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THE ELECTRONICS INDUSTRY IN THE AFRICAN COUNTRIES:  
NIGERIA\*

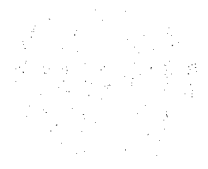
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## 0.0 INTRODUCTION

### 0.1 Origin of Study

#### 0.1.1 Background

Electronics industry, after World War II, has taken astonishing strides in terms of innovation, technology, output, employment, etc. In industrialised countries, its power and performance have been utilised in all areas of activity to great benefit. In households, offices, industries, governance, the spread effect of electronics has resulted in better information, accurate measurement, better control, lower waste, etc.

Power and sophistication of electronics seems to have no limits; so much so that in nation after nation it has become the driving force behind most activities. When to this we add its pertinence to security, defence, space, etc. it is no wonder it commands highest attention. As in case of energy consumption, electronics use per capita has become the measuring yardstick of national strength.

However, developing nations, having lagged behind in mastering this technology, are finding the gap widening not only in electronics but, as a consequence, in other activities too where the power of electronics enables other nations to forge ahead. Further, the knowledge-base, fast-change, high investments needed to enter electronics with sufficient force are barriers which will have to be somehow surmounted if developing nations are to emerge as participants in world economy.

Recent examples abound of nations having used electronics as a lead industry to spark overall economic advancement including spread-effect on other industries. Japan, Korea, Taiwan are long known examples. More interesting for our study are the recent efforts of Malaysia, Thailand, India, Indonesia.

#### 0.1.2 Objectives

This work will address itself to the task of studying ways and means for less developed countries to participate in the electronics age. Main objectives being :

- a) To appraise the history, status and growth of electronics industry in relation to the policies adopted.
- b) To identify constraints regarding the judicious use of this technology and its rapid development.
- c) To evolve strategies for accelerated usage, increasing capability, enhancing added value where beneficial.

- d) To assess the role of software activities in overall electronics development.
- e) To suggest improved institutional arrangements for implementation of these strategies.
- f) To find suitable niche markets (domestic & export).

The findings of this study will be part of the consultations between nations directed towards faster industrialization of developing countries and finding ways of increasing co-operation between North-South and South-South to that end.

#### 0.1.3 Study Treatment

Due to the highly visible and undoubtedly powerful position of "informatics" and "microelectronics" at the leading edge of technology, there is a general tendency in discussions, conferences and literature to tout these as essential requirements towards which strategies and policies for which electronics should aim. In case of less developed countries, however, there is a lot of ground to be covered prior to that stage and many tasks at a more traditional level that call for prior attention.

This study will try to see how to accomplish these transitional tasks while also deriving maximal benefits from "informatics" and "microelectronics" through their judicious use and spread effect. We will investigate where an increasing role can be locally played and capabilities garnered in the software area to genuine national benefit.

Based on the economic situation and overall policy structure, what initiatives and changes are needed to accelerate electronics growth, create spread-effect through its use, progressively increase value added and participate more actively in the world trends in electronics.

Our attempts at analysis will focus on the key pacesetting segments of the electronics industry --- i.e. telecom, computers, industrial controls & television --- to demonstrate how the country can benefit from accelerated development of these area.

#### 0.1.4 Basis Of Information

Besides a review of published data available from various sources (see Ann.A), the study is based on a visit to the country capital for meeting responsible officials, industrialists, academics, and others currently involved in the electronics industry.

The major limitation of this study is the compressed time available, and the very limited data on electronics in these countries. The findings must thus be considered as a start of the process of analysis needing refinement and detailing by further concentrated studies of the many issues highlighted by this work.

## 0.2 COUNTRY CHARACTERISTICS

### 0.2.1 Geographic [Ref. Annex.A 1,2,3]

With an area of over 900,000 Sq.Km., Nigeria is bounded to the North by Niger & Chad, West by Benim, South by Gulf of Guinea and East by Cameroons.

Vegetation of the country ranges from mangroves & swamps in the South, through thick equitorial forest on to Sub-Saharan Savannah in the North East. Four plateau-mountain groups ranging from 600 to 1800 meters comprise the high lands; Niger & Benue Rivers dominate the low lands.

Rainfall in the South ranges from 150 to 400 Cm. gradually dropping to 100 to 150 Cm. in the centre. In the North, the rain tapers off to 50 Cm. as the Sub-Saharan Savannahs are approached. Humidity is high in the South throughout the year; North is generally arid & especially dry in winter months.

### 0.2.2 Regional

Nigeria was instrumental in creating the Economic Community of West African States (ECOWAS) in 1975. The long-term objective is to develop a common market between the members. With the largest population & potential for industrial growth & development, Nigeria could take the lead in establishing South-South co-operation in industry & trade between ECOWAS members.

Discussions reveal that such a prospect is nowhere near materialising despite considerable discussions & negotiations over many years. The increasing inflation & currency devaluation in Africa makes such regional co-operation in basic sectors essential if hard currency is to be freed for the development of the more technology-intensive sectors.

### 0.2.3 Demographic [Ref. Annex.A 1,2,3,4].

With a growth variously estimated between 3 to 3.5% & 1988 population between 105 to 115 million (below 15 years growing at a fast rate.), Nigeria is heading towards entering the top five largest population in the world by 2025. Muslim faith [40%] dominates the North; while Christian (over 35%) is mainly in the South.

About 25% of the population live in towns & cities over 20,000. In 1985 Lagos had a population 5-6 million, Ibadan over



2 million with many other populous towns in the South-West. In the North the main town is Kano (over 1 million) with scattered lower population centers. South-East Nigeria is largely rural & the population is less concentrated.

TABLE 1 : Demographic Statistics

	Units	1980	1986
Population	Million	80.56	98.52
Growth	%	3.6	3.5
Between 15-59 years	%	49.50	50.84
Urban	%	20.40	23.62
Economically active	%	32.00	33.10
Urbanisation Rate	% PA	5.8	6.00
Family Size	Persons	N.A.	5.00

[Source : Annex. A 1,2,3,4]

Urbanization is placed between 5-6% but is even higher in South-West. This drain from the farm lands is a cause for concern as agriculture, forestry, fishery, accounted for over 60% of employment & nearly 40% of GDP in 70's & have been declining in this decade.

## 1.0 OVERALL ECONOMIC SITUATION

### 1.1 Major Resources

#### 1.1.1 Human [Ref. Annex.A 5,6,7].

Nigeria has a literacy rate of 42.4% (1983/4). Education facilities stretch from Nursery to Postgraduate covering major faculties.

Figure 1 summarises the education scenario over selected years. Of special note is the respectable student-teacher ratio though, in case of sciences & technology, the equipment & facilities are rather limited. Quality of graduates however, leaves a lot to be desired in the view of some teachers & employers alike.

The output of engineering graduates is about 6.5% & post-graduates in science about 2% of all graduates.

FIGURE 1 : BASIC DATA ON EDUCATION IN NIGERIA

	1980-81	1983-84	1985-86	1987
<b>PRIMARY</b>				
No. of Schools	35,625	38,211	35,433	31,454
No. of Teachers	393,144	359,701	292,821	280,344
No. of Students [000]	13,760	14,388	12,915	10,817
Student Teacher Ratio	35	40	44	38
<b>SECONDARY GRAMMAR AND COMMERCIAL</b>				
No. of Schools	4,472	5,463	5,181	5,547
No. of Teachers	33,821	80,314	94,958	122,207
No. of Students [000]	1,995	3,059	2,794	2,662
Student Teacher Ratio	59	38	29	21
<b>TEACHER TRAINING</b>				
No. of Schools	309	263	249	135
No. of Teachers	9,105	8,479	6,485	4,531
No. of Students [000]	282	267	223	109
Student Teacher Ratio	31	31.5	34	24
<b>TECHNICAL AND VOCATIONAL SCHOOLS</b>				
No. of Schools	156	208	300	240
No. of Teachers	8,888	4,157	3,126	5,115
No. of Students [000]	71	76	76	90
Student Teacher Ratio	8	18.3	24	17
<b>UNIVERSITIES</b>				
No. of Universities	13	20	24	28
No. of Teachers	6,481	8,620	9,375	10,965
No. of Students [000]	75	102	126	147
Student Teacher Ratio	12	11.8	13.4	13.4

[Source : Federal Ministry of Education, Nigeria]

Diploma/Vocation trainees in engineering skills are even further limited. Perhaps this low figure reflects the limited opportunities in the manufacturing sector as compared to other sectors of the economy. Education in Electronics & Computer Sciences is about 2% of graduate output as only some universities have separate faculties for such training.

As the government is pressing the Electronics & Computer Industry to add substantial local value, the availability of qualified people with appropriate training will become an important factor in making this possible.

Labour statistics vary from source to source. Economically active population is put at anywhere between 30-40 million & their deployment according to one source is (1983).

Employers / Self	55.9%
Employees	28.0%
Unpaid Family Workers	8.9%
Others	7.2%

[Source : Britanica World Data, 1988, Page 778]

Quoted in the "Investors Guide to Nigeria" by UNIDO, the labour statistics appear as below :

**TABLE 2 : SECTORAL DISTRIBUTION OF LABOUR FORCE (IN%)**

SECTOR	1977	1980	1985
Total (million)	30.5	32.2	36.1
Agriculture	62.3	60.0	57.8
Minining & Quarrying	0.4	0.4	0.4
Manufact'ng./Processing	16.8	17.0	18.2
Construction	0.9	1.1	1.2
Utilities	0.1	0.2	0.2
Transport / Commn.	0.6	0.6	0.6
Distribution	13.5	15.2	16.0
Other Services	5.4	5.5	5.6

[Source : National Manpower Board; Min. of Planning]

Though employment in manufacturing rose to 6.57 million in 1985, it is reported that it has declined since then due to recessionary conditions in manufacturing resulting from severe Naira depreciation, high import dependence & high inflation.

The large labour force, the rising unemployment, the devaluation of the Naira all combine to make Nigeria a low-cost labour location. The government is therefore especially encouraging the setting up (even with 100% foreign ownership) of labour intensive industries based on local resources & inputs.

### 1.1.2 Energy [Ref. Annex. A 1,2,3,4,6].

For the size of its population & the substantial resources which can be deployed to benefit the economy, the generation capacity of electric power at 35,390 million KWH [1986] ie. below 100 KWH/capita is low. Distribution of electricity is largely limited to urban areas; of the consumption, 68% is non-residential. Most of the generation is thermal due to petroleum & gas resources available.

Energy sources are abundant in Nigeria with oil at 20 billion barrels, natural gas at 2.4 trillion cu-mtrs & largely unexploited coal. What is required is the systematic & efficient operation of the power system utilizing modern means of which electronic systems are a major part.

### 1.1.3 Extractive

Nigeria has enormous resources which can be derived from its land, rivers, forests, mountains. Nearly 75% of its land is well supplied with water, & in 1980 6.1 million farmers cultivated some 5.5 million hectares in the country. Agriculture including forestry & husbandry employs around 60% of the work force in a dispersed manner in rural areas and is also a major contributor to the economy. As in other developing countries, the prosperity of the countryside and the real income enjoyed by the rural families can make a lot of difference to the market for manufactured goods.

Extracting 1.5 million barrels daily, Nigeria is the fifth largest oil producer world wide. Over 90% of exports are dependent on this resource. The ups and downs of petroleum export earnings greatly affects the available foreign exchange which in turn affects those industries which are highly dependent on imported inputs.

Other minerals include coal, iron, tin, lead, uranium, tantalites, phosphates etc. Thus Nigeria has abundant resources which need to be extracted and processed for national and world markets with the aid of modern industry.

## 1.2 ECONOMIC STRUCTURE

### 1.2.1 National Product [Ref. Annex. A 1,2,3,4,6,8,9]

Nigeria with a less than a few percent of African land mass, containing about 20% of its population, has been world wide leadertops in palm oil, second largest in cocoa, fifth largest in rubber, fifth largest in oil and a major factor in cotton, tin etc. It has in good times accounted for as much as 45% of the GDP of Sub-Saharan Africa.

Thus Nigeria holds an important position in the development of this continent. However, in several respects, there has been a decline in its economic performance in recent

years. Figure 2 shows the position over some selected years as compared to the African continent as a whole.

When viewed on a per capita basis at constant prices, and compared to other non-African developing countries, Nigeria's economic performance has been erratic. Appendix B gives some details. During the oil-boom years of the seventies, sound foundations for resource-based manufacturing were not laid and windfall income was invested in grandiose & unviable projects which put the economy through grave difficulties showing negative growth of GDP and GDP per capita after the oil boom subsided, the worst year being 1983 with -8.4% drop in GDP. The drop in GDP per capita combined with devaluation of Naira & overdependence of the economy on imports has tightened its grip on the standard of living especially of educated urban people and thus depressed the demand for durables.

Annual inflation has been high [14.4% 1970-83] throughout 70's & early 80's [except 83 & 84]. According to Manufacturers Association of Nigeria [MAN], inflation has been further climbed in 1988/89 past the 50% annual rate.

A Structural Adjustment Program [SAP] was undertaken [1986 onwards] which has had a mixed reception. Increasing devaluation, inflation & cost of money has raised production cost & put a clamp on demand. In Electrical/Electronics Sectors, the capacity utilization has dropped to 22%, imported inputs have risen by 136%, even local raw materials by 112%.

The new policy seeks to change the structure of the economy by re-emphasising agriculture & resource-based manufacturing. Some signs of success are indicated in Table 3 which compares the structure in 1977 & 1986.

TABLE 3 : DISTRIBUTION OF GDP BY SECTOR OF ORIGIN, 1977 & 1986

Sector	1977 [%]	1986 [%]
Agriculture	24	29
Manufacturing	6	9
Mining & Quarrying	25	18
Construction	9	5
Services/Others	36	39

[Source : Ref. Annex. A 3]

Measures were further taken in 1989 to tighten money supply as well as foreign exchange availability. As a result, interest rates have been on the increase, we understand that working funds are only available at interest rates varying around 30%.

Electronics & electrical industry [along with automobiles] has been a major sufferer as a result of these changes. Demand for durable goods has plummeted; users are said

FIGURE : 2 NIGERIA AND AFRICA : A COMPARISON, 1960 - 86  
(SELECTED YEARS)

INDICATOR	YEAR	AFRICA (Mill.\$)	NIGERIA (Mill.\$)	NIGERIA AS % AFRICA
Population (Mill.)	1986	524.5	103.1	19.6
GDP	1960	25,630.0	3,150.0	12.2
	1982	207,450.0	71,720.0	23.3
	1984	288,900.0	75,300.0	26.1
MVA	1970	9,223.0	2,012.0	21.8
	1984	27,489.0	8,039.0	29.2
Exports	1982	73,145.0	19,484.0	26.6
	1985	60,288.0	12,567.0	20.8
Imports	1982	83,863.0	20,821.0	24.8
	1985	58,983.0	8,877.0	14.8
Net direct foreign private investment	1970	382.0	205.0	53.6
	1982	734.0	358.0	47.5
	1985	1,516.0	341.0	22.5
Gross net reserves	1970	4,229.0	223.0	5.3
	1982	24,040.0	1,927.0	8.0
	1985	20,159.0	1,893.0	9.4
Guaranteed debt public and private	1970	8,531.0	460.0	5.6
	1982	86,204.0	6,085.0	7.0
	1985	110,430.0	13,016.0	11.8

(Source : Ref.. Annex.A 8)

to be postponing decisions expecting the cost situation to improve in the long run. Electronic industry, according to spokesmen, is erroneously being perceived as a luxury & non-priority area under SAP whereas it has a major role to play in communications, industry, office & in communicating with every home. It is not understood that overall efficiency of all economic & social activities can be greatly enhanced by judicious use of electronics.

#### 1.2.2 Infrastructure (Ref. Annex.A 1,2,3,4,6)

With over 34% of its land developed, cultivated & populated, Nigeria has an impressive roads infrastructure of 124,000 Kms. (1986) half of which are paved & of good quality. In addition 8,600 Kms. of navigable waterways & 3,500 Kms of rail track (mostly single) existed as of 1986. For the large population, abundant resource base & widespread rural activities, these facilities will need further improvement to aid faster development.

Sea transport on international ocean ways is provided by 3 large ports on the South coast. Air connection, however, are limited, uncertain, & infrequent for the extensive traffic they have to bear. There are 2 international & 14 local airports.

#### 1.2.3 Communication (Ref. Annex.A 4,6,7,10,11,12)

A major shortcoming is the inadequacy of communications infrastructure. For the large population 3,400 post offices (1986) served 28,500 people per post office handling about 700,000 mail (1/3 of it international).

Telex & telegraph lines are around 5,000 (1986) putting through about 15 million minutes of traffic 26% of which was international outgoing. Telephone connections to 265,000 subscribers (1986) handled 25.3 million international calls, with a very poor telephone density of 397 persons per receiver.

Radio broadcasting is handled by Federal as well as State authorities. By statute, each state may transmit on MW or FM with a power below 10KW while Federal Radio Corporation of Nigeria has transmitters in various places operating on SW, MW, FM frequencies with power upto 500KW (for external services). All in all, 77 stations claim nearly 100% coverage of the population which has one receiver per 6.7 persons (1986).

Television programs originated by the Federal Government are broadcast on 40 VHF channels from 24 stations including one in each state capital (1989). National Programs originating in Lagos are sent out by channels leased on DOMSAT to locations in various states and re-broadcast locally. In addition, 14 states operate their own UHF channels. Broadcasting time of 85000 hours/year reaches 35% of the population (1 TV per 54 people)

TABLE 4 : COMMUNICATIONS DECADE FOR AFRICA TARGETS (1978-88)

	Target for 1988	Nigeria[1986]	World Ave.[1983]
No. of people per post office	3000-6000	28,500	6660
Telephones per 100	1.0	0.25	14.7
Radios per 100	20	15	33
TV per 100	5	1.85	13.1

There is clearly a most urgent need to improve all modes of communication. The U.N. target for Africa as a whole would not be compatible with the much greater development potential for Nigeria which should rather target to reach the world average if its efforts at recovery with equitability are to succeed.

1.2.4 Trade [Ref. Annex.A 3,4,13,14,15]

Both exports and imports peaked in the early eighties and have been declining ever since.

(US \$ Millions)

	1982	1985	1987
Exports	19,484	12,567	6,400
Imports	20,821	8,877	3,800

Over 90% of the exports were of petroleum products and hence were earned by the public sector. Exports of manufactures are generally negligible. On the other hand nearly 80% of the imports were of manufactures, major among which are Machinery and Transport, manufactured materials and chemicals ..... items largely required by the industry.

External debt in 1987 stood at \$26.2 Billion and debt service ratio at 20.9% (down from a peak of 34.1% in 1985).

As a result of the Structural Adjustment Program,(SAP) the currency has devalued steadily from 0.55 Naira per dollar in 1980 to 1.00 Naira in 1985 and 4.83 Naira in 1988. It has declined further in 1989 to 7.3 Naira. It is largely the declining Naira which has held imports in check. The Govt. releases limited quotas of foreign exchange in the relatively free-foreign exchange market. Users have to obtain foreign exchange by way of retained export earnings or by way of daily auctions. Import dependant industries like assembly of consumer electronic equipments find it difficult to control costs in face of such odds and are presently in shut down condition.

Reported half yearly electronics imports for Jan.-June 1988 were about Naira 400 million (see Annexure 'C'). industrial Instrumentation (largely electronic) comprised over Naira 155 million; Office Machines (mainly Data Processing) nearly Naira



130 million; Consumer Electronics over Naira 85 million while Communications apparatus about Naira 30 million. These are the visible and reported imports; data on foreign exchange outflow for software are not extractable; similarly, foreign exchange outflow by way of clandestine/smuggled consumer electronics may well have been greater than legitimate imports or local manufacture of these items.

Tariff structure has been re-aligned and generally reduced as part of SAP. Lowest rate between 10%-15% is applied for capital equipment and primary raw materials; 15%-20% to raw materials partially processed (say plastic foil, flat rolled products, etc.); 20%-25% on components and parts etc. and highest duties 40%-70% to items considered less essential (VCR, Packaging foil, batteries, etc.).

Excise tax between 5% to 20% is levied on certain consumer goods again according to their essentiality. Banning of imports has been now limited to 16 items against 74 items previously --- this list does not include electronic items.

### 1.3 APPROACH TO INDUSTRIAL DEVELOPMENT

#### 1.3.1 Industrial Structure [Ref. Annex. A 3,8,16,17,18]

Nigeria's industrial development could be said to have begun only after the traumatic civil War of 1967-70; it coincided with the greatly increasing prosperity of the oil-boom during the seventies. During this period, the manufacturing sector grew at more than twice the average African rate between 1970/80. The local industry took the path of "easy" import substitution, attempting mainly the final conversion based on substantial imported inputs.

When looked at sectorwise, non-durable and durable household goods dominated the growth pattern and the public enjoyed a consumeristic life style in the years of oil boom. Intermediate goods received scant attention. In case of electronics, audio and video apparatus output grew rapidly in the seventies and early 80's but little attempt was made to use this opportunity to start a modest components base.

Many of these industries were set up with foreign investments which were attracted by the expansion of the demand. Peugeot, Volkswagen, Metal Box, Dunlop, Michelin, Lonrho, UAC, are some of the names in the larger industrial spectrum.

In electronics, the names of Philips, Siemens, Sanyo, Rank, NCR, etc. are dominant. Fully 10 out of 32 companies listed for electronics activities in the Directory of M.A.N. had foreign equity lying mostly in the range 40% to 60%. Most of the Nigerian owned companies also had loose tie-ups or arrangements with a foreign manufacturer for supply of SKD/CKD kits along with providing technical support and training for the assembly and testing of the products.

During late 70's and early 80's, the Public Sector began to enter the heavy and large industries in sectors ranging from petroleum to steel/metals, to insurance to banking, to agro-industry to beverages, to hotels etc. Smaller industries like electronics were left to private hands. The government, however, has monopoly presence in Telecommunication and in Broadcasting.

Structural Adjustment Program is expected to dilute the presence of parastatals through "privatization" and "commercialization". General view among the interviewers however indicated scepticism as to the speed and genuineness of these steps in view of the political and bureaucratic vested interests that are involved. In Electronics, Nigerian Telecommunications and Nigerian Television Authority are slated for "commercialization" which means presumably relying mainly on improved performance for growth & expansion.

Regarding size, the electronics sector can be considered in small-to-medium-scale. Of the 32 companies reviewed only 3 companies employed between 500-800 people (1986), 8 companies between 200-500, 5 companies between 100-200 and 16 companies below 100. The situation has however changed for the worse since then and employment in many companies has dropped. Judged from the angle of 1986 turnover, 4 companies were over Naira 20 million; 6 companies between Naira 10-20 million; 8 companies between Naira 1-10 million and 14 companies below Naira 1 million. Even this position has changed for the worse with the policy changes since 1986.

As at present, due to policy changes discussed in the next sector, electronics business is turned towards serving the user rather than manufacturing. Small-to-medium firms now "represent" foreign manufacturers and provide marketing and post-sales services. The number of such firms is large and unaccounted since these activities can be done with minimal facilities and infrastructure.

### 1.3.2 Policy Emphasis (Ref. Annex. A 8,16,19,20,21)

The Industrial Policy Statement of 1987 marked a revised approach to industrialization as against the fluctuating and unclear approach of the previous years. Key objectives as published by Federal Ministry of Industries (1988) are :

- a. Provide greater employment opportunities
- b. Increase export of manufactured goods
- c. Disperse industries to various states
- d. Increase local content
- e. Improve skills & capabilities.

The measures to be adopted to achieve these objectives are expected to be :

- a. Privatising and commercialising holdings in certain existing parastatals --- nearly a 100 companies would be affected by this move. Nigerian Telecom and Nigerian Television Authority will be the only electronics activities affected. Should this lead to improvement in operations and growth of parastatals it would have a beneficial effect on electronics industry.
- b. Encouraging small-to-medium private enterprises (below Naira 2 million investment) by setting up an umbrella organisation called "Small Scale Industries Corporation" to promote and assist such industries. For the electronics field, the limit of Naira 2 million (especially after devaluation) may prove far too small and should be increased several fold if genuine local content is to be achieved.
- c. Provide broader-based finance than the Nigerian Bank of Commerce & Industry by opening out the field to commercial and merchant banks. Development Finance Corporations would also be created in each state.
- d. Matching the grants of each state in development of industrial estates with infrastructural facilities.
- e. Liberalizing foreign exchange (FE) and allowing the market to determine the rate. Exporters can retain and utilise or sell their FE earnings while importers can bid to buy.
- f. Attracting foreign capital (with a minimum of Naira 20 million) by reducing the areas where such capital was initially prohibited. The new list of prohibited areas are Banking, Insurance, Petroleum Prospecting and Mining where government pressure will be dominant and a range of 40 businesses (which are small and service oriented) where 100% local capital is enjoined. An investment guarantee ensures repatriation.
- g. Import of technology is encouraged. Royalty and technical fees are permitted upto 5% each of net sales. Upper limits may be reconsidered for cases where value added exceeds 70% or the products are exported.
- h. Exporters of non-oil goods can drawback the duty paid on imported inputs and are exempted from excise. Funds have been created to compensate

initial development activities, for exceeding N 50  
Thousand of exports, for excess costs due to  
unavoidable local conditions, extra 5%  
capital allowance on plant & machinery, etc.

### 1.3.3 Institutional Framework (Ref. Annex.A 16)

Earlier need for permissions from several ministries and agencies has now been consolidated through the Industrial Development Co-ordinating Committee (IDCC) comprising the concerned ministries including Finance, Industries, Trade, Science & Technology, Labour, etc. This Committee is enjoined to process cases within 2 months. Time taken depends on the number and variety of benefits and incentives claimed by the concerned project --- foreign capital, technology import, imported plant, export incentives, pioneer status, etc. The IDCC Secretariat works within the Ministry of Industry and channels the documents and comments which are then discussed and settled at meetings.

New Departments recently started (but yet to pick up tempo) are Policy Analysis Department, Data Bank, Industrial Inspectorate Department (IID), Raw Materials Research & Development Council (RMRDC), Investment Information & Promotion Centre, Standards Organization of Nigeria (SON). These departments would go into details of industrial applications and put up their comments for the IDCC to act upon. The objective of these bodies is to see to what extent a given project complies with the specific provisions of raw materials content, local added value, dispersal of industry, genuine export pricing, correctness of proposed imports, small scale benefits, etc.

Thus though it is claimed that "licensing has been done away with", in practice it does not become so. It would only be the smaller and simpler projects not requiring any special concessions or treatment that may pass through rapidly whereas larger projects requiring a variety of special inputs could hardly be considered "delicensed".

## 2.0 ROLE OF ELECTRONICS

### 2.1 Development of Electronics Industry

#### 2.1.1 International Context (Ref. Annex.A 1,22,23,24)

Electronics in Sub-Saharan Africa is essentially as a user of imported equipments & systems. Trade data of 1986 indicates that Africa (except South Africa) imported about \$ 1.45 Billion worth electronics of which active components (which Africa does not produce) comprised \$ 40 million. The other imports comprised \$ 550 million telecom equipments, \$ 480 million precision instruments & imports \$ 215 million consumer electronics, & \$ 170 million of informatics. In addition we estimate passive components of about \$ 60 million & software of about \$ 80 million.

Electronics consumption as a fraction of GNP in 1986 was around 1% as compared to around 0.5% for Africa [1986]. A comparison between several other developing countries is shown in Table 5. A major difference is that the consumption in those countries is largely backed by production [in fact S.Korea & Malaysia export their excess] while Nigeria can hardly lay claim to local production of electronic items.

TABLE 5 : ELECTRONICS AND GNP IN DEVELOPING COUNTRIES

[1986 Billion \$]

Country	GNP	Elex.Prodn.	Elex.Mkt.	Elex.Mkt/ GNP [%]
India	213.44	2.584	2.657	1.24
Indonesia	82.11	0.675	0.907	1.10
Brazil	250.52	5.145	5.048	2.02
Malaysia	29.50	2.205	1.229	4.17
Thailand	42.44	0.765	0.759	1.79
S.Korea	98.37	7.829	4.839	4.92

[Source : Ref. Annex. A 1, 22, 23]

2.1.2 Historical [Ref. Annex. A 25, 26, 27, 28]

As with most developing countries, Nigeria had the beginning of communication & broadcast many decades ago. Initially, rudimentary facilities in telegraph, telephone, radio broadcast & television were set up regionwise in South West, East, North & Mid-West in view of the diversity of regional interests prevalent in the pre-independence & early-independence years.

Consolidation began to take place in the 70's along with political, economic & cultural drawing together of the vaired regions after the civil war. Under the strengthening Federal Govt aided by the oil boom & considerable foreign aid, the broadcasting infrastructure began to form & become better interlinked during the decade of the 70's.

In radio broadcast, provincially controlled stations [limited to 10KW of MW & FM power] were permitted to be established in each state capital & spread the cultrual & policy messages of each state in their immediate vicinity. However, Federal Radio Broadcasting Corporation was set up to become responsible for national & external programs on MW, SW & FM which now dominate broadcasting in Nigeria.

Along similar lines, a few of the stronger states began to set up TV transmitters until Decree No. 24 in 1976 created Nigerian Television Authority to take over an expand this VHF network which has now grown to 24 stations & 40 VHF transmitters [at least 1 in each state capital]. However, another decree in

1979 permitted states to set up their own TV but limited to UHF frequencies suitable to cover their states. Fourteen states have funded such stations.

In case of Telecommunications, it was only after the recent change of government 1985 that Nigerian Telecommunication [Nitel] was formed by separating out Postal Services and merging the internal & external telecom activities into a corporation. Nitel is also stated to be "fully commercialised" under the SAP initiatives.

Expansion of the communications infrastructure in the 70's took place through import of complete equipments and systems from abroad at considerable (and in view of some interviewees at unreasonably exorbitant) cost. Local industry contributed mainly in the form of construction, fabricated structures, wires, cables, and miscellaneous fittings and hardware.

However, at the consumer end the growing market attracted a number of units (among them Philips of Holland) to set up considerable assembly capacity for amplifiers, radios, television and, later, wireless, telephone aids, etc. In those days of ample foreign exchange availability and over-valued Naira, fulfilling the market demand with imported SKD/CKD kits seemed the easiest way to profits.

Computer usage in Nigeria began with the appointment of local representatives by DEC in 1972 followed by Data General, CDC, IBM, Prime. Meanwhile NCR and Rank-Xerox set up their own branches to sell and service office machines and computersied equipments. The initial computer base was of large systems mainly bought from oil money by government for their own use in petroleum, power, census, banking, education etc.

Representatives of USA companies (and latterly Japan) making micro and mini computers have recently begun to proliferate to sell and support the popular ranges. WANG, UNISYS, NEC, Panasonic etc are names seen widely in Nigeria. Selling agents for all sorts electronic items have flourished---intercoms, security equipments, EPABX etc.

At present, the Nigerian electronics activity is best characterised as use-oriented. For a brief period commencing late 70's and peaking in 1982/83, assembly of radio and TV had been fostered. However, as will be seen in a later section, changing electronics environment has subdued even these fledgeling attempts.

## 2.2 POLICY FOR ELECTRONICS

### 2.2.1 Administrative Structure

Electronics industry falls under the charge of Ministry of Industry and the broad policy initiatives outlined in section 1.3 would normally apply to electronics also. However, at

present , the electronics activities are mainly "use oriented"; hence such "sales and service" activities do not require any special processing by IDCC except where foreign investments are involved.

Paradoxically, it will be the manufacturing the projects that will generally call for processing by IDCC, IID, RMRDC, SON, etc. When combined with the limited protection given in this liberalised regime, there seems every incentive even for manufactures to turn traders as many have done. Interviews with manufactures confirmed their frustration at this state of affairs and the feeling that government considers electronics industry as unessential and even as a luxury at this stage of development --- a view hardly shared by the many other countries that have used electronics as the step towards modernization and efficient growth.

#### 2.2.2 Tariff Policies [Ref. Annex. A 14,15 ]

Import licensing is not required for any user to bring in any item that he wants (no electronic is item restricted or banned). Limitation may however be faced at the level of availability and price of the foreign exchange which has become increasingly unfavourable since 1985.

An interesting aspect of the tariffs is their specification right upto the year 1994 thus giving an understanding of the extent of protection expected in coming years. This desirable situation is diluted somewhat by adjustments made from time to time often arbitrarily.

The levels of tariff for important groups of items related to electronics are shown in Figure 3. Finished equipments for consumer use are dutied between 40-55% (though radio receivers are 10-15% an anomaly). However, other commercial equipment for offices and business use are dutied between 25-30%. Components, spares & accessories are at 20-25% while many of the raw materials used in making them are dutied between 20-45% (an anomaly if one expects to encourage components production in due time).

#### 2.2.3 Local Taxation [Ref. Annex. A 14,15 ]

Electronic and electric items used in households when assembled locally are further taxed at levels varying according to the governments concepts of the luxury nature of the items :

Video Recorders	20%
Tape-Recorders &TV	10%
Radios, Timepieces, White-goods	5%
Office Machines	5%

Such local excise puts local assemblers at a further disadvantage versus with fully imported goods.

FIGURE 3 : CUSTOMS DUTIES ON SELECTED ELECTRONIC ITEMS

ITEMS	(Percent ad Valorem)						
	1988	1989	1990	1991	1992	1993	1994
1. Plastics in primary form	15	15	15	15	20	20	25
2. Plastic film / foil	20	20	20	20	20	20	20
3. Other articles of plastic	45	45	45	45	45	45	45
4. Unwrought Iron, Steel, Aluminium, etc.	10	10	10	10	10	15	15
5. Flat or rolled sheets of No.4.	20	20	20	20	20	25	25
6. Aluminium foil	50	50	50	50	50	45	45
7. Electronic components	20	20	20	20	20	25	25
8. Wire, Cables, etc.	40	40	40	40	40	40	40
9. Radio receivers with cassette	10	10	10	10	10	15	15
10. Audio equipments	40	40	40	40	40	40	40
11. TV receivers	45	45	45	45	45	40	40
12. VCR	55	55	55	55	55	50	50
13. Micro computers	40	40	40	40	40	40	40
14. Telephone, Wireless etc. apparatus	10	10	10	10	10	15	15
15. Transformer, ballast	10	10	10	10	10	15	15
16. Batteries	70	70	70	70	70	60	50

(Source : Ref. Annex. A 15 )



### 3.0 SPREAD OF USE

#### 3.1 Key Sectors

##### 3.1.1 Communication (Ref. Annex. A 29,30,31,32,33,34,35,40 )

In a nation with varied resources, population & diversity like Nigeria, efficient communication becomes the binding force linking all corners of the country. It is also the network on which flows social and commercial information enabling interaction between work places without the need to travel and make face to face contact.

Studies have shown that modern electronic communication reduces the load on other infrastructure (posts, rail, road, air, etc.) with far lesser investment, lower running cost, negligible energy consumption etc. As Nigeria is in the process of establishing and extending its infrastructure to disperse the benefits of development in to the countryside, telecommunication should receive a high priority.

A co-relation is shown in Figure 4 between per capita GDP and percent ownership of telephones. The co-relation between national progress and spread of communication seems clear. Good communication helps growth and growth provides further funds to develop and improve communication.

Domestic communications were handled in the past by Department of Post and Telegraph under the Ministry of Communicaitons while international telecommunications were handled by the parastatals, Nigerian External Telecommunications (NET). From 1985, domestic and external telecommunication services were combined to form a new entity, Nigrian Telecommunications (NITEL) under a single Board of Directors at least five out of eight being government nominees. It is also stated that "Ministry of Communications is fully responsible for policy formulation, control and guidance".

The merger of the two cultures has not shown much benefit despite passage of four years. Reported are staff instabilities, low morale, political considerations, lack of induction and training, reduced decision making, etc. Growth and quality of service have suffered enorously : Figure 5 summarises some performance indicators.

NITEL installed exchange capacity of 360,000 lines (35% residential) is scheduled to grow to 600,000 by 1984 with the help of the World Bank Rehabilitation Project. With a waiting list almost equal to DEL connected, the expressed demand is nearly twice the supply. Survey shows that another equivalent suppressed demand exists, thus making real demand thrice the present supply (i.e. over 1 million subscribers). And of course demand would grow with the development of the economy.

Figure 4. The relationship between telephone density and gross domestic product, 1978.

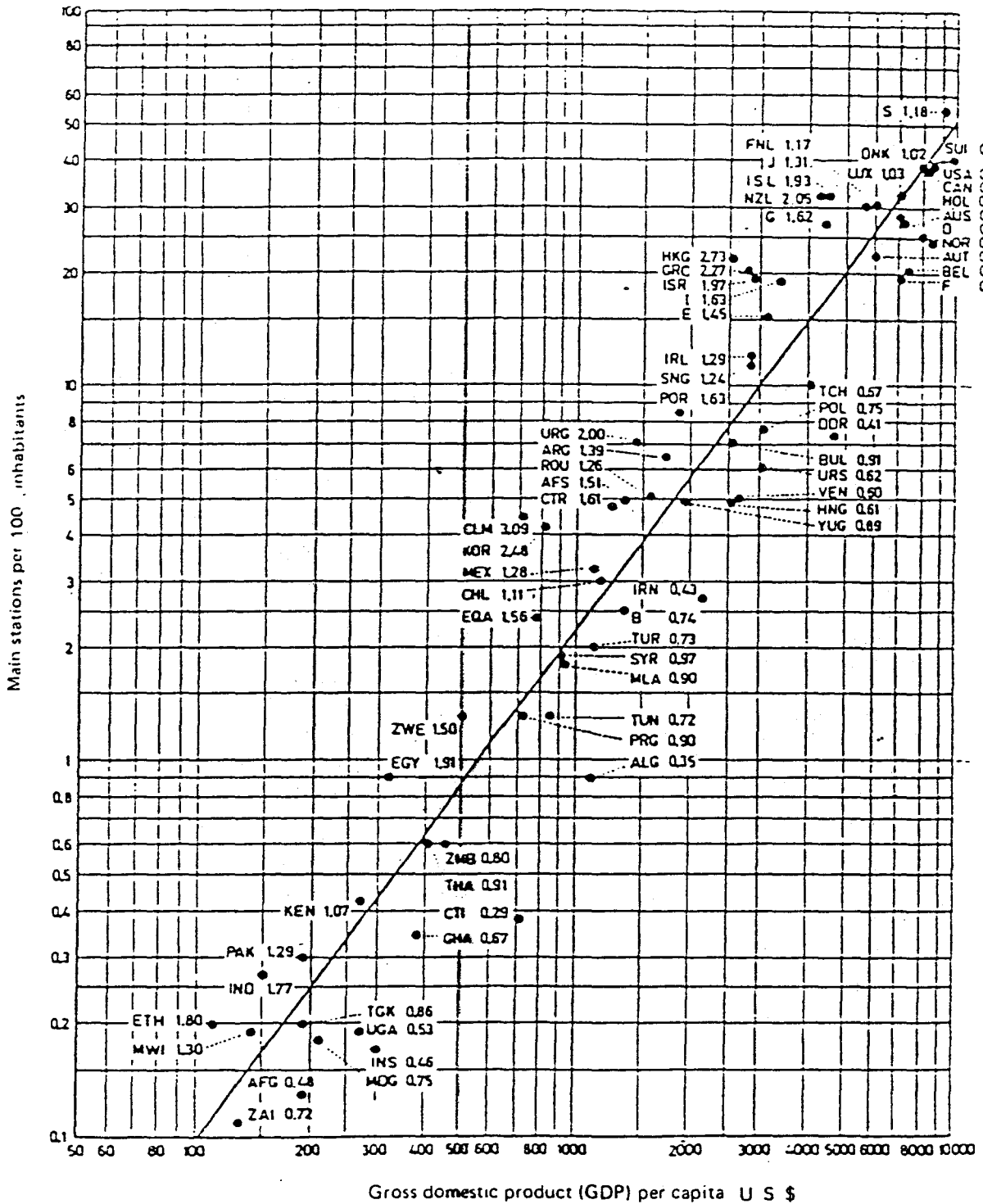


Figure 4. contd.

Names of countries or geographical areas  
corresponding to the abbreviations used

AFG	Afghanistan	ISR	Israel
AFS	South Africa	J	Japan
ALG	Algeria	JMC	Jamaica
ARG	Argentina	KEN	Kenya
AUS	Australia	KOR	Republic of Korea
AUT	Austria	KWT	Kuwait
B	Brazil	LBY	Libyan Arab Jamahiriya
BEL	Belgium	LUX	Luxembourg
BRM	Burma	MDG	Madagascar
BUL	Bulgaria	MEX	Mexico
CAN	Canada	MLA	Malaysia
CHL	Chile	MLT	Malta
CLM	Colombia	MWI	Malawi
CTI	Ivory Coast	NOR	Norway
CTR	Costa Rica	NZL	New Zealand
CYP	Cyprus	PAK	Pakistan
D	Germany (Federal Republic of)	PHL	Philippines
DDR	German Democratic Republic	POL	Poland
DNK	Denmark	POR	Portugal
E	Spain	PRG	Paraguay
EGY	Egypt	ROU	Romania
EQA	Ecuador	S	Sweden
ETH	Ethiopia	SNG	Singapore
F	France	SUI	Switzerland
FJI	Fiji	SYR	Syria
FNL	Finland	TCH	Czechoslovakia
G	United Kingdom	TGK	United Republic of Tanzania
GHA	Ghana	THA	Thailand
GRC	Greece	TUN	Tunisia
HKG	Hongkong	TUR	Turkey
HNG	Hungary	UGA	Uganda
HOL	Netherlands	URG	Uruguay
HVO	Burkina Faso	URS	USSR
I	Italy	USA	United States
IND	India	VEN	Venezuela
INS	Indonesia	YUG	Yugoslavia
IRL	Ireland	ZAI	Zaire
IRN	Iran	ZMB	Zambia
IRQ	Iraq	ZWE	Zimbabwe
ISL	Iceland		

FIGURE 5 : NITEL PERFORMANCE INDICATORS

	Units	1987	1988	1989	1994
1. Total Exch. capacity	000 No.	325	395	395	600
of which Lagos	000 No.	103	115	115	225
Urban %	%	89	85	85	...
2. DEL Installed	000 No.	228	260	361	423
of which Lagos	000 No.	85	90	100	120
3. Exchange Fill	%	70	66	91	70
4. Lagos STD Circuits	Nos.	8160	8160	8160	8160
IDD Capacity	Nos.	930	930	930	3330
5. Telex Capacity	Nos.	12800	12800	12800	15265
Subscribers	Nos.	5628	5904	6321	9742
6. Faults/DEL/Year			2	1.7	1.0
Cleared 24 Hrs.	%	...	5	5	65
Cleared 48 Hrs.	%	...	20	20	80
Cleared 7 Days	%	...	58	58	95
7. Dial Tone in 3 Secs.	%	...	40	50	100
Operator in 10 Secs.	%	...	0	0	90
8. Completion Rate	%	...			
Intn'l Outgoing	%	...	30	30	50
Intn'l Inflow	%	...	15	20	50
STD	%	...	20	20	60
9. Employees	Nos.	16644	17160	17400	...
Per 1000 DEL	Nos.	73	66	50	50

- NOTES : 1. Data on 1989 is estimated, 1994 is target for World Bank Project.
2. Grade of service measurements are doubtful due to limited instrumentation and laxity of measurement.

(Source : Ref. Annex.A 25,30,31)

Despite being the largest and most richly endowed country in Sub-Saharan Africa, Nigeria provides only 0.3 telephone DEL per 100 persons as compared to 0.75 average for Sub-Saharan Africa, 3.21 for Egypt, 6.21 for Brazil (not to speak of industrialised countries). The potential for telecommunication electronics in Nigeria is thus enormous. Given the right approach telecom can be a major factor in bringing Nigeria into the electronic age.

Review of reports from various bodies on the operation of NITEL indicates that the poor performance of NITEL is not just due to its inability to grow with the demand but more due to poor operation and maintenance of what exists. The World Bank Rehabilitation program requires NITEL to show improvement in :

- a. Enhanced training of personnel.
- b. Preventive maintenance of equipments.
- c. Much improved purchase procedures to lower investment per line.
- d. Regular metering, billing & collection of dues.
- e. Realistic cost monitoring & tariff adjustments.

There is little doubt that motivation & accountability with freedom to operate can ensure a highly profitable and growing telecom operation. The latest move of the government for "full commercialization" of NITEL was expected to be a step in that direction. In current practice, however, NITEL is still saddled with an adhoc Board comprising Minister of Communications, Director General and Managing Director. The proposed restructuring has remained pending and have led to staff instabilities, slow down of projects, and general inefficiency. A bolder step of full privatization may be necessary before NITEL can be made to realise its own potential and provide benefits which the nations sorely needs.

Poor communication leads to substantial drop in efficiencies of other economic sectors. This was sharply demonstrated by two recent ITU studies. In one case, an annualised investment of \$ 3.26 million in improving external (international) communications, helped the export sector of Kenya in earning / saving foreign exchange to the tune of \$ 11.6 million each year through better prices, lower costs, improved sourcing, lesser inventory, lesser travel, etc. In another, a goods transport system in Yemen realised in one year ten times the value of installing a communications system through improvements in breakdown delays, perishable goods, lesser warehousing, misdirected loads, etc.etc.

It seems increasingly clear that improving & growing use of telecommunications not only pays for itself and its own expansion [through the resources it earns] but also effects enormous savings in other sectors that it serves. This aspect needs to be better approached by developing nations while allocating resources.

Installed equipment at NITEL is mostly of the crossbar type purchased from varying sources (Seimens, Erricsson, ITT etc.) Supply has been contracted on turn-key basis and the suppliers have been required (in many cases) to even maintain the equipment in the field.

Telecom is unevenly distributed over the country : 35% is in Lagos city while only 25% is spread over the whole rural North. Due to poor quality of service, oil industry and railways are installing and expanding their own private digital network. Satellite and microwave can greatly reduce the problem of traversing difficult terrain to open up a rural areas.

Telex subscribers number around 6000 only though the telex exchanges can accomodate twice as many. In a country where FAX (over telephone lines) is impossible due to quality of service, one would have expected greater use of telex services.

### 3.1.2 Professional Electronics [Ref. Annex. A 36, 37, 38, 39]

Use of micro-computers in Nigeria has been on the upswing since the implementation of SAP. Prior to that, computer use was confined largely to main-frames and large-mini's installed in government departments, parastatlas (oil, airline, etc.), universities, and some large multi-nationals. About 50 mainframes existed in Nigeria in 1983, about 18% of all Africa (except South Africa). The number has grown since then. However, discussions indicate that their full capability is hardly utilised due to a number of reasons which are currently being studied for improvements by a UNDP program.

In the meanwhile, however, the liberaliazation of imports, reduction of duty levels, and relative freeing of hard currency has enabled an inflow of micro-computers to private sector users --- large and small, industry and commerce. Large systems are giving way to mini and micro systems in various combinations including local networking and heirarchic operation.

Reputable brands such as NCR, ICL, IBM, Wang, Unisys, etc. have either set up their own branches or have appointed strong local representatives to provide post-sale support. There is considerable evidence of smaller techno-entrepreneurs setting up similar units on a free-lance basis without tie-up with any single brand.

Post-sales support can include several of the following services --- configuring the set up, arranging accessory requirements (air-conditioning, emergency power, etc.), system analysis, programming, training, maintenance, etc. These activites can generate considerable local added value since, as is well known, the imported hardware may be less than half the total cost of a running system.

Such an approach has yet to be taken for other professional equipments such as --- process control,

instrumentation systems, security systems, and many such specific applications of micro-electronics. Though not evident at present, such professional services can emerge from the smaller techno-entrepreneurs mentioned earlier. Besides the requirements for electronic controls by oil, petrochemical, fertiliser industries (which require large computerised controls), other industries to benefit from such modernization could be --- Food and Beverage, Textiles, Pulp and Paper, Chemicals and Pharmaceuticals, Power and Energy, etc. During SAP, the objective is to enhance the MVA from these resource-based industries as rapidly and efficiently as possible. In today's context, electronic systems could play their useful role in accomplishing these objectives.

### 3.1.3 Consumer Use [Ref. Annex.A 6,7,9,10,11,18,27]

Mass communication in Nigeria is handled in layers : -

- a. State radio broadcast organisations run their own studios and transmitters (limited to 10 KW of MW) operating mainly from each state capital. Programs in local languages as well as those of agricultural and educative nature are broadcast as suits local needs.
- b. Federal Radio Corporation of Nigeria (FRCN) in addition has 22 SW, 15 MW, 5 FM transmitter reaching essentially all over Nigeria. 5 of the SW transmitters at Lagos are 500 KW meant for services beyond Nigerian borders. It is claimed that radio messages cover nearly 100% of the population of the country.
- c. As explained in Section 2.2.3, 14 states have 16 UHF transmitters at their state capitals and serve their surrounding countryside broadly limited by "line of sight". However, programs have local content and are presumably more pertinent to the activities of that state.
- d. Nigerian Television Authority (NTA) runs 53 VHF (thus longer range) transmitters distributed in every state in addition to those run by state governments. These provide programs of national interest as well as educative, informative and entertainment fare. A coverage of 35% of population over 60% of land is claimed.

When compared with other similar countries the transmission facilities and programs choice in Nigeria could be considerably improved through low power relay stations. A comparison is shown in Figure 6. For example, Egypt with half the population and mostly concentrated along the Nile and Delta Regions has about 3 times the transmitting facilities. NTA has access to a Domestic Satellite (DOMSAT) which can be used to

FIGURE 6 : COMPARISION OF TRANSMISSION FACILITIES

[As at the end of 1985]

Country	Population (Mill.No.)	No.Of Transmitters		No.Of Persons/Transmitter	
		RADIO (No.)	TV (No.)	RADIO (Mill.No.)	TV (Mill.No.)
Nigeria	99.7	77	61	1.29	1.63
Zambia	6.7	31	9	0.22	0.74
Egypt	48.5	154	74	0.32	0.66
Thailand	51.7	201	48	0.25	1.08
Indonesia	162.2	745	207	0.22	0.78

[Source : Ref. Annex.A 1,6]



reach the remotest areas with TV and FM programs using low power re-diffusions -- an example of space technology for rural masses.

Besides radio and TV other consumer apparatus using pre-recorded media [Audio and Video] also have their place. However, demand remains suppressed presently due to the high price consumers have to pay after considering the devalued Naira, duties, taxes, etc. Other simpler household electronics like controls for light-dimming, fan-speed, refrigeration, rice-cooking, etc. have yet to establish in wider use.

Improvement in demand for electronic items is linked to improvement in the economy as a whole. At present, disposable income with households is under severe pressure. Rapidly rising cost of living, falling value of the Naira and increasing price of all durables conspire to keep real demand suppressed. In case of consumer electronics, most of supply is presently of smuggled goods where duties, taxes, etc. are avoided; even so the price is related to the black-market price of the dollar which presently is 50% above the official rate.

Due to the high import content the government is not keen on encouraging local assembly; banks also for the same reason do not easily assign foreign exchange; interest rates are exorbitantly high. It is not realised that foreign exchange is in any case drained out via the finished radios, TV, recorders, etc coming in as imports (legitimate or illegitimate).

Additional negative effect resulting from imports is the very wide variety of brands, types and models which are imported resulting in :-

- a. Difficulties and high cost of spare parts and maintenance.
- b. Non standardization thus reducing future prospects for local manufacture.

## 3.2 TECHNOLOGY STATUS

### 3.2.1 In Communications Field [Ref. Annex.A 41]

NITEL exchange equipment is still at the cross-bar stage. Being an electro-mechanical system, it has many limitations in response - time, load-carrying capacity, error-rate, etc. In addition, such systems have high material content (as much as 80%), larger weight and size, use considerable power, and in general are not as good a value for money as the solid state systems which followed. Cross-bar systems are three generations behind the state of the art and sources of supplying them would be very few and spare parts increasingly scarce and costly (especially since many different brands of equipments have been acquired in the past). For further expansion, NITEL would do well to leap - frog to more recent technology.

Transmission system is largely cable for short-distance and microwave for long-distance. Satellite traffic is used for international and certain domestic routes ; this mode can be further expanded to reach remote and difficult locations. It is claimed that the transmission network has considerably more capability and reliability than the switching centres where maintenance has been a problem.

All important equipment is imported ; local content lies mainly in land, building, fabrication, wiring, cabling, etc. Hence mastery of telecom technology cannot be said to have taken place.

### 3.2.2 In Professional Electronics

The liberalization of foreign exchange and the relatively low level of import duties have made it possible for users to directly bring in their own choice of professional equipment according to their perceived need. Whether it be Meditronics or Informatics or Office Automation or Process Control, the user has the choice of the latest available world wide. Hence for this sector the up-to-dateness of technology depends solely on the user's ability and knowledge to make the right choice.

The situation is somewhat aided by the existence of certain external similarities and commonalities internationally -- IBM - compatible PC, Programmable Logic Controllers, Data Acquisition, Modems, etc. It is at the applications level that the variety is unlimited : similar equipments can be combined, interfaced, programmed and installed to serve widely varying purposes ---- from counting and packing matchsticks on to balancing a steel alloying plant.

The sophistication of technology lies more in the analysis of the requirement, selecting the best combination of equipments, interfacing and integrating the whole system, preparing compatible software programs, testing and installing. Given technologists with current knowledge and experience, Nigeria can avail of the latest approaches to the solution of many of its problems. However, this "brainware" activity is only at an elementary stage and applied presently to commercial and data processing applications.

### 3.2.3 In Consumer Electronics

Since most of the apparatus is presently coming in by way of imports (including smuggling), the tendency is to bring in the latest apparatus most appealing to the higher income groups. Increasingly sophisticated designs, worldwide range of brands, absence of locally established service centers, built in obsolescence, etc. make after-sales maintenance a nightmare. It enforces a "discard culture" in which models are junked when they go bad --- so that more foreign exchange has to be spent on the next model, a luxury Nigeria can ill afford.

As will be discussed in a later section, basic designs for audio, radio, TV and VCR (with minimum frills, facilities and sophistication) are now well established and well understood. Developing countries would do well to adjust policies to favour the local adaptation of such models (preferably standardising them) and enabling local assembly and later some component manufacture. It is widespread use and not the glamour of new technology that should be the target of policy for consumer electronics.

### 3.2.4 Overall View of Technology

Import of finished equipments is enabling Nigeria to avail of up-to-date electronic techniques as the user may desire. This is a useful way to spread the awareness and benefits of electronics in other sectors of the economy thus enhancing productivity, efficiency, better planning and even reduced costs in those sectors.

This approach carries with it a number of hidden disadvantages which lead to deleterious effects in the long run

- a. Proliferation of brands, designs, models, facilities' frills, etc. generally leading to higher use cost.
- b. Near impossibility of support and service except at high cost.
- c. Repeated import of future models as previous models become irreparable or lose their "charm" --- thus duplicating investments.
- d. Foreign exchange spent at the level of finished cost of equipment and the usually exorbitant price of imported spares.
- e. Little motivation to develop local capability in the face of such fast shifting markets.

Subsequent sections will discuss some ways of countering these disadvantages and encouraging the build-up of local capability.

## 3.3 ADDING VALUE AT USE LEVEL

### 3.3.1 Opportunity in Telecom

The primary cross-bar network of NITEL is presently receiving World Bank assistance for "rehabilitation" at about the same time that it is making its transition to commercialisation. Clearly, the organisation will first have to be stabilised and start to operate like the commercial organisation it is meant to be. Systematic handling of maintenance procedures to obtain substantial improvements in grade of service (see Section 3.1.1) is awaited as a result of the effectiveness of the reorganization

Thereafter will come a period of network expansion and presumably modernization. NITEL could take this opportunity to leap-frog into digital solid state systems for the new equipments that it will install. Moving from electro-mechanical cross-bar to solid state should be a move towards greater reliability, modularity, ease of maintenance, enhanced revenues, etc. Digitalization will also create the opportunity to enhance local added value if NITEL equips itself to do so.

Contracts for the new installations can be tailored to make provision for passing on more and more of the downstream activity to NITEL staff. NITEL's technologists could then become an integral part of the supplier's project team taking over step by step (and getting trained in the process) the installation, program preparation, system engineering, project conception, etc. Substantial part of the cost can thus be localised eventually leaving only hardware to be imported.

### 3.3.2 Adding Value in Professional Applications

This activity has already made a beginning with the growing strength and capability of office equipment and computer manufacturers' representatives/branches some of whom provide (in local currency) turnkey installation, software adaptation, and even training. Apart from adding local value, they are also diffusing computer awareness and knowledge among the end users in other sectors of the economy.

Parallely, smaller entrepreneurs (not attached to any particular manufacturer) have started up consultancy operations providing similar range of services. Some of them are venturing to supply some of the accessory items such as Uninterruptible Power Supplies, Isolation Transformers, etc. As capability grows with experience in commercial applications, these skills should then be utilized for industrial applications where there will be the need to move to "card-level" engineering (structuring a system by proper selection and interfacing of standardised microprocessor, memory, control cards and the like).

Policy should take cognisance of these possibilities and make provision for suitable benefits to entrepreneurs who move in such directions.

### 3.3.3 Manpower [Ref. Annex.A 5,7]

In adding value at the use level in electronics, much of the tasks are knowledge-oriented. While use of electronic apparatus in the management of business & commerce is under way in Nigeria, the wider and more beneficial use in industry will require a multi-disciplined approach. For applying electronics to the benefit of the manufacturing sector, one has to understand the processes to be controlled (could be electrical, mechanical, chemical, etc.); to express this in electronic terms; to translate the analysis into suitable software; to select, procure

& test the hardware that will do the job; and use electronic knowledge & skills for operations, maintenance, upgradation as the system goes into use.

In Nigeria, 28 Universities & 240 Vocational Schools, put out about 150 Technicians, 3300 Graduate Engineers and 650 Post-graduates (Science & Engineering), of which students specialising in electronics hardware & software are less than 600. Discussions in academic and business circles indicate that quality varies substantially between various institutions and the training is in general basic and theoretical; coverage of course material is less than up-to-date; hands-on practical experimentation is very limited. Industry claims to have to do extensive weeding of candidates, and substantial retraining in the specialities that it needs. Experimental facilities & experienced staff are major constraints.

Parastatals such as NITEL, NTA, FRCN, Petroleum Industry, etc. have training schools of their own where also the adequacy and up-to-dateness are stated to be limited.

Growth of electronics use and increase of local added value will greatly depend on success in improving the quality of training in as many of the existing institutions as possible. Business and industry needs to participate in and give support to the education process with ideas, endowments, scholarships, equipment, sandwich-facilities, etc.

#### 4.0 MANUFACTURING

##### 4.1 Market Size

##### 4.1.1 Consumer Electronics (Ref. Annex. A 6,7,10,11,14,22,40,42)

In developing countries, the first segment of the electronics industry to reach viable size for local manufacturing to start is usually consumer electronics. In technological terms also it provides a feasible entry-point for building up initial experience & capability in electronics.

Nigeria with its substantial resources and large and growing population has potential for consumer electronics market conditioned by :

- a. Growing family income in real terms
- b. Consumer apparatus cost undistorted by tariff and taxation policies.
- c. Wide availability of radio, TV & magnetic media programs.
- d. Policies assisting local manufacture against imported goods.

Radio reception (incl. shortwave) is readily available throughout the country from local stations, FRCN, other African countries and indeed the world. However, TV coverage from NTA (presently 35% of the population) is being expanded. According to NTA, six more stations are under construction and a further eleven are under design; low power translators are also planned to enable fringe and difficult areas to be covered.

The desire for information and entertainment today forms a basic public need in least developed countries and even among the lower strata in each country. Television antennas are a common sight for instance in the "favellas" of Brazil and the "jhuggis" (slums) of major Indian cities. If not met by local manufacture, this need finds its own way to fulfillment often to the detriment of the economy. Humbert puts it very dramatically when he says: "Television Sets and also cassette radios, digital watches, calculators, games & even hi-fi & tape recorders proliferate --- whilst smuggling and fraud are in general very significant. In all countries ---one can see a frenzy of consumption in leisure electronics."

Nigerian consumption of radio, TV and other consumer goods is hard to quantify because of a high level of smuggling activity, misdeclaration at customs, and erratic variations in local production. Official statistics of radio and TV ownership per 1000 do not reflect the true picture. Estimates made using available data and discussions at interviews indicate a potential annual consumption in the order of 1.2 million radios, 200 thousand sound recorders, 400 thousand TV sets, 50 thousand VCR.

TV consumption has remained at a lower level due to : (a) broadcast coverage of only 35% of population; (b) increasing price of TV due to Naira devaluation; (c) low discretionary spending capacity with rising inflation. If recent changes in policy can correct these factors, the consumer electronics market could grow at a rapid rate.

#### 4.1.2 Professional Electronics (Ref. Annex. A 12,15,31,32,33)

The telecommunications program for the medium term outlined in the World Bank rehabilitation scheme for NITEL visualises a modest growth of telephone lines from the present 400,000 to 600,000 by 1994. Considering the very low level of telephone density (see section 3.1.1), Nigeria could do with a much higher rate of expansion along with modernization to the digital regime.

As a part of the "Communication Decade in Africa" a number of UNDP projects to enhance rural and regional communication facilities have been initiated under RASCOM and PANAFTEL programs. Out of a planned expenditure of US \$ 5.05

Billions over two phases of the program, Nigeria is slated for US \$ 1.35 Billion:

	US \$ Millions
Switching Equipment	260
External Line Plant	775
Radio Relay	140
Satellite Terminals	45
Telex	40
Training & Miscellaneous	95
	-----
	1355
	-----

A 1985 review of progress indicated that the programs in Sub-Saharan Africa were going all too slowly and the targets of 1 telephone per 100, 20 radios per 100, and 5 TV per 100 have yet to be approached. Main reasons being inadequate local infrastructure and competence to move the programs at a brisk pace. The World Bank Rehabilitation Program along with RASCOM and PANAFTEL represent about US \$ 1.5 Billion worth of assets for communications in the coming five to six years.

Programs for computerization of socio-economic data of the country represent a market for informatics comprising large sized computers and special software requirements.

The liberalised import policy has led to the development of a growing market for personal computers and modern office electronics such as electronic typewriters, copiers, cash registers, telephone aids, and accessories that go with such apparatus. The service sector which represents a growing and modernising proportion of the GDP (40% in recent years) is the natural market for informatics.

The manufacturing sector share in GDP, after reaching 10.4% in 1980, shrank to half that in 1984 and has continued to be stagnant until 1987. Current efforts at rehabilitation through SAP are aimed at establishing & modernising resource-based and local value-added industries (with increasing private & even foreign investments). Food & Beverages, Cotton & Textiles, Refining & Chemicals (so far dependent on antiquated machinery) will have to invest in modern plant. This should provide an increasing market for process control and allied electronic equipments.

#### 4.1.3 Overall Electronics Market

Subject to the rehabilitation of the economy as a result of the SAP, Nigerian electronics market has the potential for annually absorbing conservatively about US \$ 200 million worth of consumer electronics, about US \$ 300 million of telecom systems, and about US \$ 100 million of informatic systems.

The "brainware" (systems engineering, programs installation, maintenance, etc.) which is an essential concomitant of digital systems could be conservatively placed at US \$ 150 million.

Keeping in mind Nigeria's size, population, resource base, etc., this is indeed a modest consumption putting it in line with the situation in Indonesia.

Due to its linkage with all other sectors of the economy, the future prospects of Nigerian electronics remain conditioned by prudent policies and management of the economy as a whole.

#### 4.2 MANUFACTURE OF EQUIPMENT

##### 4.2.1 Assembly (Ref. Annex.A 9,18,22,27,28,43)

During the bouyant markets resulting from the oil boom Nigeria seemed headed for a steady increase in standard of living. Demand for consumer electronics grew rapidly and this encouraged a number of entrepreneurs to set up capacity for assembly of radios, cassetterecorders, television, etc. Fully 22 out of the 32 listed electronics firms were started during the period 1972 to 1981.

According to MAN, the present assembly capacity of the 32 listed firms covers 3.5 million radios, TV, recorders, VCR, transreceivers, telephone aids, copiers and other such domestic and commercial apparatus. Production of radios and TV as reported in the statistics peaked in 1981 and has been declining rapidly thereafter.

TABLE 6 : PRODUCTION OF RADIOS AND TVs

Year	Radio (000 Nos.)	TV (000 Nos.)
1977	112	26
1979	148	26
1981	600 *	309
1983	320	272
1985	177	74
1987	81.5	34

[ \* estimate ]

Due to the economic down turn after the oil boom, and more particularly after the initiation of SAP from 1986, the local output of all consumer and commercial apparatus has dropped because of :

- a) Decline of GDP per capita
- b) Crises in foreign indebtedness
- c) Post 1985 devaluation of Naira
- d) Rising inflation & falling discretionary spending



A number of units (including Philips) have ceased production of consumer electronics and have diverted to other items. Many have moved over to trading and after sales for survival.

Due to policy redirection towards encouraging resource based industries and those industries that can export, the electronic industry has dropped very low in the priority list set by the government. Assembly of equipments from imported components is considered derogatively as "screw-driver" technology. The orientation of policies and tariffs does not assist local electronics units in competing against importers (legitimate and illegitimate).

Having already invested substantially in electronics assembly, it does not appear wise to let the capacity lie idle on the one hand and continue liberally importing finished electronic equipments on the other. Utilizing the global data for equipment & component markets, one can demonstrate that, the average consumption of active components in the ex-factory sale value of electronics equipment is about 13 - 14%; of passive components 17-18%. On the average, this means that importing electronic components would consume around one third the foreign exchange as compared to importing the finished equipments. Another 15-20% is ascribable to parts such as cabinet, brackets, moulded items, decor, packing, etc.

Admittedly global data includes a large proportion of professional equipments (about 85%) where other elements of cost (R&D, engineering, marketing, etc) may dominate. Consumer electronics with its low margins and low technology would have a larger proportion of active & passive components. For example a CTV set exhibits the high side of components content (due to large cost of picture tube); in that case the active & passive components work out to 50% of end equipment sale (at international prices).

#### 4.2.2 How to Minimise Component Imports in Consumer Electronics. (Ref. Annex. A 27,28)

Firstly, the set assemblers should free themselves from the "kit" tie up with particular brands and models. Clearly, the cost of components supplied as CKD will be substantially higher than if each component is purchased competitively in the world market.

Second, cabinets, plastic parts, packing material, wires, cables, fastenings can save considerable foreign exchange if subcontracted locally. A detailed study by MAN (Electronics Members) has quantified in detail the savings possible though localising such items. Depending on the product, around 20% of the foreign exchange can be saved by taking these steps.

Third, aggressive purchase by tapping supplies in soft currency countries is possible for many of the components. The impact of Naira devaluation with hard currency should be

minimised in this manner.

To accomplish this, the assembler's design department must have competence to adjust and modify the set designs to suit the local situation. More specifically, the Nigerian assemblers should undertake co-operative development to evolve a "People's Radio" or "People's TV" etc. to suit local economic conditions. The resulting volume of such standardised sets puts them in a strong position to purchase components competitively.

#### 4.3 Components Strategy

##### 4.3.1. Question of Scale

With the policy orientation currently applicable, the question of local manufacture of components cannot arise since local assembly of sets is at a very low ebb. As later covered in Section 4.4, government has a major role to play in firstly enabling local assembly to get back on its feet and capture the major share of the domestic market for consumer durables.

Manufacture of components locally is dependent on scale of offtake by the assemblers. Standardization also has a major role to play. Thus it is important that early effort be made to locally develop standardized circuitry ("Chassis") for major products like radio, cassette-recorder, BWTV, CTV, telephone set, etc which are, known to be required in sufficient volume so that local assembly becomes economical.

Assembly process involves testing of incoming components, preparing them for assembly operation, inserting into circuit board, flow-soldering, attaching non-solderable components, cabling, putting it all in a cabinet, final testing and packing. The process is quite standardized regardless of the type or model of equipment to be assembled.

One can readily consider assembling a variety of items in the same facility --- intercoms, small weighing machines, burglar alarms, etc. Many of the basic components such as PCB, resistors, capacitors, etc would be quite common and standard. This would help increase the demand on such components.

Of course, considerable modernization and automation of the assembly process is being implemented in advanced countries due to their high labour costs. Automatic insertion machines are an example, surface mount techniques (pick & place) are another, etc. For the situation in Nigeria one can concentrate on those equipments where manual assembly predominates. This will mean avoiding ultra-miniature, flat and pocketable models for the time-being (i.e. walkman, calculator etc.)

Equipments containing a large proportion of precision mechanics (Turn tables, VCR, CD, memory drives, etc) call for a higher outflow of foreign exchange due to these precise sub-assemblies. These may be considered for assembly at a later stage.

In sum, planning of components can only begin if sufficient activity in local assembly is first encouraged and build up to sufficient scale.

#### 4.3.2 Selecting Components for Manufacture

The variety of components needed for electronics is indeed large. Besides the main categories like resistors, capacitors, semiconductors, etc there is a range of sub-categories (e.g. wirewound resistors, carbon resistors, etc) some of them involving separate manufacturing processes. Thus careful choice and planning has to be done when framing the strategy to manufacture components in a developing country.

Some broad indications of the order of priorities in working out the strategy are given below :

- a) Parts and components which can be sub-contracted to other existing industrial sectors --e.g. wooden cabinets, metal cabinets, metal enclosures, metal fasteners, and brackets, plastic cabinets & parts, paper products for packaging, etc.
- b) Passive components which can be made to adequate quality and cost using modest levels of semi-automation and where scale & technology are not major cost determinants --- eg coils, wire-wound resistors, loudspeakers, transformers, etc.
- c) Components whose automated plants are of medium investment which can be justified by the limited scale applicable in Nigeria --eg PCB, Plastic Capacitors, Potentiometers, Film Resistors, Switches, Relays etc.
- d) In the medium term, the planning of more advanced passive components (Deflection Yokes, Fly-Back Transformers, Cercaps, Electrolytic Condensers, etc.) may not be justified in Nigeria from the angles of scale, technical sophistication, competitiveness, and so on.
- e) Certain other components are dependent on a variety of precision tooling and machinery of high cost which would be hard to operate and maintain in the present industrial situation in Nigeria --- e.g. Connectors.
- f) Finally, the undertaking of active components production is very technology & investment intensive and would be out of consideration in Nigeria for considerable time.

#### 4.4 Government Role

##### 4.4.1 Rationalising Protection.

In Section 2.2.2 the tariff policy currently in vogue was reviewed. It provides levels of import duty attempting to discourage import of consumer items which are construed as "luxury" --- VCR @ 55%; TV @ 45%; Audio Systems @ 40%; Microcomputers @ 40%. An anomaly in this group is "Radio with or without cassette" @ 10% which is not adequate to discourage imports. And passenger baggage is apparently free of duty as "personal effects". The effect of this protection is further diluted by imposing an excise tax on corresponding local items --- VCR @ 20%, TV @ 10%, Radio with cassette @ 10% and others @ 5%.

If local assembly is once again to be encouraged (resulting in saving of foreign exchange as shown in section 4.2.1), the locally made items should not be burdened with indirect taxes. Further, Nigeria may consider a protective import duty on all consumer electronic goods (whether by baggage or otherwise). This should enable the existing electronics assemblers to build up utilization of their existing capacities.

Further, a crash program involving a joint effort has to be made by government technical institutions along with the Technical Staff of the industry to implement recommendations made in section 4.2.2.

With increasing output of sets, government should provide encouragement for subcontractors to enter the areas of selected components, mentioned in section 4.3.2 with each subcontractor supplying several assemblers with the particular component that he would be making.

Electronic components not locally made should be permitted for import --- at the lowest level of duty (much less than the present 20%). As and when certain components are taken up locally, a rising protection can then be introduced.

#### 5.0 CONSTRAINTS AND PROSPECTS

After a period of considerable economic stress in the early 80's, Nigeria initiated a "Structural Adjustment Program" (SAP) in 1986 aimed at liberalizing and privatising the economy. As a result, use of electronic apparatus in the industrial sector has grown briskly based on imports.

The constraint to industrial use (besides high cost of foreign exchange) is mainly the awareness and competence of each user to employ electronics to the benefit of his business. Activities of the local reps/branches of various electronics transnationals are helping to spread the use which at present is mainly office automation. There are good prospects for more beneficial applications --- in process, instrumentation, health, agriculture --- for which local competence in hardware and

software needs to be built up. The low level of training in these specialities is a serious limitation.

Telecommunication in Nigeria is primitive, unreliable and has not yet had the benefit of modern electronic systems. Formation of NITEL, a parastatal to attend exclusively to internal and external communication, and the recent declaration of its "commercialization", was expected to give a thrust in this area. The constraint seems to be the hesitation and delay in restructuring and pruning to make NITEL into an accountable and efficient body. Useful modernisation programs of World Bank PANAFTTEL, RASCOM remain un-implemented pending the expected "cultural" change. Meanwhile, the nation is denied the benefits of better communication for improving efficiencies in all other sectors.

Local consumer electronic industry, which had made a beginning during the 70's to assemble radio, TV, etc. for the domestic market, has regressed alarmingly. The demand for these items is being supplied by imports (legitimate and illegitimate) resulting in avoidable drain of foreign exchange. The constraints have been :

- a) Firstly, the easy path of "Kit Assembly" taken by the assemblers for an unduly long time. During the peak of local output, no attempts were made to progressively build local competence in re-designing and import substituting.
- b) The units are therefore unable to compete at this time of high cost of foreign exchange.
- c) Meanwhile Government has given low priority and less attention to this segment (considered a luxury). It is not understood that competence in electronics begins in consumer electronics and then percolates to professional electronics.

Due to its potentially large market, Nigeria should encourage the prospects of import substitution to minimise increasing drain on its foreign exchange as its economy turns around and modernises. Consumer electronics industry awaits modifications in trade, tariff and policy to enable it to rehabilitate. However, the industry needs to be pushed to cooperate and take action and mobilise existing local talent and competence which will free it from the "Kit Culture" and unreasonable import dependence. The technologies of the basic areas of radio, recorder, B/W TV and CTV are easy to master with low cost help from a number of third world nations and international bodies.

Meanwhile, the widening use of microcomputers as well as the presence of TNC in the local market (through reps/branches), provides an opportunity to adjust policy to build up local competence in informatics and software. Modifying

trade, tariff and purchasing policies to encourage and favour local value added in systems integration, software, training etc. will nucleate increasing "brainware" efforts from small and medium private firms (as for example it has in case of India).

Prospects for import substitution in smaller niche markets need to be explored with relatively simple technologies ---e.g. intercoms, telephone aids, light/fan controls, intrusion alarms, weighing scales, UPS, small control equipments, small private exchanges, etc. Besides, there are numerous small applications of microprocessors for dairy, poultry, agriculture, etc. which should especially be encouraged in Government laboratories to encourage widespread use in such basic sectors.

Prospects are that progress will first have to be achieved in such "tail-end" efforts as above so that use and markets widen and grow before serious efforts at components manufacture can be considered.

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ANNEXURE B

INTERNATIONAL COMPARISONS OF ECONOMIC PERFORMANCE  
AT CONSTANT (1980) PRICES.

Indicator	Year	Country	Africa	Developing Countries Total	Developed Market Economies
GDP Per Capita (US \$)	1970	993	634	732	8074
	1975	1147	694	868	8907
	1981	1034	709	973	10225
	1984	812	667	954	10743
	1985	804	669	948	11012
MVA Per Capita (US \$)	1970	22	46	113	2015
	1975	34	52	140	2158
	1981	57	60	164	2518
	1984	37	59	167	2707
	1985	38	60	168	2803
Total Exports/ Capita (US \$)	1970	197	276	249	1226
	1975	206	208	265	1566
	1981	236	197	264	2103
	1984	153	184	251	2296
	1985	178	191	247	2390
Total Imports/ Capita (US \$)	1970	112	160	132	1412
	1975	188	205	188	1677
	1981	319	235	262	2095
	1984	129	186	235	2338
	1985	149	195	224	2430
Total Exports/ GDP (Percent)	1970	19.9	43.6	34.0	15.2
	1975	18.0	30.0	30.6	17.6
	1981	22.8	27.8	27.1	20.6
	1984	18.8	27.7	26.3	21.4
	1985	22.1	28.6	26.0	21.7
Total Imports/ GDP (Percent)	1970	11.3	25.2	18.0	17.5
	1975	16.4	29.6	21.6	18.8
	1981	30.9	33.2	26.9	20.5
	1984	15.9	27.9	24.6	21.8
	1985	18.5	29.2	23.6	22.1
Gross fixed capital for- mation per capita(US \$)	1970	82	95	127	1936
	1975	205	146	183	1992
	1981	275	179	228	2220
	1984	150	144	204	2292
	1985	163	147	198	2394

ANNEXURE B (CONTD.)

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Indicator	Year	Country	Africa	Developing Countries Total	Developed Market Economies
GFCF/GDP [Percent]	1970	8.3	15.0	17.3	24.0
	1975	17.9	21.0	21.1	22.4
	1981	26.6	25.2	23.4	21.7
	1984	18.5	21.7	21.4	21.3
	1985	20.3	22.0	20.9	21.7

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Source : Statistics and Survey Unit, UNIDO  
Based on data supplied by the U.N. Statistical Office,  
with estimates by the UNIDO Secretariat.

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ANNEXURE C

Reported Import Schedule Jan.-June 1988 [Summary]

(Half Year Naira Mill.)

751	Office Eqpt. (Elx & Non-Elx).	18.72
752	Automatic Data Processing Eqpt.	92.00
759	<u>Parts</u> of office machine	16.93
7611	CTV	15.13 *
7612	BW TV	1.16 *
762	Radio Broadcast Receivers	32.66 *
763	Recorders, Gramophone (incl.VCR)	12.43
7641	Line Telephone Equipment	17.00
7642	Microphones, Loudspeakers, Amp.	4.23
7643	TV, Radio, Transmitters	5.67
7648	Trans-receivers	3.46
76482	TV Cameras	0.46
76483	Radar	0.78
	<u>Parts</u> of 7641 & 7642	3.18
764930	<u>Parts</u> of TV Radio Receivers	21.47 *
764990	<u>Parts</u> of Sound Recorders	3.93
771210	Static Convertors	54.80
872020	Other Medical Equipments	61.63
873	Meters & Counters	11.63
8743	Gas, Liquid Control Instruments	0.95
8744	Scientific Instruments	13.48
874810	Elex. Regulators	2.92
87483	Rad.Cont.& Other Elx.Meas.Eqpt.	2.20
874890	Other Elex. NES & Inst. Parts	8.88

\* Smuggling rampant

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