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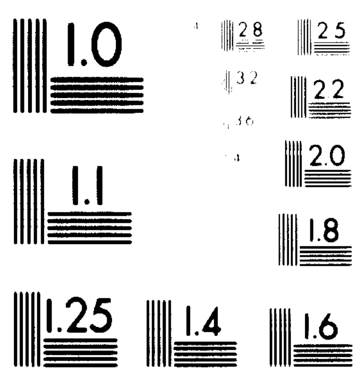

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UNIDO/T/NIGERIA 1

SURVEY ON NIGERIAN IRON AND STEEL DEMAND 1/

by

Odyr Pontes Vieira

United Nations Adviser on Iron and Steel Market Study

1/ This report is not an official document of the United Nations Industrial Development Organization. The opinions expressed are those of the author and are not necessarily shared by UNIDO.

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SURVEY

ON

NIGERIAN IRON AND STEEL DEMAND

(NIG-058-A)

by

Odyr Pontes Vieira

U.N. Adviser on Iron and Steel Market Study

June 1967

C O N T E N T S

INTRODUCTORY NOTE

Studies on the establishment and efficient operation of an integrated iron and steel mill in Nigeria have shown positive developments since the programme was first seriously considered a few years ago. Most of the preliminary investigations have been completed and their results have confirmed that a medium-sized integrated iron and steel plant will be a viable project in Nigeria.

Significant among these investigations are:

(a) the extent of local raw material deposits;

(b) suitability of these raw materials for the manufacture of iron and steel products;

(c) comparative systems of production;

(d) energy requirements, sources and comparative costs;

(e) problems of transportation with regard to raw materials and finished products;

(f) actual and potential size of the market.

As regards the structure and capacity of the market, the results of the investigations under item (f) have been rendered obsolete by significant developments in the Nigerian economy which have necessitated the serious examination of factors other than those on which the first study was based. Accordingly, it was agreed that an independent survey of the market should be undertaken with a view to relating the capacity of the proposed plant to a more realistic market demand. At the same time, it was stressed that such a survey should not be confined to the territorial limits of the Nigerian economy since there exists a substantial commercial activity between Nigeria and her neighbours in the West African sub-region.

In short, such an exercise should include the Nigerian market as well as the markets of the neighbouring West African countries.

On this premise, the Nigerian Government requested the Consortium comprising American, German and British steel companies to commission a market study that would take cognisance of both the developments in the Nigerian economy as well as the markets of the neighbouring territories in the West African sub-region. The Government in its anxiety to complete the programme within a given time further requested that the survey be completed and the report submitted within three months of its being commissioned.

But, either by accident or design the Consortium unduly delayed this assignment inspite of the Federal Government's persistent pressure for an early action.

In the end, the Nigerian Government turned to the United Nations Development Programme Unit for assistance. In response to this request, Mr. O. P. Vieira was appointed by the United Nations Organization to undertake the market survey. The following report is the outcome of Mr. Vieira's investigations.

V. A. G. Warmate
Principal Assistant Secretary

Federal Ministry of Industries
Industrial Analysis Division
Iron and Steel Unit
Lagos, May 22, 1967

UNITED NATIONS NATIONS UNIES

Technical Assistance Recruitment Services
United Nations, New York 17, New York

Bureau européen de Recrutement pour l'Assistance Technique, Palais des Nations, Genève, Suisse

8 August 1966

REQUEST FROM THE GOVERNMENT OF NIGERIA FOR SPECIAL INDUSTRIAL SERVICES

JOB DESCRIPTION
NIG-058-A

Post title: Adviser on Iron and Steel Market Study

Duration: Two months

Date required: As soon as possible

Duty station: Lagos, with visits to other regions of the country

Duties: The expert will be expected to prepare a comprehensive study for submission to the Government of Nigeria of the existing, as well as the future, demand for iron and steel products in the country in connexion with the government's plan for the establishment of a national iron and steel industry.

The expert will also be expected to take into account existing studies for the development of iron and steel industries in the other countries of the West African sub-region.

Qualifications: Extensive experience in market studies and analysis for iron and steel products

Language: English

Background information: The Government of Nigeria has before it several studies on demand, location, and technical processes for a steel plant. Before taking a final decision, the government wants an up-to-date review to be made of the existing and potential demand for steel in the country.

AS THE GOVERNMENT HAS ASKED FOR CANDIDATES TO BE PRESENTED URGENTLY, IT IS REQUESTED THAT THIS JOB DESCRIPTION BE TREATED IN PRIORITY AND NOMINATIONS BE FORWARDED AT THE EARLIEST OPPORTUNITY AND IN ANY CASE BEFORE 30 SEPTEMBER 1966.

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I. SUMMARY

1.1 - SCOPE OF THE SURVEY

This report comprises three basic chapters, namely:

1) the apparent consumption in Nigeria in the period 1954/1966;
2) forecast of apparent demand of steel in the period 1967/1973;
3) the market in West Africa for Iron and Steel products.

Initially (Chapter 2) the examination of the behaviour of apparent consumption of steel in the country was started, as well as its more expressive components - imports, domestic production and exports - in the period between 1954 and 1966. As auxiliary datae for the dimension, location and specification of production lines of the future steel plant to be installed in Nigeria, an attempt was made to measure and to characterize different types of rolled products consumed in the period, the preferred gauges, and the different sectors of consumption existing in the country.

Further, an attempt to identify the different regions of consumption was made by means of information collected among the most important consumers and steel distributors.

Chapter 3 is dedicated to the forecast of apparent demand in the period 1967/1973, based principally on the tendencies of evolution of the existing sectorial structure. The application of the method of extrapolation of historic tendency was used as an auxiliary tool, serving to give an idea of the maximum levels of demand which could be attained in the country, in the hypothesis of a rapid return to the political-military normalcy.

Finally in Chapter 4, the possibilities of the sub-regional market of steel products in West Africa, according to the recommendations of the Standard Committee on Industry, Transport, and Natural Resources, of the Economic Commission for Africa (Addis Ababa, 3 - 13th December, 1963), are analyzed.

Special attention was dedicated to the analysis of the potential producers and the potential consumers of steel of West African sub-region, with the aims of providing elements for the location of an integrated steel plant on sub-regional basis.

As fundamental sources for the present survey, the following were used:

a) Official statistics of the Nigerian Federal Office of Statistics - Lagos.
b) International statistics published by the United Nations, Barclays Bank D.C.O., and International Financial Statistics.

Questionnaires were sent to 81 consumer firms, producers and distributors of steel products, covering more than 90 per cent of total consumption in the country. Note, however, that the political tension reigning in Nigeria, worsened in the last few weeks, made the field survey work difficult, reducing equally the percentage of answers to the questionnaires to a level of 30 per cent.

Within a plan of visits formaly ellaborated in conjunction with the Federal Ministry of Industries, interviews with the authorities connected with the economic development of the country, in the Federal territory and the former administrative regions, were held. At the same time, the Nigerian Railway

Corperation, the Electricity Corporation of Nigeria, and 31 industrial establishments were visited in all the regions of the country.

Datae comprising the different tables and graphs are normally expressed in long toms, unless specifically indicated.

1.2 - CONCLUSIONS AND RECOMMENDATIONS

The results obtained in the present survey permit the following conclusions:

1) The apparent consumption of steel in Nigeria grew, in the period from 1954 to 1966, at an annual rate of 16.7 per cent. In absolute numbers, the evolution from 67.4 to 388.4 thousand tons represents a rise of about 6 times, in twelve years, which denotes the vitality of the country in her different sectors of industrial activity.
2) The global computation of apparent consumption featured, among the imported items, about 40 per cent of manufactured goods which could, at a short term, be produced in the country, once the government provides attractive conditions to the entry of capital and foreign know-how into the country. It should be noted that the three last years of the period considered above are characterized by the installation of various factories aiming at making items which until then was obtained solely through import.
3) In terms of equivalent rolled products, the transformation which was effected in demand was sensible. At the beginning of the period the flat products constituted only 27 per cent of total demand, the non-flat products predominating and, among these, the reinforcing bars and wires. In 1966 the percentage distribution indicated a slight predominance of flat products (notably hot rolled

coils and sheets).

4) There are actually three important centres of steel consumption in Nigeria. These centres are located around the cities indicated below and the percentages of demand of steel products are as follows:

Lagos region 46%
Kaduna region 35%
Port Harcourt region . . . 14%

The remaining 5 per cent are distributed among Benin.

5) The apparent demand of steel, in the current year, should suffer a fall in relation to that of last year, of about 25 per cent. This fall of the market is an inevitable consequence of the political upheaval in the country.

6) In the period 1967/1973, it was estimated that the apparent demand of steel should grow to an annual geometric rate of 11.6 per cent having to reach about 500,000 tons of equivalent steel ingots.

Taking into consideration:

a) the production of Niger steel which, taking its expansion proposed for the next 5 years into effect, should reach about 33,000 tons, and

b) the reduction of the percentage of selected imported manufactured goods to 10 per cent of total demand,

it is concluded that there will be, in the country, in 1973, a deficit of about 440,000 tons of steel ingots.

7) The comparative analysis among the countries of the West African Region demonstrated that Nigeria is the country most indicated for the location of an integrated steel plant.
On the other hand, the following countries of this region constitute the potential Nigerian consumers: Ghana (which actually consumes about 20 per cent ot total steel imported by the West Region), Ivory Coast (about 9.3 per cent), and Cameroun (about 6.3 per cent).
It is interesting to observe that Nigeria already maintains a trade of export of manufactured goods with these countries.

8) In terms of the capacity of production for an integrated steel plant projected for Nigeria (1973 being the probable time of the starting of operation), it will count, possibly, with a market of:
   - about 440,000 tons, if destined to supply solely the internal demand of Nigeria;
   - about 520,000 tons, if destined to supply steel to the West African Region.

The results of the present survey, as well as the conclusions enunciated above, were based, necessarily, in assumptions which, although possible to be carried out, depend directly or indirectly om providences of governmental organs connected with economic planning.

Thus, in order to carry out the forecasts within the periods previewed,, the following initiatives and recommendations are necessary:

1) encouragement or indirect support, by reducing taxes and other benefits, to the advantage of the installation of industries for transformation of steel products;

2) elaboration of programmes connected with the economic development of the country, and which are indirectly concurrent with the increase in the consumption of steel products (plantation, mechanization of agriculture, production of canned food for domestic use and/or for export, etc.);

3) establishment of medium and long range planning for house constructions, of vital importance to the country and of notable impact in the domestic market of steel products;

4) incentive to the installation, in Benin, of a medium size foundry and forging shop, for the benefit of automotive scrap existing in the region. This precaution will not only permit the utilisation of local labour but will also help in the selection of steel scrap for use in the projected steel plant;

5) to diminish, gradually, the export of scrap, in order to preserve this important raw material for the use of the future steel plant;

6) to start, as soon as practicable, the training and graduation of metallurgical engineers, either by sending students overseas, or by the creation of Metallurgical courses in the existing Nigerian Universities;

7) although the determination of production lines of the future plant depends on a comprehensive feasibility

study, the existence of tin in the country, and of a reasonable domestic market of flat products, recommendations are that, from the beginning, the projected plant should have, at least, a blooming-slabbing mill. In future, or at a time proved economically satisfactory, the production of plates and sheets (and consequently the production of tinplate) would place Nigeria in a very favourable position in the regional market of West Africa.

II. THE APPARENT CONSUMPTION OF STEEL IN NIGERIA

2.1 - HISTORICAL DEVELOPMENT OF APPARENT CONSUMPTION

Tables 2/1 and 2/2 show the historical development of apparent consumption of steel ingots in Nigeria from 1954 to 1966. During this interval of 12 years, consumption rose from 67.4 to 388.4 thousand tons, or rather, a geometric rate of expansion of about 16.7% per year.

The tables cited above and Figure 2/1 show, as well, the gradual development of rolled products - distinguishing flat and non-flat products - and steel castings or forgings unworked, imported steel ingots being included in this last group.

It should be noted that the consumption of flat products of steel, which at the beginning of the period was representing less than one-third of steel consumed in the country, rose progressively until it reached the same percentage corresponding to non-flat products.

This fact is justified by the increase of the mechanical industry, principally in the sector of the construction of tanks, reservoirs, etc., verified in the last few years, which require increasing quantities of flat products especially hot rolled sheets and coils.

Another aspect to project is in respect of unexpected variations which are being verified in consumption from year to year, principally from 1960 to 1966. Among the factors responsible for this fluctuation could be cited:

a) the importation of structural shapes necessary to the development of civil construction;

b) the installation and expansion of the petroleus industry, and

c) the importation of rails and accessories.

With the aim of obtaining a more realistic representation of the apparent consumption of steel in Nigeria, it was felt necessary to adjust these consumption values, minimising the influesce exercised by the last two factors mentioned above. De facto, in the table corresponding to the Nigerian imports of steel products (Appendix 1) it can be verified that:

1. the importation of rails and accessories expressed the result of political administrative decisions better than the process of development of the country. A uniform distribution of the total imported will reduce its influence on the values of annual consumption of steel products;
2. the importation of pipes, tubes, and fittings include a considerable portion - about 60% - of products utilised in the petroleum industry. These products, owing to narrow specifications, could not be made at short term in Nigeria and so they must be subtracted from the annual totals.

Taking the considerations above into account, it was possible to adjust the apparent consumption of steel ingots as indicated in Table 2/3 and in Figure 2/2.

A fitting equation, also indicated in Figure 2/2 represents the historical tendency of the adjusted apparent consumption, in the period 1960 to 1966.

In accordance with this equation, the demand as corrected in

1966 was 350,000 tons of steel ingots. This total includes selected manufactured products which could, in short form, be made in the country with domestic rolled steel products.

2.2 - ANALYSIS OF THE COMPONENTS OF APPARENT CONSUMPTION

In spite of the absolute predominance of imports in the apparent consumption of steel in Nigeria, the production of steel and the export of manufactured goods started, simultaneously, from 1963.

The formation of apparent consumption, beginning from its basic components - imports, domestic production, and exports - is presented in Appendix 7.

The following composition of apparent consumption of 1966, in terms of equivalent rolled steel products, could be deduced from the table cited:

Imports:	97.7%
Domestic production:	2.0%
Exports:	0.1%
TOTAL:	100.0%

2.2.1 - IMPORTS

Taking the official statistics of the Federal government as a base, complimented by datae obtained from the Ministry of Industries and field survey, it was possible to establish a general image of the imports of steel products from 1960 to 1966.

For better facility of analysis, the products were grouped into four categories, namely:

- rolled steel products
- manufactured goods
- castings and forgings

- steel ingots.

In the first category, all the semi-finished, flat, and non-flat products were shown, for the future use in the industrial park of the country.

In the second category, selected items of manufactured goods, whose fabrication in this country will be possible at short term, were included. The quantities imported annually were transformed into tonnage of equivalent rolled steel products.

In the third category, all the imported steel castings and forgings unworked, as well as cast pipes, tubes and fittings, were included.

Finally, all the steel ingots imported by the foundry existing in the country were included in a special category.

The resulting datae are presented in Appendix 1. It is interesting to observe that in the four categories indicated above, the tonnage imported showed a positive increase which is a good development index of the Nigerian industry, since import is still a decisive item in the apparent consumption of the country.

On the other hand, the percentage distribution of the four categories of steel products experienced an appreciable variation within the considered period, as shown in the following table:

STEEL PRODUCTS	1960	1963	1966
Rolled steel	69.7%	54.7%	46.9%
Manufactured goods	23.0%	32.9%	39.5%
Castings and Forgings	7.3%	12.0%	13.3%
Steel ingots	-	0.4%	0.3%
TOTAL	100.0%	100.0%	100.0%

Datas of Appendix 1 were formerly transformed into equivalent quantities of rolled steel products, for the benefit of the dimension of the consumer market of the steel plant to be installed in the country. The results obtained (by the application of sectorial distribution indexes and the consideration of the percentage losses resulting from the fabrication of the manufactured goods) are presented in the Appendix 2.

It could be observed in the Appendix cited above that the percentage distribution of the equivalent rolled steel products was maintained uniform in the considered period (1960/1966), with consumption practically equal to the flat and non-flat products. The same, however, did not occur in the period before (1954/1959) when, at the beginning, the consumption of non-flat products was predominant.

2.2.2 - DOMESTIC PRODUCTION

There is only one steel plant in Nigeria at present - the Niger Steel Co. Ltd - situated in Emene in the proximities of Enugu.

It is a semi-integrated plant, which uses 100 per cent of scrap. The molten metal, having been refined, is cast into ingots with an average weight of 240 lb and later rolled into bars and rods.

Put into operation in July 1962, the Niger Steel Works has been attending to about 3.2% of the total demand of rolled steel products in the country since 1963. Its production, presented in Appendix 3, comprises reinforcing rods of ¼" to

¼" diameter.

In 1966 the rolling of small angles, between ¼" and ¼" was experienced but, owing to lack of rolls its production was interrupted.

The existing equipment include a 30 tons a day arc melting furnace, a reheating furnace with a capacity for 120 ingots every 4 hours, and an old merchant mill with a capacity of 40 tons per shift.

2.2.3 - EXPORTS

Since 1963 Nigeria has exported, or better still, re-exported manufactured goods and wire, not only to West African countries but also to Europe and Asia. A summary of exports is presented in Appendix 4.

Data shown in Appendix 5 were obtained by applying the same criterion adopted for the evaluation of imports (item 2.2.1), that is, transforming the tonnages of exported manufactured goods into equivalent steel rolled products.

It can be verified that, in spite of fluctuations, exports presented an annual rate of growth of about 39% during the period 1963/1966.

On the other hand, as it is shown in Appendix 6, exports have been concentrated chiefly in the West African countries (78%), the largest importers being: Ghana (38%), Dahomey (32.7%), Sierra Leone (11.4%), and Liberia (8.3%).

In terms of equivalent rolled products, it was verified that, at the end of the period, the exports of wire predominated (80%); the second product, in a decreasing order of preference, comprised hot rolled steel (8.8%), which occupied the first plan in tonnage (50%) when exports began.

2.3 - CHARACTERIZATION OF ROLLED STEEL PRODUCTS CONSUMED IN THE COUNTRY

The gradual development of apparent consumption of equivalent rolled steel products in the period 1960/1966 is presented in Figures 2/3 and 2/4.

The quantities indicated in the graphs cited above include, apart from direct import, selected items of manufactured goods shown in Appendix 1, as well as domestic production of bars and rods (beginning from scrap), galvanized sheets (beginning from imported sheets), and wire (from imported wire rods).

The following products were not included:

a) rails and accessories, not only because of the motives exposed in item 2.1 but because these rolled products are absorved almost totally by the Nigerian Railway Corporation (90%) and by the Coal Corporation (8%), under Government control; and

b) semi-finished products, imported by the forging shop of the Nigerian Railway Corporation for maintenance of its rolling stock.

An analysis of the graphs permits the verification that:

1) the consumption of equivalent flat rolled products, with the exception of galvanized sheets, increased in the period 1960/1966, indicating the following average annual growth:

25% for hot rolled coils and sheets, and tinplate;

12% for plates, and cold rolled coils and sheets.

The fall in the consumption of galvanized sheets (about 4.8% per year) is explained by the tendency of substituting this product by aluminum or asbestos-cement for roofing purposes;

2) wire rods and wire were the non-flat products which presented the greatest annual rates of growth (about 35%) in the period;

3) the apparent consumptions of bars and rods, and shapes, presented a peculiar evolution, with opposite incremental tendencies. This phenomenon is justified by the progressive substitution of concrete by metallic structure in the construction of large buildings, and, consequently the bars and rods (in which reinforcing rods are predominant) give way to shapes.

The analysis of the two maxima of consumption presented in Figure 2/4 reveals that, in 1961, large structures (construction for the petroleum industry) predominated, while in 1964 a greater number of buildings used concrete as a construction material.

An average annual increase of about 16% (from 1960 to 1966 for bars and rods; from 1963 to 1966 for shapes) could be considered for these two rolled products.

In a field survey, carried out through questionnaires and direct interviews covering about 70% of the consumers of steel in the country, the following indications were supplied:

PLATES

Approximately 85% of this product is consumed in the construction of reservoirs, tanks, and transport equipment, principally for the petroleum industry. The remaining 15% are used the fabrication of metallic components for the construction industry (door and window frames, etc.)

The last three years of the period 1960/1966 presented the following preference of thickness:

- less than ½" 88%
- ½" to 1" 10%
- over 1" 2%

HOT ROLLED STEEL

In terms of equivalent tonnages, this was the flat product which presented the greatest values of demand, given the wide application which it comes with in all the industrial sectors of fabrication, principally in that of mechanical construction.

The last three years of the period indicated the following distribution, in terms of width:

- sheets (over 40") 87%
- strips (less or equal to 16") . . . 13%

COLD ROLLED STEEL

The pronounced development of consumption in the last three years of the period is the effect of the installation of metal containers and enamelware industries in the country. Its distribution, according to the preference of width, was as follows:

Coils:

16" to 40" 24%

over 40" 6%

Sheets:

16" to 40" 70%

TOTAL = 100%

GALVANIZED SHEETS

As was said earlier, the apparent consumption of galvanized sheets decreased in the first four years of the period, presenting therefore a slight tendency of recuperation in 1965 and 1966.

Actually, the galvanized sheets are consumed directly in the form of corrugated sheets for covering houses and buildings.

The preferences, relating to gauges, are concentrated on numbers 35 US and 34 Birmingham.

TINPLATE

The consumption of tinplate, in terms of equivalent tonnages, which was maintained around 8,000 tons per annum from 1960 to 1964, presented sensible increase in the last two years.

This fact is owed to the establishment of the crown cork industry for the breweries and soft drink factories existing in the country.

The preference concerning to the type and gauge falls on the electrolytic tinplate, 100 pounds per base-box.

BARS AND RODS

Without doubt the greatest consumption in this category is that of reinforcing bars, totalling about 75% of the apparent consumption of bars and rods in the period considered. The remaining 25% are distributed within the various sectors of the industry, in a fairly wide range of diameters.

With relation to preference according to diameter, the results indicated the following distribution of the reinforcing rods:

¼" to ½" 20%
½" to 1" 76%
over 1" 4%

SHAPES

In this category predominated the light shapes (less than 80mm), which represent, in average, 70% of total consumption. These products are destined to the mechanical industries (construction of tanks, trailers, etc.), which absorbs about 42%, and light structures (window frames, beds, etc.) which consumes the remaining (28%) of light shapes.

Medium and heavy shapes (over 80mm) are destined to the construction of metallic structures for buildings, bridges, towers, etc., absorbing, in average, 30% of the total apparent consumption.

WIRE ROD

As already mentioned earlier, the consumption of wire rod is almost intergrally absorbed by the domestic production of wire and wire products, which is estimated of about 93%. The remaining 7% are consumed in the fabrication of nuts, bolts, screws, rivets, etc.

WIRE

This product is consumed directly, or in the form of wire products (barbed wire, wire mesh, wire netting, nails, etc.).

Its preference in terms of gauge, fell principally on No. 8 Standard Wire gauge.

In terms of applications, distribution in the last years of the period was as follows:

Wire (direct consumption)	13.0%
barbed wire	4.0%
nails	41.0%
welded wire mesh	37.0%
wire netting, cabinlink fencing	5.0%
TOTAL	100.0%

2.4 - SECTORIALIZATION OF APPARENT CONSUMPTION

Participation of the different types of steel products in apparent consumption of each country is a function of its industrial structure and the relative intensity of each of the sectors.

In countries just at the initial stage of industrial development, as Nigeria, it is to be hoped that throughout the years there would be a sensible change in the sectorial structure of apparent consumption of steel. On the other hand, political upheavals in the period under analysis (1960/1966) must have acted as additional factors of sectorial modification, accelerating some and retarding others.

2.4.1 - SECTORIAL STRUCTURE

According to the usual criterion of classification of the different sectors of consumption, it was possible to identify, in Nigeria, the following classes:

1. Rerolling, drawing, and derived products, including galvanized corrugated sheets, nails, bolts, rivets, screws, etc.
2. Agricultural tools, including hand tools for agriculture and forestry (hatchets, matchets, etc.).
3. Industrial equipment, including tanks, reservoirs, cylinders, vessels, etc.
4. Transportation, including automotive assembly, railroad, and shipbuilding equipment.
5. Civil construction and public works, including structurals and construction materials (reinforcing bars, tubes and pipes, door and window frames, etc.).

6. Cans, boxes, and metal stoppers.
7. Utensils for domestic or industrial use, including household goods, beds and mattresses, metallic furniture, and miscellaneous manufactured products.

The results of the investigation are expressed in Table 2/4.

It is left here to observe that the tonnages of rolled products do not coincide with those presented in Table 2/3 and in Appendix 1, because:

a) cast pipes and fittings were not considered;
b) only the amendment relative to the petroleum industry (item 2.1) was taken into consideration, retaining the quantities of rails and accessories corresponding to actual imports;
c) in the agriculture and household sectors, the equivalent rolled steel products were increased, corresponding to domestic production of these articles, out of automotive scrap, very common in Midwest (Benin).

Having made these exceptions, the great resemblance of the Nigerian sectorial structure could be observed with that of other countries--notably Brazil--after the World War II:

Percentage datae

SECTORS	Western Europe (1956)	Great Britain (1955)	USA (1955)	Brazil (1962)	Nigeria (1963)
1. Rerolling, drawing, etc.	8.0	23.5	15.5	25.7	28.4
2. Agricultural tools	(a)	(a)	(a)	(a)	3.3
3. Ind. equipment	17.0	15.1	14.8	10.2	9.1
4. Transportation	20.0	18.5	26.1	13.4	11.2
5. Civic construction	28.0	28.0	27.1	35.4	35.7
6. Metal containers	5.0	6.3	9.3	7.4	8.2
7. Household utensils	9.0	-	5.0	5.5	4.1

Source: Tecnometal - Estudos e Projetos S.A- Mercado Brasileiro de aco (Brazilian Steel Market). Brazil. August 1964

(a) - included in Industrial equipment.

2.4.2 - CHANGES IN SECTORIAL STRUCTURE

As anticipated, the sectorial structure of apparent consumption of rolled steel products of Nigeria suffered a sensible modification in the period 1960/1966.

Four of the sectors considered increased their percentage participation in the total consumption of the country (sectors 1,5,6, and 7) while three lost their intensity (sectors 2,3, and 4). The leadership, during all the period, belonged to the sector 1 (rerolling, drawing, and derived products) while the second and third places of consumption, which in 1960 were occupied by Transportation and Civil construction, respectively, passed on to be represented in 1966 by Civil construction and Metal containers.

Within each sector, a modification in the participation of flat and non-flat products was equally verified. Thus, in the 1st sector (rerolling, drawing, etc.) the predominance of flat products (owing to corrugated galvanized sheets) of 1960 gave way to a greater percentage of non-flat products in 1966 (due to the increment of import and the production of wire and derived products).

In the 3rd sector (Industrial equipment), the reversion of predominance from non-flats (in 1960) to flat products (in 1966) is equally verified, as a result of an increase in the production of tanks, reservoirs, etc.

Finally, in the 5th sector (Civil construction and public works) an increase on the use of metallic structures is easily noticeable, through a greater rate of consumption of non-flat products than the corresponding rate of flat products.

In a general way, the sectors which produced the greatest increase were those of metal containers, civil construction, and rerolling, drawing and derived products.

In terms of equivalent rolled steel products, datae relative to 1966 indicated that 77.3 per cent of the total consumption was destined to sectors 1, 5, and 6; about 10 per cent was used by sector 3, 7 per cent by sector 7, and 4 per cent by sector 4. Agriculture, still in the primary stage of development, absorbed less than 2 per cent of the apparent consumption of steel in the country.

2.5 - REGIONAL DISTRIBUTION OF CONSUMPTION

There are three important centres of steel consumption in Nigeria, corresponding geographically to three of the four administrative regions of the country (in vigour up till Decree number 14 of the 27th of May, which made provision for the creation of 12 States in Nigeria).

These centres of cunsumption are locatèd, respectively:

- in the West and Federal Territory (Lagos area)
- in the North (Kaduna area)
- in the East (Port Harcourt area).

The former Midwest region (Benin area) still shows a weak consumption of steel.

The detailed analysis of the consumer market of these areas presents great difficulties which could only be solved with a delayed research. This is because:

1) certain products are imported by firms which also fabricate the same articles (wire, and derived products, for example). In consequence, part of the direct import is resold, through distributors who also resell the products of domestic fabrication;
2) other products are made by firms which import directly part of basic raw-materials which they need, and the rest through the imports;
3) finally, a large variety of manufactured goods are imported by few firms which possess agents in various regions, turning the exact quantification in each region very difficult.

Owing to the facts pointed out, the scantiness of available time, and altogether, the political tension of the country turning the movement to certain areas of the market impossible, it was adopted, as an approach, to estimate the regions of the market by an analysis of the three most important sectors of consumption, namely:

(1) - Rerolling, drawing, and derived products;

(5) - Civil construction and public works;

(6) - Metal containers and stoppers.

As indicated in item 2.4.2, these sectors absorbed, in 1966, about 80 per cent of the equivalent rolled steel products consumed in the country. They constitute, therefore, a significant sample of global consumption, in respect of flat and non-flat products.

The answers to the questionnaires forwarded to the producers, consumers and importers, and the interviews with the general managers of a selected number of firms, showed the following regional datae:

Sector 1: Rerolling, drawing and derived products

West and Federal Territory	40%
North	40%
East	12.5%
Midwest	7.5%

Sector 5: Civil construction and public works

West and Federal Territory	46.5%
North	35.0%
East	13.5%
Midwest	5.0%

Sector 6: Metal containers and stoppers

West and Federal Territory	62%
North	20%
East	16%
Midwest	2%

Taking the percent participation of each of these sectors in the total consumption of equivalent rolled steel products into consideration, there will result the following global distribution:

West and Federal Territory (Lagos area)	46%
North (Kaduna area)	35%
East (Port Harcourt area)	14%
Midwest (Benin area)	5%
	100%

It may be pointed out, however, that pipes and fittings for petroleum industry - located in the East - which are important items of steel consumption in the country, were not computed here according to the observation in the item 2.4.1.

2.5.1 - CHANGES IN THE REGIONAL DISTRIBUTION OF CONSUMPTION

A comparison of the results obtained in the former item - Sector 5: Civil Construction and public works - and datae relative to 1959[1] is presented below:

Market Regions	1959	1966
West and Federal Territory	42%	46%
North	33%	35%
East	25%	14%
Midwest	-	5%
TOTAL		

Although the comparison above could not give an accurate picture of the regional variation of steel consumption, once the type of construction varies amply from region to region, a slight increase in civil construction (and, consequently, in the participation of steel consumption) in the West, North, and Midwest regions could be admitted.

(1) - Report on the Feasibility of Establishing an Integrated Steel Mill in Nigeria (already cited), Page 1/3.

TABLE 2/1

NIGERIAN APPARENT CONSUMPTION OF STEEL INGOTS

1954/1959

ITEMS		1954	1955	1956	1957	1958	1959
FLAT PRODUCTS	TONS	18 434	17 874	87 854	67 814	61 768	84 576
	%	27.3	22.9	59.5	48.5	36.9	42.6
NON FLAT PRODUCTS	TONS	49 005	60126	59 853	72 010	105 805	113 644
	%	72.7	77.1	40.5	51.5	63.1	57.4
EQUIVALENT STEEL INGOTS	TONS	67440	78000	147 700	139 820	167570	198220
	%	100.0	100.0	100.0	100.0	100.0	100.0

Source: REPORT ON THE FEASIBILITY OF ESTABLISHING AN INTEGRATED STEEL MILL IN NIGERIA. JULY, 1961

By: Westinghouse Electric International Co., New York, N.Y.
Koppers International, C.A., Pittsburgh, Penn.
Chase International Investment Corp., New York, N.Y.
United Engineering and Foundry Co., Pittsburgh, Penn.
Bechtel Corporation, San Francisco, Cal.

FIGURE 2/1

NIGERIAN APPARENT CONSUMPTION OF STEEL INGOTS

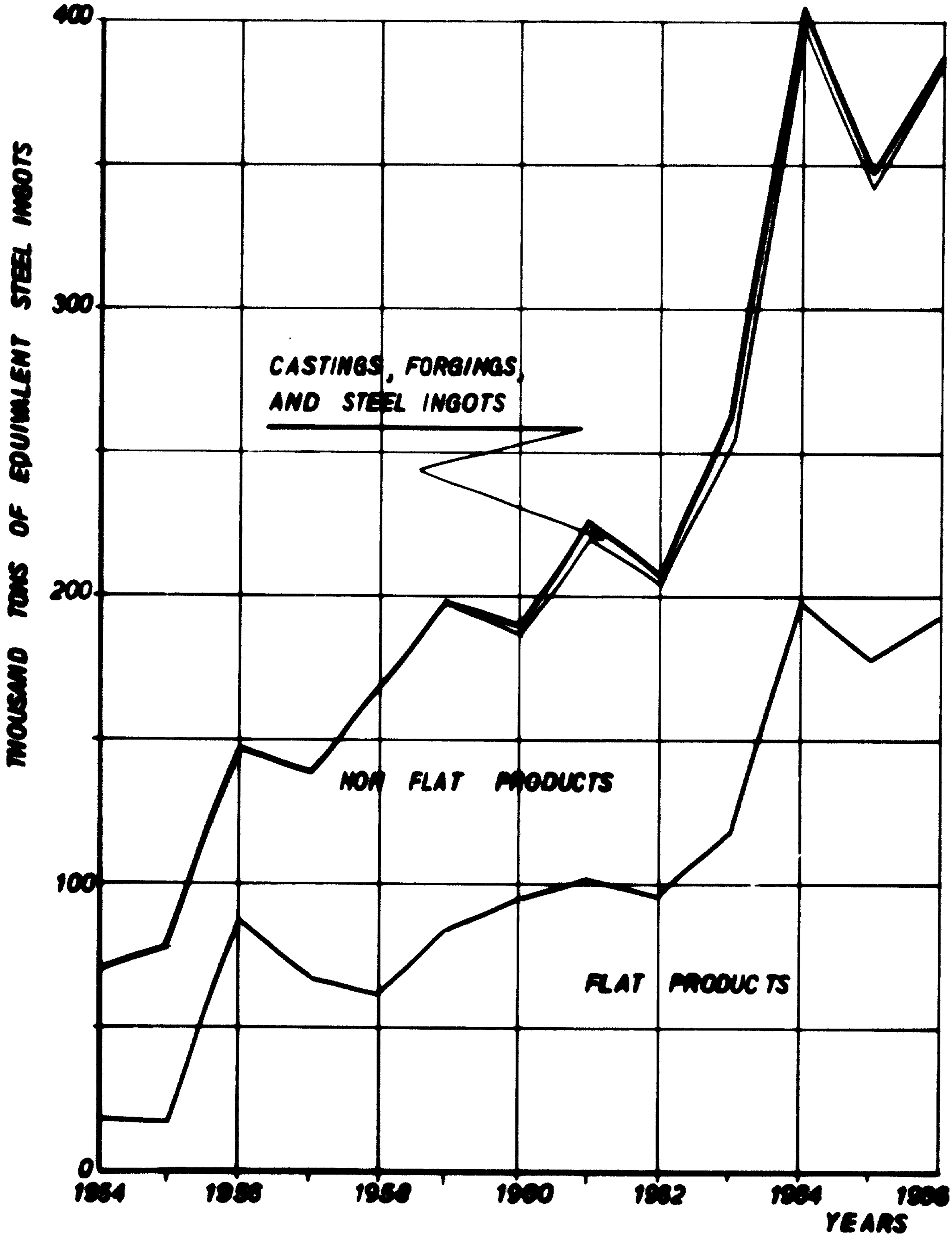


TABLE 2/2
NIGERIAN APPARENT CONSUMPTION OF STEEL INGOTS
1960/1966

ITEMS		1960	1961	1962	1963	1964	1965	1966
FLAT PRODUCTS	TONS	95 063	101 769	95 634	118 411	198 112	178 756	194 252
	%	50.0	45.3	46.3	45.6	49.0	51.4	50.0
NON FLAT PRODUCTS	TONS	92 781	119 789	110 273	136 018	200 273	164 922	193 416
	%	48.8	53.0	53.0	52.4	49.4	47.5	49.8
CASTINGS, FORGINGS, AND STEEL INGOTS	TONS	2 180	3 903	1 589	5 334	6 445	3 826	688
	%	1.2	1.7	0.7	2.0	1.6	1.1	0.2
EQUIVALENT STEEL INGOTS	TONS	190 030	225 460	207 500	259 760	404 830	347 504	388 360
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0

FIGURE 2/2

NIGERIAN APPARENT CONSUMPTION OF STEEL INGOTS, AFTER CORRECTION FOR RAILS, AND PIPES FOR PETROLEUM INDUSTRIES. FITTING CURVE

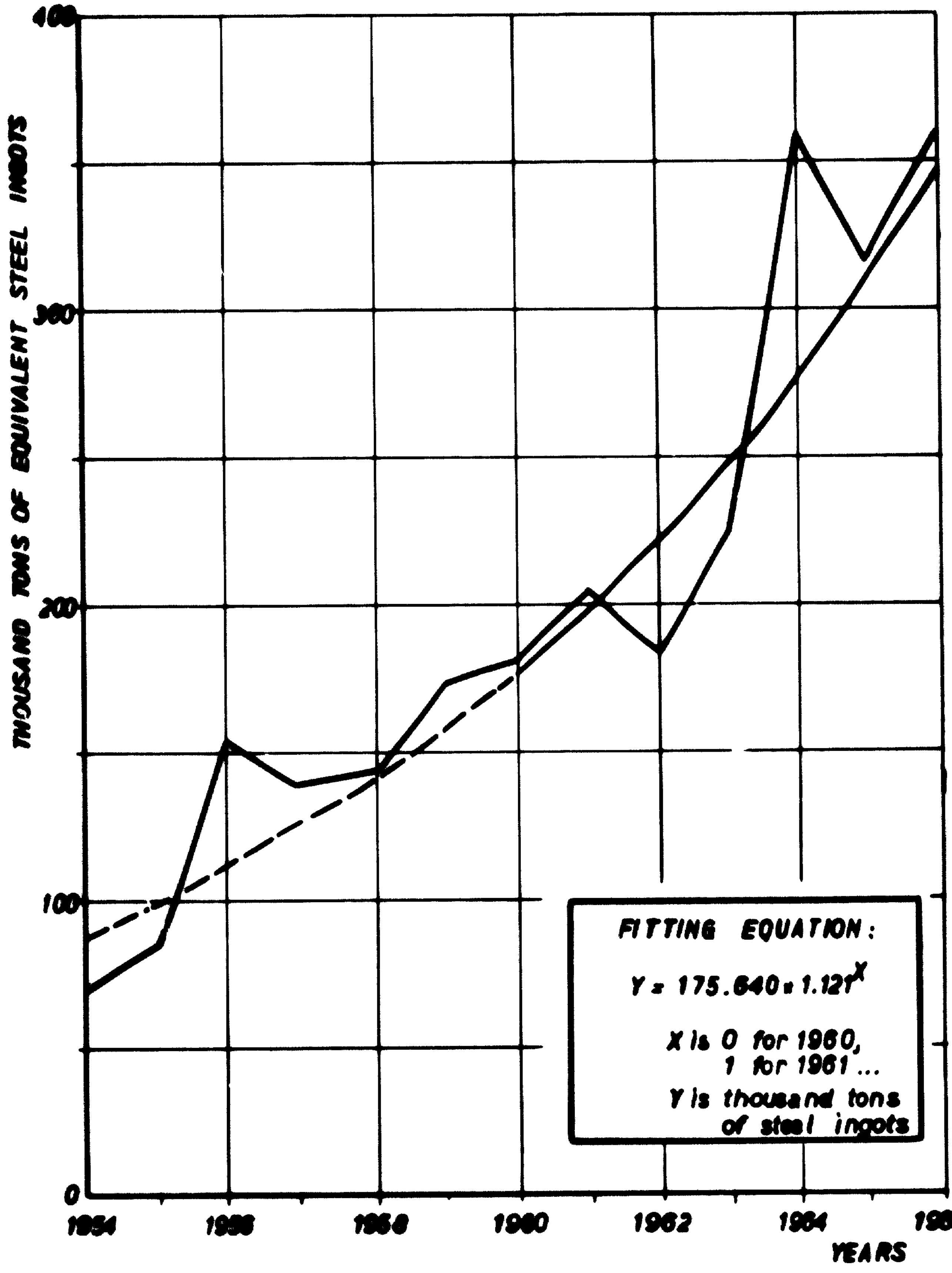


TABLE 2/3

NIGERIAN ADJUSTED APPARENT CONSUMPTION

	ITEM	1954	1955	1956	1957	1958	1959
1	APPARENT CONSUMPTION OF STEEL INGOTS (TABLES 2/1 AND 2/2)	67 440	78 000	147 700	139 820	167 570	198 220
2	IMPORTED RAILS AND ACCESSORIES	16 084	12 871	12 077	12 491	28 375	29 930
3	PIPES AND TUBES FOR PETROLEUM INDUSTRIES			1 236	6 618	14 452	12 871
4	SUB-TOTAL (4 = 1 -(2 + 3))	51 356	66 871	134 390	120 711	124 743	154 421
5	AVERAGE ANNUAL IMPORTS OF RAILS AND ACCESSORIES	18 638	18 638	18 638	18 638	18 638	18 638
6	ADJUSTED APPARENT CONSUMPTION OF STEEL INGOTS (6 = 4 + 5)	70 000	85 500	153 030	139 080	143 380	173 06

SECTION 1

PPARENT CONSUMPTION OF STEEL INGOTS

TONS OF EQUIVALENT STEEL INGOTS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
0	147 700	139 820	167 570	198 220	190 030	225 460	207 500	259 760	404 830	347 504	388 360
	12 077	12 491	28 375	29 930	23 234	29 360	21 119	12 900	29 934	8 216	1 305
	1 236	6 618	14 452	12 871	3 292	10 006	10 832	19 997	32 001	39 904	43 304
11	134 390	120 711	124 743	154 421	163 504	186 092	165 549	226 863	342 895	299 384	343 751
6	18 638	18 638	18 638	18 638	18 010	18 010	18 010	18 010	18 010	18 010	18 010
00	153 030	139 080	143 38[illegible]	173 060	181 510	204 100	183 560	224 870	360 900	317 390	381 760

SECTION 2

FIGURE 2/3
APPARENT CONSUMPTION OF FLAT PRODUCTS

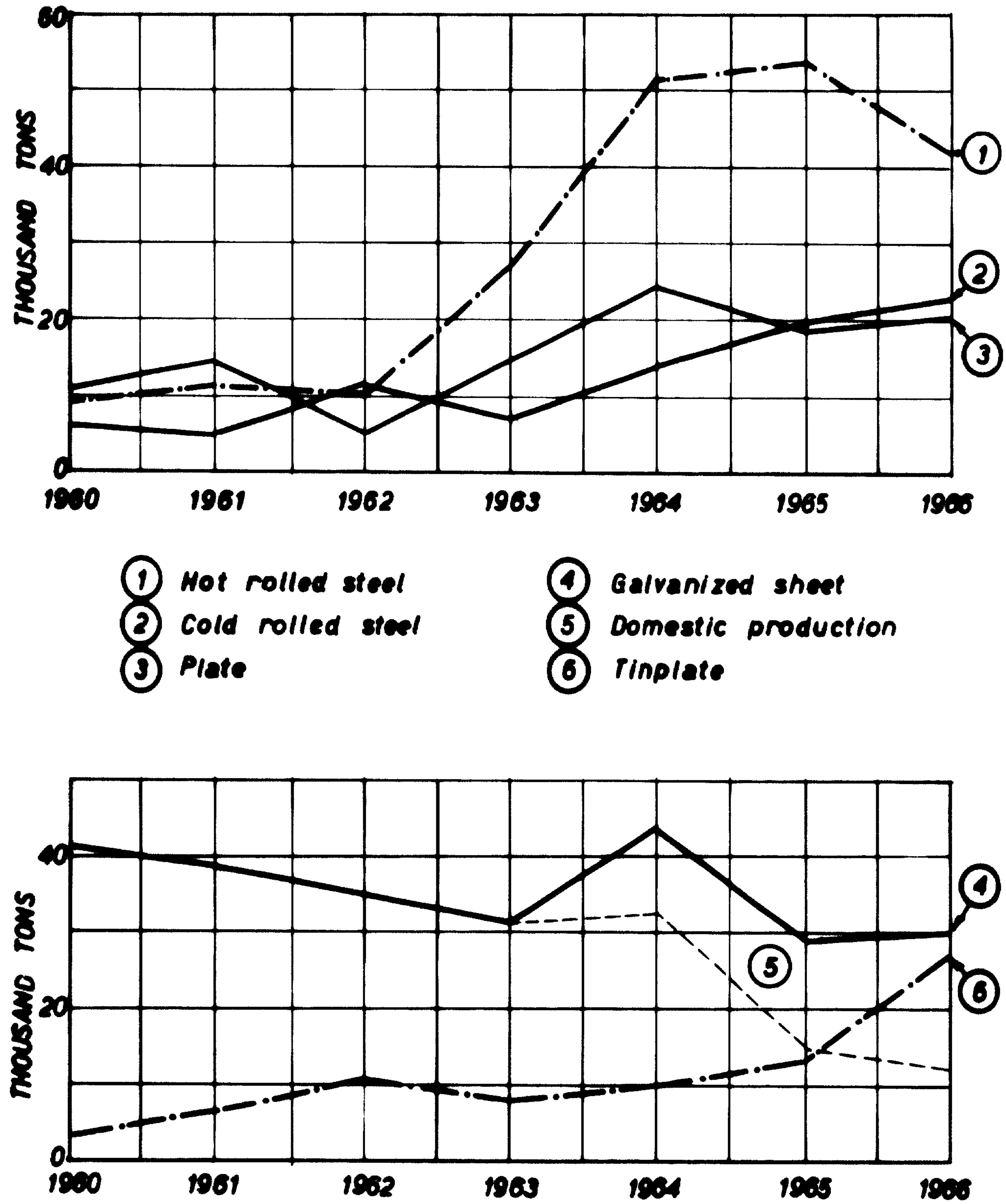


FIGURE 2/4

APPARENT CONSUMPTION OF NON FLAT PRODUCTS

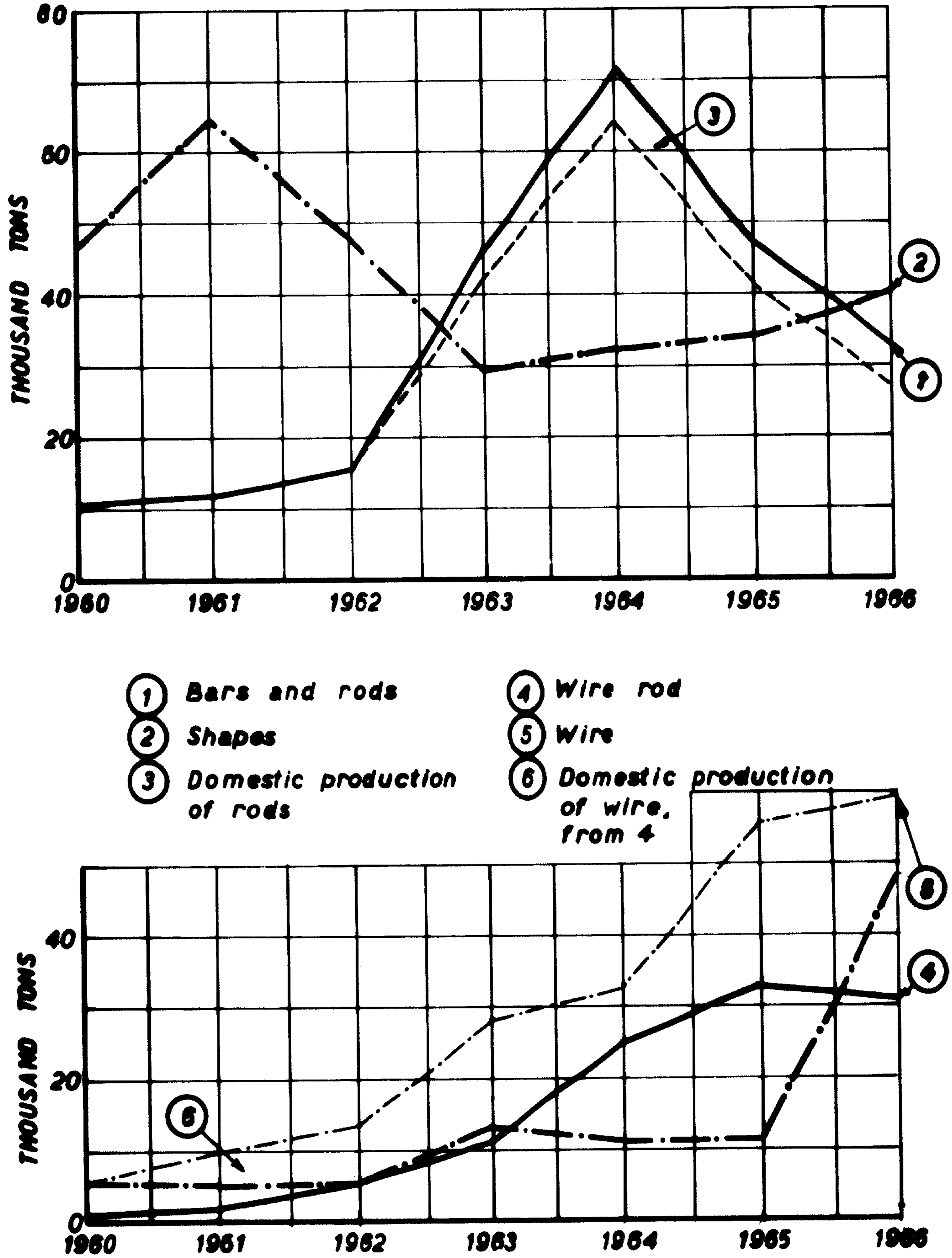


TABLE 2/4

NIGERIAN SECTORS OF APPARENT CONSUM

SECTORS	TOTAL ROLLED PRODUCTS						FLAT		
	1960		1963		1966		1960		196
	TONS	%	TONS	%	TONS	%	TONS	%	TONS
1. REROLLING, DRAWING AND DERIVED PRODUCTS	47 930	31.7	53 939	28.4	108 771	37.2	40 967	62.7	31 67
2. AGRICULTURE	3 200	2.1	6 260	3.3	4 940	1.7	2 923	4.5	5 92
3. INDUSTRIAL EQUIPMENT	20 640	13.6	17 230	9.1	28 575	9.8	3 000	4.6	9 80
5. CIVIL CONSTRUCTION AND PUBIC WORKS	25 490	16.8	67 870	35.7	73 126	25.1	4 230	6.5	7 54
4. TRANSPORTATION	38 374	25.3	21 090	11.2	11 995	4.1	600	1.0	3 60
6. METAL CONTAINERS	6 546	4.3	15 637	8.2	43 724	15.0	6 548	10.0	15 6.
7. HOUSEHOLD UTENSILS	8 973	5.6	7 786	4.1	20 879	7.1	6 998	10.7	4 10
TOTAL	151 155	100	189 832	100	292 010	100	65 266	100	78 2

SECTION 1

TABLE 2/4

S OF APPARENT CONSUMPTION

D PRODUCTS				FLAT PRODUCTS						NON FLAT PRODUCTS					
963		1966		1960		1963		1966		1960		1963		1966	
NS	%	TONS	%	TONS	%	TONS	%	TONS	%	TONS	%	TONS	%	TONS	%
39	28.4	108 771	37.2	40967	62.7	31 671	40.5	30 203	24.0	6 963	8.1	22 268	20.0	78 568	47.5
80	3.3	4 940	1.7	2 923	4.5	5 920	7.6	4 340	3.4	277	0.3	360	0.3	600	0.3
230	9.1	28 575	9.8	3 000	4.6	9 800	12.5	12 845	10.1	17640	20.6	7 430	6.7	15 730	9.6
370	35.7	73 126	25.1	4 230	6.5	7 547	9.6	20 350	16.0	21 260	24.8	60 323	54.0	52 776	32.0
090	11.2	11 995	4.1	600	1.0	3 604	4.5	8 052	6.5	37 774	43.9	17 486	15.7	3 943	2.4
637	8.2	43 724	15.0	6 548	10.0	15 637	20.0	43 724	34.2						
786	4.1	20 879	7.1	6 998	10.7	4 108	5.3	7 364	5.8	1 975	2.3	3 678	3.3	13 515	8.2
832	100	292 010	100	65 266	100	78 287	100	126 878	100	85 889	100	111 545	100	165 132	100

SECTION 2

III. FORECAST OF STEEL DEMAND IN THE PERIOD 1967/1973

3.1 - PRELIMINARY CONSIDERATIONS

There are three classical methods used to forecast steel demand in a country or region:

- extrapolation of the historical series of apparent consumption;
- determination of the growth tendencies of the sectors of industrial activities;
- establishment of a mathematical correlation between steel consumption and one or more macroeconomic variables.

The first method is susceptible to failures when used in countries which are at the initial phase of development. The period covered by statistics is, in general, very short and the fluctuations from year to year are very strong; in consequence, majority of steel demand forecasts result optimistic.

The second method is more precise but needs more effort of the research worker, since datae are so significant as the number of observations collected in the field become larger.

The third, actually much used, tries to relate steel demand to the growth of the country's economy. Its projections, therefore, should be taken with much care, since, like the first method, fluctuations in the domestic economy will affect the results previewed for the future demand of steel, sensibly.

In the present work, the first two methods were adopted since, in the actual political cycle of Nigeria, it would be difficult to base the study of steel demand on the forecasts of the development of macroeconomic variables.

All the study of this chapter will be made on the basis of fundamental assumptions pointed out as follows:

1. The demand of 1967, initial year of the period under consideration, will be considered as corresponding to 75 per cent of apparent consumption of 1966. This was the general opinion of the interviewed consumers in the different regions of the country. The results of the sales of the first five months of the year led to this forecast.
2. The import of selected manufactured goods which, in 1966, represented about 40 per cent of total apparent consumption of equivalent steel ingots, will be assumed as descending gradually until it reaches 10 per cent of total demand in 1973. This hypothesis is justifiable, since:
    a) the selected items are either partially made in the country, or could eventually come to be produced at short time;
    b) some of the large producers are still working under full capacity (barbed wire, wire, galvanized sheets, metal containers, mattresses, etc.).
3. In the estimate of apparent demand, the expansion programme of the existing steel plant will be considered. This plan, programmed for execution in five years, forecasts the successive installation of two open-hearth furnaces, and rolling facilities, raising the annual capacity from 7,200 to 33,000 tons of steel ingots.

3.2 - PROJECTION OF THE SECTORIAL DEMAND

The following table, obtained from datae of Table 2/4 of the last chapter, presents the gradual development of the sectors of steel consumption in the period 1960/1966.

Industrial Sector	Average annual rate (%)
1. Rerolling, drawing, and derived products	14.0
2. Agricultural tools	7.4
3. Industrial equipment	5.5
4. Transportation	-21.0
5. Civil construction and public works	19.0
6. Metal containers	37.2
7. Household utensils	14.8

The simple observation of these results indicates the impracticability of a direct extrapolation for the next period. There are sectors which present atypical evolution, whose cause should be known before passing to future forecast.

The interviews held with the main suppliers and consumers of steel permitted the following estimates for 1967/1973:

1. Rerolling, drawing and derived products:

The average annual rate of growth shown in the period 1960/1966 (14%) is perfectly probable in the next period. New factories of nails and screws, bolts and rivets come to be installed and the demand for wire and by-products is ascending. On the other hand, a slight reaction in the consumption of galvanized sheets is verified.

2. Agricultural tools:

The sales of handtools for agriculture and forestry have been maintaining a constant rate (about 6%) for many years. On the other hand, the use of machine tools, began practically in the last period, permits the forecast that average rate of growth of the sector will be around 7 per cent, in 1967/1973.

3. Industrial equipment:

Although this sector comprises the eventual production of heavy items (reservoirs, etc.) the constant demand of lorry-beds, trailers, tanks and lesser equipment, authorizes the maintenance of a 5 per cent rate for the next period.

4. Transportation:

This was the only sector that presented a negative rate in the period 1960/1966. The principal reason was the use of concrete and wood sleepers in substitution for steel. For the coming period, however, the Nigerian Railway Corporation forecasts the substitution of rails in an extension of 320 miles, as well as a reinforcement of metallic bridges.

The annual average demand, on the basis of 135 tons of steel per mile, and of 400 tons of steel for bridges reinforcement, will be about 7,300 tons of steel.

5. Civil construction and public works:

This sector, as already mentioned, is the principal consumer of bars, rods and shapes. Its rate of growth, therefore, is intimately linked with the government plans and with the confidence of private capital for application in civil works.

The opinion of engineers and contractors is that the probable rate in the coming period will be about 10 per cent, and so, smaller than that in 1960/1966.

6. Metal containers and stoppers:

The recent installation of factories, in this sector, was the cause of the high rate observed in the last period.

The general opinion, however, is that the market is now established to the level of 5 per cent rate of increase.

7. Household utensils:

Equally in this sector, the tendency will be a reduction of the observed rate in the last period, an increase of about 8 per cent per year in the period 1967/1973 being probable.

Table 3/1 presents the probable demand of steel ingots in the period 1967/1973, in view of the forecasts of the sectorial evolution. It may be observed that the previewed demand for 1967 obeyed the first initial assumption (item 3.1).

3.3 - EXTRAPOLATION OF THE HISTORICAL SERIES OF APPARENT CONSUMPTION

A fitting equation (Chapter 2 - figure 2/2) representing the historic tendency of apparent consumption of steel in Nigeria (period 1960/1966) was used as a means of forecasting apparent demand of the period 1967/1973.

The ordinates (annual tonnages of steel ingots) suffered a correction (slipping of the axle of abcissas) in obedience to the first assumption, in a way to obtain in 1967, the value corresponding to 75 per cent of 1966 consumption of steel ingots.

The results are indicated in the table below:

1,000 tons

YEARS	DEMAND OF STEEL INGOTS
1967	261
1968	308
1969	361
1970	420
1971	487
1972	562
1973	646

3.4 - PROBABLE APPARENT DEMAND OF STEEL IN THE PERIOD 1967/1973

As previewed earlier on, the extrapolation of the historical series let to tonnages of apparent demand sensibly superior to the sectorial evolution. This forecast would be probable if the economic pattern of the country, prevailing in the former period, could be maintained in 1967/1973.

Therefore the series obtained in item 3.2 (forecast method of sectorial evolution) will be considered as the <u>Probable Apparent Demand</u> of steel, while those obtained in item 3.3 (extrapolation of historical tendency) will be ragarded as the <u>Maximum Apparent Demand</u>. The intervals between these series will define the limits of variation of the probable demand of Nigeria.

The table below summarizes the results obtained in the two preceding items.

Tons of equivl steel ingots

YEAR	PROBABLE APPARENT DEMAND	MAXIMUM APPARENT DEMAND
1967	261,000	261,000
1968	292,000	308,000
1969	327,000	361,000
1970	366,000	420,000
1971	408,000	487,000
1972	454,000	562,000
1973	503,000	646,000

Figure 3/1 translates in a graph all that was expressed in this chapter. It can be noted that at the end of the period, if the initial assumptions are maintained, the probable deficit of steel ingots in Nigeria will be about 430,000 tons.

TABLE 3/1

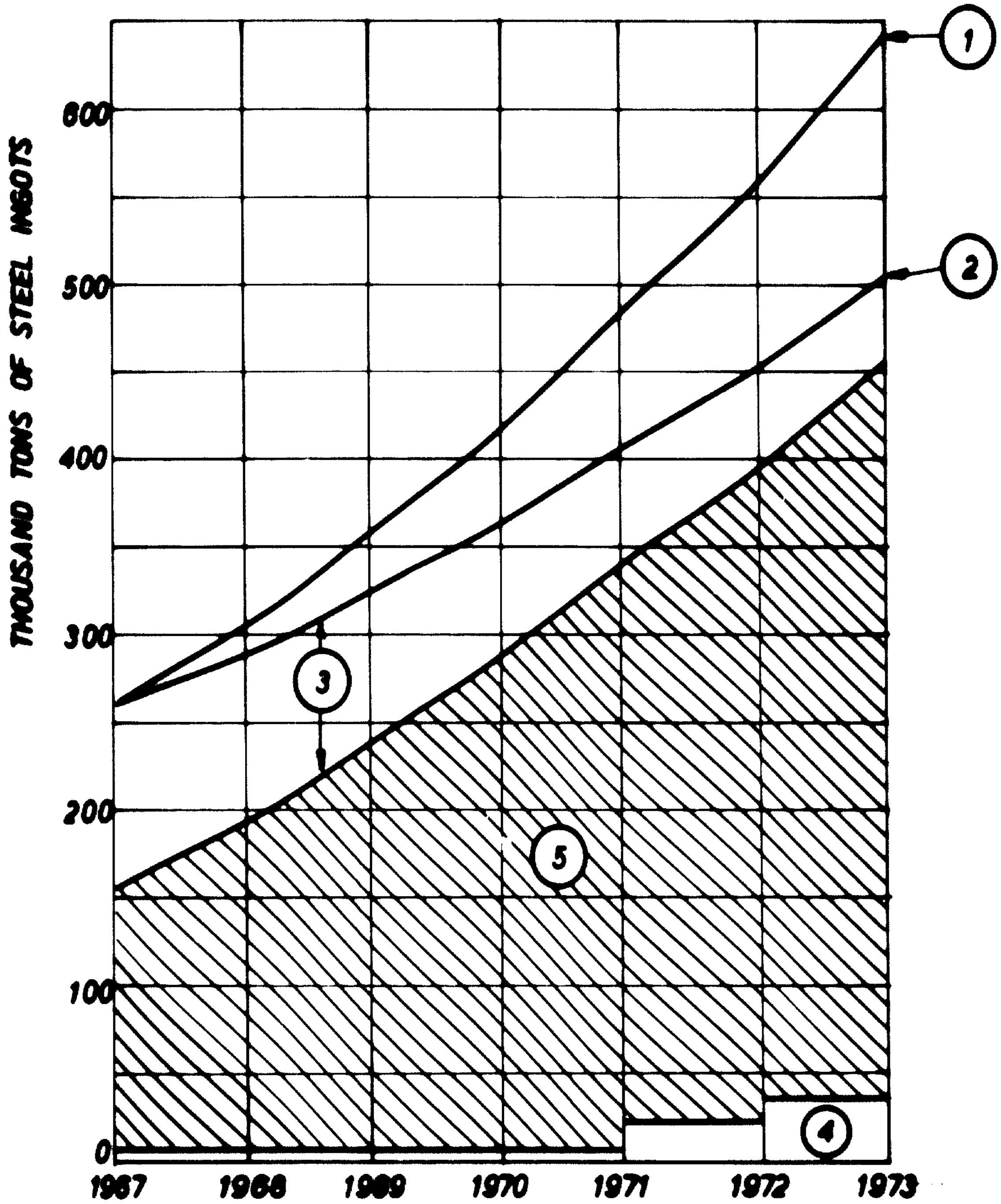
NIGERIAN PROBABLE DEMAND OF STEEL INGOTS

THOUSAND TONS OF INGOTS

SECTORS	1967	1968	1969	1970	1971	1972	1973
1. REROLLING & DRAWING	97	110	125	143	163	186	212
2. AGRICULTURE	4	4.2	4.5	4.8	5.1	5.4	5.7
3. INDUSTRIAL EQUIPMENT	26	27.3	28.7	30.1	31.6	33.2	34.9
4. TRANSPORTATION	11	18.3	25.6	32.9	40.2	47.5	54.8
5. CIVIL CONSTRUCTION	65	71	78	86	95	105	115
6. METAL CONTAINERS	39	41	43	45	47	49	51
7. HOUSEHOLD UTENSILS	19	20.5	22	23.8	25.7	27.7	30
TOTAL	261	292	327	366	408	454	503

FIGURE 3/1

NIGERIAN PROBABLE APPARENT DEMAND OF STEEL INGOTS



(1) MAXIMUM APPARENT DEMAND (2) PROBABLE APPARENT DEMAND

(3) IMPORT (MANUF. GOODS) (4) DOMESTIC PRODUCTION

(5) PROBABLE DEFICIT OF STEEL INGOTS

IV. THE WEST AFRICAN MARKET FOR IRON AND STEEL PRODUCTS

4.1 - PRELIMINARY CONSIDERATIONS

The establishment of a steel industry in under-developed regions must be preceded by careful investigation, given the complexity of problems which have to be faced.

It is natural that each country of these regions after having undergone the earlier stages of the normal sequence of industrialization - food processing, textile industries, light chemicals, leather, pulp and paper, etc. - should have their eyes focused on steel production, since it constitutes a strong acceleration factor of economic development. Consequently the simultaneous appearance of projects for steel plants of limited capacity is inevitable, since the financial resources of the countries of the under-developed regions are also limited.

This division of efforts, therefore, does not only attend the interests of the nations, in particular, but is prejudicial to regional development.

This was the motive that led the Economic Commission for Africa to endorse, in its 5th Session in February 1963, the recommendations of the Standing Committee on Industry, Transport and Natural Resources, in the sense that each sub-region of Africa be considered as a unit.

According to this orientation, the following comparative analysis of the West African countries will be made, in order to identify the potential producers and those which, in a short period, present better conditions of iron and steel demand, that is, the potential consumers. Datae used in the analysis are presented in tables 4/1, 4/2, 4/3, 4/4, and 4/5 which follow.

4.1.1 - POTENTIAL PRODUCERS

The conquest of the export market for iron and steel products is a slow operation for it must result in:

a) the displacement of traditional suppliers or,

b) the satisfaction of contained demand, motivated by insufficiency of sources of internal or external supply.

In any of these hypothesis, the quality and the cost of products, as well as a guarantee of a long term supply, are primordial factors for success.

In the particular case of the West African sub-region, the steel products, in most of the countries are imported mainly in the form of manufactured goods, owing to the reduced degree of industrialization.

Consequently, in order that a country of the sub-region could be considered a potential producer, the first condition is the existence of domestic market, capable of absorving the largest part of production, intially at least. Examined on this point of view, Nigeria, Ghana, and Ivory Coast would be the countries most indicated, because they represent respectively, 46, 20, and 9 per cent of total consumption of steel of the sub-region.

A second factor, although not so important as the first, would be availability of raw materials, Considering this aspect, Liberia, Sierra Leone, Guinea and Nigeria would be indicated.

The first three possess large reserves of iron ore with high metallic contents. Nigeria, besides possessing substantial reserves of lower grade ore and widespread deposits of limestone, presents the advantage of being the only country in the sub-region which has coal in appreciable quantities.

Finally, the third factor of selection would be the degree of industrial development, capable of permitting the recruitment and the rapid formation of skilled manpower which an intergrated steel plant requires. Two countries of the sub-region could satisfy this condition with relative facility: Nigeria and Ghana.

By viewing the factors mentioned above, permits the conclusion that Nigeria is the most indicated place for the erection of an integrated steel plant on sub-regional basis.

4.1.2 - POTENTIAL CONSUMERS

Considering Nigeria as the exporter country for iron and steel products of the sub-region, the identification of the potential consumers will result also from the analysis of the selected main factors.

The first factor would be the size of the market of each country, represented:

a) by the area and population density, and
b) by the purchasing power, converted into terms of gross domestic product per capita.

The second factor would be the localization of potential consumers in relation to the producing country. As already mentioned earlier, the price of exported products is one of the fundamental characteristics of the sub-regional market. Since transport costs affect sensibly the prices of the exported products, the nearer the consumer markets, the less will be these additional costs.

The third factor will be represented by existing international agreements which, certainly, will influence the sub-regional market.

Finally, the existence of a market already begun, would be a positive factor to be added in the indication of potential consumers.

The table below presents, for each factor analysed, the six countries most suitable, in descending order.

MARKET SIZE		LOCALIZATION	INTERNATIONAL AGREEMENTS (ECM)	ACTUAL IMPORTERS FROM NIGERIA
AREA AND DENSITY	G.D.P PER CAPITA			
Ghana	Ghana	Dahomey	Liberia(a)	Ghana
I. Coast	I.Coast	Cameroun	S.Leone(a)	Dahomey
Cameroun	Liberia	Togo	Ghana (b)	S.Leone
Dahomey	Cameroun	Ghana	Dahomey(c)	Liberia
Upper Volta	Guinea	I. Coast	Cameroun(c)	I. Coast
Liberia	S.Leone	Upper Volta	Togo (c)	Cameroun

(a) Not associated; (b) Future possible associated
(c) Associate

It is concluded, by the analysis of the table that, at short and medium terms, the steel industry of the West African sub-region, will count on six potential consumers, namely: Ghana, Dahomey, Ivory Coast, Cameroun, Liberia, and Sierra Leone.

4.2 - NIGERIAN EXPORT MARKETS

The development of steel consumption in the West African sub-region was uniform in the period between 1950 and 1962, showing an annual rate of about 11 per cent. Consumption in the last three years of the period mentioned above was as follows:

1960 . . . . .518,000 metric tons
1961 . . . . .508,000 " "
1962 . . . . .555,000 " "

In these three years, a great portion of the import of the countries, with the exception of Nigeria and Ghana, was represented by manufactured goods (about 80 per cent).

Given this steady growth of steel consumption of the sub-region, it was possible to establish a model of distribution per product(1), which has been closely followed by majority of the West African countries. This distribution is represented as follows:

Types of products	%
Ingots and semis	0.1
Bars and rods	30.3
Shapes	13.1
Wire rod and wire	7.1
Galvanised sheets	25.0
Cold rolled sheets (uncoated)	4.0
Tinplate	2.4
Plate	3.5
Tubes and pipes	12.8
Forgings	0.6
TOTAL	100.0

(1) - E/CN.14/INR.27 - The Development of the Iron and Steel Industry in Africa. December, 1963. Page 24.

Observe that the principal items of consumption:

Bars and rods (mainly reinforcing rods)	30.3%
Galvanized sheets	25.0%
Shapes (mainly small angles, joists, etc.)	13.1%

correspond practically to 70 per cent of rolled steel products and forgings imported by each country.

In the Sector of manufactured goods, the predominant items are hand tools for agriculture and forestry, gauze netting, grill fencing, and household utensils.

4.2.1 - THE EXISTING PATTERN OF THE MARKET

An evaluation of existing pattern of the market will be made, pointing out the three most probable consumers indicated earlier (item 4.1.2), namely: Ghana, Ivory Coast and Cameroun.

Owing to the absence of recent statistics, two assumptions will be raised:

1st: the same annual rate of growth (11%) of the former steel consumption will be considered in the period 1960/1963;

2nd: the distribution of the steel products (sub-regional pattern) will be maintained for Ivory Coast and Cameroun.

Consequently, the soncumption of steel of the West African sub-region, in 1966, will be estimated in 872,300 metric tons, as calculated earlier (Table 4/3), with the following participation of the three countries mentioned above:

Ghana . . . . 173,900 metric tons
Ivory Coast . . . . 81,100 " "

Cameroun . . . . 55,300 Metric tons

TOTAL = 310,300 " "

This total represents about 36 per cent of the consumption of the sub-region.

The estimate of actual consumption and the analysis of distribution per types of products will be made individually.

GHANA

This country imported, in 1959, 65,800 tons of steel products, distributed as follows: (1)

Bars and rods	21,800 tons	(33%)
Galvanized sheet, uncoated sheet and plate	16,600 tons	(26%)
Pipes, tubes and fittings	10,800 tons	(16%)
Castings, forgings, rails and accessories	16,600 tons	(25%)
	65,800 tons	(100%)

Maintaining, in the period 1960/1966, the annual rate of consumption of the earlier period (1955/1959), that is 11 per cent, the imports corresponding to 1966 would have been 77,500 tons.

Adopting the same distribution above and adding the products

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(1) - P.E. Management Group (Nigeria) Ltd. - Compendium of Basic Information Relating to the Proposed Iron and Steel Industry and Market Survey of Iron and Steel Products, 1961. Part Two - Page 26.

not recorded in this statistics in the percentages of the model of distribution, will result for 1966:

a) Rolled products, castings and forgings:

Bars and rods	25,600	tons	
Shapes	13,100	"	
Wire rod and wire	7,100	"	
Plates and sheets (Galvanized and uncoated)	20,100	"	
Tinplate	2,400	"	
Pipes, tubes and fittings	12,400	"	
Castings, forgings, rails and accessories	19,400	"	
Sub-Total	100,100	"	(57.6%)
b) Manufactured goods	73,800	"	(42.4%)
TOTAL	173,900	"	(100.0%)

IVORY COAST

Adopting the distribution pattern of steel products imported by West African countries, and considering the participation of 80 per cent of the manufactured goods in imports, will result for 1966:

a) Rolled products, castings and forgings:

Bars and rods	4,200	tons
Shapes	1,800	"
Wire rod and wire	1,000	"
Plates and sheets (Galvanised and uncoated)	4,500	"
Tinplate	310	"
Pipes, tubes and fittings	1,800	"

Castings, forgings, rails and accessories	2,610	tons	
Sub-Total	16,220	"	(20%)
b) Manufactured goods	64,880	"	(80%)
TOTAL	81,100	"	(100%)

CAMEROUN

Following the same criterion as above the estimated consumption in 1966 will result:

a) Rolled products, castings and forgings:

Bars and rods	2,850	tons	
Shapes	1,230	"	
Wire rod and wire	670	"	
Plates and sheets (Galvanized and uncoated)	3,200	"	
Tinplate	230	"	
Pipes, tubes and fittings	1,200	"	
Castings, forgings, rails and accessories	1,680	"	
Sub-Total	11,060	"	(20%)
b) Manufactured goods	44,240	"	(80%)
TOTAL	55,300	"	(100%)

The following table (4/6) summarises the datas obtained in the present analysis, referring to 1966. It could be verified that the Nigerian exports to the West African countries represented this year, just 0.52 per cent of the needs of the three countries considered.

4.2.2. - EXPORT MARKETS FORECAST

The table below presents a comparison of the distribution of imported products, in 1966, by three countries components of the West African Sub-region, of different stages of industrialisation.

ITEMS	NIGERIA		GHANA		CAMEROUN	
a) Rolled products:						
- bars and rods	10.4		31.7		30.4	
- shapes	18.0		16.3		13.1	
- Wire rod and wire	16.9		8.7		7.1	
- plates and sheets (Galv. and uncoated)	24.3		25.0		34.2	
- tinplate	13.6		3.0		2.4	
- pipes, tubes and fittings	16.8		15.3		12.8	
SUB-TOTAL	100.0	51.5	100.0	46.5	100.0	17.0
b) Castings, forgings, rails and accessories		14.0		11.1		3.0
c) Manufactured goods		34.5		42.4		80.0
TOTAL		100.0		100.0		100.0

It could be observed that as a country develops industrially:

1. The participation of manufactured goode in total import diminishes, as consequence of a progressive substitution of the items imported by equivalents of domestic production. Consequently, the participation of rolled products and castings, forgings, rails and accessories increase.

2. With the exception of plates and sheets (where galvanized sheets for roofing purposes are being substituted by aluminum or asbestos cement sheets), and of bars and rods (where reinforcing rods, substituted partially by shapes in buildings of metallic structure, predominated), the rest of the rolled steel products present greater percentage of participation.

Therefore, it is supposed that at the end of the period 1967/1973 the potential consumers of the projected steel plant of Nigeria would have advanced a stage in her industrialization.

This hypothesis is supported on the existing development plans in these countries, whose aims are summarized thus[1]:

GHANA:

Development plan: 1963/4 to 1969/70.

Creation of groundwork (transports, communications, technical and administrative education) for the development of the industrial sector. Complete utilization of natural resources.

This Plan is being observed in its basic lines, proposing for the rest of the period (1967/70) the following allocation (in £G million):

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(1) - Barclays Bank D.C.O. - London. West African Directory, 1966/7.

IND. SECTOR	1967/8	1968/9	1969/70
Mining	16.8	21.5	26.7
Housing	3.2	3.8	4.7
Roads and bridges	3.4	4.0	4.0
Railway and inland waters	0.7	1.1	1.2
Telecommunications	1.1	0.6	0.5
Electricity	1.2	1.0	1.0

IVORY COAST

Development Plan: Code des Investissements (started in 1959).

Incentive to coffee and cocoa processing, textile manufacturing, basic industries, mining, and building construction.

CAMEROUN:

Development plan: Elevation of income per head at a rate of 4.6 per cent per year.

There has been a great deal of expansion in recent years, as a consequence of the 5 years development plan 1961/1965, largely with the help of foreign investors, mainly French, which the government is anxious to attract and to which it offers considerable encouragement.

Within this criterion, it would be possible to admit that in 1973 Ivory Coast and Cameroun would present the actual distribution pattern of consumption of Ghana, this country tending towards the actual pattern of Nigeria.

The total demand of steel of the West African Sub-region, in 1973, as anticipated in the report already cited[1], will be

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[1] - E/CN.14/INR.27. Page 18, figure D.

2,040,000 metric tons. The demand of each of the countries considered in this analysis, the percentage participation of 1966 being maintained, will be as indicated below:

Ghana	.408,000 metric tons		
Ivory Coast	.190,000	"	"
Cameroun	.129,000	"	"
SUB-TOTAL	727,000	"	"(35.6%)
TOTAL (West Africa)	2,040,000	"	"(100.0%)

Table 4/7 presents an estimate of the demand of Ghana, Ivory Coast and Cameroun, in 1973, according to the principal types of steel products.

As was already pointed out earlier on, the conquest of an export market of iron and steel products is slow and uncertain. In the particular case of West Africa, the existence of international agreements already entered into, will tend certainly to limit imports out of the areas covered by the agreements to a reduced percentage.

Thus being the case, it will be prudent to admit that, at the end of the period 1967/1973, Nigerian exports will satisfy almost a part of the expected demand, or rather about 10 per cent of the total demand of the most probable consumers.

It is to be expected, on the whole, that inter-governmental actions aiming at the establishment of a West African Trade[2] could increase already existing exports, elevating the admitted rate to very sensible superior levels.

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(2)- E/CN.14/INR.26. October, 1963. Report of the Meeting of Experts on Iron and Steel in West Africa. Page 3

A superposition of the market range of export to the probable demand curve of steel in Nigeria is presented in Figure 4/1.

TABLE 4/1
WEST AFRICA — AREA AND POPULATION

COUNTRY	AREA (1000 km²)	POPULATION (1000 hab.)			DENSITY (hab/km²)	
		1966	1972	Annual rate (%)	1966	1972
CAMEROUN	479.4	5 320	6 026	2.1	11.1	12.6
DAHOMEY	113.0	2 230	2 650	2.9	19.7	23.5
GAMBIA	10.4	332	380	2.3	31.9	36.5
GHANA	239.0	8 053	9 450	2.7	33.7	39.5
GUINEA	245.9	2740			11.1	
IVORY COAST	322.0	3 920	4490	2.3	12.2	13.9
LIBERIA	111.2	1 074	1 174	1.5	9.7	10.5
MALI	1 202.0	4 617	5 320	2.4	3.8	4.4
NIGER	1 267.0	3 298	3 870	2.7	2.6	3.1
NIGERIA	924.0	59 080	74 520	2.0	64.0	80.6
SIERRA LEONE	74.2	2 250	2400	1.1	31.0	33.1
TOGO	57.0	1 652	2 084	2.0	29.0	36.5
UPPER VOLTA	274.0	4 600	5 335	2.5	16.8	19.4

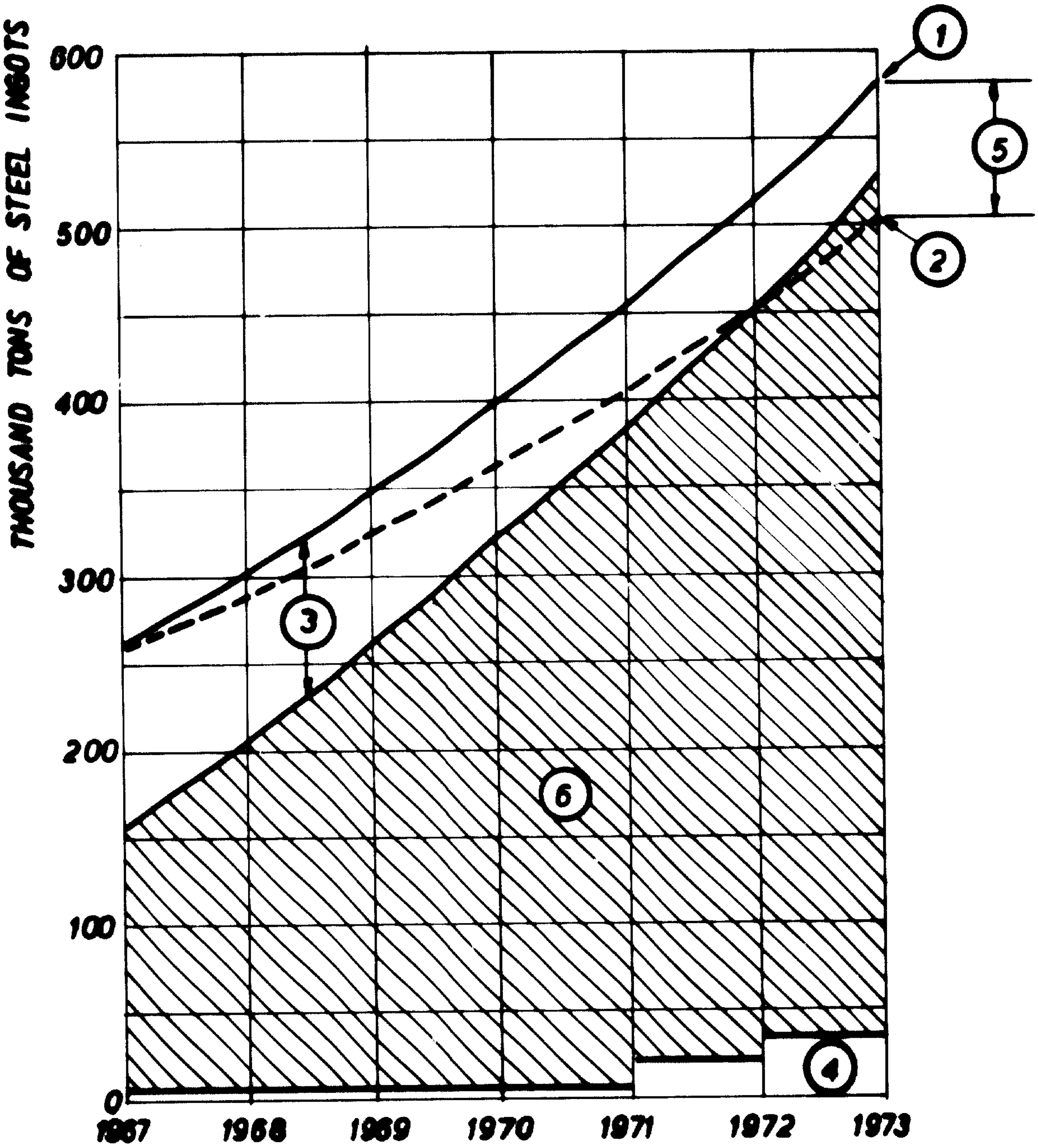
Sources :

United Nations Statistical Yearbook, 1965.

Barclays Bank D.C.O. West African Directory. London, 1966/7

FIGURE 4/1

NIGERIAN (AND WEST AFRICAN TRADE) PROBABLE APPARENT DEMAND OF STEEL INGOTS



1 TOTAL APPARENT DEMAND

2 DOMESTIC APPARENT DEMAND

3 IMPORT (MANUFACTURED GOODS)

4 DOMESTIC PRODUCTION

5 EXPORT (WEST AFRICAN TRADE)

6 PROBABLE DEFICIT OF STEEL INGOTS

TABLE 4/2
WEST AFRICA - GROSS DOMESTIC PRODUCT

COUNTRY	G.D.P. AT MARKET PRICE ($ Million)					1966 PER CAPITA ($)
	1958 (a)	1963 (b)	1964 (b)	ANNUAL RATE (%)	1966 (Est)	
CAMEROUN	456	550		3.8	615	116
DAHOMEY	121					54 (a)
GAMBIA	21					63 (a)
GHANA	986		1640	8.8	1940	240
GUINEA	311					113 (a)
IVORY COAST	615		820	4.8	900	230
LIBERIA	153	161 (d)		1.3	167	156
MALI	428					95 (a)
NIGER	169					51 (a)
NIGERIA	2 740	3 620 (c)		7.4	4 485	76
SIERRA LEONE	154	219		7.2	228	101
TOGO	111	112		0.2	113	68
UPPER VOLTA	159		205	4.3	223	48

(a) E/CN.14/INR/27. Pages 12, 13.
(b) MIN. OF FOREIGN AFFAIRS. BRAZIL. Dados Factuals sôbre os Países da Africa ao Sul do Saára. March, 1967.
(c) 1962.
(d) 1961.

TABLE 4/3

WEST AFRICA – STEEL CONSUMPTION

COUNTRY	G.D.P. PER CAPITA ($)	STEEL CONSUMPTION 1966 EST. PER CAPITA (Kg) (+)	TOTAL 1000 m. tons	TOTAL %
CAMEROUN	116	10.4	55.3	6.3
DAHOMEY	54	4.9	10.9	1.3
GAMBIA	63	5.7	1.9	0.2
GUINEA	113	10.2	28.0	3.2
GHANA	240	21.6	173.9	20.0
IVORY COAST	230	20.7	81.1	9.3
LIBERIA	156	14.0	15.0	1.7
MALI	95	8.5	39.2	4.5
NIGER	51	4.6	15.1	1.7
NIGERIA	76	6.8	401.7	46.0
SIERRA LEONE	101	9.1	20.4	2.3
TOGO	68	6.1	10.1	1.2
UPPER VOLTA	48	4.3	19.7	2.3
TOTAL			872.3	100.0

(+) E/CN.14/INR/27. Page 13, figure B: $S = P(.06 + .03p)$
P for G.D.P. per capita; p for proportion of GDP going to capital formation (assumed = 0.10); S for steel consumption per capita.

TABLE 4/4

WEST AFRICA - ELECTRIC ENERGY PRODUCTION 1966

COUNTRY	10^6 kWh		
	HYDRO	DIESEL	TOTAL
CAMEROUN	1091	6	1097
DAHOMEY		16	16
GAMBIA	...	...	...
GHANA		500	500
GUINEA		18	18
IVORY COAST	141	88	229
LIBERIA		631	631
MALI		28	28
NIGER		66	66
NIGERIA	898	126	1024
SIERRA LEONE		140	140
TOGO	5	74	79
UPPER VOLTA		73	73

SOURCES:

U.N. Statistical Yearbook, 1966.
Barclays Bank D.C.O., West African Directory, London, 1966/7.

TABLE 4/5

WEST AFRICA - BASIC RAW MATERIALS FOR IRON AND STEELMAKING

COUNTRY	IRON ORE	COAL	LIMESTONE	MANGANESE
CAMEROUN	Approx. 150 million tons. Low grade ore.		Available	
DAHOMEY	Low grade ore, probably fairly plentiful.		Available	
GAMBIA	The mineral resources have not yet been exploited or fully investigated.			
GHANA	Low grade ore fairly plentiful. Probably small concentrations of rich ore.		Available	Available
GUINEA	Rich and low grade ore both plentiful (approx. 400 million tons), high Cr.		Available (high Si)	
IVORY COAST	Low grade ore fairly plentiful		Probably available	3 to 6 million T.
LIBERIA	Approx. 50 million tons of rich ore (68 to 70 %); 400 million tons of lower grade ore. EXPORTS ORE.			
MALI	The mineral resources have not yet been exploited or fully investigated.			
NIGERIA	Approximately 270 million tons of low grade ore.	Approx. 500 million tons (low grade)	Widespread deposits	
NIGER	Low grade ore fairly plentiful.			
SIERRA LEONE	Rich ore (55 to 69%) plentiful. EXPORTS ORE.			
TOGO	Low grade ore, small deposits.			
UPPER VOLTA	Low grade ore, small deposits.			Approx. 50 million tons (52%)

SOURCES: E/CN.14/INR/27 - The Development of the Iron and Steel Industry in Africa. Nov 29, 1963 Page 32.

Barclays Bank D.C.O. - West African Directory. London. 1966/7.

TABLE 4/6

GHANA, IVORY COAST, AND CAMEROUN
ESTIMATE OF IMPORTS (1966)

ITEMS	TONS	%	
ROLLED PRODUCTS:			
Bars and rods	32 140	31.4	
Shapes	15 880	15.5	
Wire rod and wire	8 630	8.5	
Plates and sheets (galv. and uncoated)	27 330	26.8	
Tinplate	2 890	3.0	
Pipes, tubes and fittings	15 200	14.8	
SUB - TOTAL	102 110	100.0	33.4
CASTINGS, FORGINGS, RAILS AND ACCESSORIES	23 320		7.6
MANUFACTURED GOODS	180 070		59.0
TOTAL	306 500		100.0

TABLE 4/7

GHANA, IVORY COAST, AND CAMEROUN - PROBABLE DEMAND OF STEEL INGOTS. 1973

ITEMS	GHANA %		GHANA TONS	IVORY COAST %		IVORY COAST TONS	CAMEROUN %		CAMEROUN TONS	TOTAL %		TOTAL TONS
ROLLED PRODUCTS:												
Bars and rods	10.4		21 500	31.7		27 600	31.7		18 700	19.2		67 800
Shapes	18.0		37 300	16.3		14 300	16.3		9 600	17.4		61 200
Wire rod and wire	16.9		35 000	8.7		7 600	8.7		5 200	13.5		47 800
Plates and sheets	24.3		50 300	25.0		21 700	25.0		14 800	24.5		86 800
Tinplate	13.3		28 100	3.0		2 600	3.0		1 800	9.2		32 500
Pipes, tubes, and fittings	16.8		34 800	15.3		13 300	15.3		9 000	16.2		57 100
SUB-TOTAL	100	51.5	207 000	100	46.5	87 100	100	46.5	59 100	100	49.3	353 200
CASTINGS, FORGINGS, RAILS & ACCES		14.0	56 300		11.1	20 600		11.1	14 100		12.7	91 000
MANUFACTURED GOODS		34.5	138 700		42.4	79 300		42.4	53 800		38.0	271 800
TOTAL (EQUIV. STEEL INGOTS)		100	402 000		100	187 000		100	127 000		100	716 000

V. APPENDICES

APPENDIX 1

NIGERIAN IMPORTS: ROLLED STEEL PRODUCTS, MANUFACTURED

	ITEMS	1960 TONS	1960 %	1961 TONS	1961 %	196[illegible] TONS
	ROLLED PRODUCTS:					
1	Blooms, billets, slabs, and blanks					
2	Plates					
3	Hot rolled coils and sheets	2 997		6 831		3 39[illegible]
4	Cold rolled coils and sheets	1 167		2 181		1 14[illegible]
5	Galvanized sheets	39 061		37 270		32 749
6	Tinplate	2 148		5 408		8 87[illegible]
7	Bars and rods					
8	Shapes	44 096		57 324		40 153
9	Rails and accessories	18 587		23 438		16 89[illegible]
10	Wire rods	970		1 730		4 75[illegible]
11	Wire	412		740		2 03[illegible]
	SUB-TOTAL	109 438	69.7	134 922	72.7	109 98[illegible]
	MANUFACTURED GOODS: (*)					
12	Tanks, vats, and reservoirs	2 090		78		24[illegible]
13	Cutlery and tableware	1 515		1 410		1 13[illegible]
14	Springs and leaves					
15	Agriculture tools and implements	2 180		2 230		199[illegible]
16	Casks, drums, boxes, and cans	2 730		2 080		307[illegible]
17	Household utensils	4 057		2 334		9 27[illegible]
18	Stoppers and seals					
19	Matchets, axes, and hatchets	910		1 490		1 45[illegible]
20	Finished structural parts, assembled structures, door and window frames	4 100		7 940		9 60[illegible]
21	Nuts, bolts, screws, rivets, and washers					
22	Wire cables, ropes, and similar	1 385		1 319		1 14[illegible]
23	Gauze netting, grill fencing, etc.	4 196		3 916		238[illegible]
24	Nails, tasks, staples, etc.					
25	Seamless and welded pipes and tubes	13 100		14 630		1966[illegible]
	SUB-TOTAL	36 263	23.0	37 427	20.1	50 13[illegible]
	CASTINGS AND FORGINGS:					
26	Cast pipes, tubes, and fittings	10 033		10 564		10 30[illegible]
27	Castings and forgings unworked	1 557		2 788		113[illegible]
	SUB-TOTAL	11 590	7.3	13 352	7.2	11 43[illegible]
28	STEEL INGOTS					
	TOTAL	157 291	100.0	185 701	100.0	171 56[illegible]
	EQUIVALENT STEEL INGOTS	190 030		225 460		207 50[illegible]

(*) Expressed in tons of equivalent rol[illegible]

SECTION 1

X 1

TS, MANUFACTURED GOODS, CASTINGS, FORGINGS, AND INGOTS

1961		1962		1963		1964		1965		1966	
TONS	%	TONS	%	TONS	%	TONS	%	TONS	%	TONS	%
				204		80		111		4 794	
				7 193		14 762		13 911		18 701	
6 831		3 392		9 025		17 156		15 581		7 582	
2 181		1 149		1 400		949		128		3 300	
37 270		32 749		31 671		32 397		15 039		12 203	
5 408		8 874		7 122		9 358		12 931		26 146	
				32 029		51 074		28 018		19 893	
57 324		40 153		8 570		20 054		27 005		34 332	
23 438		16 895		10 320		23 947		6 573		1 044	
1 730		4 750		9 206		23 558		31 089		29 532	
740		2 034		3 526		2 219		4 412		2 713	
134 922	72.7	109 986	64.0	120 986	54.7	195 554	58.0	154 798	51.3	160 240	46.9
78		245		4 720		6 900		5 850		4 960	
1 410		1 139		1 395		1 455		1 625		1 435	
				278		392		564		368	
2 230		1 990		2 380		3 060		3 510		3 980	
2 080		3 070		520		376		380		384	
2 334		9 272		6		7		9		14	
				660		417		400		480	
1 490		1 450		3 780		5 000		3 180		1 740	
7 940		9 600		24 959		15 401		8 731		6 972	
				2 180		2 450		2 860		2 950	
1 319		1 143		2 586		3 935		2 697		3 531	
3 916		2 388		2 214		1 643		1 327		1 138	
				4 736		3 736		3 574		41 590	
14 630		19 880		22 150		62 530		71 250		65 300	
37 427	20.1	50 137	29.3	72 564	32.9	107 302	31.9	106 897	35.0	134 842	39.5
10 564		10 302		23 234		29 106		38 289		45 141	
2 788		1 135		3 180		3 675		2 068		427	
13 352	7.2	11 437	6.7	26 394	12.0	32 781	9.7	40 357	13.3	45 568	13.3
				910	0.4	1 300	0.4	931	0.4	89	0.3
185 701	100.0	171 560	100.0	220 854	100.0	336 937	100.0	301 983	100.0	340 739	100.0
225 460		207 500		254 400		396 930		340 450		381 230	

tons of equivalent rolled products

SECTION 2

APPENDIX 2

NIGERIAN IMPORTS: EQUIVALENT ROLLED STEEL PRODUCTS, CASTINGS,

ITEMS	1960		1961		1962		1963
	TONS	%	TONS	%	TONS	%	TONS
1. Semi-finished steel							204
2. Plates	11 030	7.6	14 382	8.3	5 394	3.4	14 373
3. Hot rolled coils and sheets	9 782	6.7	11 750	6.8	10 431	6.5	27 217
4. Cold rolled coils and sheets	6 179	4.3	5 257	3.0	11050	6.9	7 626
5. Galvanized sheets	40 961	28.1	38 681	22.4	34 626	21.6	31 671
6. Tinplate	3 518	2.4	6 448	3.7	10 414	6.4	8 042
SUB-TOTAL (Flat products)	71476	49.1	76 518	44.2	71 905	44.8	89 133
7. Bars and rods	10 357	7.0	11 930	7.0	15 550	9.7	42 359
8. Shapes	47 116	32.4	64 144	37.2	48 293	30.2	29 290
9. Rails and accessories	9 789	6.7	12 052	7.1	14 060	8.8	8 980
10. Wire rods	970	0.6	1 730	1.0	4 750	3.0	10 726
11. Wire	5 993	4.2	5 975	3.5	5 565	3.5	13 062
SUB-TOTAL (Non flat products)	74 225	50.9	95 831	55.8	88 218	55.2	104 417
TOTAL EQUIV. ROLLED PRODUCTS	145 701	100.0	172 349	100.0	160 123	100.0	193 550
12. STEEL CASTINGS & FORGINGS	1557		2 788		1135		3 160
13. STEEL INGOTS							910
TOTAL EQUIV. STEEL INGOTS	190 030		225 460		207 500		254 400

SECTION 1

PPENDIX 2

STEEL PRODUCTS, CASTINGS, FORGINGS, AND STEEL INGOTS

1961		1962		1963		1964		1965		1966	
ONS	%	TONS	%	TONS	%	TONS	%	TONS	%	TONS	%
				204	0.1	80	–	111	0.1	4 794	1.7
4 382	8.3	5 384	3.4	14 373	7.4	24 308	8.1	18 237	7.0	21 465	7.3
750	6.8	10431	6.5	27 217	14.0	63 694	21.0	68 061	26.1	58 687	19.9
5 257	3.0	11050	6.9	7 626	4.0	18 344	6.1	19 457	7.5	22 146	7.5
3 681	22.4	34 626	21.6	31 671	16.3	32 397	10.6	15 039	5.8	12 203	4.2
6 448	3.7	10 414	6.4	8 042	4.2	9 963	3.3	13 521	5.2	26 818	8.8
5 518	44.2	71 905	44.8	89 133	46.0	148 986	49.1	134 426	51.7	146 113	49.4
11 930	7.0	15 550	9.7	42 359	21.8	65 251	21.6	41 493	15.9	27 283	9.3
64 144	37.2	48 293	30.2	29 290	15.2	32 034	10.6	34 065	13.0	40 252	13.7
2 052	7.1	14 060	8.8	8 980	4.7	19 774	6.6	5 652	2.1	870	0.3
1 730	1.0	4 750	3.0	10 726	5.5	25 278	8.3	33 049	12.7	31 592	10.7
5 975	3.5	5 565	3.5	13 062	6.8	11 533	3.8	12 010	4.6	48 972	16.6
5 831	55.6	88 218	55.2	104 417	54.0	153 870	50.9	126 269	48.3	148 969	50.6
2 349	100.0	160 123	100.0	193 550	100.0	302 856	100.0	260 695	100.0	295 082	100.0
2 788		1135		3 160		3 675		2 068		427	
				910		1 300		931		89	
25 460		207 500		254 400		396 930		340 450		381 230	

APPENDIX 3
NIGERIAN DOMESTIC PRODUCTION OF STEEL

STEEL PRODUCTS	1960	1961	1962	1963	1964	1965	1966
FLAT PRODUCTS	–	–	–	–	–	–	–
NON FLAT PRODUCTS (Bars and rods)				4 400	6 400	6 000	6 000
TOTAL ROLLED PROD.				4 400	6 400	6 000	6 000
EQUIV. STEEL INGOTS				5 900	8 000	7500	7500

APPENDIX 4

NIGERIAN EXPORTS: ROLLED STEEL PRODUCTS AND MANUFACTURED GOODS

ITEMS	1960/1962		1963		1964		1965		1966	
	TONS	%	TONS	%	TONS	%	TONS	%	TONS	%
ROLLED STEEL PRODUCTS:										
1. Wire					5.0	8.3			0.1	.04
MANUFACTURED GOODS: (+)										
2. Tanks, vats, and reservoirs			88		2.0		17		41.0	
3. Casks, drums, boxes, and cans			12		25.0		6		16.0	
4. Domestic utensils, enamelled			2		2.0				0.6	
5. Agriculture tools							0.2		1.5	
6. Nuts, bolts, screws, rivets, washers			2							
7. Gauze netting, grill fencing					4.0		317		53.0	
8. Roofing nails					16.0		7		118.0	
9. Nails, tasks, and similar					26.0		7		65.0	
SUB-TOTAL			104	100	75.0	91.7	354.2	100	295.1	99.96
TOTAL			104	100	80.0	100	354.2	100	295.2	100
EQUIVALENT STEEL INGOTS	—		139		103		445		374	

(+) Expressed in tons of equiv. rolled products.

APPENDIX 5

NIGERIAN EXPORTS: EQUIVALENT ROLLED STEEL PRODUCTS

STEEL PRODUCTS	1960/1962		1963		1964		1965		1966	
	TONS	%	TONS	%	TONS	%	TONS	%	TONS	%
1. Semi finished steel										
2. Plates			6	5.8	0.2	0.3	1.4	0.5	3	1.0
3. Hot rolled coils and sheets			52.2	50.0	0.8	1.0	10.2	2.8	25.8	8.8
4. Cold rolled coils and sheets			37.6	36.1	15.8	19.7	8.6	2.4	22.0	7.4
5. Galvanized sheets			0.2	0.2	0.2	0.3				
6. Tinplate			6.0	6.0	12.0	15.0	3.0	0.8	8.0	2.7
FLATS SUB-TOTAL			102.0	98.1	29.0	36.3	23.2	6.5	58.8	19.9
7. Bars and rods			0.5	0.5					0.3	0.1
8. Shapes										
9. Rails and accessories										
10. Wire rods			1.5	1.4						
11. Wire					51.0	63.5	331.0	93.5	236.1	80.0
NON FLATS SUB-TOTAL			2.0	1.9	51.0	63.5	331.0	93.5	236.4	80.1
TOTAL			104.0	100	80.0	100	354.2	100	295.2	100
EQUIVALENT STEEL INGOTS	–		139		103		445		374	

APPENDIX 6

NIGERIAN EXPORTS: COUNTRIES AND EXPORTED

ITEMS:

1. Tanks, vats, etc.
2. Casks, drums...
3. Household utensils
4. Agriculture tools
5. Nuts, bolts, etc.
6. Wire netting
7. Roofing nails
8. Nails, tasks, etc.
9. Wire

YEARS	ITEMS	COUNTRIES									
		CAMEROUN	CONGO LEO	DAHOMEY	GHANA	I. COAST	LIBERIA	NIGER	SENEGAL	S. LEONE	TOGO
1963	1				83						
	2				11		0.1		0.1		0.8
	3			2							
	4										
	5				2						
	6										
	7										
	8										
	9										
	TOTAL			2	96		0.1		0.1		0.8
1964	1				2						
	2	2.6			11	0.1	6.3	1.3			0.8
	3			2							
	4										
	5										
	6			4							
	7			16							
	8			25.9				0.1			
	9			5							
	TOTAL	2.6		52.9	13	0.1	6.3	1.4			0.8
1965	1								3		
	2				5.2						0.7
	3										
	4					0.2					
	5										
	6			7	196		57			57	
	7			7							
	8			7							
	9										
	TOTAL			21	201.2	0.2	57		3	57	0.7
1966	1		0.1		0.1		5.2		0.1		
	2				6.9					9.1	
	3				0.2						
	4				0.1			0.6			
	5										
	6			14	0.3	7				26	
	7			117				0.1		0.1	
	8			64.9							
	9	0.1									
	TOTAL	0.1	0.1	195.9	7.6	7	5.2	0.7	0.1	35.2	

SECTION 1

APPENDIX 6

NIGERIAN EXPORTS: COUNTRIES AND EXPORTED PRODUCTS

(TONS)

YEARS	ITEMS	COUNTRIES: CAMEROUN	CONGO LEO	DAHOMEY	GHANA	I. COAST	LIBERIA	NIGER	SENEGAL	S. LEONE	TOGO	UPP. VOLTA	OUTSIDE AFRICA	TOTAL
1963	1				83								5	68
	2				11		0.1		0.1		0.8			12
	3			2										2
	4													
	5				2									2
	6													
	7													
	8													
	9													
	TOTAL			2	96		0.1		0.1		0.8		5	104
1964	1				2									2
	2	2.6			11	0.1	6.3	1.3			0.8		2.9	25
	3			2										2
	4													
	5													
	6			4										4
	7			16										16
	8			25.9				0.1						26
	9			5										5
	TOTAL	2.6		52.9	13	0.1	6.3	1.4			0.8		2.9	80
1965	1								3				14	17
	2				5.2						0.7		0.1	6
	3													
	4					0.2								0.2
	5													
	6			7	196		57			57				317
	7			7										7
	8			7										7
	9													
	TOTAL			21	201.2	0.2	57		3	57	0.7		14.1	354.2
1966	1		0.1		0.1		5.2		0.1				35.5	41
	2				6.9					9.1				16
	3				0.2							0.1	0.3	0.6
	4				0.1			0.6					0.8	1.5
	5													
	6			14	0.3	7				26			5.7	53
	7			117				0.1		0.1			0.8	118
	8			64.9									0.1	65
	9	0.1												0.1
	TOTAL	0.1	0.1	195.9	7.6	7	5.2	0.7	0.1	35.2		0.1	43.2	295.2

SECTION 2

APPENDIX 7

NIGERIAN APPARENT CONSUMPTION OF STEEL PRODUCTS

TONS

STEEL PRODUCTS			1960	1961	1962	1963	1964	1965	1966
FLAT PRODUCTS	1	IMPORTED	71 476	76 518	71 905	89 133	148 986	134 426	146 113
	2	PROD. IN NIGERIA	—	—	—	—	—	—	—
	3	EXPORTED	—	—	—	102	29	23.2	58.8
	4	TOTAL (a)	71 476	76 518	71 905	89 031	148 957	134 403	146 054
	5	EQUIV. INGOTS	95 063	101 769	95 634	118 411	196 112	178 756	194 252
NON FLAT PRODUCTS	6	IMPORTED	74 225	95 831	88 218	104 417	153 870	126 269	148 969
	7	PROD. IN NIGERIA	—	—	—	4 400	6 400	6 000	6 000
	8	EXPORTED	—	—	—	2	51	331	236.4
	9	TOTAL (b)	74 225	95 831	88 218	108 815	160 219	131 938	154 733
	10	EQUIV. INGOTS	92 781	119 789	110 273	136 018	200 273	164 922	193 416
PRIMARY PRODUCTS	11	IMP. CASTINGS AND FORGINGS	1 557	2 788	1 135	3 160	3 675	2 068	427
	12	IMP. INGOTS				910	1 300	931	89
	13	EQUIV. INGOTS	2 180	3 903	1 589	5 334	6 445	3 826	688
14		TOTAL EQUIV. INGOTS (c)	190 030	225 460	207 500	259 760	404 830	347 504	388 360

(a) 4 = 1 + 2 − 3 (b) 9 = 6 + 7 − 8 (c) 14 = 5 + 10 + 13

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