rapid economic development; and for this reason is well on the way to being scrapped altogether. Is there anything in between?

^{1/} Senegal, Development Plan, p. 121, for instance: "The Government will devote itself to extending the intra-African market by agreements on supplies of raw materials and finished products, by strengthening an intra-African preferential system, by seeking out what is complementary in the various economies and by industrial specialization and co-ordination when inter-state competition might be harmful."

132. In earlier pages the statement was made that signs of change have already appeared in the type of economic planning that has hitherto been prevalent. Some of the newer plans are different from their predecessors in at least one respect - they transcend the purely public sector and take into account developments in the private sector. This is a step in the right direction. But plans could go further than that. They could provide positive guidance to the economy, not merely by making provisions for incentives and stimulants to private investment, but by plotting a general course along which the economy is to be guided and specifying the major developments and changes that are to take place within it. This would necessitate a considerable degree of comprehensive planning which, in its barest outline, involves the following:^{1/} first, the determination of over-all growth rates: of national income, consumption, savings, employment etc; full consideration being given to where emphasis is to be placed (e.g. on employment or on income); secondly an assessment of the investment requirements and of the resources (both domestic and foreign) that could be mobilized; thirdly, a general investment plan for the whole economy; fourthly, and complementing this, an investment programme which, unlike the global investment plan, is built up "from below" on the basis of various projects but which needs to be linked up with it; fifthly, the fixing of targets: over-all, sectoral, regional and perhaps on a project or commodity basis; sixthly, the establishment of an institutional framework designed to check progressively the degree of implementation.

133. All this demands a considerable amount of data, particularly with regard to the structure of the economy and its resources; it also involves laborious revisions and alterations of drafts and heavy risks arising from incorrect forecasts. But these are as much part and parcel of comprehensive planning as the long-term benefits associated with it - benefits which tend to reduce waste, make possible the use of resources that may otherwise lie idle, and prevent ill-conceived projects

1/ For a fuller discussion of the techniques of development planning in under-developed countries see ECLA's Programming Techniques for Economic Development and ECLA's Problems Concerning Development Programming and Policy in African Countries (E/CN.14/ESD/1).

from draining scarce resources and, in general, hasten the pace of economic and social development.

134. Once a broad indication is given of the general course which an economy is expected to take, the various incentives offered to private investors could be turned to plans in such a way as to bring about a realization of the established targets. This would not merely give them consistency but a sense of clear purpose. And it would be possible to assess periodically (as is not done today), even roughly, the effectiveness of these incentives so that adjustments can be made as circumstances change.

135. The ultimate test of a plan is, however, in the first instance, the extent to which its major objective are achieved and, in the second, its indirect effects on the general level of economic activity which may not always be subject to statistical measurement but which nonetheless spur the tempo of growth.

CHAPTER IV

RECENT DEVELOPMENTS AND PROSPECTS FOR EXPANSION IN SELECTED MAJOR INDUSTRIES

Introduction

136. The recent changes in industrial growth and the changing pattern of industrial output in Africa have been discussed in broad outline in Chapter II. The purpose of this Chapter is to examine in more detail recent trends in a number of industries and their prospects or perspectives in the next decade or so. It has not been possible to examine all types of industry, actual or potential. Rapid industrialization means that within the comparatively near future Africa will have to be equipped, or at least make a start, with virtually the whole range of modern industries. In particular higher priority will have to be given to those industries which are the foundation of a modern economy - metals, engineering and chemicals.

137. The present pattern of manufacturing in Africa consists of a wide range, from traditional and modern handicrafts through many types of light or small-scale industry, all the way to large-scale heavy industry. Heavy industry is overwhelmingly concentrated in limited areas and above all, the Republic of South Africa, followed by the UAR, the Federation of Rhodesia and Nyasaland, Algeria, Morocco and the Congo (Leopoldville) as an intermediate group. In this intermediate group there is a fairly wide range of manufacturing including non-durable consumer goods, building materials and some chemical products. Metals, machinery and transport products are still produced on a limited scale only except in countries within or near the Copperbelt. Food, drink and tobacco are major industries in North East Africa, and textiles in the UAR. In the remainder of the continent manufacturing largely consists of small-scale production, a small number of industrial establishments, relatively simple manufacturing

processes and a predominance of non-durable goods industries, small-scale production of building materials and repair and maintenance activities.^{1/}

138. In recent years, as has been shown in Chapter II, the level of activity in these sectors has increased steadily. In particular output in the food, drink and tobacco industries has grown and now accounts for a substantial share of all employment and the total number of establishments in the manufacturing sector in most African countries. Output of textiles and of such building materials as cement, bricks and other clay product and lime has also grown.

139. The continued development of small-scale and light industry and the maximum conversion of agricultural raw materials, whether food or non-food, clearly has a vital part to play in the industrialization of Africa, for its own sake and as a means of encouraging the diffusion of labour skills. However, the major task is the diversification of industrial output and a deliberate policy of import substitution for which there is ample scope. This chapter, then concentrates on five industries or groups of industries: iron and steel, non-ferrous metals, mechanical and electrical engineering including transport and the manufacture of metal products, chemicals and fertilizers and textiles.^{2/}

140. In each of the five groups of industries an attempt is made to show past trends of consumption, largely measured by imports; past trends of production where relevant; forecasts of the possible trend of consumption during the next decade; and, finally, in each case indications of production

1/ See Economic Survey of Africa since 1950, p.p. 69 and 70. United Nations Department of Economic and Social Affairs, New York 1959.

2/ Building materials and the construction industry are not considered since they are discussed in a separate paper which has been prepared for an ECA meeting of Housing Experts. The energy industries are considered in a series of papers being prepared for a meeting to be held by ECA, with the co-operation of BTAO, in May 1963. See in particular the note by the secretariat on the present fuel balance in Africa (E/CN.14/INR/4). In addition, the forest industries, pulp and paper, food processing, rural small-scale and handicraft industries are not considered here since they are the subject of separate papers prepared by the FAO and the ILO. See also Appendix III.

possibilities. A word should be said here about the use of the term "forecast". Systematic forecasts are neither feasible nor intended. The main purpose is to show what could be done. Furthermore, the different industries discussed are considered within an over-all rate of growth implicit in the assumptions of the United Nations Development Decade, a per capita growth rate of 3 to 4 per cent representing a 5 to 6 over-all rate. Some countries are, in fact, likely to grow faster than this and some slower but the total result need not be much different from the over-all rate assumed. Some of the assumptions implicit in this over-all growth rate in the next ten years, expressed as compound percentages, are as follows:

Agriculture	4
Industry	10
of which	
mining	7
heavy manufacturing	16 - 17
light manufacturing	13 - 14
small-scale	7
commodity output	6.3
other sectors	5.0
Total Output	5.8

141. These growth rates, particularly for some sub-sectors in the industry group, may appear high but they are not seriously inconsistent with the recent past. They would be difficult to obtain in more industrialized countries but are perfectly feasible in Africa where the industrial base is so narrow that the establishment of one or two large plants every year could lead to nearly doubling the initial output. Furthermore, it would seem rational policy to aim at a high rate of growth in the initial period to allow for the inevitable flattening at a later stage.

142. The survey of the past decade carried out for each industry has been gravely handicapped by the lack of availability and uncertain accuracy of much of the statistical data. This is partly due to periodic changes in coverage, definition and methods of classification, and partly to sheer lack of availability of statistics. Some of the figures are no more than orders of magnitude. The figures relating to the future are even more uncertain and indeed speculative. In the main, the Republic of South Africa has been left out of account.

143. The analysis has been carried out as far as possible by sub-regions. This has been done not only for statistical reasons, but mainly because national divisions in Africa are too small to provide markets for rapid industrialization. As can be seen from Table 16, in Chapter III, and Table 22, the concentration of population is low both in individual countries and in sub-regions.

TABLE 22
Population and Density by Sub-regions, 1960

Sub-region	Population (millions)	Per cent	Density per square kilometre
North Africa	54	21	9
West Africa	79	31	9
Central Africa	32	12	7
East Africa	57	23	9
South Africa	30	13	7
TOTAL	252	100	8

Source: Calculated from UN official demographic statistics. An accurate estimate of the African population is difficult to arrive at. According to UN Demographic Yearbook, 1960, the total population of Africa was 237 million in 1959; according to ECA Bulletin for Africa, Vol.II, No. 2, it was 246 million.

144. Only three countries have a population of over 20 million. Twenty-three have a population of 4 million or less. Thirteen countries (excluding the off-shore islands and Spanish Sahara) have a population of less than 1 million. The density per sq. km. is less than 10 in all the sub-regions.

145. In much of modern industry, the economies of scale are such that the minimum size of plant implies a substantial capacity. This in general is true of the iron and steel industry, the manufacture of non-ferrous metals and much of the heavy engineering and basic chemical industries.

146. Larger markets also encourage the establishment of industrial complexes and bring about the benefits of external economies. Such complexes make possible greater specialization of men and machinery, the encouragement of mass production, use of specialized machinery instead of general purpose equipment, and both the encouragement of and full utilization of infrastructure facilities. Furthermore, with the development of a range of industry in a particular area, proper steps can be taken for the provision of spare parts and repair facilities.

147. It is in the light of these considerations that the emphasis throughout this chapter, and indeed in the whole study, is put on the need for sub-regional co-operation in the establishment of new industries. There are nevertheless many industries where the economies of scale are not significant, mainly light industries and non-durable consumer goods such as food processing, textiles and shoe manufacturing, as well as a wide range of building materials industries.

148. One further general point should be made: African countries in framing their policies for rapid industrialization are in a position to draw upon the rapid advance of technology which has characterized the industrial scene in Europe and North America. This can have two major advantages. One is that in some industries, techniques have recently been established which are capital saving. (A good example is the rapid development of steel making based on pure oxygen in the last decade, which has made possible economic production of crude steel on a smaller scale and at a lower investment cost per ton than the open hearth process.)

The other main advantage is the rapid development of new materials, particularly light metals, plastics and new forms of reinforced concrete, which are being substituted on a growing scale for the heavier traditional materials. This in turn can lead to lower final costs in a number of economic sectors. There is, therefore, a strong case for giving high priority to the production of newer materials in long-term investment planning, and not necessarily following precisely the stage of development which have historically characterized industrial growth in other parts of the world.

Iron and steel

149. An iron and steel industry is the foundation of a modern integrated industrial complex. In planning the rapid industrialization of Africa, African governments will have to pay serious attention to the development of iron and steel industries in the various sub-regions.

150. According to available statistical data and geological information, Africa may be considered a fairly rich in iron ore resources.

151. It will be noted from Table 23 that the main centres of iron ore production in 1960 were North and West Africa which accounted for over 70 per cent of African production. In the Central and Southern sub-regions, South Africa was the main producer. The only country which produced ore with an iron content of (less than 50 per cent) was Egypt, six countries produced high-grade ore (55 per cent and over). In Europe only three countries have good quality ore - Norway (65 per cent), Sweden (60 per cent) and the USSR (55 per cent).

TABLE 23
African Production of Iron Ore and Estimated Iron Content of
Ore according to Countries and Sub-regions, 1960

Sub-region and country	Quantity in '000 metric tons	Per cent by country & sub-region	Estimated iron content
<u>North Africa</u>			
Algeria	3,441	22	52
Morocco	1,577	10	60
Tunisia	1,033	7	53
UAR (Egypt)	249	2	48
TOTAL	6,300	41	-
<u>West Africa</u>			
Guinea	727	5	53
Liberia	3,051	20	68
Sierra Leone	1,470	9	60
TOTAL	5,248	34	-
<u>South and Central Africa</u>			
Angola	659	4	65
Southern Rhodesia	158	1	55+
TOTAL	817	5	
<u>South Africa</u>	3,071	20	62
AFRICAN TOTAL	15,436	100	-

Source: Minerals Year Book, Vol. 1, "Metals and Minerals", USA Department of the Interior.

152. The 1960 production figures, however, underestimate the quality and quantity of Africa's potential iron ore resources. All the countries for which figures are available are increasing their production as is shown in Table 24; moreover recent investigations and discoveries have revealed that most of the producing countries have more resources than are being exploited at present, and that several non-producing countries have deposits of high-grade ore.

TABLE 24

Average Rate of Change of African Production of Iron Ore,
Compared with that of the World 1956-60, and Forecasts
for 1965.

Region	Compounded annual rate of change (per cent)	Production estimate for 1965 in '000 metric tons
Africa (Continent)	5.9	20,290
West Africa	5.0	6,593
World	6.0	704,600

Source: National statistical publications.

153. In addition to Guinea, Liberia and Sierra Leone, most countries in the West African region from Mauritania to the Congo (Brazzaville) have iron ore deposits; and more production is planned in the three producing countries.

154. In Guinea a number of bases are to be established, jointly by Guinea and the European Banks Consortium (Consafrique) for the development of the Nimba and Simandou deposits. The deposits are estimated at 250 million tons of iron ore, with an iron content of 60 per cent. In addition to the mines already in operation, the Liberian authorities are planning to develop a new iron-ore mine at Nimba, first deliveries from it beginning in 1963 when 3 million tons will be exported. It is envisaged that 7 million tons will be exported by 1964, and a target of $7\frac{1}{2}$ million will be reached before the end of 1964. Other mines near the Sierra Leone border have recently begun production and are expected to produce 3 million tons during the early stages. Guinea and Liberia together possess the largest iron ore deposits in the Western seaboard of West Africa. According to some estimates, Guinea has 2,500 million tons of direct shipment ores with an iron content of 1,500 million tons; Liberia has 1,000 million tons and 600 million tons respectively. But in neither country have the deposits been fully mapped.

155. In Sierra Leone the mill capacity of the Marampa deposits has recently been increased to 2 million tons per annum and further expansion of 1 million tons is envisaged after 1965. The development of the Tomkolili deposit, 70 miles from Marampa, is under consideration.

156. Eight West African countries which, according to 1960 available statistics, were not producing iron ore, have either begun production or will be exploiting their iron ore resources in the near future. These include Nigeria, Niger, Mauritania, Ghana, Gabon, Cameroun, Senegal and Congo (Brazzaville).

157. The exploitation of the Nigerian resources is expected to begin soon. Some 45 million tons, averaging about 40 per cent, have been located at Enugu in Eastern Nigeria, and at Agbaja, near Lokoja in the North, 30 million tons averaging 50 per cent have been found. Other deposits are known to exist in the Kandi circle of Dahomey with 68 per cent iron content, but for the time being these are inaccessible owing to their distance from the railway and the ports.

158. In Niger iron ore deposits are known to exist at Say, about 35 miles from Niamey. The Say deposit is estimated to have more than 100 million tons, the iron content of which ranges from 45-60 per cent. The main disadvantage is the distance of the deposits from roads, railways and ports.

159. The Société Anonyme des Mines de Fer de Mauritanie (Miferma) has begun to exploit the iron ore deposits located at Kedia D'idjl in Mauritania. Openoast reserves are estimated to be about 115 million tons, with an average shipping grade ore of 63 per cent.

160. In Ghana iron ore reserves were located some time ago near Sheina in the Northern Region; about 1 million tons of ore are available with an iron content averaging 46-51 per cent. The main difficulty is that the deposits are not easily accessible. The present plan is that the deposits will be exploited both for export and domestic use when the Volta Lake provides inland transport. In Togo, Ghana's neighbour, deposits have been located in the Bandjeli region.

161. The Mekambo iron ore reserves in Gabon are estimated at 800 million tons. The deposits lie in a 50-mile area along the Ivindo River in North-eastern Gabon. Proved reserves of high-grade ore exceed 500 million tons. As in most other West African countries, the main difficulty is the high cost of transportation.

162. In April 1959 the Bureau of Mines of Overseas France began drilling to explore the Chaines des Mamelles iron ore deposits in Cameroun. The reserve is estimated at 100 million tons averaging 40 per cent iron. Senegal has a 30 million ton deposit of 53-54 per cent in the Kadougou region. However, for the time being these are unexploitable because of distance from the coast. In Congo (Brazzaville) iron ore has been found some 150 miles from Brazzaville, almost on the frontier of Gabon. The deposits are stated to be at least 100 million tons, and have an iron content of 65 per cent.

163. In the Northern sub-region of Africa the already producing countries, Algeria, Morocco, Tunisia and the UAR, are planning to expand production. For example, important deposits have been found at Giza in the Sahara region of Algeria with an iron content of over 55 per cent; access to the deposits would be through Morocco and the Spanish Sahara.

164. New deposits have been located in Libya and Sudan. In Libya there are deposits of iron ore which could be mined if the transport network was developed; in the Sudan investigations have shown that iron ore reserves exist in the Kardofan province totalling some 35 million tons.

165. According to available information at present, the East African sub-region is not as rich as the Western and Northern sub-regions. Deposits are known to exist in Tanganyika, Kenya and Ethiopia, but their quality and quantity has not, as yet, been precisely determined. In Tanganyika the Linanga Iron Ltd. has been formed to investigate the possibility of exploiting deposits in the southern region; the reserves are estimated at some 40 million tons with an iron content of 46.6 per cent.

166. In the South and Central sub-regions, Angola, South Africa and Rhodesia are all expected to expand production. Northern Rhodesia has deposits within a radius of 90 miles from Lusaka, but apart from a small amount used as a reagent at Broken Hill Copper Mines, none has yet been exploited. The reserves contain about 54 to 65 per cent metallic iron. Other occurrences are known to exist in Barotseland. In Southern Rhodesia a new mine at Chikurubi has begun production for export to Japan; the ore has 60 per cent iron content. In Angola work has recently begun to expand the production at Cassinga and Cuima iron mines. South Africa has ore for a much expanded local industry. Swaziland contains about 40 million tons of high-grade ore (63 per cent). A railway to transport this ore to overseas markets is currently under construction. In Katanga unexploited reserves exist in Kasai - a small beginning was made in 1959 to develop the area.

Export of Ores, Concentrates and Agglomerates

167. Most of the iron ore produced in Africa is exported as shown in Table 25. The only countries which are not big exporters are South Africa and Egypt. Great Britain, Western Germany, the United States and the Netherlands, in that order, are the largest importers of African iron ore. The main exporting countries to Great Britain are Algeria, Sierra Leone and Tunisia. North America imports practically all her African ore from Liberia, and Western Germany from Liberia and Sierra Leone. The Dutch main sources are Liberia and Sierra Leone. Other major European importers are France and Italy. To this list should be added Japan who, in recent years, has been importing increasing quantities of African ore, especially from the Republic of South Africa and Southern Rhodesia. This explains, in part, why North American, European and, lately, Japanese concerns are participating in mining

TABLE 25
African Trade in Iron Ore, Iron Ore Concentrates and Iron Ore Agglomerates in 1959. '000 metric tons

Country	Production	Exports
Algeria	1,927	2,023 ^a
Angola	349	337
Guinea	342	353 ^a
Liberia	2,689	2,708 ^a
Morocco	1,265	706
Sierra Leone	1,449	1,527 ^a
Tunisia	982	831
South Africa	2,891	169
TOTAL	11,894	8,654

Source: 1960 Minerals Yearbook, Vol.1, "Metals and Minerals", USA Dept. of Interior.

(a) Bigger exports than production for the year explained by stocks of previous year.

projects in Africa. Africa has a number of advantages as a source of iron ore supply for Europe over Canada, another chief source. Many of the deposits are close to the coast and are available for shipment throughout the year. Secondly, most African ores are of a high-grade.

168. Although there is no danger of Africa's outside markets for iron ore shrinking in the near future^{1/}, industrialization of the continent requires a rapid expansion of domestic iron and steel production.

169. The Republic of South Africa, the UAR and Southern Rhodesia are at present the only significant producers of pig-iron and crude steel. As early as 1928 the Republic of South Africa established an iron and steel industry which commenced production in 1933-34. After the second World War iron and steel industries were established in the Federation of Rhodesia and Nyasaland and the UAR. In Southern Rhodesia production of crude steel started in 1943 and that of pig-iron in 1948. In UAR a small-scale industry was established in 1948 to convert scrap iron into bars, sheets, and other shaped products; a new iron and steel plant with a capacity of 265,000 tons was completed in 1957 to process iron ore. The size and growth of the steel industries in South Africa, Rhodesia and the UAR are shown in Tables 26 and 27.

170. It will be noted that while South Africa is by far the leading producer of pig-iron, ingots, and castings and is maintaining its lead; the UAR industry is growing rapidly and has overtaken that of Rhodesia. In all the three countries the industry seems to be growing rapidly. During the industrialization of Europe a compound annual rate of increase of under 5 per cent was not unusual in the nineteenth century, while rates of increase of above 7 per cent were rather out of the ordinary.^{2/} In all the three countries expansion programmes are under way. The Redcliff works of the Rhodesian Iron and Steel Company will increase annual steel output to 150,000 tons, and the blast furnace, the fourteenth in Africa, will

1/ Long-term Trends and Problems of the European Steel Industry, UN, ECE, Geneva, 1959.

2/ S. Buchanan and H. Ellis: Approaches to Economic Development, New York 1955, Part II, Chapter II.

increase output in Rhodesia to 750 tons a day. In the UAR rolling mills of the Egyptian Iron and Steel plant erected by the West Germany firm at Helwan, have an annual capacity of about 20,000 tons of billets, rail sections, heavy and medium plate and some sheet. The blast furnaces have a daily capacity of 400 tons of molten pig. The Soviet-Egyptian economic assistance agreement includes a coke chemical plant in Helwan, a strip mill with an annual capacity of 70,000 tons of sheets, and a strip and cold-rolling sheet mill for producing 25,000 tons of sheet for tinning.^{1/} South Africa is expected to be a net exporter of 1.5 million tons in 1972-75.^{2/}

171. In other African countries small rerolling mills have been established based on scrap and plans for the erection of steelworks are being considered.

172. In North Africa, the UAR will soon be joined by Algeria and Morocco in the production of steel. In Algeria, steel plant is being built at Bone with the assistance of large French steel companies. The plant will produce 500,000 tons of crude steel, the capacity of which will ultimately be increased to one million. The plant will be completed in 1964. In Morocco a steel plant is being built at Nador. It will use ore from the Nador region and coal from the mines at Djerada.

173. In West Africa, there are only very small mills at present. In Nigeria a steel drum fabricating plant producing metal containers for petroleum products has been in existence for some time. At Emene a small steel plant is being established. The plant will produce 1,000 tons of steel a month when it goes into production. Raw materials used are cast, scrap iron and limestone. The re-rolling mill will produce reinforced rods, flats, angle irons and wire rods for nails.^{3/} Plans are underway to establish a fully integrated iron and steel industry using the local iron ore and coal resources. In Niger a plan for the

1/ Minerals Yearbook, 1960, Vol.1, O-627, USA Department of Interior.

2/ Long-term Trends and Problems of European Steel Industry, ECE, Geneva, 1959

3/ Africa Trade and Development, July 1961, and Three-Monthly Economic Review, December 1961.

TABLE 26
Production and Rates of Change of Pig-iron (including Ferro-alloys) in
South Africa, UAR and Southern Rhodesia, 1956-60.

Country	Production in Metric Tons					Annual Rates of Growth Per cent				Annual compound rates of growth
	1956	1957	1958	1959	1960	1956-57	1957-58	1958-59	1959-60	1956-60
South Africa	1356	1428	1582	1807	1999	+ 5.3	+ 10.8	+ 14.2	+ 10.6	+ 10.2
UAR	4	12	41	118	127	+ 205	+246.2	+118.9	+ 7.7	+143.2
Rhodesia	60	80	85	73	159	+33.3	+ 6.8	+ 14.9	+118.8	+ 27.6

Source: Mineral Yearbook, Vol. 1, 1960, USA Department of Interior and National Statistical Publications.

TABLE 27
Production and Rates of Change of Steel Ingots and Castings - 1956-60

Country		Production in Metric Tons				Annual Rates of Growth Per cent				Compound rates %
		1956	1957	1958	1959	1960	1956-57	1957-58	1958-59	1959-60
South Africa		1605	1737	1832	1896	2112	+ 8.2	+ 5.4	+ 3.5	+11.4
UAR		109	100	172	172	172	- 8.4	+72.7	0.0	0.0
Rhodesia		58	65	72	80	80	+12.5	+ 9.7	+11.4	0.0

Source: Mineral Yearbook, Vol. 1, 1960, USA Department of Interior and National Statistical Publications.

establishment of a small ironworks near the Say deposit is being considered. It is hoped that the plant will produce a minimum of 20,000 tons a year of reinforcing rods and cast-iron products. Nigerian coal will be used, if transport can be arranged. In Ghana a re-rolling mill is to be constructed to produce between 30,000 and 40,000 tons a year from scrap. As in Nigeria this is regarded as a prelude to the utilization of domestic iron-ore resources.

174. There are re-rolling plants in operation and planned in Uganda and Kenya, mainly for the production of iron and steel products for the construction industry.

175. In South and Central Africa, the South African and Southern Rhodesian iron and steel works dominate the field - the other countries have not, as yet, developed definite plans.

176. It has already been noted that North Africa has an iron and steel industry in UAR and two other will soon be established one in Algeria and one in Morocco. Thus there are bright prospects that the rich iron ore resources of this sub-region will soon be utilized for domestic production of steel products. The Southern and Central sub-regions are, for the time being, served by South and Central Africa. In East Africa the iron ore deposits (from Sudan to Tanganyika) have not been properly surveyed and assessed as yet. Moreover, in the East, Central and Southern sub-regions the period of political transition has not yet come to an end.

177. In the remainder of this section, attention will be focussed on West Africa, partly because there is as yet no iron or steel works, particularly owing to the vast potentialities, and partly because there are general conclusions to be drawn from the preliminary analyses offered concerning the approach to industrial development. As has already been noted, almost all the countries in this sub-region have rich deposits which begin from the Khedda hills in Mauritania and run along a stratum of over 1,000 miles down to the Congo (Brazzaville). There is no integrated steel works in the whole sub-region of over 80 million people, although three or four countries are planning steel works.^{1/}

^{1/} The countries included in this sub-region are: Dahomey, Guinea, Ivory Coast, Mali, Mauritania, Niger, Senegal, Upper Volta, Togo, Cameroon, Central African Republic, Chad, Congo (Brazzaville), Gabon, Ghana, Nigeria, and Sierra Leone.

178. Since there is no domestic production in West Africa, the analysis of the basic market pattern has been based on available import statistics. Most iron and steel products are imported into West Africa by trading companies, local sales offices of overseas steel concerns, metal fabricators, large contractors, public works departments, railways and oil companies.

179. Total imports for the years 1958 and 1959 are shown in Table 28.

TABLE 28
Imports of Iron and Steel Products by Country into
West Africa 1958, 1959. '000 Metric tons

Country or sub-area	1958		1959	
	Quantity	Per cent	Quantity	Per cent
Former French Equatorial Africa and Cameroun	50,979	14.5	22,709	7.3
Former French West Africa and Togo	120,500	34.3	55,568	17.9
Nigeria	123,599	35.2	146,415	21.2
Ghana	34,191	9.7	65,807	47.2
Liberia	5,600	1.6	6,600	2.1
Sierra Leone	16,561	4.7	13,000	4.2
Total	351,430	100.0	310,099	100.0

Source: All figures for this table and the following tables were obtained from national statistical publications unless otherwise stated.

180. Imports of the sub-region amounted in the two years, 1958 to 1959, on an average to about 330,765 tons. Calculations based on exports of the main overseas exporting countries suggest that this figure may be an underestimate and that the true figure is nearer an average of 360,000 tons for the years 1957 to 1959.

181. It will be noted that Nigeria is the major importer; this may be explained in part, by the fact that Nigeria is the largest single country in the sub-region with a total population of 35 million. Imports of former French West Africa and former French Equatorial Africa declined sharply between 1958 and 1959. This was probably due to non-economic factors (political uncertainty and recent attainment of independence) and should not be regarded as truly indicative of demand. Former French West Africa and Togo, with a total population of about 23 million, is the next largest sub-area in West Africa, and in 1958 it accounted for 34.3 per cent of the imports; almost as much as Nigeria. Ghana, which has a population of only 6 to 7 million has the highest national income per head in the sub-region; this is probably the reason why, in 1959, Ghana's imports came next in quantity to those of Nigeria.

182. Apparent consumption of steel per head, by country and sub-area, is shown in Table 29.

TABLE 29
Apparent Consumption of Steel per Head by Country and Sub-Area
in West Africa. Kilograms

Country or sub-area	Steel consumption per head. Kg.	Year of reference
Ghana	9.3	1958/1960
Former French Equatorial Africa	7.5	" "
Sierra Leone	7.3	" "
Nigeria	4.7	" "
Liberia	4.5	" "
Former French West Africa	4.0	" "
West Africa	4.8	Based on 1958 imports

Source: See Table 28.

183. It will be noted that consumption per head is very low. It is less than 10 kg. in all the West African countries; comparable figures for UAR (Egypt), Federation of Rhodesia and Nyasaland and the Republic of South Africa are 10.4 (1958/1960), 30 (1958/60), and 146 (1958/1960) respectively. On the basis of these figures, the West African steel market has hardly been touched.

184. The product pattern of imports is shown in Table 30.

TABLE 30
Product Pattern of Imports into West Africa in 1958
Metric Tons

Item	Total quantity imported	Per cent of total
Corrugated sheets, galvanised and other sheets and plates	100,070	28.5
Rods and bars	69,419	19.8
Accessories for railway construction	63,364	18.0
Others	60,916	17.3
Pipes, tubes and fittings	52,061	14.8
Total	351,430	100.00

Source: See Table 1.

185. As the pattern of development is not the same in the eighteen West African countries considered and comparable data are available for only two years, 1958 and 1959, a more accurate picture might be obtained by a closer examination of data for selected countries for a longer period than two years.

186. The average annual increase in Nigeria was 11 per cent during the five year period under review for all imports of iron and steel. Imports of galvanised corrugated sheet and other sheets declined by an average of 1.5 per cent annually; imports of hoop and strip declined by an average of 12 per cent, and imports of black plates and sheets by an average of 19 per cent.

Imports of all the other groups increased; the rate of increase for wire and wire products was lower than the average for all iron and steel, but for all the other groups it was higher.

TABLE 31
Compounded Annual Rate of Change of Iron and Steel Imports
1955-1959. Nigeria and Ghana

	Nigeria	Ghana
Items	Average annual percentage change	Average annual percentage change
Corrugated sheets, galvanised	- 1.5	- 2.7
Plates and sheets, tin-plated	+ 91.4	-
Other coated sheets	+ 10.6	+ 15.2
Plates and sheets - black	- 18.8	+ 35.1
Tubes, pipes and fittings	+ 36.3	+ 13.2
Rods and bars	+ 16.6	+ 2.4
Accessories for railway track construction	+ 18.1	+ 0.9
Sections: angles, channels, beams, special shapes, girders	+ 30.0	+ 30.0
Hoop and strip	- 11.7	+ 13.2
Wire and wire products	+ 2.8	+ 8.2
Castings and forgings, unworked, other primary forms	+ 29.9	+ 39.1
Total	+ 10.8	+ 5.6

Source: See Table 28.

187. In Ghana the average annual increase between 1955-59 was 6 per cent for all imports of iron and steel, or about one half the Nigerian rate. As in Nigeria, imports of corrugated sheets declined over the period, but the imports of all other products increased; the average annual increase exceeded that for all iron and steel imports except in the case of plates and sheets tinplated, rods and bars and railway equipment.

188. Only four product groups accounted for 94 per cent of the Nigerian imports, and only three product groups accounted for 84 per cent of the Ghana imports. The main imports of the two countries are shown in Table 32.

TABLE 32
Major Imports of Iron and Steel: Nigeria and Ghana 1959

Items	Nigeria	Items	Ghana
	Per cent imported		Per cent imported
Corrugated sheets, galvanised, other sheets	34	Rods and bars	33
Pipes, tubes and fittings	25	Corrugated sheets galvanised & other sheets & plates	26
Rods and bars	21	Castings and forgings, accessories for railway tracks, sections wire, hoop and strip	25
Accessories for railway track construction.			
Rails	14		
Total	94%	Total	84%

Source: See Table 28.

189. For former French West Africa and former Equatorial Africa data are not available for five consecutive years. Figures for a period of three years, 1957-1959, have been obtained for only two countries - Cameroun Republic and Ivory Coast; and figures for a two-year period 1959-60 have been obtained for Senegal, Mauritania and Mali.

TABLE 33^(a)
Average Annual Rate of Change of Iron and Steel Imports
1957-59 Cameroon Republic and Ivory Coast; 1959-60
Senegal, Mali and Mauritania

Item	Cameroon Republic	Ivory Coast ^(b)	Senegal, Mali, Mauritania
	Annual % change 1957-1959	Annual % change 1957-1959	Annual % change 1959-1960
Galvanised sheets, other sheets, plates	- 13.6	+ 2.0	+ 25.5
Tubes, pipes and fittings	- 46.5	- 8.1	+ 17.2
Rods and bars	- 46.4	- 20.2	+ 52.6
Accessories for rail- way track	+ 305.2	..	- 54.8
Sections: angles, channels, beams, shapes, girders	- 43.6	- 2.5	..
Wire and wire products	- 8.8	..	+ 104.9
Castings and forgings, other primary products	+ 138.0	..	- 6.0
Hoop and strips	..	..	- 44.8
Total	- 13.4	- 19.6	+ 37.6

Source: See Table 28.

(a) As an accurate indication of past trends the above table should be interpreted with caution. Non-economic factors are probably responsible for the decline in imports in Cameroon and Ivory Coast; moreover, the period covered by the data is very short.

(b) Source: Compendium of Basic Information by P.E. Management Group (Nigeria Ltd.), 1961.

190. The product pattern of imports of former French Equatorial Africa and former French West Africa is shown in Table 34 for the year 1958.

TABLE 34
Product Pattern of Imports of Former French Africa
1958
(a) Former French West Africa and Togo

Items	Per cent
Corrugated sheet, galvanised, other sheet and plate	24
Accessories for railway track construction, rails	23
Sections: angles, channels, beams	21
Rods and bars	18
Other: Pipes, tubes, fittings, wire and wire products	14
Total	100.0

Source: See Table 28.

(b) Former French Equatorial Africa and Cameroon

Items	Per cent
Corrugated sheet, galvanised, other sheet and plate	31
Pipes, tubes and fittings	21
Rods and bars	17
Other: Sections, wire and wire products ect.	16
Accessories for railway track construction	15
Total	100.0

Source: Compendium of Basic Information by P.E. Management Group, (Nigeria Ltd.) 1961.

191. It will be noted that in former French West Africa and Togo only four items accounted for 86 per cent of imports, and in former French Equatorial Africa only four items accounted for 85 per cent of imports. In both sub-areas corrugated sheet galvanised and other sheets and plate constitute the major import item.

192. Historical consumption trends, when steel supplies are provided by imports, are insufficient as a basis for future forecasts. This is especially the case in developing countries where dynamic changes in the economy will produce a new structural pattern. Therefore an attempt should be made to ascertain the relationship between steel consumption and selected macro-economic variables, and examine how their possible future behaviour will influence steel consumption.

193. In highly developed countries, there is a marked degree of interdependence between steel consumption and the fluctuations in the level of manufacturing output. In Africa, because of the low level of industrial activity, this interdependence cannot be clearly established. Moreover, within the field of development as a whole, the industries actually consuming primary steel products have not, as yet, reached a position of great importance. However, even in under-developed countries, there are certain broad indices of general economic and manufacturing activity to which steel consumption seems to be related.

194. As shown in Table 35, there is a positive relationship between income per head and steel consumption per head. Development, with its consequent improvement in living standards and the level of real earnings, gives rise to greater demand for steel which is an indispensable component almost all capital and durable consumer goods. Therefore, as the national income of African countries rises, demand for iron and steel products will increase.

195. The level of national income is not the only factor which influences steel consumption, especially under African conditions. It will be seen from Figure 1, for example, that although Ghana and Ivory Coast have a higher national income than the Federation of Rhodesia and Nyasaland, they consume less steel; and that the UAR consumes less steel than Ghana notwithstanding the fact that Ghana has a higher national income. For a given level of national income, the degree of industrialization or economic activity is an essential factor. Therefore, in addition to national income relevant indicators of manufacturing activity should be used as a basis for forecasting steel consumption. Indicators of manufacturing activity used in this analysis are imports of capital goods, gross fixed investment, and building activity as measured by cement consumption.

TABLE 35
Steel Consumption per Head in Selected Non-African Countries
1959

Country	Steel consumed per head per annum in lbs
USA	1,270
UK	875
France	684
USSR	560
Italy	300
New Zealand	300
Irish Republic	80

Source: See Table 28.

196. Figures 2, 3 and 4 illustrate the relationship between steel consumption per head on the one hand and gross fixed investment per head, per head imports of capital goods and cement consumption per head on the other. All the three variables have a positive relationship with steel consumption, the correlation coefficients are shown in Table 36.

FIGURE 1

Steel Consumption (kg) and Income (US\$) Per Capita

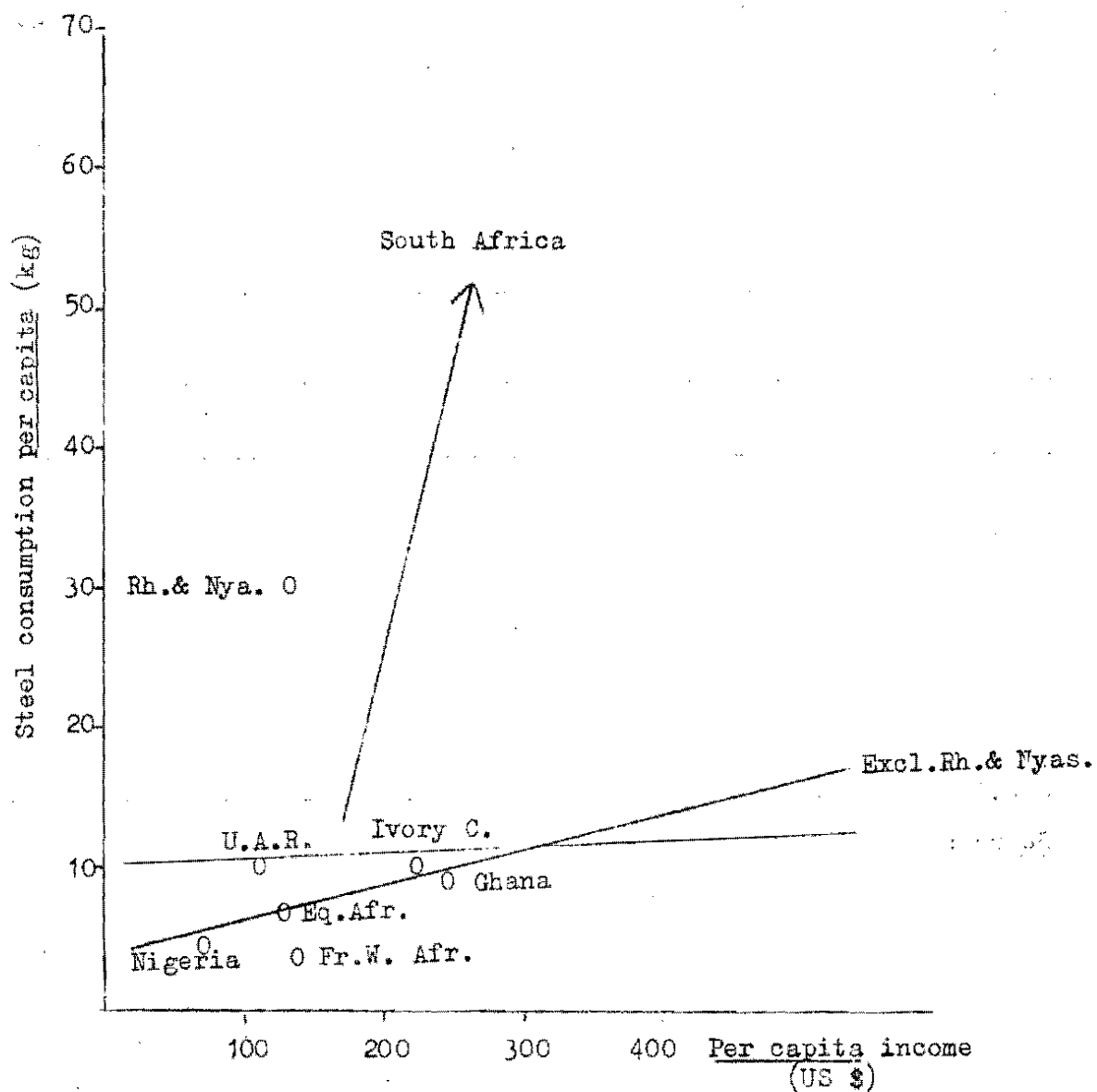


FIGURE 2

Steel Consumption (kg) and Gross Fixed Investment (US\$) Per Capita

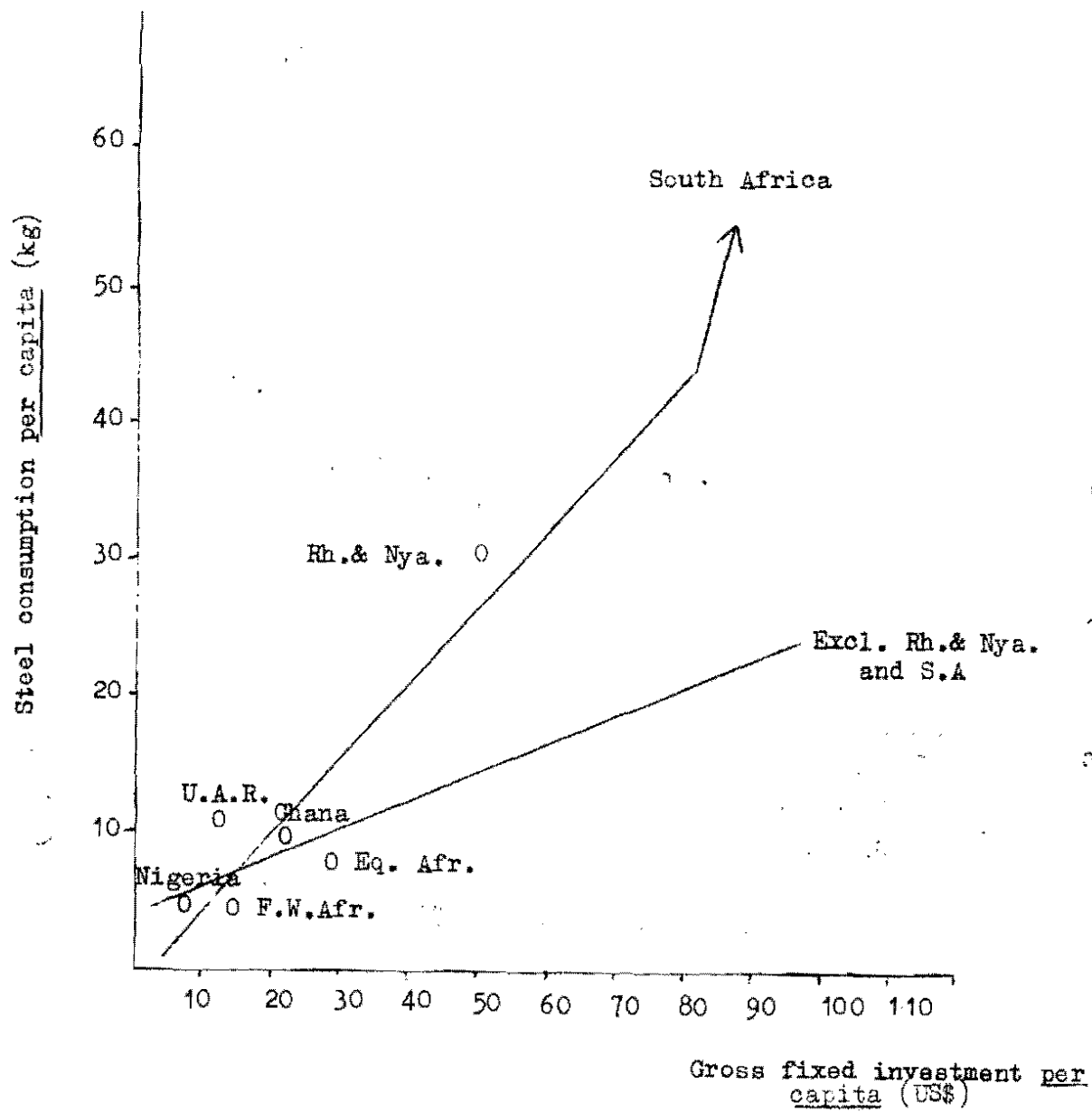


FIGURE 3

Steel Consumption (kg) and Imports of Capital Goods (US\$) Per Capita

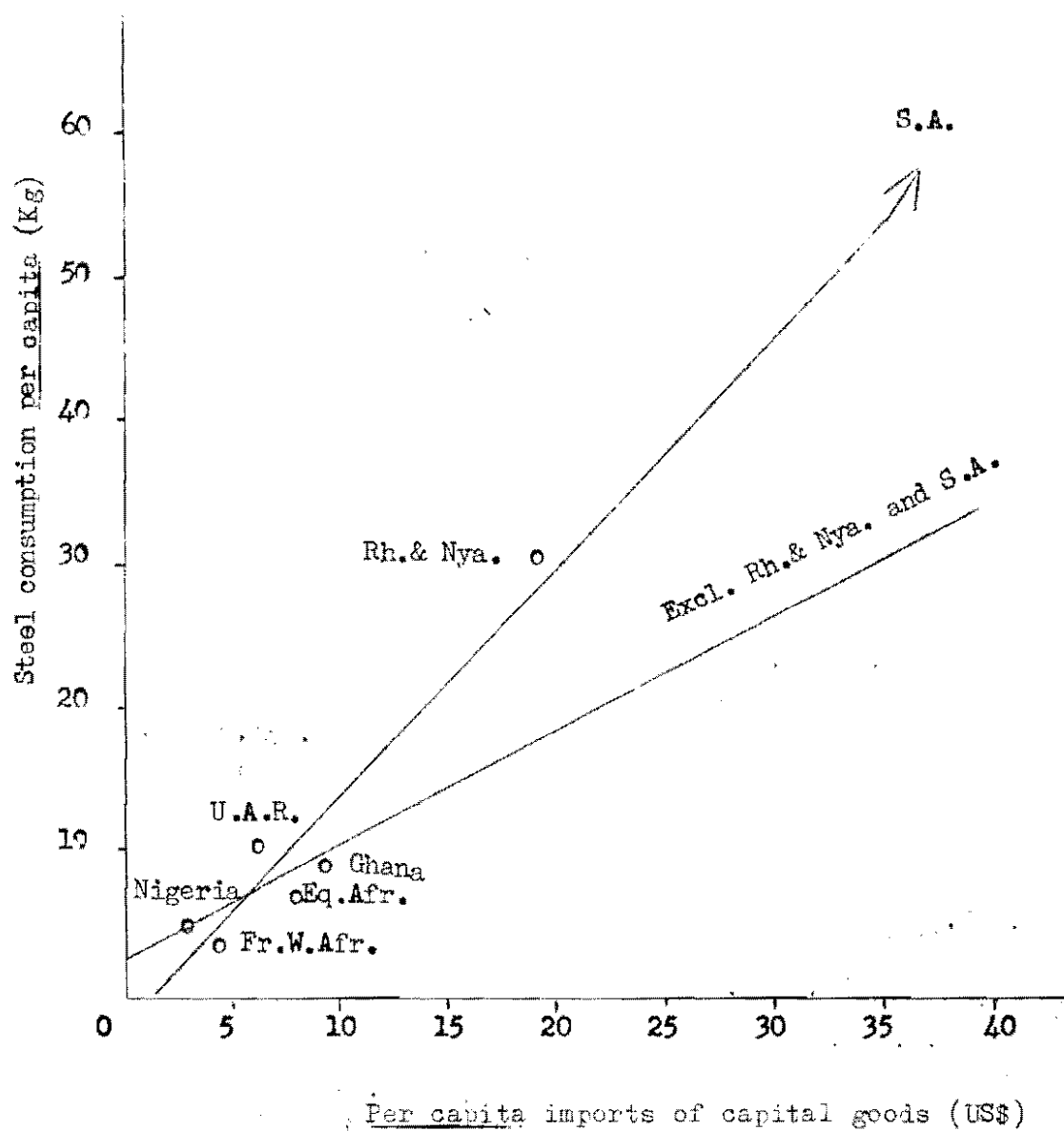


FIGURE 2

Steel Consumption (kg) and Gross Fixed Investment (US\$) Per Capita

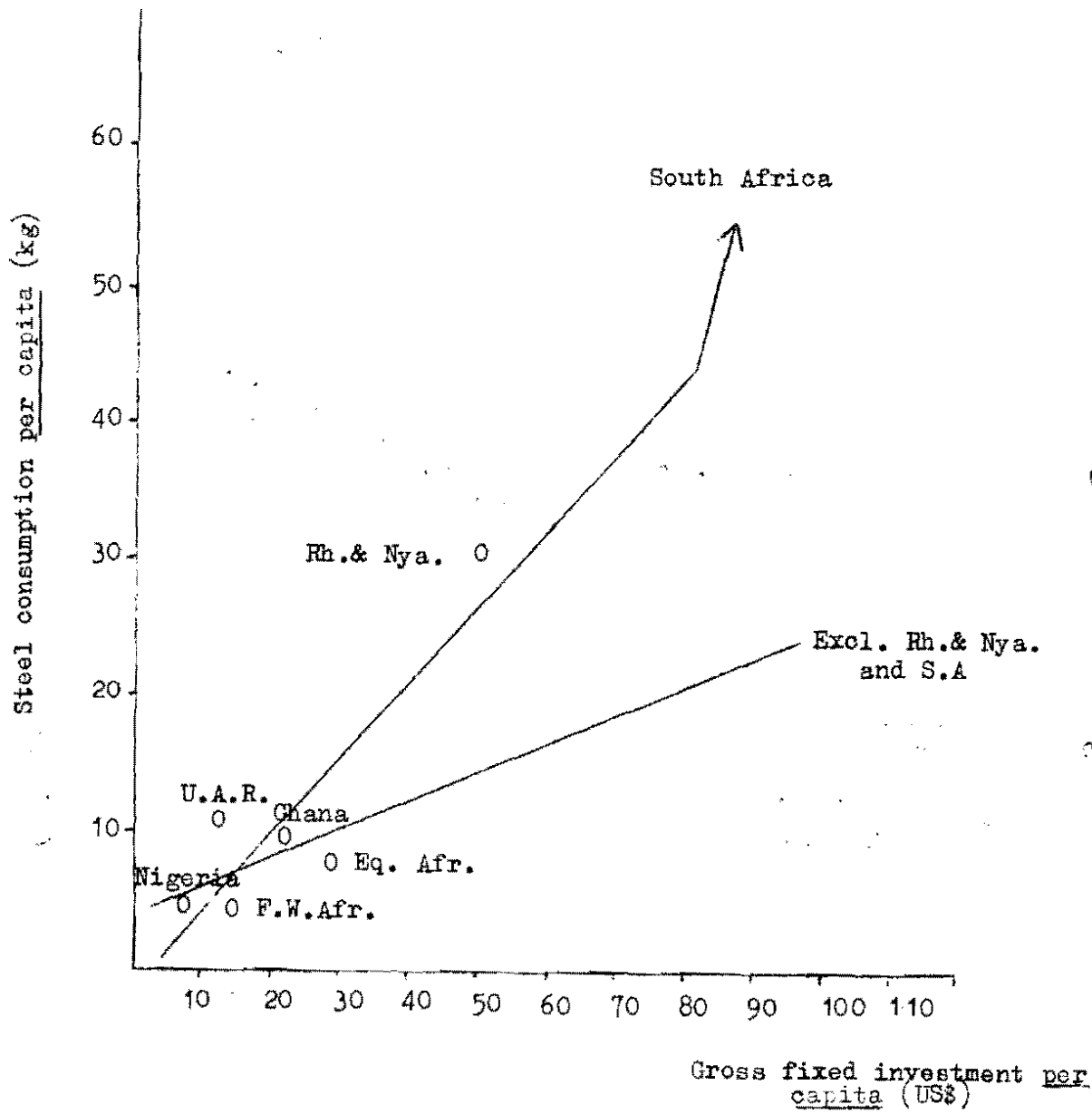


FIGURE 3

Steel Consumption (kg) and Imports of Capital Goods (US\$) Per Capita

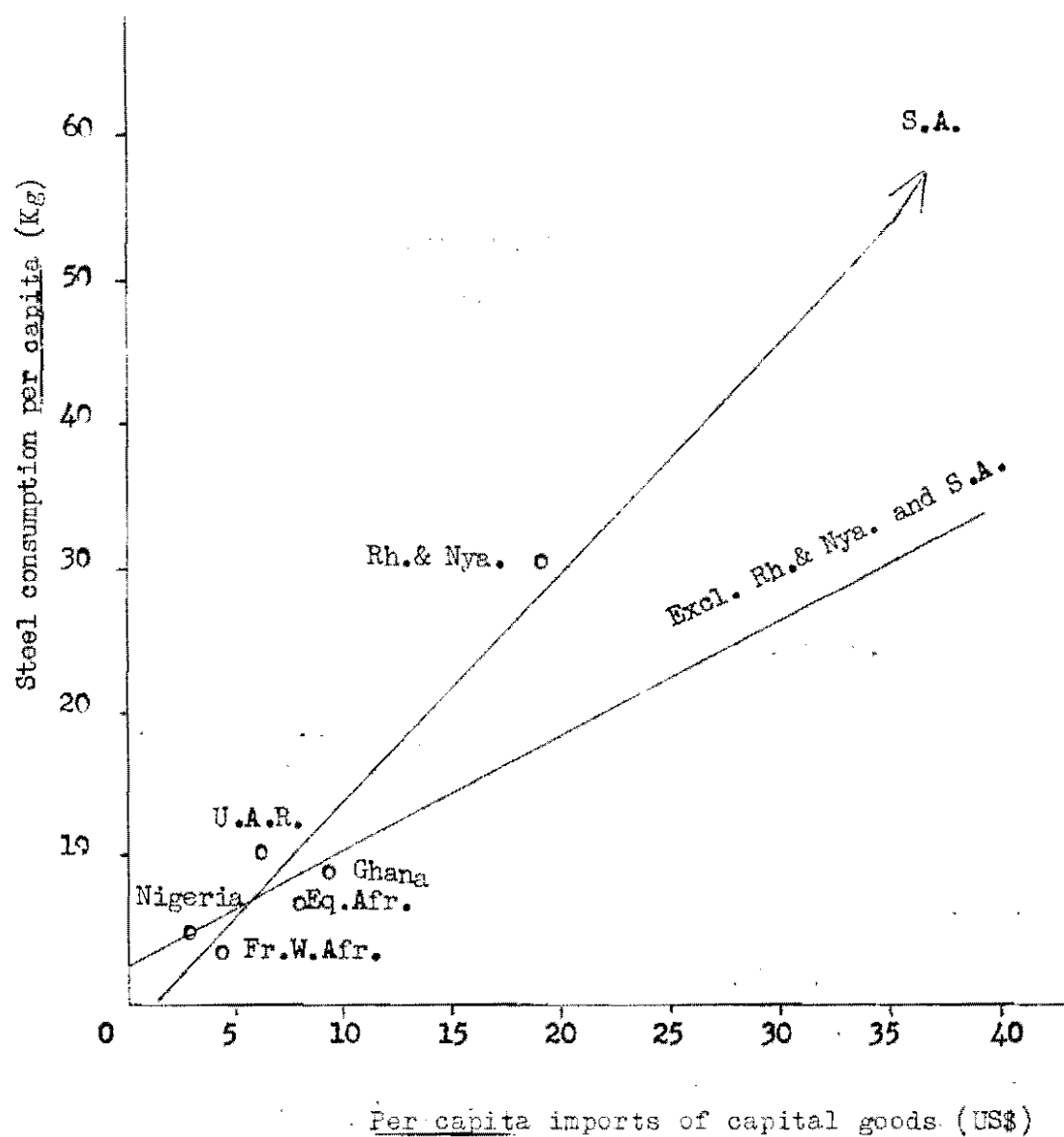


FIGURE 4

Steel and Cement Consumption per capita (kg)

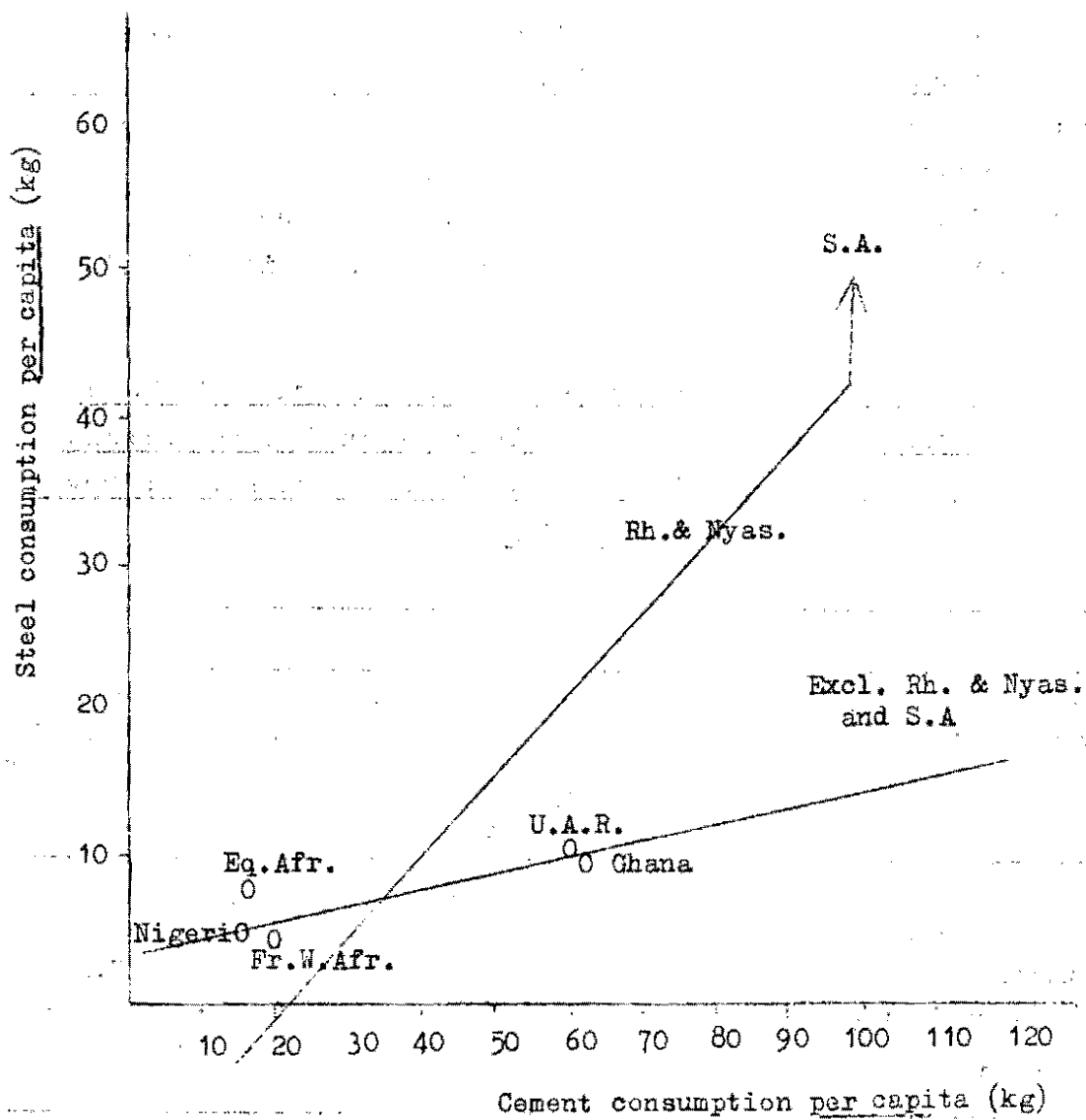


TABLE 36
Relationship between Steel Consumption per Head in Selected
African Countries and Selected Indices of Manufac-
turing Activity

Indices of Manufacturing Activity	Simple correlation coefficient
Steel and per head imports of capital goods	0.96
Steel and per head gross fixed investment	0.89
Steel and per head cement consumptions	0.76

Source: See Table 28.

197. Forecasts of steel consumption for 1965 based on assumed forecasts of national income, gross fixed investment, expenditure on capital goods, and building activity (cement consumption) are shown in Table 37.

TABLE 37
Estimated Steel Consumption for West Africa by 1965, on
Basis of Assumed 5 per cent Increase in National Income,
Expenditure on Capital Goods, Fixed Investment, and Cement
Consumption

I	II	III
Assumed 5 per cent increase in:	Increase in steel consumption resulting from 5 per cent increase in relevant variable listed in column 1 Kg. per head	Estimated steel consumption by 1965. Metric tons
Per head income	.11	462,455
Per head capital goods expenditure	1.82	617,210
Per head fixed investment	.86	530,330
Per head cement consumption	.43	419,415

Source: See Table 28.

198. The range of estimates of demand for finished steel products in West Africa in 1965 lies between 450,000 and 600,000 tons. This is not inconsistent with another estimate made by entirely different methods suggesting a level of steel consumption in the same area of about 800,000 tons (ingot equivalent) in the early 1970s.^{1/}

199. There would of course be no difficulty in meeting the future demand assumed by imports from traditional sources, particularly the United Kingdom and France. There are also likely to be increasing net exports from the Republic of South Africa. Moreover, the traditional suppliers in the early years can undoubtedly supply steel at prices and of a quality with which young industries could hardly compete. However, historical experience shows two things: the first is that the installation of iron and steel plant in developing countries generates a demand for steel products over and above previous levels. The second is that the time which elapses before a new steel industry can compete with established producers is not very long.

200. In West Africa, as has been shown, ample quantities of high grade iron ore are available. Suitable coking coal is not available, though it may well be that Nigerian coal could be adapted for this purpose. There would, however, be a strong case for locating a new iron and steel works on or near the sea coast. Large quantities of iron ore will continue to be exported from West Africa for an indefinite period, and low-cost high quality coking coal could be imported from the USA as a return cargo. Assuming that about \$300 are required to install one ton of crude steel capacity in an integrated steel works, a plant of 500 tons capacity would require an investment of 150 million, which is not excessively high in relation to the benefits which would flow from such a plant. Clearly, skilled labour would be a problem. Even the production of the simple finished products requires a certain degree of experience and a certain level of technical knowledge and skill; to say nothing of the engineers and other technical personnel required. However, it would be right policy to erect an iron and steel plant in stages, with the necessary equipment

^{1/} See Long Term Trends and Problems of the European Steel Industry, ECE, Geneva, 1959; Table 87, p. 131. (Assuming an increase of about 130 per cent in steel consumption in the 15 year period ending in 1972 in Africa as a whole, and assuming that development proceeds in all African countries at the same pace as assumed for South Africa, probably a considerable underestimate).

imported and associated agreements for training on the site. The experience of India shows that these problems are far from insuperable.

201. In the first stage, a blast furnace would be erected and perhaps also a cokery and a coke oven by-product plant, if the surplus coke oven gas could be used to produce thermo-electricity serving other consumers. The pig iron produced could be used initially largely in local foundries, perhaps for the production of cast iron pipes, and might even be exported. The further stages are self-evident: over a period of 5 years, a steel plant of 500,000 tons capacity, probably using oxygen vessels, an additional blast furnace; a blooming mill; a section mill or a rod mill; and a steel foundry. It would probably also pay to produce rails and sleepers. At a still later stage, the total crude steel output could be raised to one million tons.

202. It would be premature at this stage to make specific suggestions as to the possible location of the iron and steel plant envisaged. In the first instance, detailed feasibility studies would be required. The main point, however, is that there is a strong case for only one such plant, serving a substantial proportion of the needs of the whole West African region. This in turn would require co-operation between African countries in the financing and setting up of the plant, together of course with support from non-African countries, and also an agreement among the countries of the sub-region to ensure markets for the products of the plant.

Non-ferrous metals

203. The metals dealt with in this section comprize the five major non-ferrous metals, namely, aluminium, copper, lead, zinc and tin. These are metals that are mainly used alone or in combination with other non-ferrous metals; they are not directly dependent on the steel industry except perhaps zinc and tin which may be used for plating iron and steel sheets.

204. As the object of this section is to consider only those metals which can be used, within a reasonable period of time, as raw materials for African industry, it has not attempted to cover the additive metals^{1/} which are used chiefly for alloying with iron and steel in the production of special steels. The potential market for these metals is a function of a developed steel industry. Therefore their demand is channelled through those countries whose steel industries are sufficiently advanced to produce special grades of steel. Over 80 per cent of world tungsten consumption (excluding USSR and Eastern Europe) is consumed in the United States of America, Western Europe and Japan. North America accounts for 50 per cent of the consumption of manganese, cobalt and chromium; and for two-thirds of the consumption of molybdenum, columbium and nickel. In Africa, where the iron and steel industry is at a very early stage of development, the additive metals are not in demand for domestic utilization, and they will probably be produced almost entirely for export for a long time to come.

205. At the present time the five major non-ferrous metals produced in Africa are not utilized for domestic production but are raw materials for factories in developed countries making durable goods largely for use in industry rather than for final consumption. However, the development of iron and steel and machinery industries in Africa will give rise to local demand and utilization of the major non-ferrous metals. In addition to utilization in steel, machinery and construction industries, the metals

^{1/} Additive metals include chromium, nickel, molybdenum, vanadium, tungsten.

and the by-products of mining and smelting processes are raw materials in the chemical, insecticide and paint industries. Hence, as the growth of associated metallurgical, chemical and fabricating industries develops, African demand for non-ferrous metals will increase. Aluminium in particular has vast potential markets. Further plans for the exploitation of the mineral reserves should therefore be linked up with the industrialization plans of the African countries and sub-regions. The significance of developing domestic use for African countries is enhanced by the wasting character of the mineral reserves which, in the nature of things, face eventual depletion.

TABLE 38

African Mine Production of the Five Major Non-ferrous Ores
'000 Metric tons. 1951-1955, 1956 and 1960

Metal	1951-1955 averages	1956	1960
Zinc	133.9	253.6	260.0
Tin	25.0	26.7	20.7
Lead	196.3	225.6	214.5
Copper	806.8	735.1	978.5

Source: Mineral Yearbook 1960, U.S. Dept. of Interior.

206. Between 1951-1958 zinc ore production increased by 34 per cent; copper ore production by 12 per cent and lead ore production by 9 per cent. Tin ore production increased slightly between 1951-1955, but decreased between 1956 and 1960 by 22 per cent.

207. In the following tables the ores are considered individually.

TABLE 39

Zinc Mine Production by African Countries 1951-1955 to 1960

Countries listed in descending order of production

(Per cent of production)

Country	1951-1955	1956	1957	1958	1959	1960
Congo (Leopoldville)	48.0	46.3	43.0	45.7	30.8	41.9
Morocco	16.6	16.7	19.6	19.7	28.4	19.6
Rhodesia & Nyasaland	13.7	13.6	14.7	13.8	18.5	17.2
Algeria	10.5	12.8	12.0	13.3	15.9	15.1
South West Africa	8.6	8.5	9.3	5.8	4.9	4.6
Tunisia	2.2	1.9	1.4	1.7	1.5	1.6
UAR (Egypt)	0.4	0.2	-	-	-9	-
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

Source: Minerals Yearbook 1960, U.S. Dept. of Interior.

208. During the last decade, the Congo (Leopoldville) produced over 40 per cent of African ore production except in 1959; Morocco and the Federation of Rhodesia and Nyasaland are the next largest producers. The sub-regions which do not produce zinc ore, according to available figure, are West and East Africa. In 1960 Africa produced 9 per cent of world's total zinc ore production.

209. Twelve African countries produce tin ore, Congo (Leopoldville) and Rwanda Burundi and Nigeria are the main producers accounting for 80 per cent of African production. Central Africa is the major producing sub-region, followed by West Africa (Nigeria, Niger, Cameroon). In 1960 11 per cent of world's production of tin ore was produced in Africa.

TABLE 40

Tin Mine Production by African Countries, 1951-1955 to 1960

Countries Listed in Descending Order of Production

(Per cent of total production)

Country	1951-1955	1956	1957	1958	1959	1960
Congo (Leopoldville) } & Rwanda Burundi }	59.3	56.1	54.0	56.8	57.1	49.5
Nigeria	33.5	34.5	36.1	31.4	30.7	37.7
South Africa	4.6	5.5	5.5	7.2	7.0	6.3
South West Africa	0.9	1.8	2.4	0.8	(a)	1.3
Rhodesia & Nyasaland	0.3	1.3	1.1	2.7	3.7	3.5
Uganda	0.4	0.1	0.2	0.2	0.2	0.2
Niger	0.3	0.2	0.2	0.3	0.3	0.3
Cameroon	0.3	0.3	0.3	0.4	0.4	0.3
Tanganyika	0.2	0.1	0.1	0.1	0.4	0.7
Swaziland (South Africa)	0.1	0.1	0.1	0.1	(a)	(a)
Morocco (a)	-	-	-	-	-	-
Congo (Brazzaville)	-	-	-	0.1	0.2	0.2
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

Source: Minerals Yearbook 1960, U.S. Dept. of Interior.

(a) Less than 0.1 per cent.

TABLE 41

Lead Mine Production by African Countries, 1951-1955 to 1960

Countries Arranged in Descending Order of Production

(Per cent of total production)

Country	1951- 1955	1956	1957	1958	1959	1960
South West Africa	31.8	35.8	34.9	33.9	32.4	30.2
Tunisia	12.4	10.4	10.0	10.5	8.4	8.5
Rhodesia & Nyasaland	7.2	6.8	6.6	5.7	6.7	6.8
Algeria	3.7	4.7	4.5	4.5	4.7	4.9
Congo (Brazzaville)	1.8	1.3	0.8	1.5	2.3	2.0
Tanganyika	1.3	2.3	2.1	2.0	2.9	2.8
South Africa	0.3	0.4	0.5	(a)	0.1	0.1
UAR (Egypt)	0.1	0.1	0.1	0.1	0.3	0.3
Congo (Leopoldville)	(a)	(a)	0.1	-	-	-
Uganda	(a)	0.1	(a)	0.1	(a)	(a)
Nigeria	(a)	(a)	0.2	0.2	0.2	0.2
Morocco	41.4	38.1	40.2	41.5	42.0	44.2
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

Source: Minerals Yearbook 1960, U.S. Dept. of Interior.

(a) Less than 0.1 per cent.

210. Up to 1957 Morocco was a major producer of lead ore. But since 1958 South West Africa is the main producer according to available data. Although eleven countries produce lead ore, only six - South West Africa, Tunisia, Rhodesia and Nyasaland, Algeria, Congo (Brazzaville) and Tanganyika - produce more than 1,000 metric tons per annum. On a sub-regional basis, South and Central Africa (South West Africa and Rhodesia) account for about 40 per cent of African production.

North Africa (Algeria, Tunisia, UAR) contributes about 11 per cent. Very little is produced in West and East Africa. Tanganyika and Uganda between them produce less than 4 per cent of Africa's total; and Nigeria, the only producing country in West Africa, produces less than 0.5 per cent. In 1960 Africa produced 9 per cent of the world's lead ore.

TABLE 42

Copper Mine Production by African countries 1951-1955 to 1960

Countries Arranged in descending order of production

(Per cent of total production)

Country	1951-1955	1956	1957	1958	1959	1960
RHODESIA & NYASALAND						
Northern Rhodesia	56.9	55.0	56.7	54.3	58.3	58.9
Southern Rhodesia	0.1	0.2	0.4	1.0	1.2	1.4
Congo (Leopoldville)	34.4	34.0	31.5	32.2	30.2	30.9
South Africa	6.1	6.3	6.0	6.7	5.3	4.7
South West Africa	2.3	3.6	3.5	3.8	3.4	2.1
Angola	0.2	0.2	0.2	0.2	0.2	0.2
Uganda	-	0.4	1.4	1.1	1.1	1.5
Morocco	0.1	0.1	0.1	0.1	0.2	0.2
Tanganyika	0.1	0.2	0.1	0.2	0.1	0.1
Algeria	(a)	(a)	0.1	0.1	(a)	(a)

Source: Minerals Yearbook 1960, U.S. Dept. of Interior.

(a) Less than 0.1 per cent.

211. The Federation of Rhodesia and Nyasaland is the continent's largest producer of copper ore. It accounts for more than half of Africa's output. Congo (Leopoldville) is the only other major producer. Together the two countries account for about 90 per cent of African copper ore production. The balance is produced in South Africa, South West Africa, Angola, Uganda, Morocco, Tanganyika and Algeria.

212. In addition to mine production, a few countries have smelters and refineries.

TABLE 43

Smelter Production of Major Non-ferrous Metals

In the African Region

(for years for which dates are available)

Metal	Year	Production (thousand metric tons)
Zinc	1951-55 Av.	50.5
	1956	71.5
	1960	83.6
Tin	1951-55 Av.	3.7
	1956	3.6
	1960	4.9
Lead	1951-55 Av.	66.4
	1956	67.7
	1960	66.2
Copper	1951-55 Av.	598.7
	1956	685.3
	1960	931.3
Aluminium	1958	31.9
	1959	42.3
	1960	42.6

Source: Minerals Yearbook 1960, U.S. Dept. of Interior.

213. It will be noted that for all the metals except lead, smelter production is increasing. For zinc it increased between 1951-1955 and 1960 by 67 per cent; for copper by 56 per cent; for tin by 32 per cent and for aluminium by 34 per cent from 1958.

TABLE 44

African Smelter Production According to Country, 1951-1955 to 1960
Countries Listed in Descending Order of Production

(Per cent of total production)

Metal and Country		1951-1955	1956	1957	1958	1959	1960
Zinc	Congo (Leopoldville)	49.1	58.9	62.1	63.5	64.3	63.8
	Northern Rhodesia	50.9	41.1	37.9	36.5	35.7	36.2
	TOTAL	100.0	100.0	100.0	100.0	100.0	100.0
Tin	Congo (Leopoldville)	76.3	78.0	74.0	65.1	70.6	72.9
	South Africa	22.6	21.4	19.7	22.2	15.6	12.9
	Rhodesia & Nyasaland	0.9	0.3	6.0	12.4	13.5	14.0
	Morocco	0.2	0.3	0.3	0.3	0.3	0.2
	TOTAL	100.0	100.0	100.0	100.0	100.0	100.0
Lead	Morocco	40.2	41.5	44.0	46.6	43.8	47.9
	Tunisia	38.7	35.7	34.5	35.3	33.6	30.0
	Northern Rhodesia	21.1	22.8	21.5	18.1	22.6	22.1
	TOTAL	100.0	100.0	100.0	100.0	100.0	100.0
Copper	Northern Rhodesia	57.9	56.9	58.9	56.2	61.0	60.8
	Congo (Leopoldville)	35.7	36.5	33.7	34.9	31.9	32.4
	South Africa	6.2	6.4	6.1	7.1	5.5	5.0
	Angola	0.2	0.2	0.2	0.2	0.2	0.2
	Uganda	-	(a)	1.1	1.6	1.4	1.6
	TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

Source: Minerals Yearbook 1960, U.S. De. t. of Interior.

(a) Less than 0.1 per cent.

214. At the present time Cameroon is the only country with an aluminium smelter.

TABLE 45.
Production of Refined Non-ferrous Metals in the
African Region, 1955-57 to 1961
('000 metric tons)

Metal	1957-57 Average	1959	1960	1961
Copper	360.1	545.2	539.7	566.7
Lead	69.2	64.6	64.0	60.2
Tin	3.9	4.8	4.8	4.2
Zinc	71.0	83.4	83.4	84.0

Source: Annual Yearbook 1960, U.S. Dept. of Interior.

215. In tables 46 and 47, crude projections of possible African production for 1965 and 1970 have been made on the basis of past trends.

TABLE 46
African Mine Production Projection - '000 Metric Tons.

Metal	Increase	1960 figure	Annual rate of change in %	Mine production 1970 projection
Zinc	60,000	260,000	2.1	320,000
Tin	5,000	20,000	2.1	25,700
Lead	58,000	214,500	2.3	273,000
Copper	335,000	978,500	3.0	1,313,500

Source: Tables 46 and 47: The forecast of increase in non-ferrous metals are computed from the estimated annual rates of change expected in Africa from 1960 to 1970. The rates of change take into account present world markets in non-ferrous metals, expected growth patterns in income, population and industry in Africa and existing plans for future plant expansion.

TABLE 47

African Smelter Production Projections - '000 Metric Tons.

Metal	Increase	1960 figure	Annual rate of change in %	Mine production 1970 projection
Zinc	49,600	83,600	4.5	133,000
Tin	6,000	4,900	6.3	10,900
Lead	50,000	66,200	5.8	116,200
Copper	384,200	931,300	3.5	1,313,500

Source: See Table 46.

216. The forecast for aluminium for 1965 and 1970 is 88.3 and 182.8 respectively, based on an annual rate of change of 15.7 per cent between 1956-1960.

217. Much of the continent of Africa has been inadequately explored geologically, so that its unknowns probably exceed the known ore bodies. For example, Mauritania is not, as yet, one of the leading producers of non-ferrous metals; but in the coming years the country will produce copper and other metals. Copper reserves are estimated at 18 million tons. In the UAR (Egypt) deposits of copper, lead and zinc are known to exist at Omi Simuiki, Gabal el Atway and Abu Swail, and will soon be exploited. In Nigeria there are unexploited deposits of lead at Nyeba in the Abakaliki region. Despite high output in Rhodesia and Nyasaland, the reserves of the copperbelt are expected to last a long time; in 1958 copper ore reserves were estimated at over 600 million tons, representing about 20-25 per cent of the world's known reserves of recoverable copper.

218. Although aluminium is at the present time produced only in Cameroon out of alumina imported from France, possibilities for expanded production exist in other African countries. In Ghana the Volta Aluminium Co. Ltd. (Valco) will build an aluminium smelter as part of the Volta Project. In Angola, Aluminio Portuguese is establishing a plant at

Donda which is expected to produce before the end of 1962. Bauxite deposits exist in the Congo (Leopoldville), Congo (Brazzaville), Guinea, Ghana and Mozambique.

219. At present, the exploitation of African deposits and increase of output depend mainly on world export markets. Since African production is mainly for export, no real forecast is possible without a detailed study of the likely level of future world demand and also the translation of Africa development plans into calculations of domestic requirement of non-ferrous metals. Furthermore, although smelting and refining are important segments of mining in a number of territories, there are as yet only a few examples of metal fabricating industries.

TABLE 48

African Consumption of Refined Non-ferrous Metals
1951-1957 and 1959 and 1961
('000 Metric tons)

Metal Consumption Refined	1951-57 Average	1959	1960	1961
Copper	26.0	25.6	28.9	34.1
Lead	23.0	19.1	16.4	16.2
Tin	2.5	3.3	3.6	3.5
Zinc	23.0	23.0	29.9	26.3

Source: UN Economic Survey of Africa since 1950.
UN Commodity Survey 1961, E/CN.13/54.

220. Table 49 shows that almost all African smelter production of lead, zinc and aluminium is exported. The same is true of copper. The copper produced in the Congo (Leopoldville) and the Federation of Rhodesia and Nyasaland.

TABLE 49

African Exports of Smelter Production of Lead, Zinc & Aluminium
in Quantity and as % of Production.

('000 Metric tons)

Metal	1956		1957		1958		1959		1960	
	Q	% of Production	Q	% of Production	Q	% of Production	Q	% of Production		
Lead	67.7	100.0	66.5	93.6	61.8	86.0	62.8	96.8		
Zinc	70.0	97.0	79.0	97.7	79.7	94.7	85.18	100.0		
Aluminium (Cameroon)	-	-	-	-	-	-	39.2	92.6	42.4	99.5

Source: National statistical publications.

221. Because of dependence on outside markets, changes in the African output of the non-ferrous metals tend to follow changes in world demand. Activity in the investment goods industries, which are the main consumers of the metals, tends to fluctuate more than total consumption thus, introducing a high degree of instability into the market for non-ferrous metals. For example, in western Europe the rate of growth of output of manufactures declined steadily between 1960 and 1961. As a result, the demand for copper, lead and zinc in 1960 and 1961 was appreciably below the 1959-1960 level. In the case of aluminium the increase in the rate of consumption began to slacken in the middle of 1960, and by mid-1961 consumption began to decline^{1/}. Furthermore, most countries producing non-ferrous metals expanded mining and refining capacity in the nineteen fifties beyond current commercial needs, in part under the stimulus of defence contracts. By the end of the decade the capacity was not being fully utilized. Tin production was restrained by export quotas in the period 1958-1960; voluntary cuts were made in lead and zinc operations,

^{1/} UN 200800, Commodity Survey 1961.

Supplement on Non-Agricultural Commodities, E/CN.13/54/ADD.1., p.p. 15-17.

the major copper producers imposed periodic cutbacks of 10 per cent and aluminium smelters were unable to sell all their output at current prices. The effect of this instability on African export earnings is brought out in Table 50.

TABLE 50

African Export Earnings of Non-ferrous Metals as a Per Cent of Total
Export Earnings. 1955-1960

Ores and metals	1955	1956	1957	1958	1959	1960
Ores and Metals (Total)	12.1	13.1	10.0	8.1	10.9	6.1
Copper	9.5	10.2	7.2	6.0	8.7	
Tin	0.8	0.9	1.0	0.6	0.6	
Zinc	0.5	0.6	0.6	0.4	0.4	
Lead	1.2	1.4	1.2	0.9	0.7	0.6
Aluminium	0.0	0.1	0.1	0.2	0.3	0.5

Source: UN Yearbook of International Trade Statistics.

222. Direct consumption of non-ferrous metals in Africa is very small. In Table 51 consumption per head is given according to sub-regions for a few selected countries.

223. The figures in Table 51 are based primarily on imports of metals. Therefore they are crude estimates and should be accepted as merely orders of magnitude. However, it would seem that the only country which consumes a significant amount of metal is South Africa. For the rest of the continent, consumption is negligible and, for some metals, even declining. On the other hand, dollar expenditure on imports of non-ferrous metals is over one million in each of the sub-regions, and between 1959 and 1960 it increased in all sub-regions.

TABLE 51

Per Head Consumption of Non-ferrous Metals in Selected
African Countries & Sub-regions

Sub-region and metal	Kg. per head				
	1955	1956	1957	1958	1959
NORTH AFRICA					
<u>Morocco</u>					
Aluminium	-	0.14	0.10	0.14	0.16
Copper	0.21	0.17	0.15	0.17	0.19
Lead	-	0.03	0.02	0.02	0.01
Zinc	0.07	0.04	0.05	0.08	0.06
Tin	-	-	-	-	-
<u>Tunisia</u>					
Aluminium	-	-	-	-	-
Copper	0.10	0.07	0.09	0.08	0.01
Lead	0.04	0.01	0.01	0.03	0.02
Zinc	0.03	0.04	0.02	0.05	0.03
Tin	0.02	0.02	0.02	0.02	0.02
UAR (EGYPT)					
Aluminium	0.07	0.06	0.05	0.09	0.12
Copper	0.07	0.11	0.03	0.14	0.13
Lead	0.01	0.07	0.02	0.04	0.09
Zinc	0.05	0.05	0.04	0.04	0.07
Tin	0.03	0.03	0.02	0.04	0.03
WEST AFRICA					
<u>Ghana</u>					
Aluminium	0.19	0.18	0.20	0.13	0.40
Copper	0.06	0.12	0.05	0.07	0.07
Lead	0.05	0.05	0.05	0.06	0.04
Zinc	0.01	0.01	0.04	0.01	0.01
Tin	0.01	0.02	0.01	0.01	0.01
<u>Nigeria</u>					
Aluminium	0.06	0.06	0.07	0.06	0.08
Copper	0.02	0.02	0.02	0.02	0.02
Lead	0.01	0.01	0.01	0.02	0.02
Zinc	0.01	0.01	0.01	0.01	0.01
Tin	0.01	0.01	0.01	0.01	0.01

TABLE 51 (continued)

Sub-region and Metal	Kg. per head				
	1955	1956	1957	1958	1959
EAST AFRICA					
<u>Kenya</u>					
Aluminium	0.27	0.15	0.23	0.29	0.27
Copper	0.08	0.06	0.03	0.02	0.02
Lead	0.02	0.02	0.02	0.02	0.01
Zinc	0.01	0.01	0.01	0.02	0.02
Tin	0.03	0.02	0.01	0.01	0.02
<u>Tanganyika</u>					
Aluminium	0.06	0.06	0.06	0.05	0.04
Copper	0.02	0.03	0.02	0.01	0.01
Lead	0.01	0.01	0.01	0.04	0.01
Zinc	0.01	0.01	0.01	0.01	0.01
Tin	0.01	0.01	0.01	0.01	0.01
CENTRAL AFRICA					
<u>Rhodesia and Nyasaland</u>					
Aluminium	0.06	0.09	0.10	0.09	0.09
Copper	0.06	0.06	0.15	0.03	0.05
Lead	-	-	-	-	0.01
Zinc	0.02	0.01	0.02	0.02	0.01
Tin	0.01	0.02	0.01	0.01	0.01
SOUTH AFRICA					
Aluminium	0.45	0.44	0.56	0.57	0.56
Copper	1.02	1.30	1.36	1.63	1.97
Lead	0.81	1.04	0.98	1.06	0.87
Zinc	0.90	1.56	1.25	1.56	0.97
Tin	0.04	0.08	0.07	0.07	0.04

Source: UN Yearbook of International Trade Statistics
National Statistical publications.

TABLE 52

Expenditure on Imports of Non-ferrous Metals. 1959 and 1960

According to Sub-region.

'000 US Dollars

	North Africa		West Africa		East Africa		Central Africa		South Africa	
Metal	1959	1960	1959	1960	1959	1960	1959	1960	1959	1960
Aluminium	3966	5851	2537	4854	1869	1808	2403	1165	9673	16521
Copper	7585	9205	1453	1779	459	556	829	569	18650	30168
Lead	-	230	-	416	-	81	-	12	-	493
Zinc	966	1508	439	138	49	57	145	44	6205	13444

Source: UN Yearbook of International Trade Statistics.

National statistical publications.

224. The magnitude of dollar expenditure on relatively small quantities of imports is a rough indication of foreign exchange that would be saved by import substitution and inter-African trade. Furthermore, the figures on direct imports of the metals underestimate the utilization of, and demand for, non-ferrous metals in Africa. All the metals exported are re-imported as part of finished electrical, transport and building equipment; and also as durable consumer goods.

225. Assuming a rather modest growth in consumption of non-ferrous metals in Africa in the **decade** and if by the end of this period the whole of domestic requirements were to be covered by local production, an admittedly extreme assumption, a hypothetical plan may be constructed for the introduction of new plants, distributed over the ore bearing regions of Africa. This is shown in Table 53 which also shows the great economic gain from the fuller processing of the ores.

TABLE 53

Possible Pattern of Expansion of Non-ferrous Metal Production
In Africa by 1970

Metal	Price of product (assumed) \$ per Ton	No of new plants	Type of works	Annual ore Tonnage	Ore product grade % or metal purity %	Annual metal output per plant (tons)	Annual value output per plant in '000
Zinc	40	2	Mining	25,000	60	-	1,000
"	"	1	"	100,000	60	-	4,000
"	200	1	Smelter	-	99+	50,000	10,000
Tin	720	20	Refinery	200	75	-	144
"	"	5	Mining	500	"	-	360
"	"	2	"	1,000	"	-	720
"	2,440	2	Smelting	-	-	-	-
"	"	2	Refining	-	99+	1,000	2,440
"	"	2	"	-	"	2,000	4,880
Lead	55	2	Mining	20,000	75	-	1,110
"	"	1	"	50,000	75	-	2,750
"	170	2	Smelter	-	-	-	-
"	"	2	Refinery	-	99+	25,000	4,250
Copper	9	20	Mining	33,000	30u	-	307
"	"	12	"	250,000	"	-	2,330
"	"	10	"	750,000	"	-	6,990
"	590	3	Refining	-	99+	50,000	29,500
"	"	2	"	-	"	100,000	59,000
Aluminium	76	2	Bauxite	120,000	50%Al2O3	-	9,100
"	"	2	Mining	-	-	-	-
"	76	2	"	300,000	"	-	22,800
"	607	1	Refining	-	99+	50,000	30,350
"	607	1	"	-	"	100,000	60,700
"	607	1	"	-	"	30,000	18,200

Source: The pattern of expansion of non-ferrous metals indicates the possible plant sizes that could conceivably give the increase in consumption indicated in Tables 46 and 47. These are typical plant sizes and naturally both larger and smaller plants are feasible depending on the conditions.

226. As has already been noted, the African sub-regions are not equally endowed with all the major, non-ferrous metals and then the expansion of production envisaged could serve not only the needs of the producing countries themselves, but also of their neighbours.

227. While foreign investment will be required to promote an expansion programme, long-term planning for the future industrialization of Africa will require some revision of old policies towards external capital for this area. Non-ferrous metal reserves are not inexhaustible, and as has been shown, the demand for the metals is subject to cyclical fluctuations. For the greatest long-run benefit, the manner and the rate of exploitation of the reserves by foreign companies needs to be co-ordinated with economic development plans of the countries concerned. In this respect there may be a conflict between the government development policy and the company's mining and individual policy. Generally speaking, the mining policies of companies are guided primarily by market conditions; prices and dividend payments are related to widely fluctuating profits and not to the country's general foreign trade position, the importance of these resources as a means of earning foreign exchange, and as a source of metals for future industrialization. Maximization of the development potential effects require that the mine be treated as an integral part of the economy; hence the immediate profitability of the mine from the point of view of foreign capital cannot be regarded as the only criteria or necessarily the most important.

Engineering

228. This section discusses a wide and highly complex group of industries, making a vast variety of goods in undertakings of all sizes and stages of development: metal manufactures, mechanical and electrical engineering and to a more limited extent transport equipment. A thorough study of the entire industry is therefore extremely difficult. The present section represents a first attempt to assess the general position of the industry and its potential market; and to outline the possible strategy of future production in African countries and sub-regions.

229. The question of whether African countries should seek to encourage the growth of mechanical and electrical capital goods industries or whether they would be better advised to rely on imports has already been discussed in broad terms in Chapters I and II. What should be emphasized in this section is that the machinery industries are the key of any industrialization programme. Metal trades and, in particular, heavy engineering industries are the mother industries which provide all other industries with their productive equipment, such as power plants, machine tools, factory equipment and transport equipment. The machinery industry not only produces the stock of capital goods required for industrial development but also provides facilities for training skilled labour.

230. The development and the present position of machinery industries in various African countries cannot be accurately assessed because of limitations arising from inadequate qualitative and quantitative data. Nevertheless available data indicate that in the African region the mechanical and electrical engineering industries are much smaller in scale and less well diversified than in other under-developed countries. The only country in Africa which has a fairly well developed machinery industry is the Republic of South Africa. In other parts of the continent the machinery industry is not yet at an advanced stage. In most countries production is confined to small workshops engaged in repair and maintenance work, including bicycle repair shops, railway workshops, motor repair workshops, workshops for the repair and maintenance of agricultural equipment, and workshops for the repair and maintenance of river boats. A few countries have established cycle factories and motor vehicle assembly plants; and manufacture agricultural machines and implements. For example, in the UAR a vehicle complex has recently been built outside Cairo; German trucks and buses are being assembled. Fiat passenger cars will also be assembled before the end of 1962 and Yugoslav tractors thereafter. In the Federation of Rhodesia and Nyasaland preparations are under way for the establishment of a plant equipped to assemble motor vehicles. In Angola an Italian concern is establishing a tractor assembly plant. In other countries plans have been announced for the establishment of various kinds of metal industries, or for expanding

existing plants. Countries making metal goods on an industrial scale, however small, include Algeria, Egypt, Morocco and Tunisia in North Africa; Cameroon, Liberia, Ghana, Nigeria and Senegal in West Africa; Kenya, Tanganyika and Uganda in East Africa; Congo (Leopoldville) and the Federation of Rhodesia and Nyasaland in Central Africa. Since the end of the Second World War, metal goods industries have increased steadily. Table 54 shows the growth of machinery production for a few selected countries.

TABLE 54
Indices of Production of Metal Goods in Selected
African Countries, 1950-1957.

(1953 = 100)

Country and Industry	1950	1951	1952	1953	1954	1955	1956	1957	Annual rate of growth % 1950-1957
<u>Algeria:</u>									
Construction materials	75	94	98	100	121	131	126	136	8.4
Metals and metal products	96	117	114	100	108	145	140	183	9.5
<u>Congo (Leopoldville):</u>									
Construction materials	59	72	83	100	122	127	136	145	13.6
<u>Egypt, UAR:</u>									
Construction materials	93	104	86	100	113	-	-	-	5.0 ⁽²⁾
<u>Morocco:</u>									
Metallurgical industries	70	71	82	100	98	101	94	-	5.1 ⁽²⁾
<u>Tunisia:</u>									
Construction materials	82	88	89	100	117	146	135	144	8.4

Source: UN Economic Survey of Africa since 1950.

231. Although the figures on which these indices are based are not very accurate and are also not strictly comparable because of differences in coverage and classification, they are generally indicative of an upward trend. However, notwithstanding the progress that has been made since the war, domestic production in African countries, excluding South Africa, is negligible; a rough estimate would be that durable capital and consumer goods industries account for about 5 per cent of the gross national product. In contrast, South Africa, under-developed countries like India, Brazil and Argentina and agricultural economies like Australia and New Zealand, produce a significant proportion of their requirements of machinery as is shown in Table 55.

TABLE 55

Domestic Production of Mechanical and Electrical Machinery in
Australia, New Zealand, South Africa, Brazil, India and Argentina
Compared with Imports. Million US\$ and percentages. 1958

Country	Imports Million US\$	Domestic production Million US\$	Imports + Domestic pro- duction	Imports as % of total require- ments	Domestic production as % of total re- quirements
Australia	326.2	1051.7	1377.9	23.7	76.3
New Zealand	125.8	110.7	236.5	53.2	46.8
South Africa	299.2	283.0	582.2	51.4	48.6
Brazil	376.5	258.8	635.3	59.3	40.7
India	566.3	174.5	740.8	76.4	23.6
Argentina	224.8	200.8	425.6	52.8	47.2

Source: Computed from data contained in ECE study on Production and Export of Capital Goods in the Fields of Mechanical and Electrical Engineering, E/ECE/439/Add.1, Feb. 1962.

TABLE 56

Imports of Mechanical and Electrical Machinery into Africa
by Sub-regions, Classified According to Economic End-use.
1955-1960. '000 Metric Tons and Per Cent (a)

(a) Sub-region and equip- ment classified by end-use	(b) 1955		(c) 1956		(d) 1957		(e) 1958		(f) 1959		(g) 1960	
	Q in 000 MT	Per Cent	Q in 000 MT	Per Cent	Q in 000 MT	Per Cent	Q in 000 MT	Per Cent	Q in 000 MT	Per Cent	Q in 000 MT	Per Cent
<u>WEST AFRICA</u>												
(a) Equipment for economic infrastructure	106.3 106	53.8	107.9	54.1	105.1	54.5	98.8	51.9	106.4	48.7	108.3	49.8
(b) Equipment for agriculture mining & build- ing industry	27.4	13.9	24.7	12.4	29.0	15.0	29.1	15.3	33.3	15.3	33.8	15.5
(c) Equipment for industrial establishments	28.8	14.6	31.5	15.8	27.3	14.2	30.3	15.9	37.1	17.0	36.0	16.6
(d) Durable consumer goods	35.1	17.8	35.2	17.7	31.4	16.3	32.0	16.8	41.5	19.0	39.3	18.1
TOTAL	197.6	100.0	199.4	100.0	192.8	100.0	190.2	100.0	218.3	100.0	217.4	100.0

- (a) In calculating the tonnages shown in this and subsequent tables of items which are available only in values, a series of conversion factors from weight into value have been established. The conversion factors have made it possible to use the import statistics of some countries where values only were available. These factors have been calculated by means of the export statistics of those producing countries where both weights and numbers are published for the corresponding items. These conversion factors have been checked against the specifications and characteristics which can be found in other publications.

TABLE 56 (continued)

(a)	(b)	(c)	(d)	(e)	(f)	(g)					
<u>NORTH AFRICA</u>											
(a) Equipment for economic infrastructure	75.3	37.3	73.7	39.0	79.8	40.1	116.8	38.1	113.0	37.0	-
(b) Equipment for agriculture mining & building industry	33.0	16.3	30.1	15.9	32.9	16.5	50.6	16.5	51.1	16.7	-
(c) Equipment for industrial establishments	42.9	21.2	36.8	19.5	33.5	16.3	50.7	16.6	56.5	18.5	-
(d) Durable consumer goods	50.9	25.2	48.3	25.6	53.0	26.6	88.1	28.8	84.7	27.8	-
TOTAL	202.1	100.0	188.9	100.0	199.2	100.0	306.2	100.0	305.3	100.0	-
<u>EAST AFRICA</u>											
(a) Equipment for economic infrastructure	60.6	45.2	52.4	42.0	-	-	40.3	39.4	44.6	44.4	-
(b) Equipment for agriculture mining & building industry	37.6	28.1	46.4	37.2	-	-	32.5	31.8	30.5	30.3	-
(c) Equipment for industrial establishments	10.7	8.0	7.8	6.3	-	-	9.0	8.6	8.5	8.5	-
(d) Durable consumer goods	25.1	18.7	18.1	14.5	-	-	20.5	20.0	16.9	16.8	-
TOTAL	134.0	100.0	124.7	100.0	-	-	102.3	100.0	100.5	100.0	-

TABLE 56 (continued)

(a)	(b)	(c)	(d)	(e)	(f)	(g)					
<u>SOUTHERN & CENTRAL AFRICA</u>											
(a) Equipment for economic infrastructure	84.2	42.2	88.9	44.1	109.7	47.7	68.8	40.8	91.2	50.9	-
(b) Equipment for agriculture mining & build- ing industry	56.9	28.5	52.2	25.9	58.1	25.2	46.6	27.6	39.6	22.1	-
(c) Equipment for industrial establishments	26.6	13.3	27.5	13.6	28.5	12.4	23.8	14.1	21.8	12.2	-
(d) Durable consumer goods	31.6	15.9	33.2	16.5	33.8	14.7	29.6	17.5	26.3	14.7	-
TOTAL	199.3	100.0	201.8	100.0	230.1	100.0	168.8	100.0	179.0	100.0	-

Source: All figures used in this paper were obtained from National statistical publications, unless otherwise specified.

(a) Excluding the Republic of South Africa.

232. It will be noted that in all the countries listed in the above table, domestic production accounted for over 20 per cent of total requirements in 1958; and in Australia, Argentina, Brazil, New Zealand and South Africa it accounted for over 40 per cent. Most African countries, on the other hand, depend mainly on imports.

233. The innumerable kinds of mechanical and electrical machinery imported into African countries and sub-regions have been classified by economic end-use and by the four broad divisions of this group of industries.

234. From the economic end-use standpoint, imports of mechanical and electrical machinery take four main forms, namely:

- (a) Capital goods for economic infrastructure - roads, railways, ship-building, power, telecommunications;
- (b) equipment for agriculture, mining and building industries;
- (c) machinery for newly-established industries and for expanding industries such as textiles, pulp and paper, cement, sugar and various other industrial establishments;
- (d) durable consumer goods established.

The four broad divisions of this group of industries are as follows:

- (a) Light engineering equipment;
- (b) electrical equipment;
- (c) industrial machinery;
- (d) transport equipment.

235. For all practical purposes, the sub-divisions adopted in this section cover all forms of mechanical and electrical machinery imported in Africa.

236. For all the sub-regions, imports for economic infrastructure constituted the largest proportion throughout the period under review; in West Africa infrastructure accounted for 50 per cent of total imports of machinery; in North Africa for over 38 per cent; in East Africa for over 40 per cent and in Central and Southern Africa it accounted for 38 per cent on the average.

237. The next largest item for West and North Africa was durable consumer goods which accounted for 17 per cent on the average in West Africa and about 27 per cent on the average in North Africa. In Central and Southern Africa and in Eastern Africa, imports of equipment for mining, agriculture and building industries came second to imports of equipment for infrastructure. This may probably be explained by mining operations in the Congo (Leopoldville) and in the Federation of Rhodesia and Nyasaland, and also by agricultural development schemes carried out by expatriate farmers.

238. The pattern of machinery imports in value terms is shown in Table 57. It will be noted that, both in East Africa and in Central and Southern Africa, imports of durable consumer goods are next to equipment for economic infrastructure in value terms, while equipment for agriculture, mining and the building industry is in second place in quantity terms.

TABLE 57

Values of Imports of Mechanical and Electrical Machinery by
Sub-regions and by Items, Expressed as a Per Cent of Total
Value of Machinery Imports for the Years 1955-1960.

Sub-region and equipment classified by end-use	1955	1956	1957	1958	1959	1960
<u>WEST AFRICA</u>						
(a) Equipment for economic infra- structure	55.0	54.5	54.5	54.3	53.7	-
(b) Equipment for agriculture, mining & building industry	13.4	12.1	12.8	13.5	14.0	-
(c) Equipment for industrial estab- lishments	12.9	14.5	13.5	13.8	14.5	-
(d) Durable consumer goods	18.8	18.9	19.2	18.4	17.8	-
TOTAL	100.0	100.0	100.0	100.0	100.0	-
<u>NORTH AFRICA</u>						
(a) Equipment for economic infra- structure	38.5	42.5	44.8	37.8	33.7	37.6
(b) Equipment for agriculture, mining & building industry	13.8	12.3	14.8	16.3	17.5	16.1

(Continued over)

TABLE 57 (continued)

NORTH AFRICA (continued)	1955	1956	1957	1958	1959	1960
(c) Equipment for industrial establishments	23.6	20.2	19.2	21.7	26.5	23.7
(d) Durable consumer goods	24.2	25.0	21.2	24.2	22.4	22.6
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0
EAST AFRICA						
(a) Equipment for economic infrastructure	52.3	44.0	43.5	47.6	46.5	-
(b) Equipment for agriculture, mining & building industry	16.9	18.9	18.3	14.2	17.0	-
(c) Equipment for industrial establishments	8.7	12.8	12.1	12.8	13.2	-
(d) Durable consumer goods	22.1	24.3	26.1	25.4	23.3	-
TOTAL	100.0	100.0	100.0	100.0	100.0	-
CENTRAL & SOUTHERN AFRICA						
(a) Equipment for economic infrastructure	52.3	44.0	43.5	47.6	46.5	-
(b) Equipment for agriculture, mining & building industry	16.9	18.9	18.3	14.2	17.0	-
(c) Equipment for industrial establishments	8.7	12.8	12.1	12.8	13.2	-
(d) Durable consumer goods	33.1	24.3	26.1	25.4	23.3	-
TOTAL	100.0	100.0	100.0	100.0	100.0	-

Source: See Table 56.

239. The trend of imports, according to end-use, during the period covered by the analysis is shown in Table 58.

TABLE 58

Imports of Machinery and Transport Equipment : Volume Index

1955 = 100

	1956	1957	1958	1959	1960
<u>WEST AFRICA</u>					
1. Equipment for economic infrastructure	101.5	98.9	92.9	100.1	101.9
2. Equipment for mining, construction & agriculture	90.2	105.8	106.2	121.5	123.4
3. Equipment for industrial establishments	109.4	94.8	105.2	128.8	125.0
4. Durable consumer goods	100.3	89.5	91.2	118.2	112.0
<u>TOTAL</u>	<u>100.9</u>	<u>97.6</u>	<u>96.3</u>	<u>110.5</u>	<u>110.0</u>
<u>SOUTHERN AFRICA (excluding S.A.)</u>					
1. Equipment for economic infrastructure	105.6	130.3	81.7	108.3	-
2. Equipment for mining, construction and agriculture	91.7	102.1	91.9	69.6	-
3. Equipment for industrial establishments	103.4	107.1	89.5	82.0	-
4. Durable consumer goods	105.1	107.0	93.7	83.2	-
<u>TOTAL</u>	<u>101.3</u>	<u>115.5</u>	<u>84.7</u>	<u>89.8</u>	<u>-</u>
<u>NORTH AFRICA</u>					
1. Equipment for economic infrastructure	97.9	106.0	155.1	150.1	-
2. Equipment for mining, construction and agriculture	91.2	99.7	153.3	154.8	-
3. Equipment for industrial establishments	85.8	78.1	118.2	131.7	-
4. Durable consumer goods	94.9	104.1	173.1	166.4	-
<u>TOTAL</u>	<u>93.5</u>	<u>98.6</u>	<u>151.5</u>	<u>151.1</u>	<u>-</u>

TABLE 58 (continued)

<u>EAST AFRICA</u>	1956	1957	1958	1959	1960
1. Equipment for economic infrastructure	86.5	-	66.5	73.6	-
2. Equipment for mining, construction and agriculture	123.4	-	86.4	81.1	-
3. Equipment for industrial establishments	72.9	-	84.1	79.4	-
4. Durable consumer goods	72.1	-	81.7	67.3	-
TOTAL	93.1	-	76.3	75.0	-
<u>NIGERIA</u>					
1. Equipment for economic infrastructure	76.6	60.1	81.2	84.0	94.2
2. Equipment for mining, construction and agriculture	87.3	101.6	138.1	196.8	217.5
3. Equipment for industrial establishments	138.5	128.8	123.1	188.5	211.5
4. Durable consumer goods	163.6	100.0	127.3	145.5	209.1
TOTAL	85.9	72.8	93.3	109.4	123.3
<u>RHODESIA & NYASALAND</u>					
1. Equipment for economic infrastructure	115.9	165.6	88.5	112.0	-
2. Equipment for mining, construction & agriculture	83.6	99.0	73.8	74.2	-
3. Equipment for industrial establishments	119.4	127.8	133.3	255.5	-
4. Durable consumer goods	93.0	101.0	84.0	90.0	-
TOTAL	101.0	130.7	84.5	101.5	-

TABLE 58 (continued)

MOROCCO	1956	1957	1958	1959	1960
1. Equipment for economic infrastructure	93.8	61.6	109.3	70.2	76.8
2. Equipment for mining, construction & agriculture	78.1	74.6	123.7	70.2	65.8
3. Equipment for industrial establishments	102.2	78.9	78.9	71.1	81.1
4. Durable consumer goods	105.6	66.9	92.3	70.4	76.1
TOTAL	94.9	67.9	103.5	70.4	75.2

Source: See Table 56

240. It will be noted that notwithstanding year to year fluctuations, the trend was generally upward in each of the sub-regions and for all items. This is the impression gained by a close examination of the figures, although a time series based on only five years may be regarded as inadequate.

241. The average annual rate of increase for the region as a whole and for individual items is given in Table 59.

242. The foregoing analysis suggests that in West and North Africa priority might be given to the establishment of plants for infrastructure equipment, and where these already exist, to the expansion of the existing plants. Expanded production of durable consumer goods might also be given serious consideration. In East and Central and Southern Africa, development plans for import substitution in the field of machinery might give priority to infrastructure machinery, and mining, agricultural and construction equipment.

TABLE 59

Average Annual Rate of Increase of Imports of Machinery by end-use
into the African Region. Quantity and Value. 1955-1959.

Equipment	Quantity Per Cent	Value Per Cent
Economic infrastructure	+ 2.2	+ 1.6
Mining, agriculture, building	Constant 0.0	+ 4.9
Industrial establishments	+ 3.2	+ 7.1
Durable consumer goods	+ 4.4	+ 2.4
TOTAL	+ 2.3	+ 2.7

Source: See Table 56.

243. Having considered imports of machinery from the point of view of end-use, an attempt will now be made to analyse the composition and trend of imports from the point of view of the four broad divisions of this group of industries, as indicated earlier.

244. In Table 60, imports of machinery have been classified accordingly.

245. An examination of Table 60 shows that in all sub-regions transport equipment constituted the largest single item. In West, North, Central and Southern Africa, transport equipment accounted for over 50 per cent of imports of machinery throughout the period under review, and in East Africa for over 45 per cent, except in 1956. Industrial machinery was the next main item accounting for over 25 per cent of imports of machinery throughout the period. Transport equipment and industrial machinery together accounted on the average for 80 per cent of the imports.

246. In all sub-regions imports of electrical machinery were, on the average, less than 20 per cent of total imports. In this respect Africa does not differ from other under-developed regions of the world.

TABLE 60

Imports of Machinery by Sub-regions Classified by Divisions of the Engineering Industries

1955-1960. '000 Metric Tons

Sub-region and equipment	1955		1956		1957		1958		1959		1960	
	Q in '000 MT	Per Cent	Q in '000 MT	Per Cent	Q in '000 MT	Per Cent	Q in '000 MT	Per Cent	Q in '000 MT	Per Cent	Q in '000 MT	Per Cent
<u>WEST AFRICA</u>												
(a) Light en- gineering equip- ment	9.7	4.9	10.0	5.0	9.1	4.7	10.9	5.7	15.7	7.2	14.6	6.7
(b) Electrical equipment	20.0	10.1	16.5	8.3	16.9	8.8	19.1	10.0	26.9	12.3	25.8	11.8
(c) Industrial machinery	53.2	26.9	52.7	26.4	53.5	27.7	56.5	29.7	58.6	26.8	56.5	25.9
(d) Transport equipment	114.9	58.1	120.3	60.3	113.4	58.8	103.9	54.6	117.4	53.7	120.9	55.5
TOTAL	197.6	100.0	199.5	100.0	192.9	100.0	190.4	100.0	218.6	100.0	217.8	100.0
<u>NORTH AFRICA</u>												
(a) Light en- gineering equip- ment	4.0	2.0	4.3	2.3	5.0	2.5	7.0	2.3	6.4	2.1	-	-
(b) Electrical equipment	29.7	14.7	31.8	16.8	28.7	14.4	34.5	11.3	41.1	13.5	-	-
(c) Industrial machinery	64.8	32.0	56.4	29.8	52.4	26.3	84.5	27.6	86.0	28.2	-	-
(d) Transport equipment	103.7	51.3	96.5	51.1	113.4	56.8	180.4	58.8	171.9	56.2	-	-
TOTAL	202.2	100.0	189.0	100.0	199.5	100.0	306.4	100.0	305.4	100.0	-	-

TABLE 60 (continued)

<u>EAST AFRICA</u>												
(a) Light engineering equipment	2.1	1.6	1.1	0.9	-	-	1.4	1.4	1.1	1.1	-	-
(b) Electrical equipment	17.3	12.8	25.1	20.1	-	-	11.6	11.3	13.3	13.3	-	-
(c) Industrial machinery	41.6	30.9	45.5	36.4	-	-	38.3	37.4	36.0	36.0	-	-
(d) Transport equipment	73.8	54.7	53.3	42.6	-	-	51.0	49.9	49.7	49.6	-	-
TOTAL	134.8	100.0	125.0	100.0	-	-	102.3	100.0	100.1	100.0	-	-
<u>CENTRAL & SOUTHERN AFRICA</u>												
(a) Light engineering equipment	0.3	0.2	0.2	0.1	0.2	0.1	0.2	0.1	0.1	0.1	-	-
(b) Electrical equipment	27.8	14.0	29.8	14.8	30.5	13.3	26.6	15.8	30.1	16.8	-	-
(c) Industrial Machinery	65.4	32.9	62.7	31.1	67.9	29.5	53.5	31.7	42.6	23.8	-	-
(d) Transport equipment	105.5	53.0	109.1	54.0	131.5	57.1	88.3	52.4	106.3	59.4	-	-
TOTAL	199.0	100.0	201.8	100.0	230.1	100.0	168.6	100.0	179.1	100.0	-	-

Source: See Table 56.

A recent study^{1/} has shown that in countries with no engineering industries or where such industries are at an early stage of development, the demand for electrical machinery is low. This is probably explained by the fact that per capita income is too low to permit the import of electrical products from developed countries. In addition, balance of payments problems are a further hindrance to such imports.

247. In countries at an early stage industrialization, the first steps in the development of an electrical engineering industry generally seem to be centred on the first stages of electrical engineering and mainly on the production and imports of consumer goods. The more complicated products like electric switchgear, transformers, apparatus for signalling, measuring and control, represent a definitely lower share of imports than in countries at a relatively higher stage of industrial development.

248. The small amount of light engineering equipment imported is probably due to the fact that, apart from durable consumer goods, the demand for light equipment depends on the growth of trades in which they are used.

249. An analysis of the composition of imports on the basis of money values reveals the same pattern as the analysis based on quantity.

TABLE 61

Composition of Imports of Mechanical and Electrical Engineering Equipment by Broad Divisions of the Engineering Industries and Sub-regions. Value Expressed as a Percentage of Total for each Sub-region, 1955-1960.

Sub-region and item	1955 Per Cent	1956 Per Cent	1957 Per Cent	1958 Per Cent	1959 Per Cent	1960 Per Cent
WEST AFRICA						
(a) Light engineering	5.3	6.7	6.6	6.6	6.8	-
(b) Electrical engineering	5.5	7.4	7.6	8.1	8.6	-
(c) Industrial machinery	25.5	25.9	25.3	25.5	25.9	-
(d) Transport equipment	62.7	59.9	60.5	59.9	58.7	-
TOTAL	100.0	100.0	100.0	100.0	100.0	-

(continued over)

^{1/} Economic Commission for Europe, Production and Export of Capital Goods in the fields of Mechanical and Electrical Engineering, E/ECE/439/Add.1., Feb. 1962. Chapter III.

TABLE 61 (continued)

<u>NORTH AFRICA</u>	1955	1956	1957	1958	1959	1960
(a) Light engineering	3.2	3.4	3.6	3.6	3.1	2.4
(b) Electrical engineering	11.8	13.1	9.3	8.6	10.2	9.7
(c) Industrial machinery	32.0	27.7	27.2	31.5	36.0	33.7
(d) Transport equipment	53.0	55.7	59.9	56.3	50.7	54.3
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0
<u>EAST AFRICA</u>						
(a) Light engineering	2.4	2.8	3.2	3.1	3.6	-
(b) Electrical engineering	11.7	13.1	14.8	11.0	12.7	-
(c) Industrial machinery	22.3	27.8	30.5	27.5	26.2	-
(d) Transport equipment	63.6	56.3	51.5	58.4	57.5	-
TOTAL	100.0	100.0	100.0	100.0	100.0	-
<u>CENTRAL & SOUTHERN AFRICA</u>						
(a) Light engineering	0.4	0.3	0.3	0.4	0.2	-
(b) Electrical engineering	13.9	12.8	11.8	11.5	15.9	-
(c) Industrial machinery	32.3	33.3	34.4	33.9	29.2	-
(d) Transport equipment	53.4	53.6	53.5	54.2	54.7	-
TOTAL	100.0	100.0	100.0	100.0	100.0	-

Source: See Table 56.

250. On the whole, the trend in imports for all the different kinds of technological equipment was upward as is shown in Table 62(a) and 62(b).

TABLE 62 (a)
Trends of Imports of Machinery and Transport Equipment classified
by Broad Divisions of the Engineering Industries, 1956-1959
Volume Index 1955 = 100

Sub-region and item	1956	1957	1958	1959
WEST AFRICA				
(a) Light engineering	103.1	93.8	112.4	161.9
(b) Electrical engineering	82.5	84.5	95.5	134.5
(c) Industrial machinery	99.1	100.6	106.2	110.2
(d) Transport equipment	104.7	98.7	90.4	102.3
TOTAL	100.9	97.5	96.3	110.5
SOUTHERN AFRICA (EXCLUDING SOUTH AFRICA)				
(a) Light engineering	66.7	66.7	66.7	33.3
(b) Electrical engineering	107.2	109.7	95.7	108.3
(c) Industrial machinery	95.9	103.8	81.8	65.1
(d) Transport equipment	103.4	124.6	83.7	100.8
TOTAL	101.4	115.6	84.7	90.0
NORTH AFRICA				
(a) Light engineering	107.5	125.0	175.0	160.0
(b) Electrical engineering	107.1	96.6	116.2	138.4
(c) Industrial machinery	87.0	80.9	130.4	132.7
(d) Transport equipment	93.1	109.4	174.0	165.8
TOTAL	93.5	98.7	151.5	151.0
EAST AFRICA				
(a) Light engineering	52.4	-	66.7	52.4
(b) Electrical engineering	145.1	-	67.1	76.9
(c) Industrial machinery	109.4	-	92.1	86.5
(d) Transport equipment	72.2	-	69.1	67.3
TOTAL	92.7	-	75.9	74.3

Source: See Table 56.

TABLE 62(b)
Annual Average Rate of Change (per cent) of Machinery Imports Classified
according to Broad Divisions of the Engineering Industries for the
whole Region. 1955-1959

Equipment by technological function	Average annual rate of change - per cent Quantity	Average annual rate of change. Per cent Dollar value
Light engineering equipment	+ 9.7	+ 6.9
Electrical equipment	+ 4.1	+ 4.5
Industrial machinery	0.0	+ 4.7
Transport equipment	+ 2.8	+ 2.0
TOTAL	+ 2.3	+ 2.7

Source: See Table 56.

251. The analysis of imports according to broad divisions of the engineering industries has confirmed the conclusion arrived at earlier - that plants for the production of infrastructure equipment, especially transport equipment would be economically justifiable in all sub-regions, at least from the demand point of view. A detailed picture of the past trends of imports of transport equipment is not available, except in the case of passenger and commercial vehicles. This can be seen from Table 63 (which also shows, in rather crude form possible, future trends in demand, whether they are to be met from imports or domestic production).

252. A comparative analysis of the total imports of machinery into each sub-region, in relation to the total imports of the whole region and sub-region, reveals that there is no significant difference between one region and another.

253. The only sub-region which seems to import relatively less than the others is Central and Southern Africa (excluding South Africa); and during the years 1958 and 1959 the proportion of imports by East Africa was somewhat larger than the proportion imported by each of the other sub-regions.

TABLE 63
African Imports Past and Potential of New Cars and Commercial
Vehicles by Region 1961-1970

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Region	Number ^(a) of cars					Number ^(a) of commercial vehicles				
	1951	1960	1965	1970	Annual ^(b) Rate of change	1951	1960	1965	1970	Annual Rate o. change ^(b)
North Africa	34,540	70,593	100,900	144,200	7.4	15,645	23,054	27,980	33,980	3.9
West Africa	11,458	39,554	73,510	136,600	13.2	16,534	22,691	26,580	31,140	3.2
South Africa	48,586	115,410	177,900	274,100	9.0	19,362	25,810	29,780	34,380	2.9
East Africa	8,796	18,961	27,840	40,870	8.0	8,029	9,730	10,690	11,790	1.9
Central Africa	9,908	23,931	36,770	56,480	9.0	11,840	11,814	12,330	12,870	0.9
Africa	113,288	267,376	410,800	631,100	8.9	70,410	90,766	103,000	117,000	2.6

Source: See Table 56.

(a) The data for 1965 and 1970 are estimated from the annual rate of change from 1951 to 1960.

(b) Annual compounded rate in per cent.

TABLE 64
Proportion of Imports by Each Sub-region in Relation to Total Imports
for the Whole Continent. 1955-59

Sub-region	Proportion of imports per region				
	1955	1956	1957	1958	1959
West Africa	27.0	27.9	-	24.8	27.2
North Africa	27.2	28.2	-	22.0	22.3
East Africa	27.6	26.4	-	39.9	38.0
Central and Southern Africa (excluding South Africa)	18.3	17.4	-	13.0	12.5
TOTAL	100.0	100.0	-	100.0	100.0

Source: See Table 56.

254. It is also interesting to note that the trend of imports of machinery by the whole region showed a distinctly upward trend during the last decade.

TABLE 65
Trends of Imports of Machinery and Transport Equipment by the Whole
Region over the Last Decade. Value: Million US\$.

Equipment	1950	1955	1960	Average annual rate of change per cent 1955-60
Machinery excluding transport equipment	107	335	747	+ 18.7
Transport equipment	423	398	858	+ 7.3

Source: See Table 56.

255. It is not easy to consider the future trends of possible demand for such a wide range of engineering industries. In a comprehensive and through study of future trends, many difficult problems would have to be solved, namely, the determination of development priorities of individual

industries, selection of desired scales of operations, assessment of investment needs and production costs, and a careful assessment of current consumption and future demand of each specific type of industry. The analysis of future trends attempted in this paper should be regarded as merely a first approximation, on the basis of which more thorough studies will be undertaken in future.

256. Present and future apparent consumption will be considered first.

257. In Table 66(a) per head consumption is considered in US dollars and in Table 66(b) in kilograms. Forecasts of kilogram consumption per head have been made for 1965 and 1970.

TABLE 66(a)
Per capita Consumption of Machinery and Transport Equipment in US
Dollars by Sub-region and Selected Countries in each Sub-region
(Imports)

Sub-regions and selected countries	Per head consumption of machinery and transport equipment US Dollars			
	1958	1959	1960	Average for the period covered
NORTH AFRICA	8.6	8.2	10.0	8.9
Algeria	26.2	26.2	27.8	27.0
Libya	31.5	35.0	35.0	33.3
Morocco	6.3	5.5	6.3	6.0
Tunisia	6.6	6.7	10.3	7.9
UAR (Egypt)	6.0	6.1	6.2	6.1
WEST AFRICA	4.1	4.3	4.3	4.2
Former French Equa- torial Africa	7.8	7.3	8.3	7.8
Former French West Africa	4.4	4.4	4.4	4.4
Ghana	6.8	11.1	14.1	10.7
Sierra Leone	5.0	3.8	4.4	4.4
Nigeria	3.3	3.6	4.1	3.7
Cameroon	5.3	3.7	3.4	4.1

(cont'd over)

TABLE 66(a) (continued)

Sub-regions and selected countries	Per head consumption of machinery and transport equipment US Dollars			
	1958	1959	1960	Average for the period covered
EAST AFRICA	2.7	2.5	2.5	2.6
Kenya	6.0	6.8	8.2	7.0
Tanganyika	2.7	2.8	3.3	2.9
Uganda	3.2	3.0	3.1	3.1
Ethiopia	1.0	1.1	1.0	1.0
Sudan	3.5	2.5	3.7	3.2
CENTRAL AND SOUTHERN AFRICA	7.4	6.6	6.6	7.0
Angola	9.8	9.6	9.0	9.5
Federation of Rhodesia and Nyasaland	19.0	18.3	18.3	18.5
Congo (Leopoldville) & Rwanda Burundi	6.5	4.6	4.6	5.6
Mozambique	5.8	6.1	5.8	5.9
All regions excluding South Africa	5.4	5.2	5.2	5.3

Source: See Table 56.

258. In interpreting the figures given in Tables 66(a) and (b), it should be borne in mind that the estimates of apparent consumption are based only on imports. It was noted earlier that domestic production, however small, is undertaken in a number of countries. Another point which should be mentioned is that during the early stages of development the absolute amounts and specific types of machinery are more important than apparent consumption per head, since they may be considered as an indication of the number of projects that could be supplied with the necessary machinery.

TABLE 66 (b)

Per Capita Consumption of Machinery and Transport Equipment in
Kilograms by Sub-region and selected Countries. Imports.

Sub-regions and selected countries	Per head consumption. Kilograms					Average
	1955	1956	1957	1958	1959	
NORTH AFRICA	4.2	3.9	4.0	6.0	5.8	4.8
Algeria	5.4	5.6	8.9	11.4	12.0	6.7
UAR (Egypt)	0.7	0.5	0.6	1.3	1.1	2.1
WEST AFRICA	3.1	3.0	2.9	2.8	3.1	3.0
Nigeria	1.6	1.4	1.1	1.4	1.7	1.4
EAST AFRICA	2.7	2.4	2.4	1.9	1.9	2.3
Kenya	7.6	8.7	4.1	4.1	4.7	5.8
CENTRAL AND SOUTHERN AFRICA	5.7	5.7	6.4	4.6	4.8	5.4
Congo (Leo.) and Rwanda Burundi	5.7	5.8	5.4	4.1	3.4	4.5
All regions excluding South Africa	3.7	3.5	3.5	3.7	3.8	3.6

Source: See Table 56.

TABLE 67

Forecasts of Per Capita Consumption in Kilograms for North Africa and
the Whole Region. 1965 and 1970

Area	Forecasts of per head consumption in Kilograms		
	1959	1965	1970
North Africa	5.8	9.4	14.1
Whole of Africa (excluding South Africa)	3.8	4.0	4.1

Source: See Table 56.

259. In Tables 68(a) and 68(b), future forecasts have been made on the basis of past trends of imports for various types of equipment, classified by economic end-use and broad divisions of the engineering industries. For present purposes, the possible trend of imports has been taken. In practice, as is shown later, a growing part of requirements might be met from domestic production.

TABLE 68(a)

1965 and 1970 Forecasts of Apparent Consumption, Measured by Total Imports of Machinery in Quantity and Value Terms. Machinery Classified by Economic End-use. Whole of Africa (Excluding South Africa)

Equipment Classification (Economic end-use)	Quantity forecasts 000 metric tons			Value forecasts million US Dollars		
	1959	1965	1970	1959	1965	1970
Equipment for infrastructure	355.2	404.6	451.1	466.0	512.2	554.3
Equipment for mining, agriculture, construction	154.5	155.0	155.0	212.8	284.7	361.5
Equipment for industrial establishments	123.9	150.2	176.2	205.8	311.8	440.9
Durable consumer goods	169.4	219.1	271.5	232.9	269.1	303.5
SUM OF ALL EQUIPMENT	803.0	928.9	1053.8	1117.5	1377.2	1660.2
Forecast made on basis of average annual rate of change of all equipment	-	920.1	1031.0	-	1315.0	1505.0

Source: See Table 56

260. In order to take care of possible changes in the value of money, forecasts have been made on the basis of quantity and unit value as shown in Table 68(c).

TABLE 68(b)

1965 and 1970 Forecasts of Apparent Consumption, Measured by Total Imports of Machinery in Quantity and Value Terms. Machinery Classified by Broad Divisions of the Engineering Industries. Whole of Africa excluding South Africa

Equipment Classification (Technological Function)	Quantity forecasts 000 metric tons			Value forecasts million US Dollars		
	1959	1965	1970	1959	1965	1970
Light Engineering	23.3	40.6	50.4	39.0	59.1	83.3
Electrical Machinery	114.4	141.9	172.6	126.9	165.7	207.1
Industrial Machinery	223.2	220.1	225.5	341.8	454.6	576.7
Transport Equipment	445.3	526.3	605.3	610.2	690.5	765.5

Source: See Table 56.

TABLE 68(c)

Projections Based on Quantity and Unit Value

Equipment	Unit Value Projections: US, Kg. Projections based on unit value and quantity million dollars					
	1955	1959	1965	1970	1965	1970
All Equipment	1.34	1.39	1.47	1.54	1352.5	1587.7

Source: See Table 56.

261. It will be noted that the forecasts made in Table 68(c) do not differ significantly from those made in Tables 68(a) and 68(b).

262. All the projections made thus far are based on historical trends of imports per head, or total quantity and value of imports. This approach has certain weaknesses. Extrapolation from historical trends assumes a regular continuation not only of economic but also of technological development. Secondly, in under-developed countries, imports of machinery

in any one year or given number of years tends to be influenced by individual projects, e.g. decision to exploit oil resources; thus the movement of imports over-time will tend to be erratic. Thirdly, the stock of machinery imported in any particular year, or in existence at a particular time, will determine imports of spare parts and replacement demands. No account has been taken of planned projects or existing stock in the historical analysis of import trends. Finally, there is normally quite a gap between real needs and capacity to import, as expressed by availability of foreign exchange.

TABLE 69

Average Imports of Machinery and Transport Equipment, 1955-1960, in Relation to Total Export Earnings, and Total Imports, by Sub-region
Per cent

Sub-region	Average Imports of Mechanical and Electrical Engineering Equipment (1955-1960) as a per cent of:	
	Exports measured in million US Dollars	Imports measured in million US-Dollars
North Africa	29	17
West Africa	16	19
East Africa	27	24
Southern & Central Africa (excluding South Africa)	22	29
All Africa (excluding South Africa)	23	20

Source: See Table 56.

263. On the average, less than one-third of export earnings are spent on imports of machinery and transport equipment, and over two-thirds of imports consist of goods other than machinery and transport equipment.

264. Since increasing amounts of machinery and electrical equipment would be required as economic development and industrialization proceed, a certain correlation between apparent consumption on the one hand and GNP, fixed capital formation and electricity production on the other would be expected.

TABLE 70

Simple Correlation Co-efficient between Per Head Imports of Machinery and Electrical Equipment in US\$; and Per Capita GNP in US\$, Fixed Capital Formation in US\$, and Electricity Production in Kwh in the African Region for Selected Countries

- X_1 : Import of machinery and transport equipment per head in US dollars.
 X_2 : Per capita GNP in US dollars.
 X_3 : Fixed capital formation per head in US dollars.
 X_4 : Electricity production per head in Kwh.

	No. of data countries selected	Regression line (linear)	Correlation co-efficient (simple)
X_1 and X_2	15	$X_1 = 0.0601 (X_2 - 140.7) + 9.8$	$r_{12} = 0.46$
X_1 and X_3	12	$X_1 = 0.389 (X_3 - 23.4) + 8.6$	$r_{13} = 0.98$
X_1 and X_4	20	$X_1 = 0.0373 (X_4 - 68) + 8.6$	$r_{14} = 0.37$

Source: See Table 56.

The relationships are illustrated in Figures 5, 6 and 7.

265. As is illustrated in Figures 5, 6 and 7, there is a high correlation between the per capita share of fixed capital formation and imports of machinery and electrical equipment; and a low correlation between imports of machinery on the one hand and GNP and electricity consumption on the other. The low correlation between GNP and apparent consumption of

FIGURE 5

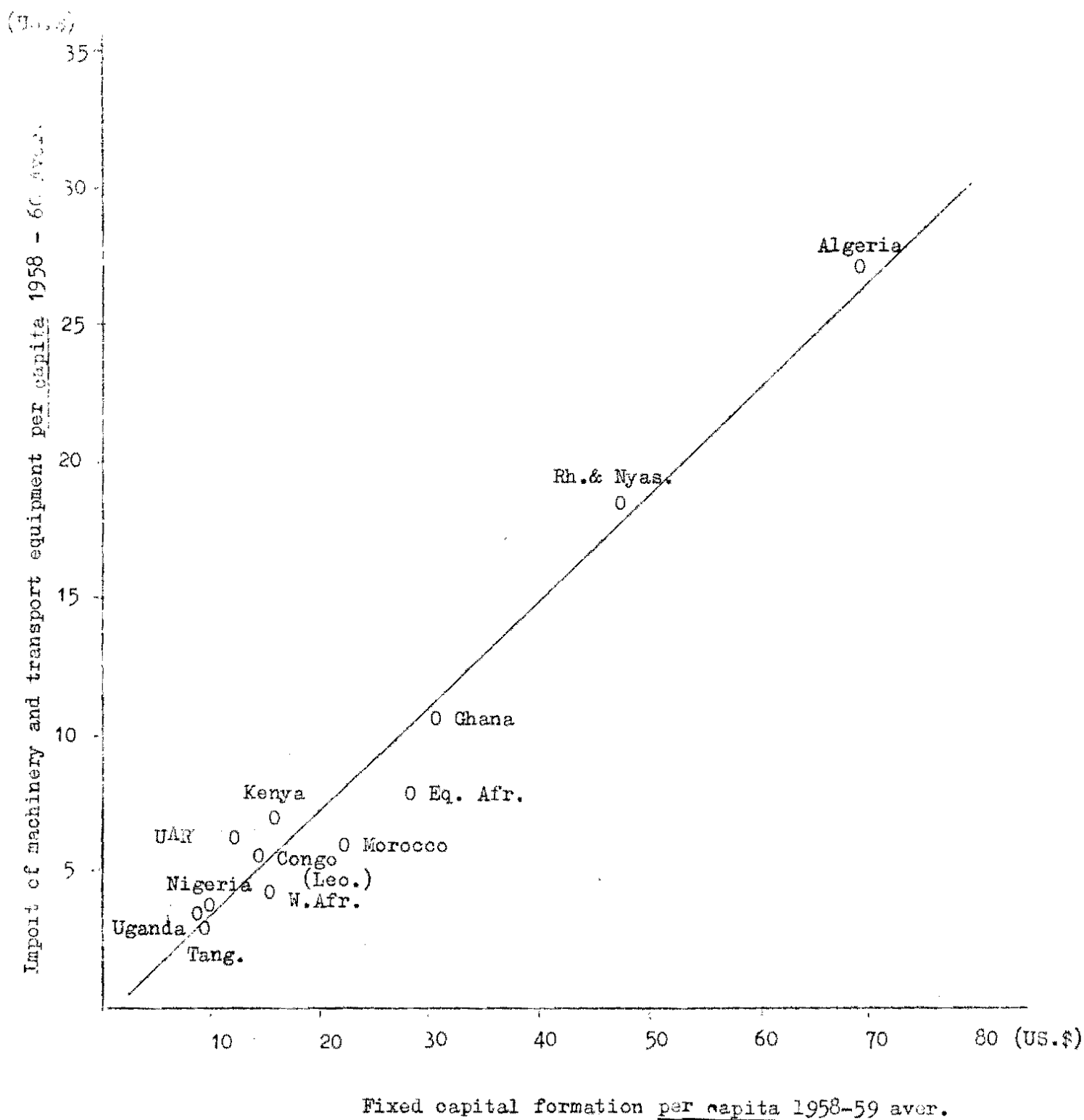


FIGURE 6

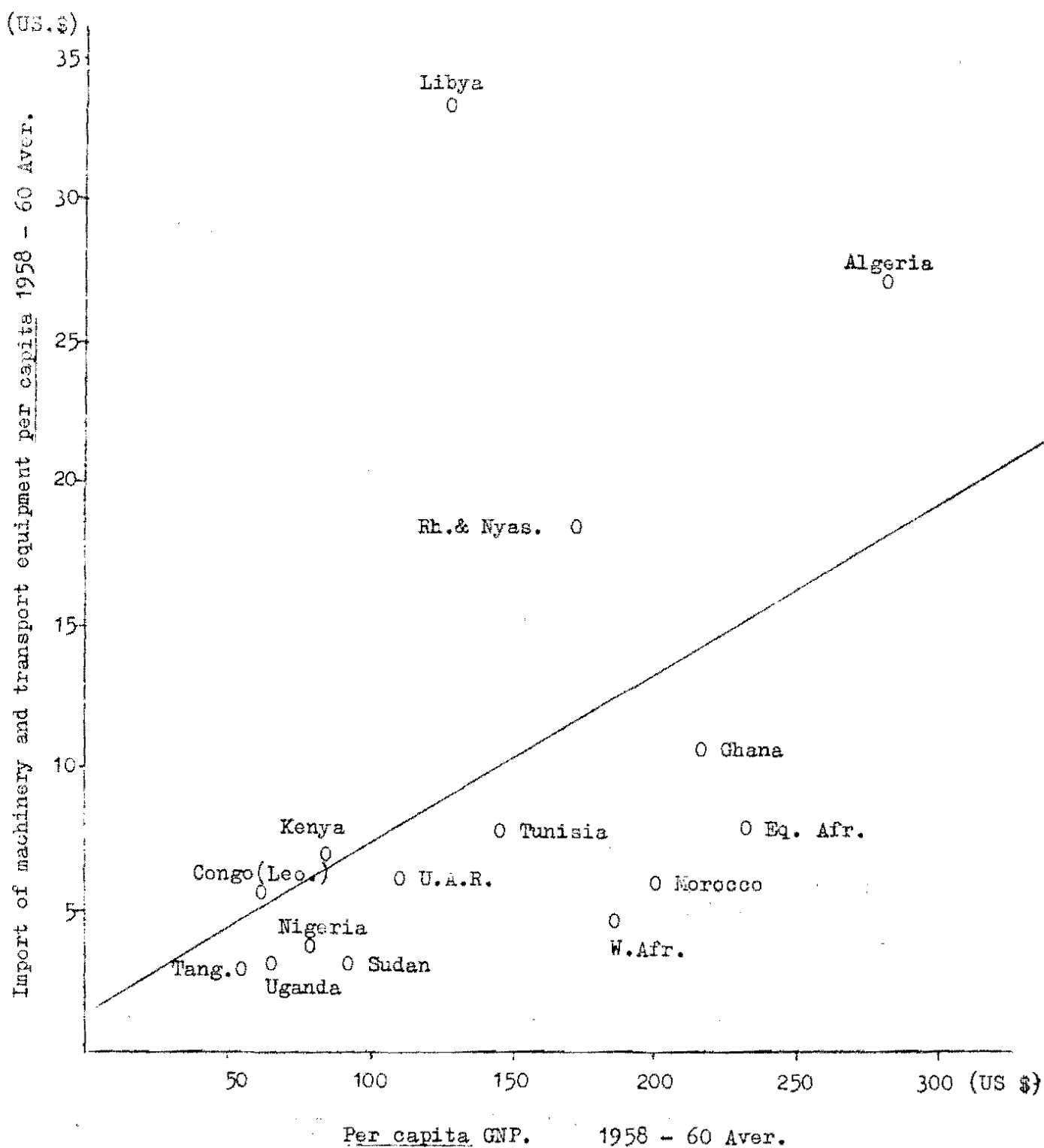
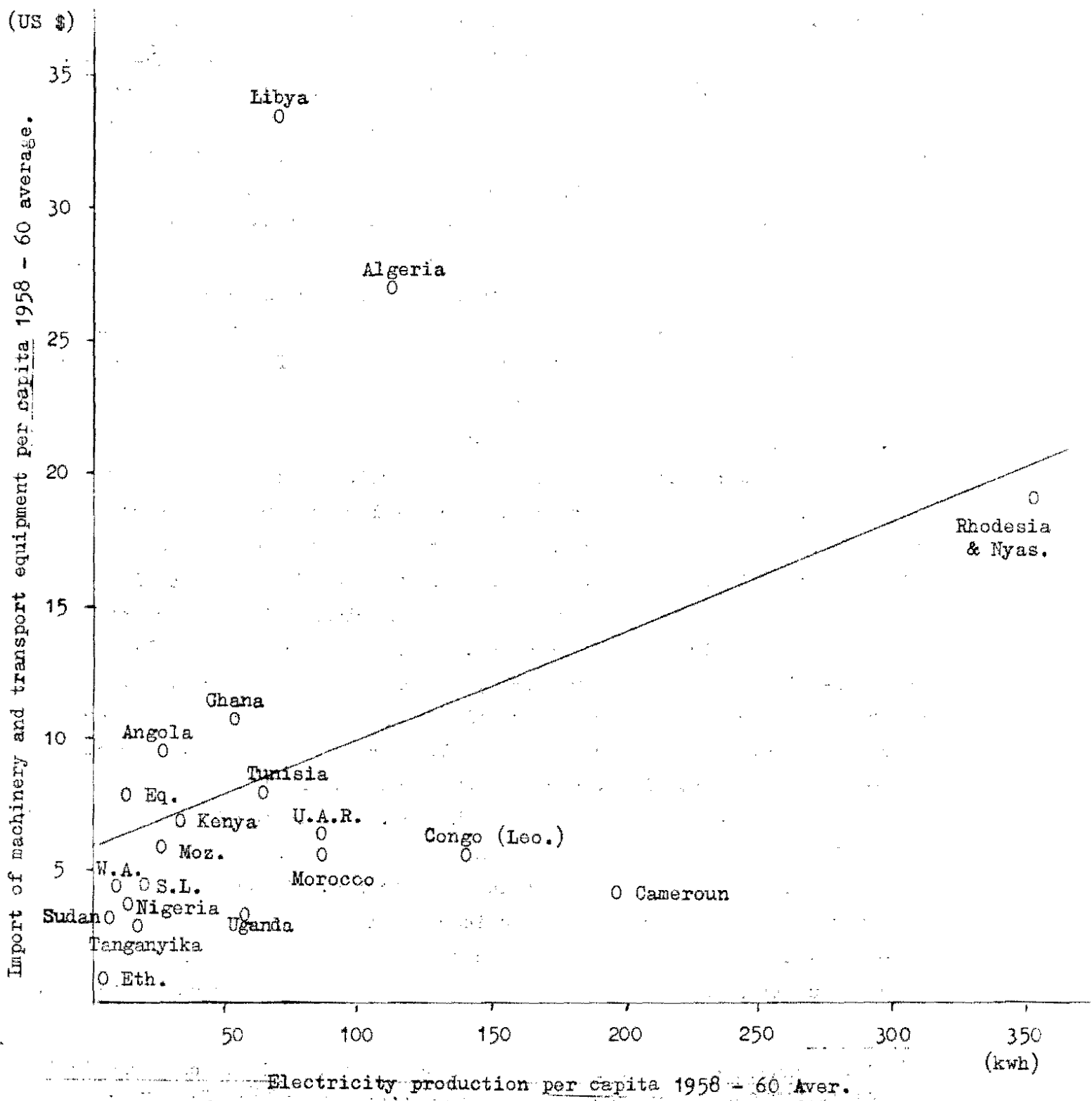


FIGURE 7



machinery is probably due to the low state of industrial development in Africa. A study by ECE has established that in developed countries GNP is positively related to apparent consumption of machinery equipment. Therefore, in planning for future machinery requirements, both GNP and fixed capital formation may be used. On the basis of the data analysed and the relationships established, an increase of 5 per cent in fixed capital investment per head will increase imports of mechanical and electrical machinery by 2 per cent; and a 5 per cent increase in GNP per head will increase imports of machinery by a fraction of 3 per cent. The GNP forecast based on African data underestimates the corresponding machinery requirements. The conclusion arrived at on the basis of the ECE study^{1/} is that for every 1 per cent increase in GNP there is a larger increase in machinery requirements.

266. For so diverse a group of industries it is quite impossible, at this stage, to work out even tentatively a possible future pattern of production. However, there are certain general considerations which can usefully be taken into account in discussing the general strategy of development in this field. Normally production of complex machines is undertaken in the later stages of the industrialization of a country, for a number of fairly evident reasons. A high proportion of skilled and semi-skilled workers are required, a varied range of special alloys and bought-out components are frequently needed, the initial design work is complex, patent rights are often involved or, alternatively, specialized know-how has to be acquired, normally by purchase. It is convenient to distinguish between heavy and light machinery. The latter is normally classified as produced in works with less than 100 employees and this definition is employed in the main in this section. A further convenient division of both heavy and light machinery is into high-dependency and low-dependency types. In the former category is machinery relying on outside suppliers special metal alloys and for components, such as pulleys,

^{1/} ECE, Production and Export of Capital Goods in the fields of Mechanical and Electrical Engineering, E/ECE/439/Add.1, Feb. 1962, pp. 42-43. The ECE Study is based on a large number of countries, including a few under-developed ones.

bearings, plastic items and drive units. Examples are tractors, motor vehicles and lathes. In the second category there is very little dependence on outside components, examples being rakes, hand tools, pulleys and bearings. Some machinery falls into both categories.

267. A broad summary of the various types of machinery classified by reference to two sets of criteria is shown in Table 71.

268. The two criteria are first, the division into machinery other than electrical, electrical and transport equipment. The second criteria is by reference to high or low-dependency. The Table also shows some very broad estimates of initial capital required, minimum annual output, the total employment involved corresponding to this output and the ratio of unskilled to semi-skilled labour required.

269. It will be seen that there are a number of immediate possibilities in Africa, given an adequate volume of turn-over, on the basis of plants with a low-dependency factor. These are summarized below.

Agricultural Machinery

Assembly of tractors, reapers, harvesters

Manufacture of implements, spades, axes, mattocks, hoes, rakes, discs

Mining Machinery

Manufacture of light fabricated equipment, storage tanks, light conveyor assemblies, small screens, jigs, special equipment

The manufacture of heavy equipment locally such as pumps, pressed conveyor sections, rollers, stamps, screens, table

Construction Machinery

Fixing hardware, nails, screws, bolts, sockets, tools

light machinery conveyors, light steel trusses and columns

Household Equipment

Manufacture of eating utensils, cooking utensils, sinks, metal fittings, baths

Simple plastic items, receptacles, canisters

TABLE 71
Possible Types and Sizes of Machinery Plants

Machinery Classification (All money figure in thousands of pound sterling)	Type	Estimated initial capital	Minimum yearly output	Ratio unskilled to semi-skilled	Total No empl.	Description
(1)	(2)	(3)	(4)	(5)	(6)	(7)
<u>Section 1 Machinery other than Electrical</u>						
Agricultural	Heavy-high	5,000	3600 or (3000 units)	1:2	1700	Manufacture of tractors, reapers harvesters, ploughs, combines
"	He - low	300	240 or (200 U)	2:1	150	Assembly of above only
"	He - low	125	100 (40,000 Units)	4:1	83	Implements, spades, axes, mattocks, rakes, hoes, adzes, discs
Mining	He -high	1,100	850	2:1	340	Crushers, grinders, ball mills, conveyors, winches scrapers, drilling equipment, pumps, screens, tables
"	Light-low	60	80	2:1	40	Storage tanks, conveyor assemblies, fabricated equipment, small screens, jigs, specialized items of construction, cells.

TABLE 71 (continued)

1	2	3	4	5	6	7
Mining	He-low	500	450	3:1	250	Special equipment, pumps, pressed conveyor sections, conveyor parts, rollers, stamps, screens, tables
Construction	He-high	3,000	2,000	1:2	950	Earth moving equipment, cranes, winches, hoists, mixers
"	He-low	600	500	4:1	420	Fixing hardware-tools
"	Li-low	70	90	3:1	45	Light conveyors, light steel trusses and columns, wheel barrows, trolleys, fabrication work
Textile	He-high	300	400	2:1	166	Cotton looms and mechanical looms and spindles-automatic equipment
"	Li-high	50	80	2:1	34	Hand cotton spindles and hand wollen looms and spindles
Metal-working	He-high	1,000	1,000	2:1	420	Lathes, shapers, planers, presses, forging, stamping, die-cutting, grinders, drills, guillotines, saws
Food processing	He-high	400	500	2:1	210	All types of equipment
House-hold	He-low	300	250	4:1	170	Eating utensils, pots, sinks, fitting, baths, floorings
"	Li-high	60	90	1:3	37	Washing machines - prefabricated
"	He-high	200	250	2:1	100	Refrigerators and stoves
"	Li-low	30	60	4:1	30	For any particular line
"	"	140	150	4:1	125	For several lines, all receptacles, plastics, stamped or cast metal fitting articles, canisters
Other miscellaneous						
Machine tools	He-low	300	210	1:2	88	All standard lines of tools, machine
Instruments	Li-high	60	80	1:6	20	Standard and special instruments
Bearings	He-low	3,000	2,000	1:1	740	All types - bearings, races, plummer, blocks,
Industrial rubber	He-low	400	250	3:1	120	Sheet rubber, tyres, belts, mouldings
"	Li-low	30	60	2:1	27	Smaller mouldings, electrical pieces, household goods

TABLE 71 (continued)

Section 2 - Electrical Machinery

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Generators and motors	He-high	400	300	1:2	150	Up to 5 H.P. Such a unit is usually part of a larger company
"	He-high	2,000	1,500	1:1	625	Over 5 H.P. in size and all special motors and generator sets
Transformers	Li-low	45	60	2:1	36	Small transformers up to 2 K.V.A. output
"	He-low	800	750	3:1	350	Large industrial transformers
Electrical appliances	Li-low	50	80	4:1	38	Simple switches, sockets, plugs, elements
"	He-low	300	300	2:1	140	Standard ranges of switchgear, meter, panels
"	He-high	350	250	1:3	78	For only one section manufacturing electronics parts, industrial and x-ray equipment, or switchgear
"	He-high	2,000	1,000	1:2	312	All developed electrical equipment, wireless, T.V. equipment, globes
"	Li-high	60	80	1:4	13	Special medical and x-ray equipment - electronic gear-testing equipment.

Section 3 - Transport Equipment

Motor Vehicles	He-low	1,000	400 (500 U)	1:1	200	Assembly of one make only
Ships	Li-low	30	60	1:2	40	All timber craft and small timber and steel power craft up to say 300 tons
"	Li-High	35	40	1:3	10	Pleasure craft - craft of special design
"	He-low	2,000	1,500	2:1	280	Steel craft from 300 tons up to say 4000 tons
Railways locos.	He-High	5,000	4,000	1:2	625	Diesel or diesel-electric coaches
Aircraft and parts	He-High	8,000	6,000	1:6	500	Aircraft under licence Maintenance and Service

Source : See table 56

Other Types of Machinery

Manufacture of machine tools

Bearing and plumber-blocks

Industrial rubber goods - tyres - household fittings

Electrical Machinery

Small transformers and large industrial transformers

Simple switches, plugs, sockets, insulators, elements

Standard ranges of switchgear, industrial fittings

Transport Equipment

Assembly of motor vehicles

Timber vessels and small ships up to 300 tons gross

Vessels from 300 to say 4000 tons

270. Actual production possibilities must depend on a series of detailed feasibility studies, inter alia, with a view to establishing market potential, economies of scale for different specific industries and raw material availabilities. Raw materials are by no means a decisive factor but the development of domestic iron and steel production will give a major impetus.

271. Sub-regional co-operation is feasible for a wide range of the products which could be manufactured and, indeed, essential though at this stage it would be premature to make specific suggestions. The growing engineering industries in the UAR and the proposed integrated iron and steel plant in Algeria would seem to form one natural point of departure. The proposed iron and steel plant in West Africa would be another. The already existing facilities for the production of iron and steel and some forms of machinery in Central and part of East Africa a third.

272. Sub-regional co-operation will also facilitate the adoption of uniform standards and specifications which are essential for the development of engineering industries. Standardization also promotes lower production costs, inter-changeability of tools and components and flexibility in production and programming.^{1/}

^{1/} Economic Commission for Asia and the Far East, Development of Engineering Industries in the ECAFE Region, E/CN.11/ITNR/Sub.2/L.26, November 1960.

273. The establishment of uniform standards also gives rise to considerable research expenditure too heavy to bear in any one country. Joint research can also promote the substitution of domestic for imported raw materials.

Chemicals and Fertilizers

274. The question of industrialization in the chemical field may be approached in either of two ways. The first is to import the basic chemicals required in the production or processing of other chemicals or related products. This is what is actually taking place in most African countries. The second is to use locally manufactured basic chemicals provided consumption of such chemicals justifies the erection of local establishments. At this stage the latter idea is impractical for most African countries as individuals. It may work for a group of countries whose combined consumption is at least equivalent to the capacity of the minimum economic size plants.

275. The study on the situation of chemical products or chemical establishments in Africa is a difficult task, complicated by the fact that it has to deal with hundreds, even thousands, of products whose number is increasing very rapidly. A study on the basis of individual chemical products is consequently impossible, and we must for the moment deal with chemicals as groups. The Standard International Trade Classification (SITC)^{1/} has been adopted for this purpose. Some data were readily available in this form but most of them were collected from different sources and attempts made to group them according to the said classification. Regrouping is complicated by the fact that some of the available material is compiled in a way that makes it difficult to know what chemicals are included or excluded.

276. Another difficulty encountered in dealing with available material was the varying denominator in which quantities and values were expressed. Volume units, such as, gallons and litres, weight units, such as, pounds and kilograms and value units, such as, pounds and francs further complicated

^{1/} This classification does not include products of chemical process industries, such as, ceramics, cements, glass, pulp and paper, rubber and petroleum (excluding petro-chemicals).

the work. Some volume units which were relatively unimportant in magnitude were left out. Those which were appreciable were converted into tons assuming a specific gravity of 1. This coupled with the incomplete (and in some cases completely unavailable) quantity figures has rendered quantity figures inferior to value figures in accuracy. As it is impossible to relate quantity figures to value figures (because of the huge number of chemical products involved) value figures may, among others, serve in giving indications as to the foreign exchange that could have been saved had the chemicals been manufactured in the continent.

277. The material collected is thus only general in nature. It shows which regions are the big consumers of chemicals in general and consequently targets for future detailed studies. To recommend the erection of a particular chemical plant in a certain area, may be done only after a detailed study has been done on a regional or sub-regional basis.

278. In descending order, sulphuric acid, soda ash, caustic soda, chlorine, ammonia and hydrochloric acid are the backbones of the chemical and related industries. They are in some way or another used in producing the thousands of chemicals and related products and are hence known as basic chemicals. The use of these is not limited to the manufacture of chemicals or related products. Basic chemicals are used extensively in metallurgy, textiles and other branches of industry. In short, the important role played by chemicals in the development of a country is such that their per capita consumption is used as a criterion of the state of technical development of a nation. In less developed countries (African countries) it seems that the degree of industrialization in the chemical field is related to the presence of fertilizer plants. For economic reasons fertilizer plants usually produce their own acids and other basic chemicals in their establishments or vicinity. Consumption of basic chemicals other than for fertilizers and to some extent refining and producing of metals is low in most African countries. Because of the refineries, (over 17 of them being extended, under construction or planned)^{1/} and other chemical and related projects in similar situation, one should expect that demand

^{1/} See Table 84.

for basic chemicals, especially, sulphuric acid and caustic soda, will expand considerably within the coming few years. This fact should be kept in mind when considering a fertilizer plant for a particular area since the basic chemicals could be produced more economically as units of fertilizer plants rather than as separate plants.^{1/}

279. In this study the continent is divided into four regions: Northern, Western, Eastern and Central. The first includes Sudan and Morocco and the countries between them; the second comprises all countries west of the Sudan and north-west of the Congo River; the third consists of Ethiopia, Somalia and the former British East Africa and the last includes all the rest but excluding the Republic of South Africa. Portuguese Guinea, Spanish West Africa and Guinea, the High Commission Territories, Somalia and French Somaliland were left out either because of their small market or absence of adequate data.

280. Of the total world import of chemicals about 7.7 per cent goes to the African continent. This compares with 3.7 per cent for the Middle East, 12 per cent for Latin America and 40 per cent for Western Europe. On import per capita basis this is equivalent to \$2.00 and \$3.68 for Africa and Latin America respectively.^{2/}

281. Import per capita varies considerably from region to region. The 1958 West African value of import per head, for example, was \$1.18. This contrasts with 0.53, 1.81 and 3.71 for East, Central and North Africa respectively.^{3/} Because of local production, consumption per head in the latter three regions is higher than indicated by the import per capita figures.

282. In table 72 the combined import of the four regions and that of the Republic of South Africa for the 1956-60 period is compared with the continent import data obtained from UN Monthly Bulletin of Statistics.

1/ The importance of and need for basic chemicals are shown by references made to them whenever appropriate.

2/ UN Monthly Bulletin of Statistics, March 1962.

3/ See Table 75.

Note: Comparison on the basis of import was used in the absence of consumption data. Satisfactory information was not available on production, the third factor for determining consumption.

In all the years in question, excepting 1960, the former figures are higher than the latter. This is to be expected. The UN Monthly Bulletin of Statistics deals only with imports from outside of the continent whereas the data collected from national publications include intra-African trade. In 1959, for instance, the Federation of Rhodesia and Nyasaland imported chemicals worth about 10 million dollars from the Union of South Africa^{1/}. Data expressed in terms of value can not therefore be too far from reality.

283. As can be seen from Table 72, import of chemicals has been rising during the 1952-60 period. The apparent decline of import for 1959 and 1960 was partly due to incomplete data for the Northern and Central Regions. Production of new chemicals and increased output of existing industries in these two regions could be a more valid reason for the decline. Had the trend for the last two years followed the path of the previous years, 1960 imports would have been about double those of 1952. Assuming a faster rate of consumption and taking into account the possibility of import substitution by locally manufactured chemicals, imports in 1970 may amount to 2 times that estimated for 1960.^{2/}

284. Based on the average value for the 1952-60 period the regional per cent shares of import of chemicals and related products are:

Northern Region	51.6
Western Region	22.0
Central Region	20.6
Eastern Region	5.8

285. According to commodity, medicinal and pharmaceutical products lead with 23.2 per cent followed by fertilizers (16.2 per cent), perfumery, cosmetics, soaps, and cleansing and polishing preparations (11.6 per cent), inorganic chemicals (9.8 per cent), pigments, paints, varnishes and related materials (7.8 per cent) and explosives (5.1 per cent).^{3/}

^{1/} Republic of South Africa, Foreign Trade Statistics, Vol. III.

^{2/} See Table 74.

^{3/} See Table 73.

TABLE 72

Import and Export of Chemicals (1952-60)

Group	Commodity Description	Value in '000 US \$									
		1952	1953	1954	1955	1956	1957	1958	1959	1960	Average 1952-60
	AFRICA (Import)										
511	Inorganic chemicals	26287	23609	25937	32434	31563	38590	32779	43172	46116	33330
512	Organic chemicals	2649	4522	4817	8403	7577	6344	8857	7052	6085	6250
521	Mineral tar and crude chemicals from coal, petroleum & natural gas	925	680	805	552	510	474	430	806	992	686
531	Coal tar dyestuffs & natural indigo	3160	3968	4349	4247	4217	5324	6290	10042	8282	5550
532	Dyeing and tanning extracts	5467	5961	5635	6200	1260	2297	1575	1822	1551	3525
533	Pigments, paints, varnishes and related materials	15037	17456	23692	27475	31346	31529	32718	29491	30677	26600
541	Medicinal & pharmaceutical prods.	47743	55257	63785	76841	80022	94328	101635	107270	105806	81400
551	Essential oils, perfume and flavour materials	10024	11294	12255	13008	11103	12939	12106	6595	6708	10660
552	Perfumery, cosmetics, soaps and cleansing & polishing prep.	23946	26705	32449	40117	44973	53204	50573	52437	34953	39900
561	Fertilizers, manufactured	53507	46785	48413	56386	41905	71219	74586	43650	54797	54600
591	Explosives	10912	9609	16511	16861	19233	19253	19411	23315	22021	17440
599	Misc. chemical materials and products	23408	31374	34097	44930	47673	56720	62997	68037	61348	47750
	Total import (excl.R. of S.Africa)	223961	237925	273624	328755	323082	393917	406099	396004	381515	329400
	Total import (Republic of S.Africa) ^{a/}					100007	92596	93027	98564	109312	98700
	Total import (incl.R. of S.Africa)					423089	486513	499126	494568	490827	479000
	Total import (UN Monthly Bulletin of Statistics)					385000	465000	480000	490000	540000	472000
	Difference					38089	21513	19126	4568	-49173	6820
	Total import (World)					5220000	5770000	5900000	620000	3800000	180000
	Per cent import (Africa)					7.4	8.1	8.1	7.4	7.3	7.7

a/ Foreign Trade Statistics, Vol. IV
 Import statistics of the Republic of South Africa 1956

TABLE 72 (continued)
Import and Export of Chemicals (1952 - 1960)

Group	Quantity in metric tons								
AFRICA (Import)	1952	1953	1954	1955	1956	1957	1958	1959	1960
511	139941	173135	201064	229050	219503	276897	226484	325490	319764
512	2813	6355	9120	18208	13003	13954	17137	10802	10833
521	6492	4574	5805	7228	5397	9120	3563	6177	5517
531	2726	2744	3038	2926	2194	3968	2514	3792	3865
532	6681	5173	5317	6442	4518	7609	5549	7846	7566
533	25693	28734	46485	50577	53906	49247	62449	61138	65023
541	12256	13081	14664	16728	16465	16790	19836	18857	17467
551	5314	5795	9124	5332	6399	6389	9485	3317	2319
552	47089	60791	82006	98159	98586	106901	108584	115357	118956
561	806639	723784	792382	900599	679250	1141600	1225374	762927	1127005
591	13037	14944	33404	33040	38668	39303	40504	41487	48243
599	48658	65724	56751	84342	74605	101460	99024	101269	85155
Total Import (excl. R. of S. Africa)	1121439	1108234	1264460	1459631	1220494	1782638	1839602	1473359	1826313

Source: National statistical publication

TABLE 72 (continued)
Import and Export of Chemicals (1952 - 1960)

		Value in '000 US \$									Average
Group	Commodity Description	1952	1953	1954	1955	1956	1957	1958	1959	1960	1952-60
	AFRICA (Export)										
511	Inorganic chemicals	4797	3857	3373	3976	4590	4747	5557	6297	3072	4474
512	Organic chemicals	496	737	678	1550	888	1462	1211	631	294	883
521	Mineral tar and crude chemicals from coal, petroleum & natural gas	-	-	-	-	-	-	-	-	-	-
531	Coal tar dyestuffs & natural indigo					2					
532	Dyeing and tanning extracts	4433	4310	5821	8016	5498	5717	4019	3570	-	5173
533	Pigments, paints, varnishes and related materials	95	83	270	268	425	396	584	367	195	298
541	Medicinal & Pharmaceutical prodts.	877	1379	1382	1660	2216	1090	1460	249	154	1163
551	Essential oils, perfume and flavour materials	1271	1343	1728	1879	3023	2523	1445	822	497	1615
552	Perfumery, cosmetics, soaps and cleansing & polishing prep.	186	157	215	403	1200	946	546	606	204	496
561	Fertilizers manufactured	1524	1600	4903	4352	4463	5478	7131	6202	547	4067
591	Explosives	25	145	342	184	165	380	636	223	9	234
599	Misc. chemical materials and products	206	258	695	666	553	587	700	495	611	530
	Total	13910	13869	19407	22954	23023	23326	23289	19862	5583	18358

TABLE 72 (continued)
 Import and Export of Chemicals (1952 - 1960)

Group	Quantity in metric tons								
	1952	1953	1954	1955	1956	1957	1958	1959	1960
511	147421	118543	107232	122972	141952	123015	107971	151339	127994
512	3666	6132	3399	2241	3332	6262	5088	3442	1162
521	-	-	10	-	-	-	-	-	-
531	-	-	-	-	2	-	-	-	-
532	26301	22953	26351	36410	23820	27839	19984	24700	-
533	134	63	269	332	1434	503	1624	1445	746
541	297	430	452	539	411	352	449	124	95
551	532	437	424	464	758	649	727	367	46
552	392	453	644	1051	2043	1192	732	887	193
561	56630	34554	141859	76825	75395	92896	120230	121581	23979
591	58	44	423	258	216	585	1192	595	3
599	2469	3319	5122	5739	4210	6255	6255	1090	1240
Total	234900	186928	286185	246831	253573	259548	263591	305570	155458

Source: National statistical publication

Explanation of Symbols

- negligible (less than one half of the unit indicated)
- .. data not available (complete or incomplete)

286. Though the continent is definitely an importer of chemicals it does, however, export some in appreciable quantities. The average magnitude of the export in terms of value is about 5.6 per cent that of the 1952-60 average import.^{1/} About 49 per cent of this was contributed by North Africa - fertilizers, essential oils and organic chemicals being the main export commodities with fertilizers accounting for over 50 per cent. East Africa with 40 per cent comes second. Soda ash and wattle bark extract accounted for over 90 per cent of her export. The balance of 11 per cent comes from the Central Region consisting of inorganic and organic chemicals and pyrethrum flowers and extracts.^{2/}

287. Tables 76 to 80 give details of regional import and export of chemicals and related products in general and fertilizers in particular. A brief account on each region is presented here under:

288. North Africa - In spite of its relatively advanced stage, this region absorbs over 50 per cent of total imports and shows a rising trend. Some of the irregularities, especially, the low figures for 1959 and 1960 are mostly due to missing data. Medicinal and pharmaceuticals (25.2 per cent), fertilizers (24.2 per cent), inorganic chemicals (10.8 per cent), perfumery, cosmetics etc. (8.2 per cent) and pigments, paints etc. (5.6 per cent) lead the list of imported chemical commodities.

289. West Africa - Import value has more than doubled and quantity about tripled for the 1952-60 period. As both local production and re-exports of chemical products are negligible imports may be taken as equivalent to consumption. According to table 75, 1965 and 1970 consumption forecasts in terms of value are \$228,000,000 and \$252,000,000. The corresponding estimates based on past import trends are \$178,000,000 and \$280,000,000. The steady rise of consumption (import) of chemicals during the period under study together with the prospect for faster industrialization suggests the tripling of 1960 consumption value by 1970.^{3/}

1/ See table 72.

2/ See table 72 and 77.

3/ See tables 74 and 75. In table 75 the 1965 and 1970 population figures were based on the 1958 figures and rate of increase of 2 per cent compounded. The average import per head for Ghana, Gambia and Cameroon together with the population figures were used in forecasting the 1965 and 1970 imports.

TABLE 73
Share of Imports by Commodity and Region (1000 US \$)

E/CH.14/LNR/1
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Commodity	Northern Region			Western Region			Central Region			Eastern Region			N+W+C+E Regions		
	% R	1952-60 Average	% L	% R	1952-60 Average	% L	% R	1954-59 Average	% L	% R	1952-60 Average	% L	% R	1952-60 Average	% L
Inorganic chemicals	54.8	18920	10.8	19.7	6888	9.2	21.5	7480	10.6	3.8	1270	6.5	100	33330	9.8
Organic chemicals	60.6	3972	2.2	14.3	957	1.3	19.0	1274	1.8	6.5	452	2.3	100	6250	1.8
Mineral tar & crude chemicals...	25.6	176	0.1	53.1	375	0.5	12.0	88	0.1	10.6	78	0.4	100	686	0.2
Coal tar dyestuffs and natural indigo	62.4	3460	1.9	28.6	1588	2.1	6.8	379	0.5	3.0	165	0.8	100	5550	1.6
Dyeing and tanning extracts	81.7	3000	1.7	6.0	222	0.3	2.1	75	0.2	6.2	238	1.2	100	3525	1.1
Pigments, paints, varnishes ...	35.3	9800	5.6	28.4	7840	10.5	27.8	7665	10.9	9.5	2730	14.0	100	26600	7.8
Medicinal and pharmaceutical products	54.5	44600	25.2	24.5	21120	28.2	15.5	13280	18.8	5.5	4480	23.0	100	81400	23.2
Essential oils, perfume & flavouring materials	50.0	5550	3.2	32.7	3592	4.9	15.3	1684	2.4	2.0	213	1.1	100	10660	3.2
Perfumery, cosmetics, soaps ...	35.0	14520	8.2	35.1	14580	19.5	20.5	8600	12.2	9.4	3621	18.5	100	39900	11.6
Fertilizers, manufactured	76.3	42750	24.2	5.4	3045	4.7	14.1	8240	11.7	4.2	2432	12.4	100	54600	16.2
Explosives	17.2	3354	1.9	26.8	5016	6.7	51.1	9440	13.4	5.0	1118	5.7	100	17440	5.1
Miscellaneous chemical materials & products	54.5	26480	15.0	18.8	9480	12.7	21.2	10620	15.1	5.5	2816	14.5	100	47750	14.0
(Total chemicals, Angola)								1667	2.3						4.8
Total		176540	100		75000	100		70200	100		19520	100		329400	100
%		51.6			22.0			20.6			5.8			100	

Note:

%
R) Refers to individual commodity share by region

%
L) Refers to individual commodity share within a region.

TABLE 74

Import forecasts based on past trends.

(1000 US \$)

Region	1958	1959	1960	Average annual percentage change (1952-60)	1965	1970	1960/70
North Africa	231,639		276,000 ^{a/}	9.35	433,000	673,000	2.45
West Africa			103,122	10.32	174,000	280,000	2.59
Central Africa		76,226	82,000 ^{a/}	7.84	120,000	175,000	2.14
East Africa			28,268	10.40	46,000	74,000	2.63
Africa	406,099		493,000 ^{a/}	10.90	796,000	1,285,000	2.61

^{a/} Estimated from previous years.

Source : Figures based on Tables 72, 76 and 77

TABLE 75
Import (Consumption) forecasts for West Africa
 (1000 US \$)

Country or Region	1958			1965		1970	
	Population	Import	Imp./head	Population	Import	Population	Import
Nigeria	33,208,000	23,216	0.69	38,800,000	106,300	42,900,000	117,500
Ghana	4,836,000	18,430	3.80	5,550,000	15,200	6,126,000	16,780
Sierra Leone	2,260,000	2,889	1.28	2,600,000	7,120	2,870,000	7,860
Gambia	280,000	601	2.15	321,000	880	355,000	973
Liberia	1,250,000	1,984	1.59	1,435,000	3,930	1,585,000	4,350
FWA (former)	20,102,000	20,518 ^{X/}	1.02	23,100,000	63,250	25,400,000	69,600
Togo	1,100,000	1,548	1.41	1,260,000	3,450	1,270,000	3,480
FEA (former)	4,958,000	7,680	1.55	5,700,000	15,600	6,300,000	17,250
Cameroon	4,613,000	9,024	2.26	4,600,000	12,600	5,075,000	13,900
Total W. Africa	72,607,000	85,890	1.18	83,300,000	228,000	92,000,000	252,000
East Africa	46,232,000	24,505	0.53				
Central Africa	42,090,000	76,226	1.81				
North Africa	62,480,000	231,639	3.71				
Africa	223,409,000	406,099	1.82				

^{X/} 1957 figure

290. Medicinal and pharmaceuticals (28.2 per cent) lead, followed by perfumery cosmetics etc. (19.5 per cent), pigments, paints etc. (10.5 per cent) and inorganic chemicals (9.2 per cent).

291. Central Africa - Import of chemicals occupies third place. Import trend is similar to that of the Northern Region. A doubling of the 1960 import value by 1970 may be confidently expected due to the fact that unlike the Northern Region most of Central Africa does not have appreciable existing or planned chemical industries.

292. The share of the regional total import, ranging between 18.8 per cent and 10.6 per cent, is almost evenly distributed among seven of the commodities, the share for the five remaining commodities amounting to only 5 per cent. The percentage ranges refer to pharmaceuticals and inorganic chemicals respectively.

293. East Africa - As in the case with West Africa, imports have doubled within the same period and may double again by 1970. The main items were medicinals etc. perfumery etc. pigments etc. fertilizers and inorganic chemicals accounting for 23, 18.5, 14, 12 and 6.5 per cent of the total respectively.

294. Most of the products of the chemical industry are used as raw materials or supplies for other industries. With the exception of some countries which produce some of those chemical raw materials, all African countries depend mainly upon imported chemicals for their secondary chemical industries. Here is a brief general account of present and planned production.

295. North Africa - Chemical industry-wise this region appears to be relatively advanced.^{1/} It takes first place in the production of fertilizers, both nitrogenous and phosphatic. It is, at the moment, still importing fertilizers. When the plants under construction and under study go on stream, (within three to six years time), this region

^{1/} See Table 81. This table, though incomplete, gives a rough idea of the comparative production of the regions which the countries in the table represent. The choice of these countries is purely a matter of convenience.

is expected to be in a position to export its surplus.^{1/} For some plants in some of the countries the surplus may be as high as 80-90 per cent of the capacity.

296. The basic relationship between chemicals and fertilizers applies well to the northern region. Sulphuric acid is produced in the UAR, Tunisia, Algeria and Morocco; caustic soda and chlorine in the UAR, Algeria and Morocco; soda ash in the UAR and Morocco and nitric acid in the UAR. Ammonia and some of its derivatives will be available in the UAR, Tunisia and Morocco when the nitrogenous fertilizer plants start operations.

297. Although complete data on the production of the basic chemicals in North Africa are not available one may state that this region is relatively advanced.

298. West Africa - Quite a number of secondary chemical plants exist. With the exception of the extraction of essences and some similar processes the plants are mostly dependent upon imported raw materials. Moulding powder for the plastics and calcium carbide for acetylene plants are examples of imported raw materials. Paints, matches, explosives, pharmaceuticals, perfumes, agricultural chemicals and of course soaps and cleansing preparations are among the chemical products that are partially manufactured.

299. None of the basic chemicals are, however, manufactured locally. This is explained partly by the fact that unlike the North African Region this area seems to have no fertilizer plant which, as we have seen, necessitates some basic chemical manufacturing. With the exception of a sulphuric acid unit (for the production of triple superphosphate) and a chlorine - caustic plant planned for Senegal^{2/}, it appears that no plans for basic chemical industries exist.

^{1/} See Table 82. The fertilizer plant for which the Sudan Government has given its consent is most probably a nitrogenous plant.

^{2/} Plan quadriennal de developpement, 1961-64.

300. Some countries have shown interest in establishing chemical plants.^{1/} Cameroon is interested in phosphorous and match factories.^{2/} So is Upper Volta in matches.^{3/} Agricultural chemicals, pharmaceuticals, paints and matches are among the chemical industries that Nigeria is contemplating.^{4/} The United Africa Company of Nigeria is awaiting final agreement from the Nigerian Government for the erection of a £250,000 pharmaceutical factory.^{5/} Sierra Leone is investigating the possibility of establishing plants for pharmaceuticals, toilet preparations and paints.^{6/} In the Ghana Second Development Plan (1959-64) it is mentioned that preliminary investigation on paints and varnishes and lacquers, pharmaceuticals, insecticides, cosmetics, plastic and distillation products plants have been completed. Senegal's 1964 target in the field of chemicals (excluding matches and soaps) is to raise 1959 production value by a factor of 4.66.^{7/} These are but few examples. The remaining countries, we may assume, are in a similar position.

301. Central Africa - This region is more advanced than the Western. It has, besides those industries dependent upon partially processed imported raw materials, some basic chemical industries. Sulphuric acid is manufactured in Congo (Leopoldville) and in the Federation of Rhodesia and Nyasaland. Unlike the Northern Region some of the sulphuric acid plants in this region serve the requirements of industry in general and are therefore not components of fertilizer plants.

302. The prospect for the fertilizer industry is bright. Single and triple superphosphate fertilizers are produced in Salisbury to meet the Federations demand. Within a few years time the Federation is expecting to have a nitrogenous fertilizer plant incorporating an explosive factory.^{8/}

1/ Fertilizer plants not included.

2/ Rapport sur les possibilités de développement industriel du Cameroun, January, 1960.

3/ L'industrialisation de la Haute-Volta, January, 1962.

4/ Western Nigeria Development Plan (1962-68).

5/ African World, August 1962.

6/ Introduction supplied to the secretariat by Board of Trade Officials, London.

7/ Plan quadriennal de développement (1961-64).

8/ Report on the Development of Manufacturing Industry within the Federation of Rhodesia and Nyasaland.

This will make ammonia and nitric acid available to the consuming industries in this region and possibly to East Africa. It is foreseen that excess nitrogen fertilizer production will be absorbed by neighbouring countries.

303. East Africa - There are some extracting and refining plants producing wattle bark extract and soda ash respectively. The latter is peculiar to this region and as a group these plants probably rank first in tonnage production. In addition there are establishments depending partially or wholly on imported raw materials in Kenya. Besides soda ash Kenya also produces sulphuric acid and caustic soda. Plants for both of these chemicals are envisaged in the draft of the second five year development plan of Ethiopia.

304. The fertilizer situation in East Africa is not as encouraging.^{1/} So far it has been limited to the processing of small quantity of phosphate fertilizers only. Part of the demand in Kenya is satisfied from local production. A 25,000 tons superphosphate plant (with a provision for expansion to meet the East African requirement) at Tororo, Uganda, has gone on stream in September this year.^{2/} It will produce 1,500 tons of **sulphuric acid** in excess of the fertilizer plant requirements. Because of the Dadda (Ethiopia) potash refining plant that will go on stream in 1964 this region will occupy a special place in the production of fertilizers.^{3/} Disregarding the experimental pilot plant (5,000 tons capacity) in Tunisia this will be the only one of its kind and its yearly output of 300,000 tons K_2O would be more than three times, the 1959/60 total consumption of the continent.^{4/}

305. From columns designated by % L (see Table 73) it is obvious that of all the chemical commodities medicinal and pharmaceutical take the largest share of foreign exchange in all the regions. It shares 23.2 per cent of the total. Next comes fertilizers (16.2 per cent). North

1/ For possible nitrogenous fertilizer supply for this region see paragraph 302.

2/ African World, May 1961.

3/ Information supplied to the secretariat by a private company in Ethiopia

4/ See Table 78.

Africa, the main importer of fertilizers (over 67 per cent) is expected to be a net exporter of fertilizers in not too distant a future and as a result fertilizers will lose its second place. In general medicinals etc. perfumery etc. inorganic chemicals and pigments etc. in descending order, are the chemical commodities that deserve further study as far as the whole continent is concerned.

306. With the realization of fertilizer plants both under construction and study the Northern Region will, within three to six years, be a net exporter of fertilizers.^{1/} Although the future prospect for other chemicals may not be as bright as for fertilizers this region is well ahead of the others.

307. In the production of chemicals the Central Region comes second to the Northern Region. The realization of the nitrogenous fertilizer and explosive plant in the Federation of Rhodesia and Nyasaland will bring it a step nearer to the North.

308. The Eastern Region, a producer of caustic soda, soda ash and sulphuric acid does not appear to have any plans for the other basic chemicals namely ammonia. This will naturally widen the gap between this region and the Central Region. The potash refining plant in Ethiopia will, however, more than compensate for it.

309. With the exception of the phosphate plant planned for Taiba (Senegal), the Western Region lacks fertilizer plants and thus basic chemical industries. It is thus the least developed in the field of chemical industry.

310. Only a small portion of the fertilizer consumed in Africa goes to the Western Region. This is clear from Table 79 which shows that more than 91 per cent of the imported fertilizer is absorbed by the main consumer regions leaving less than 9 per cent to be shared by the rest, mainly West and East African countries. Since the East African Region appears to be more advanced in agriculture and consequently better acquainted with the use of fertilizers, the West African consumption

^{1/} Information supplied to the secretariat by the government. See Table 81.

is probably not more than 4.5 per cent. This assumption is strengthened by figure obtained from detailed import and export data, which form the basis for the tables on chemicals. The West African Region share, according to these data, is about 4.1 per cent. In terms of value this is 5.4 per cent.

311. These figures by themselves do not show up the necessity for fertilizer industries in this vast area. Figures, however, could be deceiving. Many governments of this region have shown interest in having fertilizer plants. Congo (Brazzaville), for instance, with available cheap power from the Kouilou hydropower plant is contemplating a nitrogenous fertilizer plant based on phosphate deposits at Halle.^{1/} In Cameroon consumption of fertilizers has been rising for over five years by about 30 per cent (estimated 1968 nitrogenous fertilizer consumption being 15,000 tons).^{2/} The Cameroon Government is aware of the need for a nitrogenous plant based on local natural gas. The Nigerian Government is willing to participate in establishing a fertilizer plant.^{3/} A fertilizer industry has been put among the list of desirable industries by the Ghana Government which is determined to study and promote the use of fertilizers.^{4/} Official 1970 consumption estimate of fertilizers in Upper Volta is 25,000 tons of phosphate and 12,000 tons of nitrogenous.^{5/} According to the 1961-1964 Plan quadriennal de développement, Senegal's fertilizer requirement is expected to increase from 18,000 tons in 1961 to 80,000 tons in 1964. These are clear indications of the important role that fertilizers may play in giving impetus to the development of chemical industries in this region.

312. Connected with the interests in the preceding paragraph is EAC's 'Fertilizer Program'. According to it "the full program will be implemented in three Regions in different parts of the world, namely the Near East,

1/ Africa Economic Newsletter, Johannesburg, February 1961.

2/ Rapport sur les possibilités de développement industriel du Cameroun, Jan. 1960.

3/ Africa Trade & Development, London March/April 1960.

4/ Id., August/September 1959 and August 1960.

5/ L'industrialisation de la Haute Volta, June 1962.

West Africa and Northern Latin America, and will include regional fertilizer meetings, and marketing and development studies, as well as field work in the individual countries." Countries in the West African Region taking advantage of the program are: Ghana, Nigeria, Togo, Dahomey and Senegal.^{1/}

313. In most development plans emphasis was put on the development of agriculture. Application of fertilizers is one, if not the only one in some cases, of the means of accomplishing such aims.^{2/} This naturally implies a faster rate of growth in fertilizer consumption.

314. In most of the West African countries it seems that the biggest obstacle in establishing fertilizer plants is the inadequacy of the internal market of individual countries. This difficulty may be overcome if fertilizer industries were planned with a view of supplying a whole region or sub-region both with fertilizers and the basic chemicals associated with its manufacture. This is one of the reasons why, in this study, emphasis was put on fertilizers rather than on basic chemical industries.

315. The preceding paragraphs have indicated the need for fertilizer plants in this region. It now remains to consider the availability of raw materials, fuels and power.^{3/} In general the situation is fairly good. Coal is available in Nigeria; crude petroleum in Nigeria, Gabon and Congo (Brazzaville); natural gas in Cameroon, Gabon and Nigeria; phosphate in

^{1/} FAO, Freedom from Hunger Campaign, F.P.2/25.8.61.

^{2/} The statement is supported by the following quotation from ILO, Chemical Industries Committee, Sixth Session, Geneva, 1962. "What part do fertilizers play in increasing yield? Yield varies with time and country. In present day France, for example, crops are at least four times as great as at the beginning of the nineteenth century. It has been found that 60 per cent of this was due to the introduction of chemical fertilizers, 25 per cent to the improvement of mechanized farm equipment and 15 per cent to the introduction of selected varieties of crop plants."

^{3/} See Table 83.

Senegal, Togo, Nigeria, Congo (Brazzaville) and Gabon. Potash is said to exist in Congo(Brazzaville) and Gabon. Whether the deposits of this salt are worthy of exploitation or not is not known yet. As is the case with the whole continent sulphur is scarce. There are no indications of its presence even as pyrite, gypsum or anhydrite. Economic recovery of sulphur from natural gas or refinery gas may prove feasible in which case, at least part of the sulphur requirement will be met from local production.

316. Besides coal and natural gas, fuel will be obtained from the petroleum refineries being built in Nigeria, Ghana, Senegal and that planned for Liberia.^{1/} Thus fuel should not present a problem.

317. The substantial electric power requirement for the nitrogenous fertilizer plants may be obtained from the hydro-power projects that are under construction or under study. These include: the Niger and Kadura Rivers in Nigeria, the Volta River in Ghana, the Konkoure River in Guinea, the Kouilou River in Congo(Brazzaville) and the Bia River in Ivory Coast.

318. In summarizing the position of the fertilizer industry in Africa, a number of general conclusions may be arrived at. First requirements for North Africa are being taken care of and no further investments appear justified for some time to come. Secondly, the expansion of production contemplated in Central Africa could in the near future cater for all the sub-region's needs of nitrogenous fertilizer but room exists for the expansion of the phosphatic type. Thirdly, the requirements of East Africa for potash fertilizer will be more than covered by a plant in the course of erection (which will look to the whole continent and beyond for markets); there is, however, scope for expanding production of phosphatic and starting production of nitrogenous types. Fourthly, since markets in some individual countries of West Africa are in themselves too small, a co-ordinated production policy in the sub-region both for fertilizers and basic chemicals is recommended. It has been noted that this sub-region is the least well provided for in this area and therefore offers substantial scope for development.

^{1/} See Table 84.

TABLE 76 Import of Chemicals by Regions and Commodity (1952-60)

		Value in US \$'000									
Group	Commodity Description	1952	1953	1954	1955	1956	1957	1958	1959	1960	Average 1952-60
NORTH AFRICA											
511	Inorganic chemicals	15848	14033	14455	19330	16974	22133	19287	21580	26662	19920
512	Organic chemicals	2010	3101	3171	6111	5160	3838	5723	3247	3384	3972
521	Mineral tar and crude chemicals from coal, petroleum and natural gas	393	307	366	17	31	-	64	156	72	176
531	Coal tar dyestuffs & natural indigo	1383	1762	2107	2313	2860	3253	4878	7078	5543	3460
532	Dyeing and tanning extracts	5434	5676	5084	5667	706	1590	801	1046	1007	3000
533	Pigments, paints, varnishes and related materials	4819	6708	8467	9246	11357	11024	13844	10604	12143	9800
541	Medicinal & pharmaceutical products	28130	32607	37060	42196	42419	42261	55249	57229	57025	44600
551	Essential oils, perfume & flavour mat.	6339	6797	6642	7881	5326	5184	4674	3389	3707	5550
552	Perfumery, cosmetics, soaps & clean- ing and polishing preparations	8726	10426	11502	15349	19227	21213	23385	18647	2246	14520
561	Fertilizers, manufactured	48828	42552	38529	40876	28206	52606	59407	32246	41635	42750
591	Explosives	3229	2124	3021	2812	3518	1568	4322	4666	4810	3354
599	Miscellaneous chemical mat. and prod.	15432	20120	17777	25306	23249	29533	40005	35789	31050	26480
Total		140671	146273	148181	177104	159033	201263	231539	195077	189284	176540
WEST AFRICA											
511	Inorganic chemicals	5699	5403	4153	5478	5716	6606	4550	12045	12388	6888
512	Organic chemicals	351	344	730	814	917	936	894	1909	1721	957
521	Mineral tar and crude chemicals from coal, petroleum and natural gas	426	296	341	406	323	313	215	327	726	375
531	Coal tar dyestuffs & natural indigo	1678	2055	1944	1575	1002	1721	972	1607	1735	1588
532	Dyeing and tanning extracts	7	184	319	303	199	199	317	286	192	222
533	Pigments, paints, varnishes and related materials	5186	5021	6540	7621	8450	8531	8514	5032	11111	7840
541	Medicinal & pharmaceutical products	12256	13853	15227	19749	20365	23356	25867	28113	31791	21120
551	Essential oils, perfume & flavour Mat.	3123	3191	4116	3566	3834	4346	6062	1867	2234	3592
552	Perfumery, cosmetics, soaps and cleaning & polishing preparations	11348	11137	11431	13322	13778	17521	13529	10703	20417	14580
561	Fertilizers, manufactured	2116	2060	2615	3966	3210	3866	3939	2627	3036	3045
591	Explosives	3732	3290	4312	5103	4432	5401	4805	7667	6921	5016
599	Miscellaneous chemical mat. and prod.	3978	4145	6696	8300	11396	13001	9283	13783	15850	9480
Total		49900	50979	58424	70203	73622	85797	78947	99596	108122	75000

TABLE 76 (continued) Import of chemicals by Regions and Commodity (1952-66)

Group	Quantity in metric tons								
	1952	1953	1954	1955	1956	1957	1958	1959	1960
NORTH AFRICA									
511	93585	124499	143496	159665	143521	184264	158549	166193	190555
512	1949	3853	6351	14682	9071	10190	13752	8018	7959
521									
	985	922	1232	500	182	-	232	1082	354
531	582	796	970	1110	1328	2032	1826	2060	1965
532	6568	4751	4776	5840	3213	5698	3818	4970	5290
533									
	7333	9618	19438	17672	19515	15407	27183	24532	29974
541	8962	9378	10724	11997	10712	10654	12571	13163	13051
551									
552	2827	3057	4680	2000	1962	1840	1818	1547	832
561	24172	29848	33379	41321	35790	36491	48334	42895	52357
591	754763	672377	612703	639524	432453	809237	936772	552182	871157
599	3149	3886	5798	5641	4818	3291	9138	9668	14856
	39095	47270	34774	55678	43178	59778	771209	63589	58831
Total	943970	910255	878321	955030	705743	1138882	1285202	889899	1247181
WEST AFRICA									
511	17128	14885	17369	20612	24084	30793	19928	109275	102742
512	513	400	945	1142	1297	1159	745	2500	22600
521									
	5357	3429	4076	5892	4179	7133	2479	2863	3684
531	1985	1761	1860	1391	553	1739	519	977	993
532	28	61	90	101	269	330	434	585	375
533									
	7366	7432	12818	16275	15919	17256	20454	22186	23371
541	1870	1783	2113	2289	2591	2731	3381	3043	3271
551	2295	1996	3668	2496	3443	3526	6671	1000	1093
552									
	15618	19294	27557	33215	38147	41329	33986	46456	44678
561	24311	23934	33173	37060	40591	49296	52220	34871	41230
591	5510	4701	5215	5876	4830	5900	5527	7278	7057
599	3892	4455	5979	8815	10805	20147	6957	11714	13127
Total	85873	84131	114863	135164	146708	181339	153301	242748	244221

TABLE 76 (continued) Export of Chemicals by Regions and Commodity (1952-60)

		Value in US \$'000								
Group	Commodity Description	1952	1953	1954	1955	1956	1957	1958	1959	1960 (Average 1954-59)
CENTRAL AFRICA										
11	Inorganic chemicals	3423	3175	6171	6480	7744	3614	7713	2096	5373
12	Organic chemicals	141	912	814	1165	1219	1025	1301	1173	1113
21	Minerals tar and crude chemicals from coal, petroleum and natural gas	106	58	50	60	65	75	49	227	97
31	Coal tar dyestuffs and natural indigo	53	47	177	306	274	224	259	333	581
32	Dyeing and tanning extracts	11	7	5	8	31	111	87	175	143
33	Pigments, paints, varnishes & related materials	2512	3443	6713	7581	2453	9031	7452	6192	4427
41	Medicinal and pharmaceutical products	4688	5113	9302	1172	12941	10130	7451	5992	9245
51	Essential oils, perfume & flavour materials	140	1275	1215	1242	1507	3109	1379	1039	767
52	Perfumery, cosmetics, soaps and cleansing and polishing preparations	1023	2717	6416	7330	8515	11151	9118	1672	7711
61	Fertilisers, manufactured	169	899	5281	2638	8457	1111	9466	4926	6430
91	Explosives	2369	3320	8330	7963	10503	1111	3119	2111	2111
99	Miscellaneous chemicals materials & products	2443	5137	7894	2626	10290	11356	11006	1111	9111
	Angola (chemicals total)	396	705	879	1301	1700	1696	1112	315	2179
	Total	15229	27558	39311	62072	71271	84531	73419	76226	55341
EAST AFRICA										
										(1952-1960)
11	Inorganic chemicals	1412	993	1158	1145	1129	1237	1229	1451	1593
12	Organic chemicals	147	135	102	313	281	544	939	723	313
21	Mineral tar and crude chemicals from coal, petroleum and natural gas	39	48	69	90	86	102	96	97	78
31	Coal tar dyestuffs and natural indigo	46	104	121	53	81	125	231	274	453
32	Dyeing and tanning extracts	5	24	227	222	294	397	370	315	204
33	Pigments, paints, varnishes and related mat.	2460	1167	3117	3081	22893	2901	3123	3016	2730
41	Medicinal and pharmaceutical products	2689	2824	2470	3721	4991	553	5869	3230	6745
51	Essential oils, perfume & flavour materials	22	31	279	319	416				
52	Perfumery, cosmetics, soaps and cleansing and polishing preparations	2039	2385	3100	3915	3423	4444	4521	4215	4552
61	Fertilisers, manufactured	1994	1274	1288	2906	2152	3137	2074	2041	3956
91	Explosives	1482	375	798	983	980	1158	1135	1291	1452
99	Miscellaneous chemicals materials & products	1555	1072	1730	2698	2738	2820	2703	3940	5165
	Total	13861	13015	13088	19376	19156	22383	22074	24505	28266

TABLE 76 (continued) Import of Chemicals by Regions and Commodity (1952-60)

Quantity in metric tons									
Group	1952	1953	1954	1955	1956	1957	1958	1959	1960
CENTRAL AFRICA									
511	20378	27741	34204	42753	47074	55833	42439	43347	19311
512	183	2044	1779	2284	2565	2541	2564	137	131
521	150	64	177	151	423	1124	755	2132	49
531	141	173	195	410	290	160	125	698	848
532	21	21	13	25	338	684	508	1404	1109
533	4564	6683	10629	11530	12422	11044	9862	9020	6678
	1424	1920	1827	2442	3162	3405	3884	2651	1145
541	192	742	776	836	994	1023	996	770	394
551									
552	4349	7210	14849	16550	18290	20857	17860	18918	13990
	7300	10728	130167	186215	166233	244091	202870	136071	158878
561	3212	5269	21176	20173	27730	28692	24449	22941	24545
591	2771	10194	13218	16049	17249	18016	17096	21807	8236
599	4100	3400	4800	7000	8000	9400	19100	14900	14600
Total	48785	76189	233810	306418	304770	396870	342508	274796	249914
EAST AFRICA									
511	8850	6010	5995	6020	4824	6007	5568	6675	7156
512	168	58	45	100	70	64	76	147	143
521		159	320	685	613	863	97	100	1430
531	18	14	13	15	23	37	44	57	59
532	64	340	438	476	698	897	789	887	792
533	6430	5001	3600	5700	6050	5540	4950	5400	5000
541	...	...	...	...	...	...	...	...	...
551	2950	4439	6221	7073	6359	8224	8404	7088	7931
552	20265	16745	16839	37800	39973	38976	33511	39803	55740
561	1166	1088	1215	1350	1290	1420	1390	1600	1785
591	2900	3805	2780	3800	3373	3519	3762	4159	4961
Total	42811	37659	37466	63019	63273	65547	58591	65916	84997

TABLE 77 Export of Chemicals by Commodity and Region (1952-1960)

		Value in '000 US \$									
Group	Commodity Description	1952	1953	1954	1955	1956	1957	1958	1959	1960	Aver- 1952-60
NORTH AFRICA											
511	Inorganic chemicals	338	168	149	199	175	209	195	161	5	167
512	Organic chemicals	407	682	602	1426	723	1313	965	631	294	783
521	Mineral tar and crude chemicals from coal, petroleum & natural gas	-	-	-	-	-	-	-	-	-	-
531	Coal tar dyestuffs & natural indigo					2					
532	Dyeing and tanning extracts	32	17	11	13	1					15
533	Pigments, paints, varnishes and related materials	95	83	240	245	407	325	510	286	130	258
541	Medicinal & pharmaceutical prodts.	877	1379	1382	1660	2216	1090	1460	249	154	1163
551	Essential oils, perfume and flavour materials	1177	1281	1561	1690	2829	2330	1305	645	440	1473
552	Perfumery, cosmetics, soaps and cleaning & polishing prp.	135	99	146	327	1118	853	506	509	176	430
561	Fertilizers, manufactured	1524	1600	4903	4352	4463	5478	7131	6583	514	4061
591	Explosives	25	145	342	184	165	380	636	223	9	234
599	Misc. chemical materials & prodts.	206	258	475	394	252	303	344	91	47	263
	Total	4816	5712	9811	10490	12351	12281	13052	9278	1769	8840
CENTRAL AFRICA											
511	Inorganic chemicals	15	-	35	199	136	743	1977	1434	3067	845
512	Organic chemicals	89	55	76	124	165	149	246			129
532	Dyeing & tanning extracts	1224	1326	1139	1673	1293	1456	1115			1318
533	Pigments, paints varnishes and related materials	-	-	30	23	18	71	74	81	65	40
551	Essential oils, perfume and fl. mat.	-	-	71	56	89	75	64	99	57	57
552	Perfumery, cosmetics, soaps and cl. & Pol. prep.	51	58	64	72	76	86	35	96	28	63
561	Fertilizers	...	...	-	-	-	-	-	19	33	6
599	Miscellaneous	...	...	220	272	301	284	356	404	564	343
	Total	1379	1439	1635	2419	2078	2864	3867	2133	3814	2403
EAST AFRICA											
511	Inorganic chemicals	4444	3689	3189	3578	4279	3795	3385	4802		3895
532	Dyeing and tanning extracts	3177	2967	4671	6330	4204	4261	2904	3570		4011
551	Essential oils, perfume, varnishes & related materials	94	62	96	133	105	118	76	78		95
552	Perfumery etc.	...	...	5	4	6	7	5	1		5
	Total	7715	6718	7961	10045	8594	8181	6370	8451		8004

TABLE 77 (continued) Export of chemicals by commodity and region (1952-1960)

Quantity in metric tons									
Group	1952	1953	1954	1955	1956	1957	1958	1959	1960
NORTH AFRICA									
511	4232	2543	2482	2569	2206	3647	2225	156	69
512	3526	6033	3221	1913	2815	5744	4339	3442	1162
521	-	-	10	-	-	-	-	-	-
531	...	...	...	...	2	...	...	...	...
532	12	17	21	20	...	...	...	...	...
533	134	63	269	331	1414	470	1604	1445	746
541	297	430	452	539	411	352	449	124	95
551	452	375	306	378	677	546	660	303	8
552	112	139	312	744	1706	1022	709	883	193
561	53630	34554	141859	76825	75395	92896	120230	121336	23522
591	58	44	423	258	216	585	1192	595	3
599	2469	3319	4707	5214	3530	5540	4594	125	130
Total	64922	47517	154062	88791	88372	110802	136010	128409	25928
CENTRAL AFRICA									
511	389	-	550	1978	213	298	543	30	127925
512	140	99	178	328	517	518	749	...	...
532	1889	2036	1630	2590	1620	1039	414	...	...
533	-	-	-	-1	20	33	20	...	...
551	-	-	84	31	45	45	19	33	38
552	280	314	309	291	317	149	10	...	...
561	...	...	-	-	-	-	-	245	457
599	...	...	415	525	680	715	11000	965	1110
Total	2698	2449	3166	5744	3412	2797	2755	1273	129530
EAST AFRICA									
511	142800	116000	104200	118425	139533	119070	105203	151153	...
532	24400	20900	24700	33800	22200	26800	19570	24700	...
551	80	62	34	55	36	58	40	31	...
552	...	...	23	16	20	21	13	4	...
Total	167280	136962	128957	152296	161789	145949	124826	175888	...

Source: National statistical publications

TABLE 78

Production, Consumption and Trade in Fertilizers

(N, P₂O₅ & K₂O) 1954/55-1959/60E/CN.14/INR/1
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	Nitrogen (N)							Phosphoric Acid (P ₂ O ₅)						
	54/55	55/56	56/57	57/58	58/59	59/60	60/61	54/55	55/56	56/57	57/58	58/59	59/60	60/61
	1000 metric tons N							1000 metric tons P ₂ O ₅						
Output	26	38	40	48	55	59		187	211	235	229	260	259	
Percentage changes	46	5	20	15	7			13	11	-3	14	-		
Consumption	186	203	202	260	290	230		210	217	234	248	244	232	
Percent changes	9	-	29	12	-21			3	8	6	-2	-5		
Percentage of world														
Output	0.4	0.5	0.5	0.6	0.6	0.6		2.4	2.6	2.8	2.7	2.8	2.7	
Consumption	3.0	3.1	2.8	3.3	3.3	2.5		2.8	2.8	2.8	2.9	2.7	2.4	
Exports, gross	-	-	-	-	-	-		34	41	45	51	58	55	
Imports, gross	159	165	162	212	235	169		47	47	46	62	56	44	
Exports-Imports	-159	-165	-162	-212	-235	-169		-13	-6	-1	-11	+2	+11	
Potash (K ₂ O)								All fertilizers (N, P ₂ O ₅ +K ₂ O)						
	54/55	55/56	56/57	57/58	58/59	59/60	60/61	54/55	55/56	56/57	57/58	58/59	59/60	60/61
	1000 metric tons K ₂ O							1000 metric tons (N, P ₂ O ₅ & K ₂ O)						
Output	1	1	1	-	-	-	-	214	250	276	277	315	318	
Percentage changes	-	-	-	-	-	-	-	17	10	-	14	1		
Consumption	63	65	62	76	89	91		459	485	498	584	623	553	
Percent changes	3	-5	23	17	2			6	3	17	7	-14		
Percentage of world														
Output	-	-	-	-	-	-		1.0	1.1	1.2	1.1	1.2	1.1	
Consumption	1.0	1.0	0.9	1.0	1.1	1.1		2.3	2.3	2.2	2.4	2.4	2.0	
Exports, gross	-	-	-	-	-	-		34	41	45	51	58	55	
Imports, gross	62	64	61	76	89	91		268	276	269	350	380	304	
Exports-Imports	-62	-64	-61	-76	-89	-91		-234	-235	-224	-299	-322	-249	

Source: FAO, Fertilizers, an Annual Review of World Production, Consumption and Trade, 1960.

TABLE 79
Consumption and Output of Fertilizers of Main Consumer and Producer
Countries of Africa (by Region)..... in metric tons

	C=consumption O=output	1954/55	1955/56	1956/57	1957/58	1958/59	1959/60	Average
Nitrogenous Fertilizers								
Northern Region:								
UAR	C	111,196	122,586	115,210	157,345	177,074	105,773	131,524
	O	21,700	29,590	26,660	32,240	23,302	38,077	30,429
Sudan	C	10,524	9,801	14,824	15,760	16,680	13,277	13,477
	O	-	-	-	-	-	-	-
Algeria	C	9,500	(11,803)	(11,803)	12,338	13,572	(11,803)	11,803
	O	-	-	-	-	-	-	-
Morocco	C	5,388	6,102	4,413	4,135	7,499	6,520	5,676
	O	-	-	-	-	-	-	-
Total N	C	136,508	150,292	146,250	189,578	214,825	157,373	162,480
	O	21,700	29,590	26,660	32,240	34,302	38,077	30,429
Consumption - Output		114,908	120,702	119,590	157,338	180,523	99,296	132,051
Southern Region:								
Union of South Africa	C	25,609	25,946	23,751	30,187	36,113	43,517	30,854
	O	4,620	7,963	13,338	16,230	21,024	20,605	13,963
Rhodesia & Nyasaland, Fed. of	C	6,708	9,954	12,070	16,409	15,640	16,229	12,835
	O	-	-	-	-	-	-	-
Mauritius	C	6,428	(7,349)	7,666	7,335	6,457	8,863	7,349
	O	-	-	-	-	-	-	-
Total S	C	38,745	43,249	43,487	54,931	58,210	68,609	51,038
	O	4,620	7,963	13,338	16,230	21,024	20,605	13,963
Consumption - Output		34,125	35,286	30,149	37,701	37,186	48,004	37,075
Total N + S	C	175,353	193,541	189,737	243,509	273,035	205,982	206,391
	O	26,320	37,553	39,998	48,470	55,326	58,682	44,392
Total A (Africa)	C	186,000	203,000	202,000	260,000	290,000	230,000	228,500
	C	94	94	93	93	94	90	90
$\frac{N + S}{A} \times 100$	O	100	100	100	100	100	100	100

TABLE 79 (continued)

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	C=consumption O=output	1954/55	1955/56	1956/57	1957/58	1958/59	1959/60	Average
<u>Phosphate Fertilizers</u>								
Northern Region:								
UAR	C	15,000	20,558	23,688	27,494	27,676	24,990	23,234
	O	10,710	20,558	23,688	27,515	27,688	24,990	22,523
Algeria	C	27,000	(25,600)	(25,600)	24,200	(25,600)	(25,600)	25,600
	O	19,680	20,000	20,000	14,317	15,000	(17,799)	17,799
Tunisia	C	11,241	6,165	6,200	6,200	5,795	9,179	7,464
	O	32,300	40,020	43,000	47,850	59,981	62,039	41,081
Morocco	C	19,795	18,268	9,311	15,736	18,747	17,142	16,499
	O	17,300	16,453	8,774	13,892	18,746	15,682	15,141
Total N	C	73,036	70,591	64,799	73,630	77,818	76,911	73,000
	O	79,990	97,031	95,462	103,576	121,415	120,510	102,400
Consumption - Output		-6,954	-26,440	-30,663	-29,946	-43,597	-43,599	-29,400
Southern Region:								
Union of South Africa	C	112,639	119,051	142,826	132,428	134,811	132,124	128,980
	O	104,192	112,964	138,805	124,666	125,438	125,163	121,871
Rhodesia & Nyasaland, Fed. of	C	13,981	15,803	16,807	26,720	16,544	6,260	16,019
	O	-	-	-	-	11,953	-	11,953
Total S	C	126,620	134,854	159,633	159,148	151,357	138,384	144,999
	O	104,192	112,964	138,805	124,666	137,391	125,163	133,824
Consumption - Output		22,428	21,890	20,828	34,482	13,966	13,221	11,175
Total N + S	C	199,656	205,445	224,432	232,778	229,175	215,295	217,796
	O	184,182	209,995	195,559	228,240	258,806	227,874	230,368
Total A (Africa)	C	210,000	217,000	234,000	248,000	244,000	232,000	230,833
	O	187,000	211,000	235,000	229,000	260,000	259,000	230,000
$\frac{N + S}{A} \times 100$	C	90	95	96	94	94	93	94
	O	98	100	83	100	99	88	100
<u>Potash Fertilizers</u>								
Northern Region:								
Algeria	C	12,500	13,000	(17,035)	20,210	22,433	(17,035)	17,035
	O	-	-	-	-	-	-	-
Morocco	C	6,566	6,164	2,913	3,939	4,804	5,193	4,929
Total N	C	19,066	19,164	19,948	24,149	27,237	22,228	21,964
	O	-	-	-	-	-	-	-
Consumption - Output		19,066	19,164	19,948	24,149	27,237	22,228	21,964

TABLE 79 (continued)

	C=consumption O=output	1954/55	1955/56	1956/57	1957/58	1958/59	1959/60	Average
Southern Region:								
Union of South Africa	C	22,354	26,787	20,245	21,090	28,341	32,106	25,153
	O	636	675	551	-	-	-	620
Rhodesia & Nyasaland, Fed. of	C	12,065	9,161	8,110	14,201	16,042	12,867	12,074
	O	-	-	-	-	-	-	-
Mauritius	C	3,129	3,198	4,458	4,784	5,324	(4,178)	4,178
	O	-	-	-	-	-	-	-
Total S	C	37,548	39,146	32,813	40,075	49,707	49,151	41,405
	O	636	675	551	-	-	-	620
Consumption - Output		36,912	38,471	32,262	40,075	49,707	49,151	40,785
Total N + S	C	56,614	58,310	52,761	64,224	76,944	71,379	63,369
	O	636	675	551	-	-	-	620
Total A (Africa)	C	63,000	65,000	62,000	76,000	89,000	91,000	74,333
	O	636	675	551	-	-	-	620
$\frac{N + S}{A} \times 100$	C	90	94	85	84	86	79	86
	O	100	100	100	-	-	-	100

Figures in brackets are average figures replacing figures not available.

Source: Same as for Table 78

TABLE 80
Approximate Consumption and Production
of Fertilizers by Kinds.

	Consumption		Production	
	1958 or 1958/59	%	1958 or 1958/59	%
Nitrogenous Fertilizers				
Ammonium nitrate	104,623	36.5	6,314	6.0
Ammonium sulphate	78,608	27.4	14,710	19.0
Calcium nitrate	39,077	13.4	34,302	25.0
Urea	25,344	8.4	-	-
Other nitrogenous fertilizers	14,790	5.1	-	-
Ammonium sulphate nitrate	11,123	3.5	-	-
Sodium nitrate	9,630	3.3	-	-
Complex fertilizers	670	2.2	-	-
Calcium cyanamide	65	0.2	-	-
Total	283,930	100.0	55,326	19.5
1958/59 actual total	290,000		55,326	
Phosphate Fertilizers				
Single superphosphate	175,310	82.7	195,088	11.3
Other phosphate fertilizers	15,487	6.8	-	-
Basic slag	11,375	4.8	2,249	200
Concentrated superphosphate	8,402	4.0	61,469	730
Complex fertilizers	355	1.7	-	-
Total	210,929	100.0	258,806	12.3
1958/59 actual total	244,000		260,000	
Potash Fertilizers				
Muriate over 45% K ₂ O	39,738	67.0	-	-
Potassium sulphate	11,170	18.9	-	-
Other potash fertilizers	7,809	13.2	-	-
Complex fertilizers	381	0.6	-	-
Crude Potash salts up to 20% K ₂ O	124	0.3	-	-
Total	59,222	100.0	-	-
1958/59 actual total	89,000			

% Per cent of total consumption (third column).

% Per cent of production to consumption (fifth column).

Source: Same as for table 78,

TABLE 81

Chemical Industry Production in the UAR, Cameroon, Congo (Leop) and Kenya

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	Unit	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961 ^{a)}	Capacity
UAR (1)												
Inorganic Chemicals												
Sulphuric acid	1,000 tons	55	55	55	63	70	80	83	93	103	103	
Caustic soda	"	3	2	2	2	2	3	3	4	4	21	
Carbon disulphate	"	1	2	2	3	3	3	3	4	4	4	
Sodium sulphate	"	3	3	2	10	8	10	6	10	4	4	
Sodium silicate	"	2	1	2	3	2	3	3	2	3	3	
Sodium hypochl.	"	4	4	3	4	5	6	9	11	9	9	
Potassium hypochl.	"	3	4	5	6	6	7	6	6	11	11	
Carbon dioxide	"	2	2	2	2	2	2	2	2	2	2	
Oxygen	1,000 m ³	1,233	1,234	1,081	1,620	1,563	1,635	1,820	1,953	2,200	2,400	
Organic Chemicals												
Acetylene	1,000 m ³	300	327	294	340	411	415	428	465	500	560	
Glycerine	tons	550	884	1,172	1,618	1,274	1,700	1,800	2,000	2,000	2,000	
Pigments, paints etc.												
Paints and polishes	1,000 tons	1	1	1	2	2	3	3	3	4	5	
Medicinal and Pharmaceuticals												
Drugs	tons	-	500	700	900	1,100	1,300	1,500	1,700	2,000	2,000	
Perfumery, cosmetics etc.												
Soap	1,000 tons	63	56	65	90	72	74	75	70	72	80	
Detergents	tons	400	548	864	1,206	987	1,958	1,967	2,153	2,200	2,200	
Fertilizers												
Superphosphate	1,000 tons	106	68	108	137	157	178	179	167	190	190	
Potassium nitrate	"	111	115	159	191	172	208	220	246	255	270	
Nitrate of ammonia	"	-	-	-	-	-	-	-	-	75	75	
Miscellaneous												
Plastic products	1,000 tons	1	1	1	1	2	2	1	1	2	2	
Insecticides	tons	-	-	300	400	500	700	1,100	5,000	5,100	5,100	
Glue	1,000 tons	1	1	1	1	1	1	1	1	1	1	

Source: (1) Statistical Pocket-Book of the United Arab Republic (1952-61)

TABLE 81 (continued)

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Chemical Industry Production in the UAR, Cameroon, Congo (Lec.) and Kenya

	Unit	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961 ¹	Capacity
Cameroon (2)												
<u>Inorganic Chemicals</u>												
Oxygen	m ³											200,000
<u>Organic Chemicals</u>												
Acetylene	m ³											60,000
<u>Perfumery, Cosmetics etc.</u>												
Soaps	tons											9,300
Congo (Leopoldville) (3)												
<u>Inorganic Chemicals</u>												
Sulphuric acid	tons					117,000	122,751	126,638	114,861			
Oxygen	m ³					1,004,144	1,024,216	1,119,727	928,813			
Carbon dioxide	tons					290	59	692	961			
<u>Organic Chemicals</u>												
Industrial glycerine	tons					408	501	587	665			
Acetylene	tons					101	102	101	87			
<u>Pigments, paints etc.</u>												
Colours	tons					4,572	5,831	4,023	3,789			
Varnishes	tons					38	52,000P))			
<u>Perfumery, Cosmetics etc.</u>												
Soaps	tons					23,005	25,371	27,685	27,464			
Perfumery	tons					288	194	188	189			
<u>Explosives</u>												
Powder and explosives	tons					2,861	2,988	2,688	3,141			
<u>Miscellaneous</u>												
Insecticides	tons					900	900	650	568			
Plastic materials	tons					116,000P	91					

Sources: (2) Rapport sur les possibilités de développement industriel du Cameroun, January 1960.

(3) La situation économique du Congo Belge et du Ruanda-Urundi.

TABLE 81 (continued)

Chemical Industry Production in the UAR, Cameroon, Congo (Leo) and Kenya

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	Unit	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961 ^{a/}	Capacity
Kenya (4)												
<u>Inorganic Chemicals</u>												
Soda ash	tons			105,000		145,000	133,000					
Carbon dioxide	tons			600		700	700					
Sodium silicate & phosphate (sale)	£					21,000	37,000					
Oxygen												
<u>Organic Chemicals</u>												
Acetylene												
<u>Dyeing and tanning extracts</u>												
Wattle extract	tons			26,000		26,000	25,000					
<u>Medicinal and Pharmaceuticals</u>												
Pharmaceutical products (sales)	£					119,000	153,000					
Vaccines (sales)	£					...	32,000					
<u>Perfumery, Cosmetics etc.</u>												
Hair oils and perfumers (sales)	£					19,000	19,000					over
Soaps	tons						9,000					1,900
Fertilizers	tons			...		3,200	5,000					
<u>Miscellaneous</u>												
Insecticide (sales)	£					...	192,000					

Source: (4) Kenya Survey of Industrial Production, 1957

a/ Provisional

TABLE 82

E/CN.14/INR/1 Existing and Planned Fertilizer Plants in the UAR, Tunisia, Morocco and Sudan
Page 198

Name of Plant	Location	Year of Est.	Products	Capacity
<u>UAR^{a/}</u>				
Egyptian Chemical Industries (KIMA)	Aswan	1960	Calcium ammonium nitrate (20.5%N)	1,600 t/d (316,000 t in 1961)
El Nasr for Fertilizers and	Suez	1951	Calcium nitrate (15.5%N) Nitric acid (95-99%)	270,000 t/y 1,500 t/y
Abu Zaabal & Kafer-El-Zayat Fertilizers & Chemical Co.	Abu-zaabal	1963 1948	Ammonium sulphate Calcium superphosphate	100,000 t/y 200 t/d (61,000 t/y in 1961)
The Egyptian Finance and Industry Company	Kafer El Zayat	1937	Superphosphate	120,000 t/y
Assiut Fertilizer Plant	Assiut	1965	Superphosphate	200,000 t/y
Helwan Plant	Helwan	1965	Ammonia Calcium ammonium nitrate	170 t/d 600 t/d
<u>Tunisia^{a/}</u>				
SIAPE	Sfax	1951	Triple superphosphate (45% P ₂ O ₅)	120,000 t/y
RENO	Sfax		Hyperphosphate	60,000 t/y
FORENAND	Sfax	1963	Triple superphosphate	120,000 t/y
ICM	Chekera	1964	Ammonia Ammonium phosphate Urea	150 t/d 100,000 t/y 35,000 t/y
Potash Plant	Zarzio	1963	Potash	5,000 t/y

^{a/} Information supplied to the secretariat by governments

TABLE 82 (continued)

Existing and planned Fertilizer Plants in the UAR, Tunisia, Morocco and Sudan

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Name of Plant	Plan for Extension	By-products	Raw materials	Remarks
UAR ^{a/}				
Egyptian Chemical Industries (KIMA)	380,000 t in 1962	$\text{NaO H}_1\text{O}_2 \text{ HCl}$	Air, water limestone	Production of heavy water and CaC_2 planned
El Nasr Far Fertilizers and Chemical Industries	. . . .	. . . .	Refinery gas, limestone	160,000 t/y amm. nitrate 258,000 t/y Ca. nitrate 110,000 t/y Ammonia 150,000 t/y amm. sulphate
Abu Zaabal and Kafer-El-Zayat Fertilizers and Chemical Co.	New H_2SO_4 unit in 1962 106,000 t/y in 1962	Oleum	Phosphate rock imported pyrite	units under study
The Egyptian Finance and Industry Company	New H_2SO_4 unit in 1962		phosphate rock imported pyrite	
Assiut Fertilizer Plant			Phosphate rock imported pyrite	
Helwan Plant				
Tunisia ^{a/}				
SIAPÉ	160,000 t/y in 1962/63	Phosphoric acid	Phosphate rock imported sulphur	
RONO			Phosphate rock	80-90 % for export
FORENADE			Phosphate rock	90 % for export to imported sulphur Algeria and Libya
ICM			Phosphate rock Crude oil	
Potash Plant			Sylvite	Pilot Plant

^{a/} Information supplied to the Secretariat by Governments.

TABLE 82 (continued)

Existing and Planned Fertilizer Plants in the UAR, Tunisia, Morocco and Sudan

Name of Plant	Location	Year of Est.	Products	Capacity
<u>Morocco</u> ^{a/}				
Societe Cherifienne d'Engrais et de Produits chimiques	Casablanca	. . .	Superphosphate	150,000 t/y
Electro-Mechanica	Tetauan	. . .	Phosphate bicalcio	2,000 t/y
Societe Marocaine des Engrais Pulverises	Safi and Berrechid	. . .	Hyperphosphate	100,000 t/y
Safi Complex	Safi	1963/64	Granulated triple superphosphate (48 % P ₂ O ₅)	200,000 t/y
			Ammonium phosphate (11-18 % N) (48-55 % P ₂ O ₅)	100,000 t/y
			Ammonium sulphate	50,000 t/y
<u>Sudan</u> ^{b/}				

^{a/} Information supplied to the Secretariat by Governments

^{b/} Africa Trade and Development, London, July 1962

TABLE 82-(continued)

E/CN.14/11P.1
Page 201Existing and Planned Fertilizer Plants in the UAR, Tunisia, Morocco and Sudan

Name of Plant	Plan for Extension	By-Products	Raw Materials	Remarks
<u>Morocco</u> ^{a/}				
Societe Cherifienne d'engrais et de Produits Chimiques	. . . .	. . . .	Phosphate rock	Working below capacity (less than 50 %)
Electro-Mechanica	3,000 t/y in 1962/63	. . . .	Phosphate rock pyrite	60 - 70 % for export
Societe Marocaine des engrais pulverises	. . . .	. . . .	. . . .	. . . .
Safi Complex	Capacities to be doubled in due course	. . . .	Phosphate rock pyrite	50 % for export
<u>Sudan</u> ^{b/}	. . . .	. . . .	. . . .	Government gave consent for the establishment of fertilizer plants

^{a/} Information supplied to the Secretariat by Governments^{b/} Africa Trade and Development, London, July 1962

TABLE 83

Productions and Reserves of Raw Materials

	1948	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	Reserve
<u>Coal</u>												Tons
(thousand metric tons)												
Algeria	226	247	269	295	303	302	297	236	153	122	119	20,000,000
Congo (Leop.)	117	218	253	315	379	480	420	433	294	267		50,000,000 to several million
Morocco	290	394	460	565	486	467	482	521	510	465	410	100,000,000
Mozambique	9	78	115	162	142	172	218	270	248	257		700,000,000
Nigeria	615	560	530	711	646	761	800	828	940	754		16.5 to 300,000,000
Southern Rhodesia	1696	2300	2559	2618	2748	3315	3554	3853	3535	3758		67,000,000 to 5 billion
Tanganyika	-	-	-	-	1	1	1	1	1	2		216 to 420,000,000
Union of S. Africa	24017	26632	28065	28459	29315	32147	33602	34769	37085	36453		75,000 to 200,000 million
Bechuanaland												large
UAR												40,000,000
Madagascar												50 to 60,000,000
Tunisia (lignite)		8	-	-	-							
Madagascar		6	4	5	1							
<u>Natural Gas</u>												
(million of m ³)												
Morocco	-	-	-	4	8	8	7	3	2	4		
Tunisia	-	-	-	-	1	4	6	6	6	6		200 to 300,000,000
Algeria												8000,000,000,000
U. of S. Africa (mill. ft ³)		13	12									
Cameroun												14,000,000,000
Nigeria												large
Gabon												large
<u>Crude Petroleum</u>												
(thousand metric tons)												
Algeria	-	7	46	85	75	57	33	20	448	1329	10300	500,000,000
Angola	-	-	-	-	-	-	9	10	51	51		
Gabon	-	-	-	-	-	-	-	173	505	753		37.5 billion barrels
Morocco	13	76	101	103	118	103	97	75	74	95	92	14,000,000 "
Nigeria	-	-	-	-	-	-	-	1	256	547		great
Union of S. Africa	40	36	36	37	34	37	48	37	...	...
UAR	2092	2591	2629	2690	2278	1819	1756	2397	3185	3093		72,000,000
Libya (50,000 ton												50 billion barrels
Congo (Braz.) (in 1960, 100,000 ton in 1961				estimated								

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	1948	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	Reserve Tons
<u>Sulphur</u> (thousand metric tons)												
Algeria - (pyrite) from pyrite	14	32 13	25 10	30 13	34 15	10	2	8	11	13		
Morocco -- (pyrite) from pyrite	-	2 1	2 1	2 1	1.6 1	1	1	2	7	...		
S. Rhodesia-from pyrite	5	12	8	16	16	8	7	8	22	15		
U. of S.Africa-from pyrite	15	14	14	37	88	140	172	162	208	198		
<u>Sulphuric Acid</u> (thousand metric tons)												
Algeria	...	49	42	37	48	47	34	40	39	34		
Congo (Leop.)	25	43	54	61	84	112	117	123	127	...		
Morocco	20	32	33	30	38	35	20	30	42	35		
UAR	...	47	44	40	57	73	80	89	...	...
Union of S. Africa							214					
<u>Nitric Acid</u> (thousand metric tons)												
Canary Is.	0.1	0.1	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.3		
Mexico	...	...	0.4	0.8	1.1	2.0	...	...	...	...
<u>Phosphate</u> (thousand metric tons)												
Algeria	671	777	703	619	774	752	610	613	565	531	548	1,016,000,000
Madagascar	...	...	1	2	1	3	3	3	5	7		
Morocco	3226	4717	3953	4156	5020	5328	5522	5567	6538	7027	7500	1,000,000,000 over 100,000,000
Senegal	-	1	21	42	5	8	5	-	-	...		
Seychelles	22	4	11	9	12	1	4	6	17	6		
South West Africa	...	1	2	2	1	2	-	3	-	1		
Tunisia	1864	1679	2265	1719	1823	2200	2077	2067	2280	2200	2100	1,500,000,000
Uganda	...	2	5	5	3	3	3	3	3	3		
Union of South Africa	40	82	97	80	95	136	157	169	216	232		
UAR	300	501	478	443	535	626	615	586	558	679		179,000,000
Togo												50,000,000 less than 1,000,000

TABLE 83 (continued)

1948 1951 1952 1953 1954 1955 1956 1957 1958 1959 1960																Reserve
Phosphate (cont'd)																Tons less than 1,000.
Nigeria Gabon Kenya Uganda																
Gypsum/anhydrite (thousand metric tons)	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	
Algeria	28	38	33	-	41	52	86									Extensive
Angola	-	1	...	...	...	-	...						
Tanganyika (exports)	-	-	-	-	-	-	0.5									
Tunisia	9	17	19	22	23	24	23									
UAR	77	71	94	...	...	...	...					
Union of S. Africa	65	79	83	88	115	120	145									6.5 - 30 million/ 400,000 considerable
Somalia																
Morocco	15	17	30	15	0.6	-	8									Considerable
Libya																
Potash																3,000,000 K ₂ O
Ethiopia																

Sources: Table compiled from many publications some of which are:

1. Bateman, Alan M., Economic Mineral Deposits, 2nd edition, John Wiley & Sons, Inc., N.Y., 1956.
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4. Carlson, Albert S., Economic Geography of Industrial Materials, Reinhold Publishing Corporation, N.Y., 1956.
5. Statistical Summary of the Mineral Industry (1946-1952), Her Majesty's Stationery Office, London, 1954.
6. World Petroleum Report (1960), Vol. VI, Mona Palmer Publishing Co. Inc., 1960

TABLE 84

E/CN.14/TP.1
Page 205Petroleum Refineries Planned or Under Construction

(Excluding existing refineries in Egypt, Morocco, Angola & the Rep. of South Africa)

Country	Capacity (tons)	Location	Year of Completion	Comment
Kenya		Mombasa	1963	
Fed. of Rhodesia & Nyasaland		Feruka	1963	
Liberia				Agreement signed
Ghana	1,200,000-2,000,000	Tema	1963	Contract awarded to Agip
Rep. of South Africa	3,000,000	near Durban	1963	
Tunisia	1,000,000	La Skehirra		To be built
Algeria	2,500,000	Maison Carree (near Algiers)	July 1963	To be built
Nigeria	1,000,000	Port Harcourt	1963-1964	Planned
Libya	1,500,000	Marsa el Braika		Under construction
Morocco	1,200,000			To be constructed
Sudan				Talks with Agip completed
Senegal	2,000,000	Near Dakar		Construction to start soon (2/1/61)
Ethiopia	500,000	Assab		Planned
Mozambique	500,000	Lingamo/Matola ?	1960	Put in commission
Madagascar				Possibility being studied (21/10/61)
Morocco		Mohammedina		In operation
Rep. of S.Africa (Sasol)		Sasolburg		To double its present production (oil from coal)
Angola	500 t/d	Launda		In operation
UAR (Egypt)				2 ref. at Suez & 1 at Alexandria cap. to be raised to 6.5 m by 1963

Sources: 1959, 60 and 61 issues of the following publications:

1. African Economic Newsletter, Johannesburg
2. African World, London
3. African Trade and Development, London
4. The Economist Intelligence Unit Ltd. London

Textiles

319. 2,500 million square yards of textiles - cotton, wool, rayon and synthetics - constituted the African market in 1948. By 1960, this figure had expanded to over 4,300 million yards, or a rise of 74 %. Expansion has occurred in a series of uneven steps and, as may be seen below, it has been a case of two or three steps forward and one step backward.

TABLE 85
Total Market for Textiles

Year	million sq. yards	Index
1948	2,476	100
1949	2,730	110
1950	2,755	111
1951	3,159	128
1952	3,078	124
1953	3,322	134
1954	3,816	154
1955	3,839	155
1956	3,774	152
1957	4,362	176
1958	4,168	168
1959	4,119	166
1960	4,314	174

Source :

FAO regularly publishes figures of fibre consumption, exports and imports. These figures are available country-wise, in kilograms and tons, for most countries up to 1958 and for a smaller number of countries up to 1960. Regional totals are available up to 1960. These figures were converted into yardage by applying the FAO standard ratios, ignoring the small quantity (in Africa) of fibres going into non-cloth uses. With this as the basis, all other statistical material has been worked out independently at ECA.

The African totals of FAO and ECA figures (if these were re-converted) will not tally because FAO's definition of Africa excludes UAR, Sudan and Libya.

320. This large and growing market offers a convenient starting point for a somewhat more detailed statement of the textile situation in Africa:

321. How is the over-all growth of supplies reflected in terms of per capita availability of supplies? The answer to this question divides itself into two periods : 1948 to 1954 and 1955 to 1960. During the first of these periods per capita consumption (or availability of supplies) increased more or less steadily. If per capita incomes in Africa are assumed to have expanded by 3 to 4 % a year, then fabric consumption can be recorded as having increased more than pari passu. (At the 3 % rate of per capita income growth, income elasticity of demand would be almost 2, and the 4 % rate of growth, it would work out to 1.5). Translated into projections over succeeding years, this high income elasticities would hold phenomenal rates of growth in over-all textile requirements

322. Yet the succeeding period, 1955 to 1960, provides a contradiction.

TABLE 86

Per Capita Availability of Textile Supplies in Africa

Year	sq. yards	Year	sq. yards
1948	12.59	1955	17.07
1949	13.74	1956	16.50
1950	13.61	1957	18.75
1951	15.30	1958	17.33
1952	14.59	1959	16.71
1953	15.44	1960	17.02
1954	17.35		
1954 as		1960 as	
per cent		per cent	
of 1948.....136.7		of 1955.....99.7	

Source : See Table 85

323. Interpretations of a purely arithmetical kind do not have to be drawn in order to see that the experiences of the two periods are different and that more recent years have seen a drastically lower fabric response to upward increase changes than was true of the earlier period.

324. The African consumer is predominantly a buyer of cotton textiles, followed by rayon, wool and synthetics, in that order. This order has remained more or less intact over the years 1948-1960, but the emphasis inter se has changed considerably, as will be seen below :

TABLE 87
Distribution of the African Market between Different Textiles

Year	Total (in million square yards)				
	market	Cotton	Wool	Rayon	Synthetics
1948	2,476	2,159	146	171	-
1955	3,839	2,867	135	820	18
1960	4,314	3,169	117	942	86
Change in 1960 over 1948	+ 1,838	+ 1,010	- 29	+ 771	+ 86

Source : See Table 85

325. Out of every 100 yards sold in Africa in 1948, 87 were made of cotton; but in 1960, cotton's share had come down to 73 yards. The main reason for this shrinkage is the dramatic increase in the proportion of rayon fabrics, from 7 % in 1948 to 22 % in 1960. The decline of wool has been both absolute and proportional. Synthetic fibres constitute a small (2 %) but rapidly rising category.

326. These wide disparities in intra-textiles trends have to be considered in the formulation of any projection of the market in 1970.

327. Table 88 indicates how these intra-textiles trends have shaped in the context of per capita consumption standards.

TABLE 88
Per Capita Consumption (in square yards)

Cotton	Wool	Rayon	Synthetics	Total
11.06	0.75	0.88	-	12.69
11.84	0.66	1.23	-	13.74
11.14	0.58	1.89	-	13.61
12.23	0.71	2.36	-	15.30
12.15	0.61	1.83	-	14.59
12.30	0.63	2.50	-	15.44
13.33	0.65	3.30	0.07	17.35
12.75	0.60	3.65	0.08	17.07
11.74	0.59	4.02	0.12	16.50
12.63	0.59	5.32	0.21	18.75
12.37	0.52	4.16	0.28	17.33
12.35	0.47	3.63	0.27	16.71
12.50	0.46	3.72	0.34	17.02

Source : See Table 85

328. The preponderance of cotton, with qualifications, is clearly brought out; at the same time it is obvious that wool can hardly hope to be a major fibre. Rayon fabrics, have expanded most rapidly but having completed the great spurt forward are stabilising at a level significantly lower than the highest level attained (1957 : 28 %). Synthetic fibres, a late entrant, maintained a rapid pace of increase.

329. The broad facts established, attention can now be focussed on some country characteristics : per capita consumption levels and the role of different kinds of fibres in making up the over-all consumption level.

330. Information for some 33 countries (sometimes clusters of countries) for 1960, which together account for between 97 and 98 % of the total African market is presented in Table 89.

TABLE 89

Size of the Textile Markets in Africa - 1960

Country	Rank	Size of Home Market (million yards.)
UAR	1	845
South Africa	2	740
Nigeria	3	429
British East Africa	4	273
Morocco	5	221
Algeria	6	204
Sudan	7	189
Ghana	8	185
Rhodesia	9	177
Congo and Nyassaland	10	161
Ethiopia and Eritrea	11	125
French West Africa	12	114
Tunisia	13	90
Angola	14	67
Ivory Coast	15	58
Mozambique	16	57
Madagascar	17	56
Cameroon	18	51
Former French Eq. Africa	19	46
Sierra Leone	20	41
Libya	21	22
Mauritius	22	16
Somalia	23	15
Gambia	24	14
Seychelles	25	9
Port. Guinea	27	9
Togoland	28	8
British Somaliland	28	8
Reunion	29	7
Cape Verde Islands	30	2
Sao Tomé and Príncipe	30	2

Source : See Table 85

331. The largest textile markets of Africa are to be found in the UAR, South Africa, Algeria, British East Africa and Morocco, in that order. Taken together, these five areas comprise some 58 % of the total market. At the other end of the spectrum, there are a dozen countries with an individual market varying between 2 and 16 million yards which together account for less than 3 % of the total market.

332. Each country-market however, is not a replica of the relative fibre positions as seen in the aggregate. In the Republic of South Africa 53.5 % of the fabric-yardage is derived from cotton, while the continental average is 73.4 %. Against this may be juxtaposed the further fact that it consumes a larger proportion of all other fabrics - 4.5 % of wool compared to 2.7 % for Africa; 36.6 % of rayon compared to 21.85 %; and 5.3 % of synthetics as compared to 2.0 %. There are at least 10 markets where the proportion of cotton exceeds 90 % and in several cases it reaches 100 %.

333. For rayon, the most dynamic growth-fabric of the period under review, the country proportions vary from nil (in Somalia and British Somaliland) to 44.1 % in Rhodesia and Nyasaland.

334. The maximum share of wool in any African country does not rise beyond 10.1 % and is nil or negligible in more than half of the countries for which data have been presented.

335. Synthetics have the lowest ceiling of all fibres as yet and have a mixed record, varying from nil and negligible to 8.8 %.

336. This wide assortment is of course a compound of many factors - income, climate, habits and lack of habits.

TABLE 90
Size of Home Market - 1960 (in million yards)

Country	Cotton	Wool	Rayon	Synthetics	Total
Republic of South Africa	39.6	33.5	271	39.0	740
UAR	74.3	18.7	82	1.1	845
Gambia ^{b/}	10.1	-	4	-	14
Ghana	13.9	2.3	44	-	185
Zanzibar and Pemba ^{b/}	0.6	-	4	-	10
Libya ^{a/}	1.7	0.3	5	-	22
Mauritius ^{a/}	1.1	0.3	4	0.2	16
Sao Tomé and Príncipe ^{b/}	0.2	-	-	-	2
Reunion ^{a/}	0.5	0.04	2	-	7
Algeria	10.3	20.7	70	10.4	204
Tunisia	5.9	9.0	22	0.3	90
Morocco	11.6	7.0	78	19.5	221
Seychelles ^{a/}	1	-	-	-	1
Sierra Leone	3.5	0.4	6	-	41
Rhodesia and Nyassaland	9.6	3.0	78	1.3	177
Madagascar	4.0	0.4	11	4.3	56
Sudan	16.6	0.4	23	-	189
Port. Guinea ^{b/}	9	-	-	-	9
Former Fr. West Africa	10.4	0.01	5	5.4	114
Congo (Leo)	13.4	8.2	19	-	161
Nigeria	31.7	3.9	106	2.4	429
Angola	5.4	0.8	12	-	67
Former Br. East Africa	19.9	5.1	68	0.6	273
Cape Verde Islands ^{a/}	0.2	-	0.2	-	2
Br. Somaliland ^{a/}	0.8	-	-	-	8
Cameroon ^{b/} (Fr.)	4.1	0.3	8	1.6	51
Liberia ^{b/}	1.1	0.04	1	-	12
Mozambique	5.2	0.6	4	-	57
Ethiopia and Eritrea	11.3	4.3	7	0.3	125
Former Fr. Eq. Africa	37	-	9	0.2	46
Somalia ^{a/}	15	-	-	-	15
Togoland ^{a/}	0.8	-	-	-	8
Ivory Coast	4.5	0.04	13	-	58
Africa ^{c/}	3169 (3094)	116.6 (118.3)	942 (956)	86 (866)	4314 (4255)

Source : See Table 85

^{a/} 1957 data

^{b/} 1958 data

^{c/} totals in brackets relate to the countries listed.

TABLE 91

Distribution of Home Market between different fabrics, 1960

Country	Cotton	Wool	Rayon	Synthetics	Total
Republic of South Africa	53.5	4.5	36.6	5.3	100 %
UAR	87.9	2.2	9.7	0.1	100 %
Ghana	75.1	0.1	23.8	-	100 %
Gambia	71.4	-	28.6	-	100 %
Zanzibar and Pemba	60.0	-	40.0	-	100 %
Libya	77.2	0.1	22.7	-	100 %
Mauritius	70.5	1.9	25.6	1.3	100 %
Sao Tomé and Príncipe	100.0	-	-	-	100 %
Reunion	71.4	-	28.6	-	100 %
Algeria	50.5	10.1	34.3	5.1	100 %
Tunisia	65.6	10.0	24.4	0.3	100 %
Morocco	52.5	3.2	35.3	8.8	100 %
Seychelles	100.0	-	-	-	100 %
Sierra Leone	85.4	0.1	14.6	-	100 %
Rhodesia and Nyasaland	54.2	1.1	44.1	0.7	100 %
Madagascar	71.4	0.7	19.6	7.7	100 %
Sudan	87.8	0.2	12.2	-	100 %
Port. Guinea	100.0	-	-	-	100 %
Former Fr. West Africa	91.2	-	4.4	4.7	100 %
Congo (Leo)	83.2	5.1	11.8	-	100 %
Nigeria	73.9	0.9	24.7	0.6	100 %
Angola	80.6	1.2	17.9	-	100 %
Former Br. East Africa	72.9	1.9	24.9	0.2	100 %
Cape Verde Islands	90.1	-	9.9	-	100 %
Br. Somaliland	100.0	-	-	-	100 %
Cameroon (Fr.)	80.4	0.5	15.7	3.1	100 %
Liberia	91.7	-	8.3	-	100 %
Mozambique	91.2	1.1	7.0	-	100 %
Ethiopia and Eritrea	90.4	3.4	5.6	0.2	100 %
Former Fr. Eq. Africa	80.4	-	19.6	0.4	100 %
Somalia	100.0	-	-	-	100 %
Togoland	99.6	-	0.4	-	100 %
Ivory Coast	77.6	-	22.4	-	100 %

Source : See Table 85

337. Discussion hitherto has freely used the unsatisfactory measure of per capita figures and it will be difficult to avoid using these further. But as country-wise data in per capita terms are approached, it should be clearly realised that the mere addition of numbers may be extremely misleading in individual cases. Likewise, the methods of arriving at fabric yardages are generally satisfactory, but could lead to absurd results in some specific context. It is worth remembering that in several cases very small areas are being compared with much larger ones, and it is likely even probable, that the larger country with a nationally low figure will have many individual areas where the rates are much higher. Per capita figures, by definition, give no idea of the pattern of distribution within the country. In any case what is being dealt with is an abstraction - yardage alone gives no idea whatever of the quality of price of cloth.

338. Table 92 gives details of per capita availability of cloth for 33 countries for 1958 and where available also for 1959.

339. The obvious conclusion from reading this table is the wide variation in per capita consumption levels - from 5 to 8 yards on the bottom rungs of the ladder to 35 to 43 yards on the uppermost.

340. These are higher in the countries of North Africa, whereas in West Africa, and East and South Africa, countries can be found at all levels of per capita availability.

341. Some significance lies in the year-to-year variation in the per capita availability in the countries for which data are available for both 1958 and 1959. To average the results would be convenient but would conceal these characteristic variations.

342. On the other hand, a mere commercial fluctuation, uncorrected for changes in stocks, could lead to quite erroneous conclusions about the rate of growth.

TABLE 92

Per Capita Availability of Cloth
(in square yards)

COUNTRY	1958	1959	1960
Republic of South Africa	43.4	41.7	
UAR	38.3	34.0	
Gambia	37.4	...	
Ghana	35.7	33.2	
Zanzibar & Pemba	27.2	...	
Libya	23.8	...	
Mauritius	23.8	...	
Sao Tome & Principe	23.0	...	
Reunion	22.1	...	
Algeria	21.3	20.4	
Tunisia	20.4	24.7	
Morocco	19.6	20.4	
Seychelles	18.7	...	
Sierra Leone	17.0	16.2	
Rhodesia & Nyasaland	16.2	18.7	
Madagascar	15.3	12.8	
Sudan	14.5	14.5	
Port Guinea	13.6	...	
Former Fr. West Africa	13.6	14.5	
Congo (Léopoldville)	12.8	10.2	
Nigeria	12.8	11.9	
Angola	12.8	13.6	
Former Br. East Africa	11.9	11.9	
Cape Verde Islands	11.9	...	
British Somaliland	9.4	...	
Cameroon (Fr.)	7.6	16.2	

TABLE 92 (continued)

	1958	1959	1960
Liberia	7.6	...	
Mozambique	7.6	8.5	
Ethiopia & Eritrea	7.5	6.0	
Former Fr. Eq. Africa	7.6	...	
Somalia	5.9	...	
Togoland	5.1	...	
Africa	17.33	16.71	17.02

Source: See Table 85.

343. This section vaguely attempts to explore the relationship between per capita incomes and levels of fabric consumption. Per capita income data are juxtaposed in Table 93 against data regarding per capita cloth availability. The data for income pertain to 1956 or 1957 and the data for cloth availability relate to 1958.

344. The correlation between consumption standards and per capita income becomes apparent. But the nature and the extent of it is not always clear. Thus, taking the two cases of highest per capita consumption, the Republic of South Africa and UAR, we find that even though per capita income in UAR is only one-third of that of the Republic of South Africa, cloth consumption levels differ by only 10 per cent. At this other extreme, Gambia with one of the lower per capita incomes has a cloth consumption exceeded only the Republic of South Africa and UAR.

345. This divergence underlines the need to check patterns of country consumption, instead of merely relying on broad, aggregative continental considerations.

TABLL 93

Relationship Between Per Capita Cloth Consumption Levels
and Per Capita Incomes

Country	Cloth Consumption in sq. yards	Rank	Income (US \$)	Rank
UAR	38.3	2	109	10
Rep. of South Africa	43.4	1	346	1
Gambia	37.4	3	56-70	15
Ghana	35.7	4	194	4
Zanzibar	27.2	5	98-126	11
Mauritius	23.8	6	232	2
Algeria	21.3	7	221	3
Tunisia	20.4	8	176	66
Morocco	19.6	9	191(5)	5
Sierra Leone	17.0	10	70	13
Rhodesia & Nyasaland	16.2	11	132	8
Madagascar	15.3	12	119	9
Congo (Leopoldville)	12.8	13	76	12
Nigeria	12.8	14	69	14
Former Br. East Africa	11.9	15	48-78	16
Cameroons (Fr.)	7.6	16	142	7
Ethiopia	7.6	17	30	17

Source: UN Economic Survey of Africa Trade 1950.

346. The bulk of textile supplies for Africa has come and still comes from non-domestic sources. The importance of domestic manufacture has increased rapidly but only sometime in the mid-sixties or later are domestic producers likely to supply the major part of the market. A broad, picture of past developments is indicated below:

TABLE 94
African Production of Textiles and
the Total Size of the Market
(in million square yards)

	1958	1955	1960
Home production	601	1,205	1,739
Total market	2,476	3,839	4,314
Home proportion as % of total market	27.5%	31.4%	40.3%

Source: See Table 85.

347. Notwithstanding a remarkable expansion in domestic output, indigenous producers supplied less than three-fifths of the increase in the market over the period 1948 - 1960.

348. As is to be expected, the aggregate position varies from one kind of textiles to another, as shown in Table 95.

TABLE 95
Proportion of Market Supplies Produced at Home

	1948	1955	1960
Cotton	29%	37%	49%
Wool	41%	52%	71%
Rayon	nil	7.5%	9%
Synthetic Fibres	nil	nil	4%

Source: See Table 85.

349. The main increase in domestic production has taken place in cotton and wool.

350. In country-wise terms, the UAR^{1/} is almost the only one which produces almost all of its cotton, wool and rayon fabric requirements. Substantial domestic production of textiles exists in several other countries - Algeria, Congo (Leopoldville), Ethiopia and Eritrea, British East Africa, Nigeria, South Africa. In most countries there is some production of textiles, usually of cotton. But the general situation outside of the UAR is one of over-all dependence on imports, less in the case of cotton, but almost complete in the case of rayon and synthetic fabrics.

351. Considerable expansion programmes in the equipment of African textile industries are under way, but even so it would appear that the ratio of planned domestic production to total requirements is inadequate.

352. Any over-all projection in the area of textiles must assess three directions of change: the rate of population increase; the rate of income growth per capita; and the nature of the anticipated quantitative response in relation to the growth in per capita income and other factors.

353. It has been assumed that the continent's population in 1970 will be 325 million as compared to the FAO's estimate of 253.5 million for 1960. Income growth, per capita, is placed at between $3\frac{1}{2}$ to 4 per cent a year, or 40 to 45 per cent (approximately) over the period 1960-1970.

354. It was seen earlier that there is no clear, single approach to the matter of the quantitative response of fabric consumption to income and other factors. Nonetheless, it cannot be as high as it was in 1948 - 1954; and cannot possibly be as low as it was in 1955 - 1960. The low per capita levels obtaining at present would preclude the latter, even if cross-section elasticities from budget inquiries could be ignored as unrealistic when applied over a time-series. Cross-section elasticities are generally concerned with the income-elasticity of the expenditure on

^{1/} The UAR is also the only considerable exporter of textiles in Africa.

clothing rather than on cloth expressed in yards (and not as expenditure, which brings in the effects of the levels of prices paid by consumers in different socio-economic brackets). If one were to assume that the African consumer will buy better (higher-priced) cloth as his income rises, it would follow that he would buy less cloth, in terms of yardage. The prima facie evidence seems to be in the direction of a more expensive (per yard) product-mix of textiles.

355. In the light of these considerations - the present low level of per capita consumption, the trend towards a more expensive (i.e. better) product-mix, and the drastic slowing down of the consumer's quantitative response during recent years - it might be tentatively suggested that the per capita level of consumption, in Africa as a whole, in 1970 is not likely to exceed 19.5 yards, which is only 11.3 per cent over the 1958-60 average. Any figures of expenditure on cloth must take into account the additive influences of higher prices and better fabrics which - in a period when per capita incomes are expected to move up by 40 per cent or so - might be expected to increase by some 25 per cent or more. Alternatively, this would mean an income-elasticity of expenditure for cloth (not clothing) of the order of +.6 or a little more.

356. On the basis of 19.5 yards of per capita consumption in 1970, 325 million Africans will need 6,338 million square yards of textiles.

357. How much of these 6,338 million yards will be cotton, rayon, wool and synthetics? Cotton will continue to be the dominant fabric. The factors inhibiting rayon in an essentially warm climate are varied, so that rayon might stabilize at around 24 per cent of the total market, in contrast to 22 per cent in 1960. Synthetics will probably grow faster as the demonstration-effect gets into full swing from an increased range of points of contact and as more countries become users. This can be tentatively put at around 5 per cent, compared to the 1960 level of 2 per cent. It would be easy and convenient to extrapolate the downward trend in wool, but it is felt that superiority of wool and its ready acceptance in certain income ranges will have its impact on consumption levels. There does not, therefore, appear to be any likelihood that wool

will keep on losing ground; if anything, this trend might be mildly reversed and wool could perhaps constitute 3 per cent of the total supply in 1970.

358. Making these assumptions - 24 per cent for rayon, 5 per cent for synthetics and 3 per cent for wool - there remains a balance of 68 per cent for cotton. This figure is arrived at here as a residual, but appears reasonable when seen in its own context as well.

359. Thus the textile situation in Africa would look as in 1970 as shown in Table 96.

TABLE 96

Textile Market (1960) and Forecast for 1970

	Textile Market 1960	Textile Market 1970	Projected Increase
	(million sq. yards)		
Cotton	3,169	4,310	+ 36%
Wool	117	190	+ 62%
Rayon	942	190	+ 61%
Synthetics	86	317	+ 268%
Total	4,314	6,338	+ 47%
Per Capita Consumption	17.02 yards.	19.50 yards.	

Source: See Table 85.

360. A growth of 2,024 million yards may be visualized over the ten years 1960-70, which may be contrasted with the growth in the preceding twelve years of 1,750, million yards. For the textile industries of Africa - where 2,600 million yards were imported in 1960 - this implies a home-based growth potential of the order of 4,600 million yards, two-and-three-quarter times the existing output in Africa.

361. How far can the potential be filled by 1970? The best answer can obviously be only tentative, but a consideration of the employment, investment and foreign exchange implications does underline the stakes involved.

362. The fulfilment of the cotton textile potential -- current imports plus expected increase of the market of 2,748 million - yards - will need 120,000 looms, each loom working an average of two swifts a day (300 days a year) and producing an average of 40 yards per loom-shift. These looms will, in turn, have to be matched by the necessary spinning equipment (40 spindles to a loom or so), that is, 4.8 million spindles working on a two-shift basis. On the basis of 9 men per 1,000 spindle-shifts, cotton spinning could afford industrial employment to over 86,000 workers. The weaving sector, on the basis of 65 men per 100 looms per shift, could give employment to 156,000 workers. The employment in the finishing sector would not be less than 25,000 workers. In other words, and without providing for normal absenteeism, the full realization of the cotton textile potential would imply an industrial work-force of 267,000.

363. A similar calculation for rayon textiles (without taking into account the production of pulp) would be as shown in Table 97.

TABLE 97

Rayon Industry Capacity & Employment Levels, 1970

	Capacity Requirements	Likely Employment
Spinning	167,000 tons a year	15,000
Weaving	71,000 looms	92,000
Finishing		8,000
Total likely employment		115,000

Source: See Table 85.

364. Thus, the cotton and rayon potentials could generate, if fully realized, daily employment of the order of 382,000; wool and synthetics would probably take the direct employment possibilities to over 425,000.

365. The investment implications are naturally considerable. Some approximate calculations, based on recent and current Indian experience, are shown in Table 98.

TABLE 98

Investment estimates for 1970 Projection

<u>Cotton</u>	<u>Investment Involved</u>
Spinning (@ 60. US \$ per spindle)	289 Million US \$
Weaving (@ 800 to 1,000 US \$ per loom)	96-192 " " "
Finishing (<u>ad hoc</u> figure)	50-75 "
	435 - 556 " "
<u>Rayon</u>	
Spinning (@ 10 m.US \$ for 3,500 tons a year - 10 tons a day for 350 days)	480 Million US \$
Weaving (@ 800 - 1600 US \$ per loom)	57-104 "
Finishing (<u>ad hoc</u> figure)	30-40 "
	487 - 624 " "

Source: See Table 85.

366. Thus the realization of cotton and rayon textile potentials would require an investment of between 922 and 1180 million US dollars. Including wool and synthetics, the total investment in fixed capital (land, buildings, plant and machinery) would probably be a 100 million dollars higher.

367. The investment implications may very roughly be set off against the gross value of importing the entire quantity regarded as the potential - 4,600 million yards. Taking the average value at 30 US cents a yard, the import bill would be 1,380 million US dollars in 1970 alone; and the total cost over the decade as a whole would be in the neighbourhood of 8,800 million US dollars. Even after allowing for some complementary imports of spare parts and stores implicit in the manufacturing programme, the investment cost of manufacturing will only be a fraction - say, between one-eighth and one-sixth - of the cost of imports over the decade as a whole. (Since textile plants last over two decades, if not more, of two-shift operation, the advantage of manufacturing is clearly understated). To the extent to which investment is met from the continent's own resources, the saving in foreign exchange will be even greater. A rapid growth of textiles can thus provide one effective counterpart for meeting the import-costs of many other industrial programmes where the import-substitutive effects are small.

368. Looked at in any way - in terms of raw material supplies, in terms of markets, in terms of the gratifying increase in African production of textiles during 1948 - 1960, in terms of the fact that most branches of the textile industry can work with small units of capital investment, the textile potential of Africa is a proposition capable of large-scale realization.

369. What would the textile map of Africa look like in 1970, assuming this large-scale realization.

370. One answer to the question can be given in broad terms. The textile industries will always be widely dispersed, over several hundred towns in a fairly but not entirely random distribution over the urban face of Africa. And of course there will be concentration in a small number of towns. The former is the result of the widely dispersed markets on the one hand and of the fact that a textile plant can operate with as few as 8,000 cotton spindles or 4, 6 or 8 looms. (In rayon or synthetics, spinning is a larger unit technically, but weaving is capable of fragmentation into

small viable units.) The concentration in a few centres is implicit in general, agglomerative tendencies. How far these tendencies of centre-wise dispersion can also become rural dispersions is a moot question in which policy-making at government level will have a good deal of influence.

371. In country terms, the locational pattern of textile manufacturing will probably be influenced by three factors or a combination of them.

372. Large markets - for instance, all countries with a home consumption exceeding 100 million yards in 1960 - could be one obvious basis for manufacturing, as has been done to a large extent in the UAR and the Republic of South Africa. In terms of future growth, Niger, former British East Africa, Morocco, Algeria, the Sudan, Ghana, Rhodesia and Nyasaland, among others, have the strength of demand which can sustain an extensive textile supply.

373. The great producers of raw material - such as the UAR, the Sudan, Uganda, Tanganyika, Nigeria, Congo (Leopoldville), and the Central African Republic - obviously have the least expensive raw material equation. And where this and the earlier list coalesce, maximum growth can be expected, other things being equal.

374. But since other things are rarely equal, the third direction of the country-wise answer becomes relevant. The possibilities of a Manchester or Japan-like textile industry, capable of exporting its wares to African countries and beyond, exist.

CHAPTER V

SOME PROBLEMS OF NATIONAL POLICY AND SUB-REGIONAL CO-OPERATION

375. The purpose of this chapter is to discuss in outline form some problems of national policy and to emphasize again the importance of and scope for sub-regional co-operation, as a condition precedent to the industrialization of Africa.

376. Almost all African countries have drawn up or are in the course of elaborating over-all national development plans. Provision for the growth of existing industry and for the establishment of new industries finds a place in all of them. The prospective growth of industry has to be fitted into an over-all growth framework. Account has to be taken of existing materials and of what foreign exchange is available for the import of goods which cannot or will not in the immediate future be produced domestically. A manpower budget has to be drawn up, broken down by industrial sectors, and detailed provisions have to be made for the training of labour and middle grade personnel as well as for the training or temporary importation of managerial and technical staff. A financial plan has to be drawn up, distinguishing between domestic sources of finance and external ones, whether from international agencies, through bilateral arrangements with foreign governments, or by attracting foreign enterprise. Detailed forecasts have to be worked out of the growth of the domestic market and realistic plans for future exports have to be made. Given the small size of many African domestic markets, now and even a decade hence, and given the difficulties of breaking into non-African markets by young industries, development plans in each country have to be dovetailed with the corresponding plans of neighbours. It is impossible to overstress the crucial importance of the economies of scale and the international division of labour.

377. Experience in the industrial development of other under-developed countries, notably Latin America, shows the importance of import substitution as a conscious policy. On the one hand, as pointed out in earlier chapters, this means a deliberate re-orientation of import policy, with the cutting down of imports of consumer goods and the products of light industry, together with the concentration of foreign exchange to the maximum possible extent on the import of those capital goods which cannot in the near future

be produced in Africa. On the other hand, it means the deliberate fostering of new industries by a policy of selective protection. The economists' "infant industry" argument applies with special force to African conditions.^{1/} This does not mean of course that there should be a deliberate fostering of industry which is likely to remain cost in character, for whatever reason, for an indefinite period of time. It does mean that young industries require protection for a reasonable initial until they get into their stride.

378. Detailed feasibility studies are an essential first step in an industrial development programme, in appropriate cases preferably carried out on a co-operative basis with other countries. There is, however, a danger of waste and duplication in carrying out feasibility studies. Sometimes they can be done by means of a country's own resources. Often there is recourse to the assistance of other countries, whether through governments or private enterprise, or from international organizations. But the high cost of effective feasibility studies demands a co-ordinated approach, first of all at the national level. Furthermore, many thorough such studies have already been carried out but have not yet been translated into development action. Some of them lie in the archives of the former metropolitan powers.

379. Reference has already been made to the problem of financing, inevitably a limiting factor. In the first instance it is essential to draw to the maximum possible extent on domestic resources. This in turn involves proper provision in the national development plan and also the devising of mechanisms to increase the availability of domestic savings, a problem outside the scope of the present report. It also involves a co-ordinated and rational use of external sources of finance. Here again, there is scope for co-ordination between neighbouring countries.

380. Some of the capital equipment required for the development of industry will continue to have to be imported for a long time. Plans for the import of such equipment have to be drawn up for several years ahead and dovetailed in with the planned growth of domestic output. There is advantage in drawing on a narrow range of suppliers, to co-ordinated designs and specifications and to assure continuity in the availability of spare parts and servicing.

^{1/} See Gunnar Myrdal, Economic Theory and Under-Developed Regions. London. 1957, p. 94

Frequently, the import of capital equipment can be tied in with the partial financing of the development project and also the training of technical personnel, management and skilled labour.

381. Africa, unlike Asia, is not, with limited exceptions, overpopulated. The main problems are under-employment and disguised unemployment. This is part of the case for rapid industrialization. There is need to continue to rely on a proportion of imported technological and managerial skill and still more for the temporary importation of highly skilled artisans. But the key question is a rapid development of training programmes at all levels. Furthermore, there are advantages in as much as possible of this training programme being carried out locally, on the job and in national training establishments. Training outside Africa should be largely confined to technologists and to part of the supervisory personnel. There is also much scope for arranging joint training programmes between African countries, and therefore a division of labour between them. This is the underlying principle of the imaginative scheme for the training of middle grade personnel now launched by CCTA.

382. Much of the training process must devolve on the local educational authorities. Thus, there would appear to be a good case for the establishment of at least one mechanical trades school course in each large city. This course should preferably start from the age of 14 and run for 2 years, the first year mainly concerned with the handling of simple tools and general maintenance problems, and the second with simple general machine shop practice. There is a case for the steady development of courses in general business administration at both junior and senior standards. One should perhaps start at 15 and last 2 years, covering simple accounting and associated arithmetic, followed by elementary book-keeping and business management principles; and the other might be a one-year extension to the junior course. It would also seem desirable for university curricula to give at least equal weight to practical technical courses as to those on the arts and more theoretical research.

383. There are also major problems to be solved, both domestically and internationally, in assuring the transfer and adaptation of appropriate

technologies and of continuing and developing industrial research. Much of this involves far-reaching international co-operation and is referred to again in next chapter. Yet national governments have the task of assisting local industries in choosing the right technologies and frequently, therefore, in choosing between competing sources of advice by reference to objective criteria. It is also in the first instance a national problem to ensure the adaptation of technologies developed in industrialized countries to local conditions. This, in turn, means that governments should be prepared to devote some resources to research. It would appear beyond the human and material scope of most African countries, to devote substantial resources to fundamental research, although this is not true of all areas. The main emphasis should be applied on research in relation to local problems. There is perhaps a danger that the research facilities established in many African countries by the former metropolitan powers may be regarded as of lower priority in relation to immediate tasks. This would be a mistake. But since all research is expensive, it does mean that there is scope for division of labour and, therefore, co-operation with neighbouring countries.

384. Throughout this brief chapter there has been emphasis on the scope for and vital need of inter-regional co-operation. For reasons which have been elaborated throughout this report and particularly in the discussion of specific industries in Chapter IV, there are obvious barriers of history, tradition, language, currency, even industrial specification. Most of these problems have been just real in Western Europe, with the added difficulty of the growth of a whole network of vested interests operating behind tariff walls. Yet many of the countries of Western Europe have now finally decided to plan their economic well-being on a joint basis. Whatever difficulties the European Common Market may give rise to for other countries, there can be little doubt of its value to the participants themselves.

385. Very similar problems are now confronting African continent. Each African country is rightly trying to promote industrialisation at the fastest possible pace. In doing so it naturally looks first at its home market and, if it finds that a certain process of manufacture is not economic on the basis of the home market alone, it assumes that it should be able to dispose

of its surplus to its neighbours. Such an assumption would be valid were it not for the fact that its neighbours may well be thinking along exactly the same lines, with the results that two neighbouring countries may well be planning to produce a surplus of a particular commodity in the expectation that one will be able to sell it to the other, a multiplication of this process on any scale would soon mean the ruin of industrialization programmes.

386. There can and should be no rigid sub-regional groupings. What may be an appropriate grouping as an outlet for the product of one new industry may not be for another. Nevertheless, this report has assumed that there are certain natural broad groupings, even though the exact frontier may change from case to case and from time to time. One is North Africa, probably, including also the Sudan; another is West Africa to the Congo River; a third is East Africa including Somalia and Ethiopia and much of Central Africa. The Republic of South Africa may be regarded as a sub-region of its own. These sub-regions would seem to form the starting point for the detailed and intensive examination of industrialization programmes in the light of the principles of international specialization.

CHAPTER VI

THE ROLE OF THE ECONOMIC COMMISSION FOR AFRICA AND OTHER INTERNATIONAL ORGANIZATIONS IN INDUSTRIALIZATION

387. The last years have seen an increased interest on the part of the United Nations and its Specialized Agencies and, for that matter, governments and private industry in developed countries in assisting the developing countries towards rapid industrialization. Perhaps the most significant event has been the establishment by the United Nations Economic and Social Council of an Industrial Development Committee and, as a by-product thereof, the creation of a United Nations Industrial Development Centre with the task of both stepping up the total effort in this field and promoting effective co-ordination between the various organizations which are playing a part therein. This Chapter is primarily concerned with the role of ECA but within the framework of a growing effort by all those international agencies, governments, private industries and individuals who wish to lend a hand.

388. The origin of the suggestions made lies in ECA's Programme of Work on Industry adopted by the fourth session of the Commission and derived also from the analysis of this report yet set within the framework of this wider approach. The following are the suggestions which emerge for the next two or three years:

1. Too little is known about the present state of industry in Africa. Consequently it is of great importance to continue with the build-up of the inventory of African industries including energy on which work has already started. Linked with this is the need for the collection and regular publication of data on output, imports and exports and also consumption of industrial products, including raw materials, intermediate goods and final products. In this connexion the Industrial Censuses planned on a world-scale in 1963 are of great importance. The Report of the recent Seminar on African Industrial Statistics sponsored by the Economic Commission for Africa and the Statistical Office of the United Nations in co-operation with the United Nations Bureau of Technical Assistance Operations particularly is relevant.^{1/}

^{1/} Report of the Seminar on Industrial Statistics, Addis Ababa, 18-28 July 1962 (E/CN.14/173)

2. This report has included preliminary studies of past trends in production, consumption and trade, forecasts of the possible future trend of demand and some indications of future production possibilities in a number of industries. Separate papers have been prepared by FAO and ILO on other industrial sectors which lie within their primary spheres of competence. The next step would appear to be more intensive studies of specific industries by the ECA, by the Specialized Agencies concerned, in some cases by joint efforts, and with the co-operation throughout of the United Nations Industrial Development Centre and wherever appropriate the other Regional Economic Commissions. Studies of the following industrial sectors are envisaged :

iron and steel with special reference to West Africa; aluminium, copper, lead, zinc and tin with emphasis on the maximum development of the production of metal in Africa, possibilities for each metal being examined on an appropriate sub-regional basis; energy with special reference to hydro-electric power; oil and natural gas^{1/};

The engineering industries including metal manufactures, mechanical and electrical engineering and transport equipment, to be examined, in the first instance, on an all-African basis; chemicals and fertilizers, with special reference to West Africa; textiles, to be examined in the first instance on an all-African basis;

pulp and paper, in collaboration with FAO;

building materials and construction^{2/};

timber manufactures in collaboration with FAO;

food processing in collaboration with FAO;

^{1/} The detailed programme which might be carried out by the ECA in this area can be expected to emerge from the ECA Meeting on Electric Power considered within the framework of over-all energy problems in Africa, to be held in Addis Ababa with the co-operation of ETAO in May 1963.

^{2/} A detailed programme is likely to emerge from the forthcoming ECA meeting of African Housing Experts to be held in Addis Ababa in January 1963.

handicraft and small-scale industries and rural industries with special reference to the processing of agricultural raw materials and including small tools in collaboration with FAO and ILO.

All these studies would be concerned to establish both future demand and future production possibilities, wherever appropriate within the framework of sub-regional co-operation. Each study would be designed to prepare the ground for meetings of African experts on the industry or industrial sector concerned, on a regional or sub-regional basis, as appropriate. It would seem desirable to give priority to iron and steel in West Africa, chemicals and fertilizers in West Africa and the group of engineering studies on an all-African basis. The objective should be to carry out these studies and hold the consequent meetings during the next two years or so.

3. Linked with and arising out of the studies and expert meetings envisaged under (2), the ECA should assist in the carrying out of feasibility studies and provision of advisory services at the request of governments. The ECA's role in feasibility studies should be primarily to give assistance in the arranging and carrying out of such studies by other bodies but it should be prepared to take a direct part therein in appropriate cases. Efforts should be made to build up advisory services, partly through regular members of the ECA staff including regional advisers, and partly by taking advantage of the new high level advisory service established within the United Nations Industrial Development Centre by a decision of the Economic and Social Council. In this connexion and in order to carry out effectively the ECA Industrial Development Centre Programme of Advisory Services in the field of Industry, it would seem desirable to review each national assistance programme and evaluate the task of BTAO country experts in the industrial development field. This in turn might make it possible to use the services of these experts in the carrying out of the ECA's programme, directly by agreement with the country concerned. BTAO experts are, of course, appointed at the request of individual countries to carry out tasks in the country programme concerned. Two adjustments would appear appropriate. The first would

be a conscious attempt on the part of African countries requesting technical assistance to fit their demands into the framework of the total United Nations family effort; the second would be to make greater use of the country experts in carrying out this UN programme as a whole. This whole approach now becomes possible with the study extension of ECA's responsibilities in technical assistance matters within the over-all framework of the decentralization of the economic and social activities of the United Nations and the strengthening of the regional Economic Commission.^{1/}

4. The drawing-up of a manual on the preparation and implementation of investment projects, in which advice would be given on the carrying out of the different aspects of investment in a variety of industries and plants. The preparation of this manual is a long-term project, already started, but which requires the co-operation of both African and non-African experts. It would be concerned with technological as well as economic aspects, including problems of investment decisions, the preconditions of investment, the direction and proportion of investment and the execution of investment plans.^{2/}
5. Further studies on industrial planning and programming, which should be carried out in co-operation with the Economic and Social Development Division of the ECA, the African Institute for Development Planning expected to be set up in Dakar in the Autumn of 1963, and the United Nations Industrial Development Centre.
6. Studies of problems of transfer of technology, adaptation of technology to African conditions and applied industrial research in Africa, carried out in co-operation with the United Nations

^{1/} See Report by the Secretary General of the Decentralization of the Economic and Social Activities of the United Nations presented to the 17th Session of the General Assembly (A/5196).

^{2/} See note by the secretariat with proposals for the preparation of a Manual of Investment Projects (E/CN.14/INR/13)

Industrial Development Centre.

7. Training activities in the sphere of industry, including managerial and technical personnel, middle grade personnel of all kinds and skilled and semi-skilled workers, carried out in co-operation with the ILO, UNESCO, the United Nations Industrial Development Centre and CCTA.
8. Study of problems of financing industry in Africa. It would appear useful to study the complex problems connected with financing manufacturing industry, including analysis of self-financing methods, the channelling of private savings to industry through capital markets, the internal financing of the sale of capital goods, and the provision of credit for the export of manufactures. A study of this kind would require the co-operation of the African Development Bank when set up, other international financing agencies, private banks and the United Nations Industrial Development Centre.
9. A seminar on Industrial Estates, which might be held in 1964, the detailed scope of which remains to be worked out, and which would be carried out with the co-operation of the United Nations Industrial Development Centre. One of the objectives would be to draw upon the experience of other developing regions.
10. A large part of the efforts to assist African countries in industrial development programmes is being made by governments and private industry in industrialized countries outside Africa, or by regional groupings of these countries, such as OECD, EEC and CMEA. The activities of these countries and organizations range from general studies, through feasibility studies and Technical Assistance projects to the provision of finance on a substantial scale. Much knowledge of African industrial development problems is in the possession of the former metropolitan powers or the regional international organizations to which they belong. It is clearly right that arrangements between these countries and organizations on the one hand and African countries on the other should be

subject to bilateral negotiations. Nevertheless, with a view to promoting better co-ordination of all the efforts being made towards the industrialization of Africa and the avoidance of duplication of efforts and wasted resources, it would seem desirable to work steadily towards a position where the ECA would be kept informed of the many activities of this kind which have been carried out, and in particular of current and projected studies. The ECA need not, and indeed would not, be in a position to seek any formal co-ordinating role, but it would seem well placed to carry out on an increasing scale informal co-ordinating functions, which would be in the interest of all concerned.

APPENDIX I

National Income Estimates of African Countries by sector of origin
(in million US \$)

Country	Period of reference	Population million	Per Capita income (\$)	Total income	Agri-culture	Min-ing	Manu-facturing	Rest
North Africa		63	129	8,145	2,653	233	945	4,314
Algeria	1958	10	250	2,500 ^{a/}	550	80	280	1,590
Libya	1957/58	1	131	131 ^{a/}	35	10		86
Morocco	1958	10	154	1,535 ^{b/}	522	92	276	646
Sudan	1955/56	10	82	816 ^{b/}	497	1	9	309
Tunisia	1957	4	135	540 ^{b/}	184	24	65	267
U.A.R. (Egypt)	1956	28	94	2,622	865	26	315	1,416
West Africa		65	111	7,236	4,345	145	592	2,154
Cameroon	1956	3	150	451 ^{b/}	243	10 ^{c/}	49	149
Former Fr. West Africa	1956	19	144	2,730	1,636	28 ^{c/}	335	731
Dahomey								
Guinea								
Ivory Coast								
Mali								
Mauritania								
Niger								
Senegal								
Upper Volta								
Former Fr. Eq. Africa	1956	5	116	581	318	56 ^{c/}	56	151
Central Afr. Republic								
Chad								
Congo (Brazzaville)								
Gabon								
Gambia	1959	-						
Ghana	1959	5	243	1,215 ^{d/}	729	24	97	365
Liberia								
Nigeria	1956	32	71	2,259 ^{a/}	1,419	27	55 ^{a/}	758
Sierra Leone								
Togo	1959	1						

National Income Estimates of African Countries by sector of origin (continued)

Country	Period of reference	Population million	Per Capita income (\$)	Total Income	Agri-culture	Min-ing	Manu-facturing	Rest
South and East Afr.		103	103	10,589	2,817	1,108	1,693	4,726
Angola	1959	5						
Congo (Leo'ville)	1958	14	84	1,170 ^b	304	187	140	539
Ethiopia	1957/58 ^f	21	33	702	536	-	38	128
Fr. Somaliland								
Kenya	1958	6	97	579 ^a	245	6	59	269
Madagascar	1956	5	117	586 ^b	313	-	54	219
Mauritius	1958	1	138	138	41	-	28	69
Mozambique	1959	6						
Rhodesia & Nyasal.	1959	8	154	1,232	234	259	123	616
Ruanda Urundi	1957	5	49	245				
Somalia	1959							
Tanganyika	1959	9	55	496 ^a	295	19	20	162
Uganda	1959	7	58	407	266	6	17	118
Union of S. Africa	1958	14	360	5,034	583	631	1,214	2,606
Zanzibar								
Africa		231	1,124	25,970	9,815	1,486	3,230	11,194

^a/ Gross domestic product at factor cost

^b/ Gross domestic product at market price

^c/ Raw materials and semi-products

^d/ Assume the same distribution as West Africa

^e/ Including utilities and gas

^f/ Average

Source: Ethiopian Observer, May 1959

Domestic Income and Product in Kenya

Uganda, 1960 - Statistical Abstract

Tanganyika, 1961 - Statistical Abstract

UN Statistical Yearbook 1960

African Statistics, June 1962

UN Economic Survey of Africa since 1950

Comptes Economiques, Chad, Central

African Republic etc.

APPENDIX II- 1
Index Numbers of Manufacturing Industries
1938 to 1957
1953 = 100

Country or Area	Relative Weights	1938	1948	1949	1950	1957	Annual change in percents	
							1938-1957	1948-1957
1. Algeria	12.4	...	78	73	84	143	...	6.9
2. Belgian Congo	5.6	11	40	47	59	151	14.7	15.9
3. Egypt	11.3	40	79	86	90	129	6.3	5.6
4. Morocco	12.0	...	83	84	92	...	...	...
5. Southern Rhodesia	3.1	21	60	68	79	173 ^a	11.7	12.5
6. Tunisia	3.6	...	85	90	91	122	...	4.1
7. Rep. of S. Africa	52.0	31	61	70	77	118	7.3	7.6
Africa	100.0	30	67	73	81	127	7.8	7.4
Africa excluding South Africa	48.0	29	74	77	85	140	8.6	7.3

Source : United Nations Economic Survey of Africa since 1950.
United Nations Statistical Yearbook 1960.

^a/ Estimated from the new index of Rhodesia and Nyasaland.

APPENDIX II - 2
Index numbers of Mining Output
1953 = 100

	Relative Weights	1938	1948	1949	1950	1957	1960 ^{a/}	Annual change in percents	
								1938 1960	1948 1969
1. Algeria	4.88	50	61	73	76	89	103	3.3	4.4
2. Congo (Leopoldville)	20.24	..	66	..	76	114	...	...	...
3. Egypt	0.82	40	75	92	106	106	...	...	...
4. Morocco	7.10	30	57	63	73	121	141	7.3	7.8
5. Rhodesia & Nyassaland	20.68	..	..	77	79	120	156	...	...
6. Tunisia	2.18	97	83	74	83	110	101	0.2	1.6
7. Rep. of S. Africa ^{b/}	44.10	76	79	83	88	133	...	...	...
Africa	100	69	73	79	82	123	150	3.6	6.2
Republic of S. Africa	44.1	76	79	83	88	133	160	3.4	6.0
Rest of Africa	55.9	47	65	74	77	115	141	5.1	6.7

Source : United Nations, Economic Survey of Africa since 1950.
United Nations, Statistical Yearbook 1960.
United States Department of Interior, Mineral Yearbook 1960.

^{a/} The indices for Africa, South Africa and the rest of Africa are estimated from the output of principal minerals weighted by the gross value of output.

^{b/} Includes atomic materials and precious metals.

APPENDIX II - 3

Average Gross Value of Output in Mining and
Quarrying in 1955-57

Principal Minerals	Africa Rep. of South Africa in million US dollars		Per cent of Total	
			Africa	Rep. of South Africa
Asbestos	52.7	22.6	2.432	2.520
Bauxite	2.1		0.001	-
Cassiterite	53.5	2.8	2.469	0.312
Chrome	17.1	8.3	0.789	0.926
Coal	86.1	55.3	3.973	6.166
Cobalt	48.4		2.234	-
Copper	534.7	34.3	24.671	3.824
Diamonds	172.6	38.3	7.964	4.270
Gold	614.7	554.2	28.463	61.789
Iron	79.5	6.6	3.668	0.736
Lead	72.1		3.327	-
Manganese	76.4	12.4	3.525	1.383
Petroleum	28.7		1.325	-
Phosphates	90.3	0.8	4.167	0.089
Uranium	110.8	110.7	5.113	12.343
Zinc	33.4		1.541	
Other	94.0	24.9	4.338	2.776
Antimony		3.4		0.379
Platinum		22.3		2.487
Total	2,167.1	896.9	100.000	100.000
Africa	2,167.1	100		
Republic of South Africa	896.9	41		
Rest of Africa	1,270.2	59		

Source : United Nations, Economic Survey of Africa since 1950.

APPENDIX III

PROSPECTS FOR POWER

1. In 1960 world energy consumption per capita reached the equivalent of 1.4 tons of coal. In North America it was close to 7.8 tons and in Western Europe almost 2.6, while in Africa it was only 0.31 tons^{1/}. 1950/60 marked the beginning of the development of the power industry in Africa in the contemporary sense of the word. While world production rose by 153 per cent between 1951 and 1960, it increased in Africa by 206 per cent from 31 million tons of coal equivalent to 58 million. Even so, the over-all balance remained negative and in 1960 this deficit reached 7.0 million tons of coal equivalent.
2. During the same period important new power resources have been discovered. Reserves of solid fuel are substantial and amount to several billion tons but they are not equally distributed. Coal deposits are plentiful in the Republic of South Africa and Southern Rhodesia. Nigeria's reserves are estimated at about 142 million tons. Moreover, black and brown coal deposits are known in Congo (Leopoldville), Mozambique, Morocco and Algeria. Open cast coal reserves in Africa are estimated at 80-85 billion tons. Africa's oil reserves are estimated at more than 1.1 billion tons. At the end of 1961 they were broken down as follows: Algeria 677 million tons, Angola 4 million, UAR 72 million, Gabon 7 million, Libya 332 million, Morocco 7 million, Nigeria 35 million. Geologists estimate that more than 6-8 million square kilometers of these areas is likely to contain oil or natural gas. So far geological research has only been carried out in about 5-8 per cent of the region and it seems likely that the volume of reserves will be multiplied several times as exploration proceeds. Natural gas reserves are estimated at 1,800 to 2,000 billion cubic meters, which equals roughly 1,800 to 2,000 tons of crude oil. It is estimated that the Sahara contains not less than 1/10 of the world reserves of natural gas.^{2/} There is virtually no limit to Algeria's and Libya's natural gas

1/ Statistical Yearbook 1960, UN Stat. Dept.
Monthly Bulletin of Statistics, April, 1962, UN Stat. Dept.

2/ Le Monde, 21 July 1962.

resources. There are very large potential hydroelectric power resources in Africa. Production of coal reached close to 44 million tons in 1960, of which the Republic of South Africa accounted for 38.2 million tons and Southern Rhodesia for 3.6 million tons^{1/}. In general, coal production in Africa equals consumption. The oil industry has developed rapidly. In 1960 nearly 15 million tons of oil were extracted as against 2.5-3 million tons in 1957-58, Algeria producing 8.8 million tons, Egypt 3.3, Nigeria 0.86, Gabon 0.8^{1/}. Fourteen refineries now being built could, it is estimated, produce in 1964-65 from 15 to 18 million tons of oil products. African countries consumed in 1960 10-11 million tons of liquid fuel and 3-4 million tons of fuel oil^{1/}. In 1960 Africa produced 58 million tons of equivalent of energy and it is believed that 1961 production exceeded 70 million tons^{1/}. In 1965 Africa should be able to produce between 140 and 150 million tons of energy, or double its present output.

4. It thus appears reasonable to expect that one of the basic factors underlying industrial development - the provision of energy - will not have any adverse or retarding effect on development plans.

^{1/} World Energy Supplies 1956-1959, UN Stat. Papers, Series J. NY. Monthly Bulletin of Statistics, April, 1962, UN Stat. Dept. Yearbook of International Trade Statistics 1960, UN Stat. Dept. Statistical Yearbook 1961, UN Stat. Dep.



ECONOMIC COMMISSION FOR AFRICA
Standing Committee on Industry
and Natural Resources
First session
Addis Ababa, 12-21 December 1962

INDUSTRIAL GROWTH IN AFRICA

A Survey and Outlook

Corrigendum

It is regretted that the need to circulate E/CN.14/INR/1 as soon as possible before the first meeting of the Standing Committee on Industry and Natural Resources made it necessary to curtail the normal lengthy editorial process to which a document of this scope is usually submitted. A considerable number of errors and typing mistakes have occurred. The following corrigendum draws attention to errors of substance.

Page 1, para 2, line 3: for "million" read "billion"

Page 3, table 1: population figures are in millions, per capita export, import and national income figures are in US dollars; the totals of gross domestic product are in billions of US dollars.

Page 18, table 4, heading: for "1950" read "1948"

Page 28, para 49, line 4: for "1953" read "1958"

Page 49, table 10: against India under column "construction" insert
"..." for "L"

Page 58, para 108, line 2: for "1961" read "1964"

Page 89, tables 26 and 27: output figures are in thousand metric tons
62-4095

Page 99, para 195, line 5: for "UAR consumes less steel than" read
"UAR consumes more steel than"

Page 105, para 200, line 9: for "500 tons" read "500,000 tons"

Page 108, para 206, line 1: for "1951-58" read "1951-60"

Page 111, para 210, lines 1 and 2: for "Up to 1957 Morocco... available data"
read "Morocco is the leading producer,
followed by South West Africa. Between
the two leading producers, nearly 75
percent of the total output is accounted
for"

Page 111, para 210, line 3: for "six" read "seven" and insert Morocco in
the list of countries starting after "six"

Page 112, para 210, first line: insert "apart from Morocco, the leading
producer" before North Africa

Page 115, para 214, table 45: the second column heading should read
"1955-57"

Page 115, para 215, line 2: delete "1965 and"

Page 115, table 46: the annual rate of change for tin is 2.2%, not 2.1%

Page 116, table 47: the heading of the last column should read "smelter
production", not "mine production"

Page 116, table 47: the annual rate of change for copper is 3.0% and the
corresponding smelter production in 1970 is 1,240,000
tons, not 1,313,500 tons.

Page 117, table 48: for "1951-57" read "1955-57" in headings of table and
column

Page 123, table 53: figures in the last column are in thousand US dollars

Page 127, para 231, line 7: for "gross national product" read "gross
national requirement of machinery"

Page 131, para 234, line 9: delete "established"

Page 172, table 74: the heading of the last column should read "1970/1960"
and not "1960/1970"

Page 193, table 80: production figures are in metric tons

Page 208, para 321, line 10: for "held" read "yield"

Page 209, para 323, line 4: for "increase" read "income"

Page 210, table 88: the table covers 1948 to 1960

Page 213, table 90: decimal points should be deleted in the column "cotton".
Thus, the entry against Republic of South Africa is
not 39.6 million yards, but 396 million yards

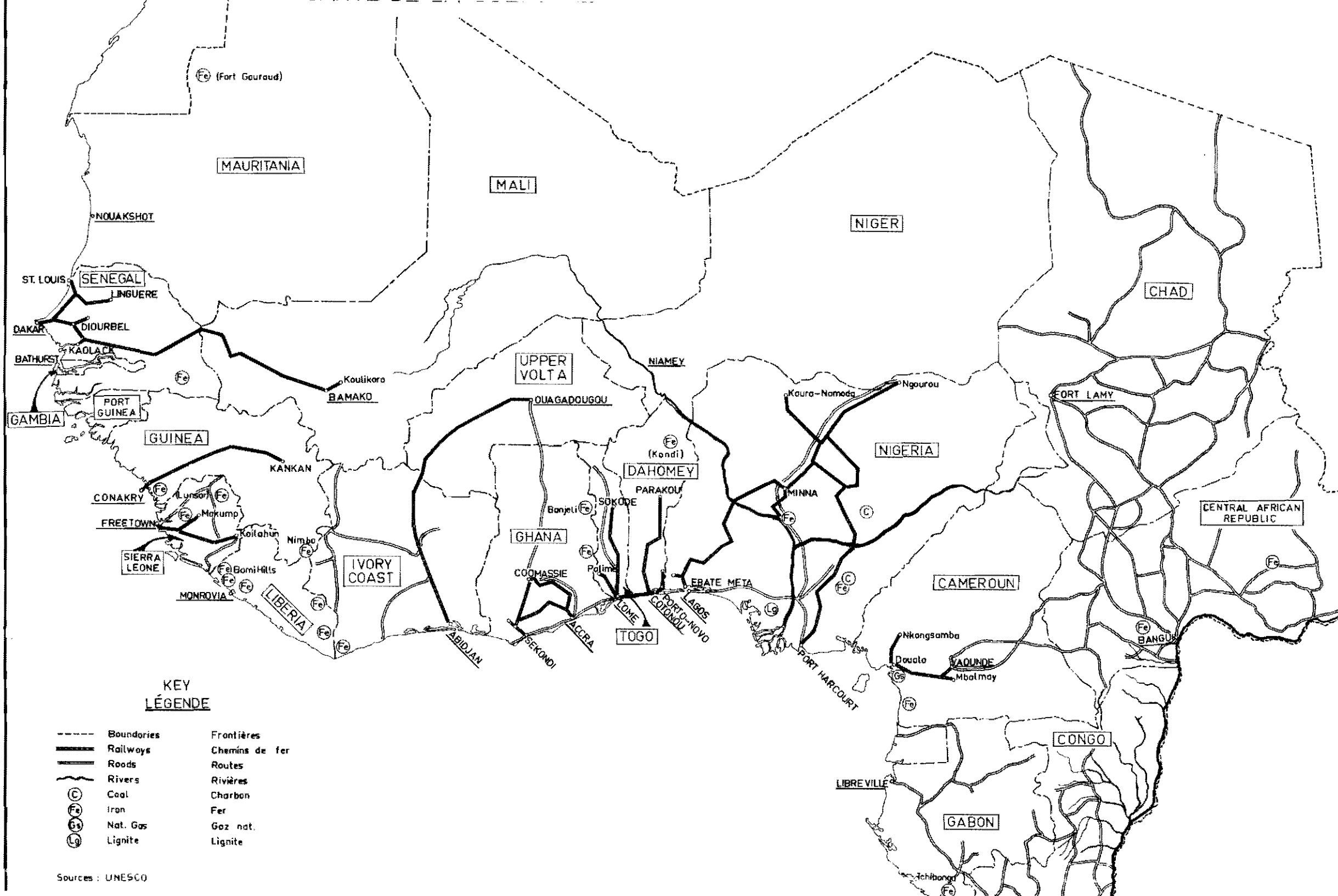
Page 219, table 94: for "1958" read "1948"

Page 222, table 96: the projection for rayon in 1970 is 1,521 million
yards, not 190 million yards

Page 224, table 98: the investment estimate for cotton weaving is
"800 to 1,600 US\$ per loom", not "800 to 1,000 US\$
per loom"

Appendix I, page 2: the per capita income for all of Africa is US\$ 112.4,
not \$1,124

Appendix II, page 2: in the last column, for "1948-1969" read "1948-1960"



KEY
LÉGENDE

---	Boundaries	Frontières
==	Railways	Chemins de fer
---	Roads	Routes
~	Rivers	Rivières
(C)	Coal	Charbon
(Fe)	Iron	Fer
(G)	Nat. Gas	Gaz nat.
(Lg)	Lignite	Lignite

Sources : UNESCO