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(ITAP)

IP/NIR/84/020/11-02/J 12413
NIGERIA

Technical Report: Foundry-Forge Sub-Sector

Prepared for the Government of Nigeria
by the United Nations Industrial Development
Organisation acting as executing agency
for the United Nations Development Programme

Based on the work of Mr. P.K. Sandell,
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This document has not been edited

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ABSTRACT

Post Title: Expert in Production of Foundries/Forges

Project Number: DP/NIR/84/020/11-02/J 12413

Project Objective: To strengthen the Policy Analysis Department (PAD) of the Federal Ministry of Industry & Technology (FMI&T) and support the available team of PAD in upgrading industrial sub-sector. Reviews and in assisting the organisation of a Seminar on the sub-sector concepts and development strategies.

Project Duration: Three months during mid-June to mid-September, 1992 at the Training Unit of PAD (FMI&T), Ibadan.

Conclusion and Recommendation

This report is a survey of the Nigerian foundry and forging industries, which identifies its present structural imbalance and deficiencies and establishes the most important tasks facing the subsector. These are (a) to overcome the wide-spread incidence of idle capacity through end-user linkages, (b) reduce costs and attain viability and (c) thereby contributing towards import substitution in the manufacturing sector. A Master Plan, which emerged out of an interactive exercise, of Buyer -Seller meet and Investment Clinic, is prescribed, supported by an appropriate industrial policy package. This action plan is targeted to reduce idle capacity, reduce importation of spares and components, and establish a foundation for the growth of the manufacturing sector in Nigeria.

(ii)

EXPLANATORY NOTES

BSM	Buyer Seller Meet held on the 18th August, 1992 at Policy Analysis Department Training Hall, Ibadan.
PAD	Policy Analysis Department, Federal Ministry of Industry and Technology, Ibadan.
IC	Investment Clinic, held on the 19th August, 1992 at P.A.D. Training Hall, Ibadan.
ASC	Ajaokuta Steel Company Limited, Ajaokuta.
DSC	Delta Steel Company Limited, Warri
NMT	Nigerian Machine Tools, Osogbo
NFL	Nigerian Foundry Limited
AES	Adebowale Engineering Services Limited,
TCPC	Technical Committee on Privatisation and Commercialisation
WG	Working Group constituted in the Workshop, Buyer Seller Meet and Investment Clinic (17th-19th Aug. '92), held at PAD Ibadan.
FWG	Group I: Investment, Demand, Production and Import, Demand-Supply gap.
SWG	Group II: Infrastructure Requirement and Policy Package Peugeot Automobile Nigeria Ltd.
VN	Volkswagen Nigeria Limited
SCG	Strategic Consultative group
SMID	Strategic Management of Industrial Development
IMP	Industrial Master Plan (OR IMP)
ITAP	Industrial Technical Assistance Project (UNIDO)
IDC	Industrial Development Centre (Zaria,Osogbo)
ARCEDEM	African Regional Centre for Engineering Design and Manufacture
NMDC	National Metallurgical Development Centre

MAN Manufacturers Association of Nigeria
NASSI Nigerian Association of Small Scale Industries.
FIIRO Federal Institute of Industrial Research, Oshodi.
UNDP United Nations, Development Programme
UNIDO United Nations Industrial Development Organisation

Local Currency :

The UN operational rate of exchange during the assignment was between 18.3 to 18.5 Naira to the US dollar.

INTRODUCTION

Background

This Report is the outcome of the Industrial Technical Assistance Project which was put in place by the Nigerian Government with assistance from UNDP/UNIDO, to establish in-house capability to initiate and manage industrial development strategies. Training programmes were mounted, anchored on the studies carried out under the IMP project. The overall objective was to create through these programmes, including seminars, a cadre of professional staff and civil servants, familiar with the industrial scenario, particularly the growth requirements for the various sub-sectors. The foundry and forge industries were identified as a key sub-sector, critical to the industrial development of Nigeria.

Previous Seminars on the Foundry Sub-sector

PAD organised a Seminar during 21st April to 1st May, 1992 entitled "Training Workshop on Leather and Leather Products, Foundry and Forge and Pharmaceuticals" where more or less the same group of participants were exposed to all the sub-sector lectures. Those related^{to}/foundry -forges were delivered mostly by PAD officials, university professors and consultants. The Executive Summary of the IMP study on this sub-sector were also presented. Thus preliminary seminar activity had already started, before my arrival at Ibadan on 21st June, 1992. I was informed about another Seminar which was scheduled from 29th June, 1992 entitled "ITAP Sub-sector Training Workshop: Rubber and Rubber Products, Cement and Pharmaceuticals and Review Seminars on Non-Metallic Building

Materials and Foundry and Forge". As the ITAP Project Coordinator was away at Abuja, I could only meet him on 29th June, 1992, hence there was no time for structuring the foundry-forge programme at seminar. A half-day was spent on 29th June, 1992 on this sub-sector, during which period the UNIDO Consultant spoke to the participants regarding the latest world developments in foundry-forge technology and practice as well as modernisation methodology for the small and medium scale enterprises. The participants at this Seminar included a group of people, who more or less, continued through all the sub-sector proceedings. The number of delegates particularly involved in foundry-forging or allied activity, were few. A report of this seminar have been sent to UNIDO, Vienna, vide letter dated 14-7-92 to the back-stopping officer.

Main Seminar

Before organising the main Seminar the following preliminary work were completed:

- a. Desk Research
- b. Review Comment on IMP Study/SCG Report
- c. Field Survey - actual plant visits.

The main Seminar format was dictated by the conclusions derived from its preliminary work and was held on an innovative format between 17th to 19th August, 1992, as explained later.

Structure of the Report

This Report Consists of Four Parts as follows:

I. Desk Research and Review Comments

The Study (report of the IMP) completed in April, 1991, along with the report of the SCG, the Executive Summary and the

PAD 1992 April Seminar papers were reviewed. This review established the need for re-assessment of the statistical data, which were either self-contradictory or did not reflect the actual ground position. The investment proposals submitted in the SCG report were found to be neither technically feasible nor commercially viable.

II. Field Survey

Plant visits were made to key installations. This Survey established the need for an interactive forum (the Buyer-Seller Meet), as well as a diagnostic forum for formulating investment strategies (the Investment Clinic).

III. Seminar, Buyer-Seller Meet and Investment Clinic

This was held with focus on the new concept of BSM and IC, which was introduced for the first time in the ITAP training programme. The Seminar formulation, logistics and reports have been discussed.

IV. A Diagnostic Survey and a Master Plan for Strategic Development

The final part of the Report is the outcome of all the above activities and presents a Diagnostic Survey and a Master plan for a Strategic Development of the Nigerian Foundry-Forge industries. This report, written by the UNIDO Consultant, has been submitted to the Director, PAD for consideration for issue as a PAD document.

Job Description

The duties enumerated in the Job Description have all been completed in full. The additional one carried out is the preparation of the Diagnostic Survey and Master Plan indicated

above, which updates all the IMP/PAD studies carried out so far on the sub-sector. In fact, it is an advance into the second phase of the IMP project.

Timing

The total assignment was for three months. The Consultant arrived at Lagos on 18th June, 1992 and left Lagos on 9/10th September, 1992.

REVIEW COMMENTS ON :**INDUSTRIAL MASTER PLAN STUDY OF THE FOUNDRY AND FORGE SUB-SECTOR**

(PART I)

This review is based on the Interim Report (March 1991), final draft (April 1991) the SCG Report (June 1991), an ARCEDEM Foundry market survey (Feb 1991) and the 1992 April ITAP Training Workshop papers. (see list of References). It is being submitted in two parts. Part I reviews the data presented in the STUDY. Part II reviews the investment implications of the SCG recommendations.

The STUDY has produced a wealth of valuable information on the state of the Nigerian foundry and forge industry. Specifically, the following features have emerged in sharp relief:

- (1) The sub-sector is not able to meet all the spare part and component requirement of the end-user industries/trades,
- (2) In spite of the existence of a large idle capacity. The delay in commissioning the foundry-forge facilities at the Ajaokuta Steel Plant has added to the dimension of this problem.
- (3) Technologically the sub-sector is at a level far below the advanced developing nations. The technology gap is glaring in respect of the informal or "tiny sector", which in terms of numbers, constitute 60% of the sub-sector.
- (4) There is a large dependence on import for:
 - equipment and machinery, including spares thereof.
 - pattern and dies
 - vital inputs like forging billets, die blocks, pig

iron, foundry binders, etc.

(5) The spare parts required for maintenance are not available readily from indigenous source. Difficulty in importing such items leads to plant breakdown, loss of production and idle capacity. The details of import for the sub-sector and allied ones have been covered extensively in the STUDY, and relevant figures are quoted in Appendix I of this review.

(6) The sub-sector demand arises almost entirely out of the need to develop indigenous manufacture of spares and components for the engineering industry, since the Nigerian economy is heavily dependent on imported inputs of machinery and equipment. The metal spare parts market, in money terms is equal to :

Domestic supply :	250 million Naira
Import :	750 " "
Total :	1000 " "

The STUDY has not located any significant demand arising out of the Defence/Railway/ machinery manufacturing/ machine building sectors, as there is no significant pressure of these activities in the Nigerian economy. This is an important aspect, which will be dealt with in further detail in Part II of this review. The need to be self-reliant in spares cannot be the only investment determinant. The capacity installed to manufacture castings and forging which are intermediate products can be viable only after finishing (machining, heat-treatment etc.) by the end-user. Thus the growth of the end-user industries have to be also linked to that of the foundry and forge sub-sector. Their demand both for original equipment as well as spares will have to be estimated by the STUDY. The end-users are manufacturers of Cement, Sugar,

Textile, Earthmoving, Valve, (Petrochemical , FERTILIZER)
 Tractors, Automobile, Railway Rolling stock, Water supply
 Electrical power generation and transmission, Mining machinery
 etc.

Demand Appraisal *

The demand appraisal (for the period 1991 - 2001) for foundry - forge sub-sectors have been apparently based on a pre SAP exercise (Ref SCG Report). An annual growth rate of 15% per annum had been considered for estimating the projected demand for castings till 2001. Categorywise, the share of the various types of foundry, has been taken at a constant figure over this entire period as follows:

Steel :	18.7%
C.I. :	57.4%
Non Ferrous :	23.9

The demand has been indicated as follows for 1991 : (SCG)

	tonnes
Cast Iron :	77949
Steel :	25358
Non ferrous :	32478
Total :	135783
Say :	136000

This demand will have to be re-assessed because of the following reason:

* The STUDY (April 1991) does not indicate any DEMAND figure for forgings and castings in NIGERIA. However AKINBINU, the National UNIDO consultant, Prof AKU etc have in their ITAP Seminar papers (1992) as well as the S.C.G. have given a TABLE indicating Demand for CASTINGS DURING 1991 - 1001. It is not clear how SCG has referred to the IMP Study Report April 1991 as

* the source, as the said report does nowhere mention the TABLE.

Post - Devaluation Projection of the Nigeria Economy :

The Central Bank of Nigeria has recently released figures for Nigeria's economic performance in 1991. The rate of growth GDP shows a decline to slightly over 4%, as compared to 6% in the previous year. Agricultural commodities constitute 30% of the GDP, followed by approximately 12% each for the Oil and Trading sectors. Manufacturing, Banking and Insurance, and Services shares come to about 8% each.

This trend has not changed radically during the year 1989 - 91. Of interest, is the low share of "manufacturing" activity in the GDP.

While the overall capacity utilisation has been around 39%, the manufacturing sector utilised about 34.6% of its capacity. Again there has not been a radical change in this scenario between 1989 - 91.

The devaluation of 80% in the Naira in March 1992 is likely to adversely affect capacity utilisation, because the shortage of imported spare parts, is likely to assume more critical proportions. A drop in capacity utilization has been experienced by countries with low export potential in manufactured or engineered goods, immediately after devaluation.

In India, for example the Rupee was devalued in 1991, with a view to encourage more export earnings. However, actual growth in exports, in term of dollar, fell during the post devaluation eight-month period from + 9.1% growth rate to - 5%, i.e. a negative growth. The GDP growth rate declined from 5.6% before devaluation to 2.5% to 3%, while a drastic fall in

the growth rate of the following sectors were observed:

	1990 - 91 ----- 1989 - 90 (pre-devaluation)	1991 - 92 ----- 1990 - 91 (post-devaluation)
Industry	8.5	- 0.9 (April-Nov)
Manufacturing	9.1	- 2.3 (")
Engineering	13.4	- 6.7

(Source: Confederation of Indian Industries)

Imports came down drastically with devaluation from a growth rate of 13.2% (dollar terms) to - 20.7%, improving, however the foreign exchange reserves, and reducing both budget and fiscal deficits. The negative effect of devaluation on the growth rate of engineering sectors, due to foreign exchange shortage, is unavoidable for an external debt ridden economy like India or Nigeria.

Under the circumstances, an assumption of 15% annual growth in the demand for forging-castings in Nigeria will no more be justified. Further, as the STUDY brings out that the current annual consumption level is about 20000 tonnes (local + import) the demand projected in SCG Report equal to 135000 tonnes in 1991, rising at 20000 tonnes per year (15%) till 2001 is an over - estimation. The 1991 projection can be checked against the actual consumption for the particular year - the figures for which should be available by now.

No meaningful industrial master Plan/SMID plan can be drawn up without a realistic assessment, which should be based on a growth rate of (say) 6 to 8% This will be a very difficult exercise, but

will be essential for taking strategic investment decisions, which can be justified as technically feasible as well as commercially viable.

Categorisation

The category - wise demarcation into cast iron (including malleable iron/alloy iron) steel and non-ferrous foundries will have to be reassessed in the light of the scenario in other developing / developed countries, where non - ferrous foundries have a share between 1% (developing) to 15% (industrialised countries), of the total foundry production. A 24% share is unheard of

Capacity Utilisation / Production

Statistics regarding Production and capacity Utilisation may be reassessed, since as the relevant figures given in the STUDY, SCG report and related reports do not match. For example:

(A) Ref. "Executive Summary, STUDY"

		tonnes
(a) Foundry capacity :	Ferrous :	50000
	Non ferrous	5500

		55500

	Utilisation	25%

(b) Production (1990) is 25% of capacity or: 13875, say 14000 tonnes, which is the "domestic supply".

(c) The Executive Summary states that 14% of the total supply is being met through this "domestic supply" (page xix) or local production. In other words national supply, including imports, should therefore be equal to about 100,000 tonnes, per year including all types of castings. This appears to be on the

high side considering that average imports of castings and forgings during 1980s was 5370 tonnes per year and the domestic production in 1990 was 14000 tonnes, giving available supply at about 20,000 tonnes. The quantum of the country's actual requirement and sourcing will have to be re-estimated.

(B) The installed capacity indicated in the Executive Summary differ from that mentioned in later pages of the Final draft Report: (pp. 34 - Table 2.3), from which we note that:

Installed capacity of the largest of Foundries			
Surveyed	:	All castings:	65,695 tonnes
production (1990)	:	All castings:	5381 tonnes
Capacity utilisation	:		8.3%

In other words, if installed capacity of only a portion of the industry surveyed is about 65700 tonnes, that of the entire industry would be much higher than 55500 t mentioned in the SUMMARY.

(C) The production of 14000 tonnes deduced from Executive Summary data may be compared with the production in 1989 = 10000 tonnes. (page 92 of STUDY). This means that production in 1990 was 40% higher than in 1989, which does not appear realistic.

(D) AKINBINU and the S.C.G. Report give a different figure :

Total installed capacity	:	All castings	: 39000 t
Production (1990)	:		5381 t
Utilisation	:		13.7%

Incidentally, the SCG Report/Study indicate that ARCEDEM has CI casting / forging facilities. A visit on the 9th July 1992 showed no such facilities exist in ARCEDEM. They propose to set some

capacity in future

Arcedem Study

A survey was carried out by ARCEDEM to assess the foundry capacity in Nigeria. (FEB 1991). It covered 26 foundries in 8 States, representing "48% of the total estimated number of 54 foundries in Nigeria, the majority of them being located in Lagos and Oyo States. The findings of the survey indicate that :

Total Foundry Capacity	=	34000 tonnes / year
Actual Production	=	16000 tonnes / year
Utilisation	=	47%

The relevant and interesting paras from this survey, copies of which are available in the Federal Ministry, are quoted bellow :

Capacity Utilisation

" Break-down of installed and actual production capacity in terms of metal casted as obtained from 13 of the visited foundries is given below:

For Cast Iron

Total installed capacity (T/Y)	10,240
Total capacity used (T/Y)	4,990
Percentage used	48.73%

For Aluminium

Total installed capacity (T/Y)	1,530
Total capacity used (T/Y)	780
Percentage used	51.98%

For Brass / Bronze

Total Installed capacity (T/Y)	150
Total capacity used (T/Y)	40
Percentage used	26.67%

The total installed capacity for the 26 foundries surveyed

amounts to about 16,200 tonnes per year while the actual production as revealed by the survey is only 7,700 tonnes per year making a capacity utilisation of 47.5%.

Since the sample is supposed to represent about 48% of the total number of foundries in operation in Nigeria, it could be assumed that the total foundry capacity available amounts to about 34000 tonnes per year and that the actual production is around 16000 tonnes per year. ”

Thus a realistic reassessment of actual installed capacity and production in the industry is necessary to reconcile the various figures and thereby to correctly establish the national supply.

(B) Priority for new Steel Castings Capacity

The STUDY calls for new investments in steel castings production. S.Y. AKU (Ref.1.) estimates steel casting demand, based on 10% of national steel consumption, at 150,000 t and the installed capacity as 29650 t, which is higher than the total production of all types of castings (14000 tonnes) in 1990. Thus on the face of it the demand of 150000 tonnes and the installed capacity of 29650 t appears over estimated. India, for example, produces around 100,000 tonnes of steel castings, while the gross steel consumption is around 10 million tonnes. It should be noted that NIGERIA'S steel consumption has been falling steadily from 1.5 million tonnes to the present level of 0.77 million tonnes (B.U.N. IGWE -- Ref 4..) 1% of this consumption will mean a steel casting requirement for Nigeria equal to about 8,000 tonnes. A realistic assessment of steel castings demand - supply gap will be necessary before any project investment can be viably

formulated. The SCG may re-examine the demand-supply gap.

(9) Production of Forgings

The demand for forging is 50000 tonnes per year. The installed capacity is 4200 tonnes. (SCG report). Is this projection made by the National Committee on Engineering Infrastructure (pre SAP?) still valid for the post-Devaluation period?

No specific figure of the quantity of forging produced yearly has been indicated in the STUDY, except a general mention that local production meets 15% of demand. In other words, if SCG figure is taken as the demand the production should be around 7500 tonnes, which is higher than the installed capacity. A statistical re-investigation of the forging industry is necessary to judge the actual ground situation.

The ten identified forging shops are in the government sector. The captive facilities at Ajaokuta are the largest. "There is a dearth of forging facilities in the country as the captive ones are not meeting the need of the consumers." (ref.). In other words the STUDY has to confirm whether the idle capacity in Government owned forges can be diverted for jobbing work. Ibadade reports that, apart from the widely known local blacksmiths whose industry dates back to ancient times, there are virtually no forge shops, except the one at Ajaokuta steel plant, Delta steel etc.

Demand = Supply Gap: Foundry = Forge Industry

IN CONCLUSION, THE DEMAND - SUPPLY GAP IN RESPECT OF THE SUB-SECTOR HAS TO BE ADEQUATELY JUSTIFIED IN THE STUDY. It is important to know the dimension of the uncovered demand, its volume and physical characteristics in order to formulate investment policies and SMID strategies. An attempt is made to review the demand supply gap, considering the table in SCG Report and 25% utilisation. which appears more likely (midway between 15% SCG, 25% Summary and 47% ARCEDEM figures:

Castings (All types) and Forging(A) Installed capacity

<u>Foundry</u>	<u>Tonnes</u>
Ferrous	50000
Non-ferrous	5500
 <u>Forging</u>	4200
Total	59700
(say)	60,000t.

(B) <u>Production</u> -- (1990) -- Casting : 14000	
-- (1990) -- Forging : 4200	

	18200
say	18000t.

(C) <u>Demand</u>	Castings : -- 135000
	Forgings : -- 50000

	Total 185783
	Say 180000t.

(D) Hence Demand - Supply Gap: (C) -- (B) : 162000 tonnes.

Demand - Capacity Gap: (C) -- (A) : 125000 tonnes.

The above at best can be considered as the guesstimate.

Cost of Bridging Demand - Supply Gap

Fresh investments in creating additional capacity to bridge the Demand - Supply gap, based on guesstimates, will be both unwarranted and uneconomical in view of the large idle capacity already existing in the industries and lack of significant capital goods manufacture. In any case, the investment cost could be in the region of N1200 - 1500 million. This estimate is based on current Indian experience and cost. This an investment of 1.5 billion Naira, to build fresh foundry forge capacity, on an omnibus basis cannot be justified economically for this sub-sector, on a ten year perspective, as it will neither be technically feasible or commercially viable. This review therefore cannot support the investment of 2.8 billion suggested by the SCG report. (see part II)

Stastics Required for IMP/Strategic Management of Industrial Development

Strategic management of Industrial Development of the sub-sector will call for involvement of the public as well as the private sector. The latter's role is vital, in view of the government's declared policy to encourage privatisation and commercialisation. Private sector investment will be forthcoming only when :

- (a) A steady current and future market is assured.
- (b) A viable return on investment is possible.

It is therefore important to test the future Long-term prospects of investment proposals against the touchstone of actual market

demand - supply gap, its quantum, characteristics and linkage with the end-user industries present and future consumption.

THE BROAD ATTRIBUTES OF THE PRODUCTS WHICH HAVE A DEMAND SHOULD BE KNOWN BEFORE ANY INVESTMENT DECISION IS TAKEN, in order to determine the volume of investment which depends on the type of infrastructural input, the process technology and on the selection of machinery and equipment, dictated by product attributes. These attributes, in the case of castings and forgings are, weight, and among others, intricacies of size, shape, accuracy and tolerance level, metal categories and product application.

The STUDY was updated to provide as much information as it is possible to gather through BSM/Field Survey⁶⁷ the nature of market demand, present supply, product mix grouped by attributes, segmental market demand, other sub-sector linkages etc, so that an information base is now available for use by both the policy makers and public sector as well as private sector entrepreneurs.
(see Nigerian Foundry Forge Sub-Sector - ^{Chapter V}~~content~~ No 1V)

II

REVIEW COMMENTS ON :

INDUSTRIAL MASTER PLAN STUDY OF THE FOUNDRY AND FORGE SUB-SECTOR (REFERRED TO AS STUDY) = (PART II)

Part II of this Review examines the technical feasibility and viability of the Investment Proposal suggested by the Strategic Consultative Group for the foundry forge sub-sector.

The object of the fresh investment is presently, to meet the shortfall in supply of forging and castings, which has been projected in the SCG report as follows :

Installed Capacity After Investment

Supply - Demand Gap (source: SCG report)	Tonnes
Castings (all types) :	130,000
Forging :	46,000
	176,000

The poor supply results from a gross underutilisation of the installed capacity which is as follows : (SCG report figures):

	Tonnes
Castings :	39,000
Forging :	4,200
	43,200

With the additional capacity proposed by SCG, the installed capacity can be ultimately :

	capacity (Existing) tonnes	Capacity (Additional) tonnes	Capacity (Total) tonnes
Casting	39,000	90,000	129,000

Forging	4,200	50,000	54,200
	-----	-----	-----
	43,200	140,000	183,200
	-----	-----	-----

Viability of the Proposal

The conclusion emerging from Part I of the Review was that the Demand Projection incorporated in the Study/SCG report and therefore the Supply Demand- Supply Gap is a guestimate, which should be realistically re-assessed. Page 13 of Part I of the Review highlights the necessity of knowing correctly the country's present Production and Future Requirement in order that investment proposals can be formulated on technically feasible and economically viable basis. Without this feature, private sector and indeed even Public sector participation in the investment process may not be forthcoming.

The SCG proposals being related to a guestimate of the country's shortfall in the sub-sector, is therefore open to serious objections in respect of its technical feasibility and commercial viability.

Summary of New Investment Proposed

Foundry (all Castings)

(a) 30 new foundries with capacity of about 3,000 tonnes each may be established during the next 10 years. This will add 90,000 tonnes of new capacity.

(b) Ten new forgingshops each with a capacity of about 5,000 tonnes may be established during the next 10 years. This will add 50,000 tonnes of new capacity in the industry.

(c) 22.3% of the current shortfall is ascribed to non-ferrous casting.

The percentage of the total new capacity proposed, for each of the three major metals are:

<u>Category</u>	<u>Fresh capacity tonnes</u>	<u>Percentage of total new capacity</u>
Cast Iron	30,000	33.3%
Steel	30,000	33.3%
Non-ferrous	30,000	33.3%
	----- 90,000 -----	

There is practically no instance in the developed and developing countries (of capitalist regime) where growth in capacity has been shared equally (in terms of volume) by the three metal categories.

Non-ferrous foundry in advanced countries constitute about 10 to 15% of the total production, which is the modern trend.

In the developing countries, the percent shares varies from 1 to 5%.

The installed capacity, after the proposed expansion can go up from the existing level of 43,200 tonnes to 183,200 in 10 years time, namely, an increase of 324% in ten years. This is an unrealistic and impracticable proposition.

THE TOTAL INVESTMENT RECOMMENDED (PRE-DEVALUATION VALUE)

	<u>Million N</u>
Foundries (all types)	2313
Forges	500
	----- 2813 -----
or Post devaluation (80%) VALUE	= 3516

Viability and Feasibility of the Proposed Investments

The viability etc. of this investment proposed will have to be judged in the following perspectives;

(i) There are probably no instances in the history of foundry - forge development in the capitalist world, where 40 new installations have been established in 10 years., @ 4 each year, at a huge cost of 3.5 billion of national currency.

(ii) It is important to judge the investment proposals in the perspective of the experience in developing countries, in situations similar to Nigeria, and the state of technology development in both the developing and advanced economies. Experience shows, e.g. in India, that given experienced and effecient management,

(a) It would take at least two years from concept to commissioning a capacity (foundry / forge) of about 5000 tonnes per year. Thereafter a gestation period of two more years , which can mean a negative cash flow, becomes necessary, provided there is no delay in receipt of the required funds, and in the availability of trained workers, power and other, infrastructural facilities.

(b) The break-even period varies from five to six years, given a capacity utilisation of 70% and above, depending on the availability of PATTERNS and DIES, and at least a six months full order book during regular operations. Patterns and Dies must be precured in advance of regular operations. This point is stressed because all available reports indicate serious lack of capacity in manufacture of patterns etc. as well as shortage of

pattern makers.

(iii) Choice of Technology is a vital area. The western practice, more attuned to labour saving, automation machine, and large scale of operation, cannot be willy-milly transplanted in a developing country. The Level of Technology suitable for the Nigerian Industry has not been discussed anywhere. The specialisation of product mix has also not been formulated. In the absence of these parametres, how can Investment proposals be realistically determined?.

(iv) Part I of this Review has highlighted how the product mix is an important determinant of Investment. Product-mix grouping will depend on end-user linkage, in terms of :

weight : which can vary from a few grammes to (say) 100 tonnes

metal : Steel, alloy steel (stainless, heat-resistant, corrosion resistant, etc.) C.I. Malleable iron, Ductile iron, brass, bronze, copper etc.

Size, shape, intricacy : automobile castings will have different characteristics than railway rolling stock items. This is only one among hundreds of examples.

The investment proposals do not relate to product-mix and therefore cannot be appraised. At best, they can be considered ad-hoc suggestions.

(v) The optimum Scale of Operation will depend on the choice of technology, selection of infrastrucutre, machinery and equipment, all based on the product mix, and has to be justified by short and long-term market demand prospects. Capacity fixation therefore will depend in the final analysis, on the type of product-mix specialisation. For example, a foundry making

castings for cement machinery spares and equipment will require to make heavy Live Rings weighing around 2T to 10T per piece in steel or grinding rings in Ni-Hard weighing 2T to 3T per pieces. The required melting unit, will have a batch size of say 15 tonnes and thus a 15000 tonnes / 18000 tonnes foundry capacity will be necessary, manufacturing both ingots and castings. An automobile foundry, based on semi mass-production will be viable on a capacity of 9000 tonnes per year, to 12000 tonnes per year in a developing country. Thus an ad-hoc decision of establishing 30 foundries with 3000 tonnes capacity each will not be relevant to end-user needs.

(vi) The following questions arise while examining the proposed investment :

(a) Where will the funds equal to 3.5 billion Naira come from and at what rate ? From the Government, private sector, or through International loan and aid, and will it be available as and when disbursement is required ? If not, the break-even period will get prolonged . Will the private sector accept the uncertain viability situation and come forward to invest ? will international agencies ? This matter is again discussed subsequently.

(b) Assuming, that by some unforeseen strategy, the funds are made available, will it be possible to put up 4 units (each with capacity of 3000 tonnes for foundry and 5,000t for forging), every year, considering that almost 80 - 90% of the equipment will have to be imported ? Does the public / private sector have the managing and technical infrastructure ? The obvious answer is : No. The setting up of the 40 Units in 10 years is

technically not feasible given the ground realities in Nigeria. Indeed the proposal appears impracticable.

(c) By the tenth year, probably only 30 / 40% of the investment, in the most ideal condition of 70 to 75% utilisation, will break-even. The others will be running at a loss. Thus, while by some means the 3.5 billion Naira is assumed to be available, who will fund the subsequent loss ?

(d) Where will the load come from ? only from manufacturer of spare parts? The demand - supply estimate has been shown in Part I, to be a guesstimate, and the future load is therefore a questionable proposition. In fact the load has to be generated by demand for :

Spares as well as original component for new machinery manufacture.

For example, Cement manufacturers in India consume 60 tonnes of steel casting for manufacturing new machinery to produce cement per million tonnes of capacity, while about 170 to 200 tonnes of castings are consumed per million tonnes of cement produced for maintenance. In Nigeria, as machinery manufacturing activity is practically nil now, the load has to arise from Spares, and will not be enough to support the optimal capacity utilisation of 90,000 tonnes of new capacity, when even the present installed capacity of 39,000 tonnes to 55,000 tonnes is utilised only at 15% to 25% capacity.

(e) The growth in original machinery manufacturing by end-users is not known. The product - mix grouping/specialisation has not been projected and is yet uncertain. The capacity

indicated are ad-hoc and cannot be optimal as shown in para (v). Unless the product mix grouping is not identified, the investment suggested, can not be justified as viable or Technically feasible.

Even assuming that new optimal capacity can vary between 2400 - 24,000 tonnes, instead of the flat rate of 3,000 tonnes, depending on specialisation, will there be capacity utilisation to a viable level even after 10/15 years? All these questions again, are based on the fact, that by some miracle a capacity of 140,000 tonnes castings and forging can be commissioned from concept to production / operation in ten years time, distributed in 40 new units, given the existing lack of trained manpower, lack of technology, lack of industrial infrastructure, lack of sufficient load and what is most important, lack of manufacturing facilities for patterns and dies.

(f) Castings and forgings are intermediate products. Assuming that, by some unknown strategy again, 140,000 tonnes of new capacity for casting and forging is optimally used, will the end-users have capacity to : Finish (heat - treat and machines etc.) : castings and forgings for use in
 sub-assemblies and / or
 assemblies.

(g) The minimum world norm for investment to sale ratio is 1 : 1 in this sub-sector and the value of castings and forgings constitute about 7 to 10% of the value of manufactured goods in developing countries like India etc. Considering these parameters, will the Nigerian foundry / forges, after investment of 3.5 billion Naira be able to achieve a sale of at least 3.5

billion Naira? And will the manufacturing industry, in say 10 / 12 years time have a value output ten times this amount, namely 35 billion Naira ?

(vii) In the absence of viable answers to the above comments / questions, the investment proposals of the SCG will merely amount to an exercise in arithmetic, divorced from economic and technical realities. This review is unable to justify the proposals in its present form.

Private Sector Participation

The policy of the Nigerian Government is directed to private sector-led development of the economy. This sector in Nigeria is apparently involved more in TRADE, with its share of approximately 12% of the GDP, instead of MANUFACTURING whose share is less, at about 8%. This is understandable as the private sector will prefer quick returns, and a steady market, even if the margins are low, which are provided by the Trading sector to the uncertainties and headaches of manufacturing even though the latter generates higher margins.

It will not be easy to attract the private sector to change its bias and come forward to invest in the sub-sector since

(a) the viability of the Investment proposals are open to many doubts, as explained earlier.

(b) there are many grey areas in the STUDY and

(c) concrete and acceptable statistics justifying the evidence of an attractive and steady future market have yet to emerge from the STUDY.

SMID/IMP

A suitable strategy for investment emerged through the consultative process which was implemented through the organisation of the Seminar, Buye-Seller meet and Investment Clinic during 17-19th August, 1992. The solutions that emerged from this process are expected to provide a practical, acceptable and feasible basis for the investment and Development strategies in the sub-sector. See the chapter on Nigerian Foundry Forge Sub sector : Diagnostic Survey and Master Plan for strategic Development included in this Report.

III

FIELD SURVEY _____ PLANT VISITS.

1. **DURATION** : 18TH JULY - 4TH AUGUST 1992. covering more than 2500 km, mostly by car.
2. **OBJECTIVE**:
 - (a) To meet key officials of the Ministry of Industry and Technology, in order to appraise them re: the importance of an interactive forum like the Buyer - Seller meets, etc.
 - (b) Visit to key foundry / forge plants, in order to familiarise myself with the Sub-Sector performance and structure, technology level, problems and constraints in respect of productivity and quality related issues.
3. **DETAILS OF - MEETINGS**:
 - 3.1.1 **Dr. A. Owosekun**
Director, Policy Analysis Department
Federal Ministry of Industry and
Technology,
Abuja.

Explained the various contradictions in the Industrial Master Plan Study / SCG Report prepared by PAD, and the necessity of revising the investment strategies proposed in the SCG report, as indicated in my REVIEW COMMENTS. The importance of organising interactive and diagnostic forum like the BUYER SELLER meets and Investment Clinic was also explained. Dr. Owosekun appreciated the REVIEW COMMENTS and also commended the idea of holding the Buyer/Seller meet. He also approved that a field survey to reappraise the Sub-Sector performance may be carried out.

3.1.2

MR. A.O. KAYODE**Assistant Director, Small Scale Industries,
Federal Ministry of Industry and Technology
Abuja.**

Mr. Kayode was invited to attend the Seminar, to explain the role of IDCs for the development of the Sub-sector /Small scale sector. He was informed that besides role as a resource centre for technology information and guidance, the IDCs can develop prototype spares, which are castings / forgings, for import substitution. For this purpose a Foundry should use a 500kg Induction Melting furnace, since otherwise many of the spares and components identified in the PAD Study cannot be made. With such a furnace, the capacity of the Proof (or demonstration) Foundry will be around 1200/1800 tonnes of ordinary and alloy steel / or cast iron / SG iron castings. Spare liquid metal produced (in 3rd shift) should be used for casting pencil ingots for forging / rolling. Mr. Kayode noted down the above suggestions and confirmed his participation in the Seminar.

3.1.3

Met G.O. Amanyi**Assistant Director Small Scale Industries
Federal Ministry of Industry,
Abuja.**

Explained to Mr. Amanyi the concept of Buyer/Seller meet. He agreed to come to the Workshop and speak on the Small Scale sector.

PLANT VISITS

JOS STEEL ROLLING CO. LTD.
P.M.B. 2701
Jos

3.2.1.

Met: Dr. Sanusi A. Mohammed
General Manager / Chief executive.

The basic objective of the visit was :

(a) to see the forging facilities as reported in the SCG
(b) to find out whether pencil ingots can be used in the rolling mill. Ingot of size 4" to 3" x 60" can be cast with the excess metal in steel foundries, using duplex ingot moulds, and then rolled. The capacity of Jos Rolling Mill, established with West Germany collaboration, is 210,000 tonnes (based on 25 mm) per year. Presently billets from Delta Steel Company, as well as through imports, are used. The imported billets cost N9,000 per tonne and the price of rolled product (rounds) vary from N8,500 to N9,500 per tonne.

The Rolling mill sells end-cuttings at N1000 - 1300 per tonne, which is cheaper than India. The company is producing around 8,000 tonnes per year, with about 600 workers. Since pencil ingots can be manufactured at a cost of approximately N6,750 per tonne, it was suggested that Jos should consider the rolling of pencil ingots, produced indigenously, so that the idle capacity is utilised. Such ingots can be supplied by steel foundries having induction

furnances, Dr. Mohammed indicated that a change of layout and modification of the Pusher Furnance will be necessary, which will have to be checked. He agreed to present a paper in Buyer/Seller meet, and confirmed that Jos Rolling Steel has no forging facilities, except the standard blacksmith maintenance purpose. The Study Report will need corrections.

BAMFORDS INTERNATIONAL Nig. Ltd.:
P.O. BOX 673,
Rayfield, Jos.

Met Mr. Anthony Dallison, Production Manager.

This foundry was established, as per Mr. Dallison, at an investment of N80 million, ten years earlier and has not yet been able to utilise more than 5% of its capacity, which is now claimed as 14,000 tonnes per year. The main reason is that NEPA has not given the Power connection the Unit, which was indicated to be 2mw. The adjacent company, m/s NASCO was apparently willing to give this power (2mw) to Bamfords, but NEPA has objected to this. There is no doubt that the company has got substantial facilities, consisting of a mechanised moulding unit with BMM moulding machines (CQ & BQ type), a mechanized sand Plant, Roller conveyer lines, Pouring monorails, teapot ladles, a Shot Blast plant, H.T. Furnance, and Pattern shop facilities. The fresh induction furnaces are apparently old ones transferred from the U.K. their design is outdated. The melting installations include one 500kg and 4 numbers 1,000kg induction melting furnaces, having motor generator sets

with 1,000 C/S frequency, along with one 30 tonne capacity Channel Holding furnace. All refractories are imported. Sand is obtained from Bacitta and scrap is purchased from Local sources at N1,000 per tonne. Graphite, and Bentonite are imported. Cost of imported Bentonite is very high at N400 per tonne. The main products of the company are Corn Grinding Plates (1% chromium) weighing ~~11~~¹⁵2 to 6kg each, 5000 nos/month and grinding media balls of various diameters. The Company has around 400 tonnes per year of captive load and should be able to produce, based on the facilities seen, around 700 to 900 tonnes per month of Gray Iron castings, including grinding media. In fact it desires to specialise in grinding media. However, Bamfords will have to install a proper laboratory for chemical testing, along with a metallurgical microscope in order to manufacture graded castings. Mr. Dallison indicated the demand for Grinding media in Nigeria will be around 20,000 tonnes per year. He agreed that Bamfords will participate and present a paper at the Buyer/Seller meet indicating thier problem. This Foundry can be developed as a suitable source for Grinding media.

PEUGEOT AUTOMOBILE Nig. Ltd.
KADUNA OFFICE: MANUFACTURING PLANT
P.M.B. 2159, KADUNA
TEL: 71132

Met Mr. U.A. Abubakar
1 Officer (Research)
and Jean Rojon
AGM Purchase and

Local Content Delopment

The Company started production in 1979 ~~with a capacity~~ and assembled 43,000 cars in 1982. Capacity 40000 cars/year. It is presently utilising 20% of its capacity due to various reasons of import constraints, market constraints etc. The officers explained that they have tried to indigenise the production of Disc Fly wheels, Brake Drum, Pulley etc / from local foundries like Bamfords, Delta Steel etc. but have not been successful to get consistent quality. They confirmed that they would be prepared to machine castings and forgings like Brake Drums, Gear Case, Clutch Housings, Rocker Arm, Cam Shaft, Steering items etc. and the weight of such Castings and Forgings would be about 100kg per car. On further interrogation, the company agreed that there is an urgent necessity to put up an Automobile foundry/ forge, to produce the entire range of PAN requirement, including Cylinder Blocks and Heads. Regarding, patterns and dies, the UNIDO Consultant suggested that it would help if old but serviceable patterns and dies from their French plants can be supplied to Nigerian foundries to help indigenisation. Mr. Abubakar agreed to submit a paper in the Workshop indicating their requirement of casting/forgings and their indigenisation plan. It was apparent from the discussion, that the indigenisation effort by foundries in Nigeria has been based on lack of technical knowledge re: the methodology and techniques required to produce automotive castings/forgings to international standards.

3.2.4

DELTA STEEL CO. Ltd :
Steel Sector, OVWIAN - ALADIA
P.M.B. 1220, WARRI-NIGERIA

Met : Engr. Ifeanyi B. Okeke
Assistant General Manager (Steel Making)

The foundry/forge units could not be visited as the workers were on strike and were assaulting the staff. However, Mr. Okeke explained that their Foundry/Forge is in operation and have developed castings for Peugeot Automobile Nigeria Ltd. Their Foundry capacity is 6,000tonnes per year of gray iron, non-ferrous steel castings. The installation is modern. He agreed to present a paper in the workshop. From various report received during plat visits, it was evident that DSC is a promising functional unit in the Sub-Sector.

3.2.5.

AJAKUTA STEEL COMPANY LTD.

Met : Mr. M. Iribhogbe
(Manager Foundry)
Mr. P.A. Adamolekun., (Forge Shop)
and Mr. S. Odesola., (Manager PPC)

Located on the west bank of river Niger, it was established in 1979. It is the largest steel plant in Nigeria covering a huge area of 800 hectares. The Engineering Complex, consisting of seven auxillary units of the plant, is now complete, with a modern Foundry, Pattern shop, Forge and Steel fabrication Shops, along with an

Express Laboratory. The last one is under final installation.

The Foundry and Pattern shops are large units as per international standards. The melting facilities noticed were : Two nos 6T capacity Arc Furnance. These were of Russian design, consisting of gliding body, instead of the fixed body and swinging roof, which is the latest technology followed in the capitalist world. The furnances have 12 taps, and the electric power was reported to be around 2,500/3000KW. The metal from these furnances can be held in a 10tonne capacity Holding Furnance, apparently channel type, with 250KW power. Additionally there is an (coreless) Induction furnace with 2 crucibles, of one tonne capacity. Thus the melting capacity is more than the target production (Phase I) of 3,260 tonnes of steel castings, (macimum 5 tonnes piece weight) and 3,500 tonnes of iron castings (maximum 15 tonnes piece weight) and 200 tonnes of non-ferrous castings (maximum piece weight 800kg). The Foundry installation, comprising of Roll-a-draw and BMM type moulding machines, screw type continuous mixers, a mechanised SAND plant, core sand mixers, a SAND Slinger, Heat Treatment furnance, Shot Blast chambers, of latest design. There is no doubt that ASC can make the most complicated castings and forgings, not only for the Steel Plants, but also components/spares for a wide range of industrial machinery sugar, textile, cement, earth-moving and other types of industrial machinery. The

laboratory is provided with spectrometer and Non-Destructive testing, metallurgical and Physical testing facilities, and therefore the international quality standards should be obtained. Production include grinding media, Hadfield steel liners, steel plant components, etc. Similar remarks apply to the Forging Shop which has 2 numbers steam ^{hammers} of 1 tonne and 2 tonne capacity each, and a number of pneumatic hammers, of 400kg and 250kg capacity, along with a wide range of heating furnances, besides crank type and screw type presses and shearing plate bending profile gas cutting 30mm billets are obtained from Delta Steel Co. Ltd and has been froged into different agricultural implements. With the Fabrication and the Machine shops the Ajaokuta Enginering complex is today an operating modern factory, with a capacity to specialise in heavy and medium weight ranges with a capacity, personally assesed at 10000 - 12000 tonnes product of castings and 4000 tonnes per year of forging. The fact that the Foundry is only making about 60 to 100 tonnes of casting per month and the forging shops barely same, shows that there is practically little or no linkage between the Buyers and a most important Seller in the foundry forge Sub-Sector today in Nigeria.

3.2.6.

Nigerian Foundries Limited
1 Adeyemi Bero Cres
Ilupeju Industrial Estate
Lagos.

Met : Juhn Barberopoulos
Managing Director

This foundry is manufacturing a wide range of Sanitary and water supply fittings, including pump components. As the Managing Director was away on a sudden appointment the plant could not be visited. Reports received indicate that the Foundry has possibilities for specialising in Grinding media and pipe castings.

3.2.7

**Nigerian Machine Tools Oshogbo
KM. 8, IKIRUN ROAD
P.M.B. 4343 OSOGBO
OSUN STATE, NIGERIA.**

**Met: MR. I.O. AGBOOLA
MANAGER ENGINEERING OPERATION
AND MANAGING DIRECTOR**

The new Foundry layout was examined. The construction will be over by end of this year. The layout indicated a modern foundry with capacity to make complex castings, and equipped with a modern laboratory. It was suggested that the Foundry should rightaway establish linkages with customers and modify the layout include CO2 process instead of only Furan process. Furan is an imported item.

3.2.8

INDUSTRIAL DEVELOPMENT CENTRE

**Met : MR. GABRIEL
State Coordinator**

Mr. Gabriel said that their foundry is yet to be set up. Zaria IDC has one installation. The investment criterion for various industry sectorisation were obtained from Mr. Gabriel. He agreed to attend the Workshop and also to present a paper on IDC's role in the Industry.

3.2.9

Adebowale Engineering Services
KM. 38, ABEOKUTA MOTOR ROAD,
P.O. BOX 743,
SANGO OTTA

Met: Chitta Sen
Plant Manager

This Foundry is a medium level technology based and has a capacity of 4,500 to 6000 tonnes of high grade Iron castings based on a six tonne Rotary Furnance Mr. Sen agreed to attend the Workshop and also to present a paper. His Foundry can specialise in Power Plant alloy iron castings, grinding media, sanitary / water fittings and export man-hole covers. It was interesting to note a stock of unsold man-hole covers in the plant.

3.2. 10

VOLKSWAGEN NIGERIA LIMITED
KM. 17 BADAGRY HIGHWAY
VOLKSWAGEN ESTATE
OJO, TEL: 880771

Met : Mr. Arthur Madueke
Manager Project Development
and
Rasheed Adegbenro
Manager Public Relations

Volkswagen Nigeria Limited agreed to attend the Buyer/Seller meet and to present a paper on their Casting and Forgings requirement and their indeginisation plan. They are now assembling about 8 to 10 cars a day as against

a capacity for 100 cars per day. Germans hold 51% equity which press reports indicate, is being purchased by a Nigeria industrialist. The cost of the new car is N292,000.

3.2. 11.

**NIGERIA ASSOCIATION OF ENGINEERS
1, ENGINEERING CLOSE VICTORIA ISLAND
LAGOS**

**Met : Mr. Kunle Mokuola
AND The President**

The President and Secretary agreed to attend the Buyer/Seller meet and also to present a paper on investment prospects.

**AFRICAN REGIONAL CENTER FOR
ENGINEERING DESIGN AND
MANUFACTURING IBADAN**

Met Dr. Abdel Rahaman, Executive Director.

ARCEDEM was set up in 1980 to assist member countries (25 at present) for the development of capacity for engineering designs and manufacture of industrial and agricultural machines and equipment.

It has been developing spare parts for machines as well as complete equipment and tackles, so that they can be manufactured by local workshop. Examples are Presses, pallet trucks, tobacco processing units etc. ^{VERS} Reserves engineering is thus an important activity of this Centre. It is also organising courses in specific areas of designs, manufacture and maintenance.

The Centre has excellent machine shop and fabrication facilities, which can manufacture the most modern machinery

and equipment, given the design or proto type.

A forging Press of 2,700 tonnes capacity is been installed and the building and equipment for a foundry and pattern shop are ready. There is no reason, why given the necessary technology, personnel and management support, the Centre cannot commence the manufacture of metal, resin and metal patterns and dies for the Foundry/Forging Sub-sector, as well as organise training of Pattern Makers.

4. CONCLUSION OF PLANT VISITS

4.1. STRATEGIC MANAGEMENT

THE PLANT VISITS WERE AN EYE-OPENER. It will not be correct to say that Nigeria lacks modern facilities for manufacture of medium and heavy industrial machinery, components and spare. The Engineering Complex at the Ajaokuta Steel Company (ASC), combined with the functional casting-forging installations at the Delta Steek Company (DSC) can, and should provide, the country, a capacity of about 12,000 - 15,000 tonnes per year, of medium to large castings/forgings, of the highest quality, that can made with the latest machineries, in steel, malleables and SG iron, as well as in non-ferrous, if required, after marginal revamping. With the installation of the proposed foundry at the Nigeria Machine Tools (NMT) at Osogbo, which has an excellent machine shop, including heavy Planners under installation, Fabrication and H.T. shops, the country will have approximately 15,000-20,000 tonnes manufacturing capacity in the large sector, having modern facilities. This capacity cannot only be utilised to make spares for

Steel Plants, Rolling Mills, but also for Sugar, Cement, Paper, Textile machineries, Power Plants, Railway and defence and of course for machine tools, Hammers, including plastic and agro-based product processing presses. The layout is not suitable however for mass production do auto items in ASC, DSC and NMT. Currently, the utilisation of installed capacity is barely 10 per cent. Discussions indicate that there is little possibility of improvement in capacity utilisation. The most important factor lacking is Strategic Management.

4.2

INTER INDUSTRY LINKAGE

The major catalyst to trigger optimum utilisation of installed capacity is the LINKAGE between the producers and end-user industries, which prima-facie, require strengthening.

Since the plants visits had necessarily to be kept short, the reasons for the lack of orders, could not be fully studied. What emerged was :

- (a) Inadequate interaction between producers and the end-user industries, particularly in the matter of reverse engineering for development of machinery and spare parts.
- (b) Addition to the culture of import. This can be tackled by an interventionist government policy, supporting indigenous manufacture, wherever quality level is achieved, in preference to imports.

4.3

STRUCTURAL IMBALANCE

There is an imbalance in the structure of the Sub-Sector. The large scale plants, which will be about 3 in number, (DSC,ASC,NMT after NMT foundry goes into operation), represent the modern level of machinery, equipment and technology, appropriate for third world countries, with large unemployed people. This capacity is in the Public Sector. It is for consideration whether the Engineering Complex of the steel plants, which are under the Ministry of Power and Mines, should be privatised in order to provide the necessary profit motivation to accelerate the marketing linkage with end-users industries. Without this, capacity utilisation can not be increased. The TCPC, set up by the Government, may consider the matter,

In the middle category of technology, there are less than 10 foundries/forge in the medium scale, like BAMFORDS, ADEBOWALE, NIGERIAN FOUNDRIES, DEFENCE INDUSTRY COMPANY, ADDIS ENGINEERING, JIMEX etc. Only 2 can be visited. From these visits, and reports available, it can be indicated that so far as castings are concerned, the medium scale foundries can be developed into specialised resources for steel and iron castings of acceptable qualities, for the following end-users: power generation and transmission, textiles, rolling mills, sugar, coal and ore mining, construction and earth moving, cement including grinding

media, pipes and pipe fittings, sanitary/municipal castings and light/medium industrial machinery components and spares.

With the addition of cupolas, holding furnaces etc, and centrifugal machines, cast iron pipes can be introduced in these category of foundries. This is only one example of the potential for development of foundry/forge units in the medium level of technology into specialised resources linked to one or more end-user industries.

Only a few small / scale or road-side units could be visited. From reports, it is gathered that there are large number of such units in the Sub-Sector (about 70% in terms of number), which are basically primitive installations, capable of providing items of ungraded quality, requiring low-level know-how and equipment.

The imbalanced structure is typical of third world scenerio.

4.4

GENERAL CONCLUSIONS

The other conclusions that emerged from the plant visits were:

(1) There appears to be inadequate knowledge of the type of foundry/forge layout etc necessary for manufacture to international standards, as for example castings/forgings required for the automobile industry.

(2) ARCEDEM has facilities for manufacture of metal dies, metal and wood patterns, etc, given the required technology support. Pattern shops were also seen in the plants

visited. In fact the Pattern Shop at Ajaokuta Steel Company (ASC) is massive by any standard, though for unknown reason, only wood patterns are projected. This plant can be revamped easily to make metal patterns also. All the plants visited do their own training for pattern makers. A detailed study may be made of the pattern and die making capacity in the country, and the training facilities available, so that a development strategy can be evolved. Pattern and dies constitute the core technology area of the Sub-Sector, and must be given due importance at this stage itself.

(3) The management personnel operating various plants particularly in the public sector, will require more exposure to the practical aspect of manufacturing.

Summarising, unless the inter-industry linkage at macro and micro levels is strengthened, and proper government policy support introduced, further creation of fresh capacity might only add to the existing idle capacity in the Sub-Sector.

4.5 RECOMMENDATION

As an immediate measure, a forum should be created, where civil servants, producers, end-users, and suppliers can interact and established the required linkage.

It was therefore decided to concentrate on the BUYER-SELLER Meet Seminar on 18th August 1992 Further, a diagnostic forum, to discuss the direction of investment strategies, which will be linked in terms of specialisation, to one or more industries,

will be essential. This ^{was} ~~can be~~ organised as INVESTMENT CLINICS
on 19/2/92.

IV. ORGANISATION OF THE SEMINAR

Seminar Objectives

The preliminary work carried out (see Introduction) established the fact that while previous seminar papers and IMP/PAD studies described at length the various policy issues, constraints and problems being faced by the sub-sector, they missed diagnosing the real threat to the sub-sector. This is the lack of viability due to widespread incidence of idle capacity. While such problems are not uncommon in industries around the world, what is unique to Nigeria is the fact that companies having installed capacity to manufacture spares to international standards, were going idle due to lack of orders. The objective of the Seminar was therefore quite clear:

Provide Interactive Forum (BSM/IC)

The Seminar had to provide an interactive forum where manufacturers (Sellers) and end-user industries (Buyers) could get together and interact^{on} such issues as : Communication gap regarding producer potentials and end-users requirements; reasons for importation; failure in quality and delivery by local suppliers, etc. The presence of civil servants, suppliers, and research persons make such interactions more effective, particularly in the area of infrastructural and policy formulation. The IC was targetted to provide a diagnostic forum where micro-level funding and investment strategies, specifically related to the areas, which are heavily import-dependent, could be worked out on a viable basis. The presence of development bankers were considered necessary.

Seminar Format

Having fixed the objectives of the Seminar, the next step was to finalise the format. We deviated from the routine format which was being hitherto followed for all ITAP seminars. A substantial innovation, for the first time:

Innovative Seminar Format including BSM/IC

General lectures by PAD officials and university professors/consultants kept at minimum. In order to provide continuity, some of the previous PAD seminar's papers relevant to the Overview understanding of the sub-sector were included for presentation on the first day only. The focus was on BSM/IC.

Private Sector Participation

The private sector as well as public sector producers as well as end-user industries were invited in large numbers, and the seminar invitees were professionals in the sub-sector or in allied industries, civil servants, academics, PAD/IDC officials, etc. Importance was given to the participation of office bearers of M.A.N. and the Nigerian Association of Small Scale industries. The participation of the private sector was in keeping with the present government policy of encouraging a private sector-led growth.

Preparatory Steps

Having fixed the Seminar objective and format, the following preparatory steps were followed:

a) Budget

As there was shortage of fund at the PAD, due to which invitation letters could not be posted in time, it was decided to

present a budget for covering postage and stationery, overhead projector, folders and other seminar supplies, local travels, etc. to UNIDO at Lagos for assistance for funding. The undersigned along with senior counterpart staff paid a number of visit to UNIDO office at Lagos explaining the importance of the BSM/IC methodology for the ITAP, so that^a fax was sent to UNIDO, Vienna for fund. A prompt reply was received on 27th July. This reply quoted below is ample evidence of keen interest taken by the UNIDO at Vienna in supporting interactive consultative process involved in IMP/SMID for the development of Nigeria

TELEX

VIENNA (UNIDO/DL) 27 JULY 15H

920727/1625 NR. 4317

FOR TOMMY INFO KWANASHIE/UNDP LAGOS PH MUELLER DP/NIR/94/020 ITAP REYR FAX330 OF 20 JULY AAA PROPOSALS RELATED TO FOUNDRY AND FORGE SUB-SECTOR HIGHLY APPRECIATED, WHICH JUSTIFY IMPORTANCE THAT SUB-SECTOR FOR NIGERIAN IND. DEV. AND IMPLEMENTAION THOSE ACTIVITIES FOR US DLS 20,000 AUTHORISED LOCAL EXPENDITURES.

The overhead projector was purchased along with cassettes, which allowed presentation of graphs and figure during the lectures as well as tape recording of the entire deliberations.

Target Audience

It was necessary to target the audience as explained earlier (p.50). Lists of sub-sector related actors were obtained from M.A.N.; NASSI; feedback fo the Field Survey; and PAD records, (see Annexure List of invitees). The standard invitation letters which were being issued so far were used only for inviting Federal and State Government civil servants. New format of the

invitation letters were drafted for the following categories:

(a) producers; (b) end-users; (c) bankers and (d) suppliers and traders related to the sub-sector. Samples of these letters are given in Annexure 5.....

Advertisement

UNIDO had agreed to fund media advertisement. A sample of press advertisement format is enclosed in Annexure 6..... Due to lack of Newspaper space this advertisement could not be published.

Seminar Logistics and Monitoring

During the plant visits, the UNIDO Consultant along with the counterpart staff, had visited 15 key companies, both manufacturers and end-users, like PAN, VN, WAPCO, NFL, BAMFORDS, AES, etc. and had explained the importance of participation at the BSM/IC. This ensured high level of participation from the industry. Additionally, special couriers were sent just before the seminar, to various public/private sector companies to ensure that they present their exposé at the BSM/IC regarding their actual requirement for castings and forgings, as well as problems and constraints. On the 5th August, UNIDO Consultant put up a suggestion, to the ITAP Coordinator regarding setting up a committee, to meet *daily*, consisting of officers with specific allocation of duties, in respect of transport arrangement; lecture hall arrangement; catering; registration; folders; and lecture copies etc. This letter was also discussed with the Director of PAD who assured maximum possible assistance from PAD Abuja office. These daily coordinating meetings were chaired by the

UNIDO Consultant, and proved to be very effective monitoring mechanism.

Seminar Duration and Programme

The Seminar was held for three days as per programme given in Annexure 9.... A printed booklet was issued, the "Introduction" of which was drafted by the UNIDO Consultant and approved by ITAP Coordinator. This booklet is annexed herewith (Annexure..9A..)

Proceedings of the Seminar, BSM and IC

The list of delegates, participants is attached in Annexure ..8.... The largest participation was the manufacturers and end-user industries as well as from NNPC, NEPA, FIIRO, IDC, Federal and State Government Ministries. The BSM and IC achieved outstanding success in fulfilling the objectives of the Seminar. So much so, the President of the Nigerian Foundry Association declared in the BSM that the Nigerian foundry industry should have earlier thought of such a BSM and thanked UNIDO for showing the way.

The dicussion though at times heated were extremely informative and helpful both to the producers and the buyers, providng information not only on sources from where orders could be obtained but also on local sources which can be used for import substitution. For example, three foundries (NFL, AES, ASC) committed to supply the entire requirements of Grinding Media for the Nigerian cement companies, matching cost and quality.

A linkage based investment proposal spelt out the need for specific micro-level investments, linked to high technology/high grade areas, and specific product diversification and product specialisation areas. A paper on Macro Economic Policy Environment was presented at the IC and various policies were fully discussed.

Group Formation and Recommendation

At the end of the third and last day, two groups were formed as indicated in Annexure .11... consisting of almost equal number of participants, to deliberate and report as follows:

Group I

To assess the existing installed capacity and production, the capacity demand and the demand-supply gap, relevant to the sub-sector. Accordingly, to comment on and finalise the investment proposal presented at the IC on a technically feasible and commercially viable basis.

Group II

To assess the current policy and infrastructural support for the sub-sector and arrive at a consensus policy package. The Conveners of the two groups were drafted from private sectors. The reports presented by them, including consensus recommendations, have been incorporated in the updated sub-sector STUDY report described hereunder.

Achievement of the Seminar

The benefit of the BSM/IC emerges out of the participants' Response Poll (see Annexure .14.) All participants, almost in one voice, appreciated the innovative interaction and were particularly happy and grateful to the organisers of the

seminar. PAD is now actively considering with UNIDO, Vienna's approval, using the innovative model of BSM/IC for the sub-sectors.

A Diagnostic Survey and A Master Plan for
Strategic Development

The Seminar made it possible to update the IMP/PAD Study, with the help of feed-back obtained from the preliminary work, in the form of the paper, with the title as given in the sub-heading, which is included in Chapter 5 of this Report.

This document will prove useful in the hands of civil servants and policy makers; industrialists, prospective entrepreneurs and industrial researchers; for the formulation of development and investment strategies for the growth of Nigerian manufacturing sector.

P. K. SANDELL

B. Tech (Hons), F.I.B.F (U.K)

MANAGING DIRECTOR

JOSNA CASTING CENTER ORISSA (P) LTD. INDIA
CALCUTTA, INDIA, Tel: 789934

5th September, 1992

Dr. A. A. Owosekun,
Director,
Policy Analysis Department,
Federal Ministry of Industries & Technology,
P.M.B. 5 U.I. Post Office,
Ibadan.

Dear Dr. Owosekun,

Reference my discussions with you on 1st September, 1992, at Abuja. I attach herewith a report written by me on the "THE NIGERIAN FOUNDRY FORGE SUB-SECTOR: A DIAGNOSTIC SURVEY AND A MASTER PLAN FOR STRATEGIC DEVELOPMENT", which updates all the IMP/PAD Study done so far on this Sub-sector.

This Report may be considered as a PAD document, which can provide a model for further ITAP programmes as well as IMP second-phase studies. This assumes, of course, the extension of ITAP. I have already recommended that this report may be included in the training manual.

Your presentation on the Nigerian Economy at the Abuja seminar on 1st September, 1992 was brilliant.

With my best regards.

Yours sincerely,



P.K. Sandell

cc: Dr. M. Kwanashie

CHAPTER

V

THE NIGERIAN FOUNDRY - FORGE SUB-SECTOR

A DIAGNOSTIC SURVEY AND A MASTER PLAN FOR

STRATEGIC DEVELOPMENT

(iii)

ABSTRACT

The Nigerian Foundry-Forge sub-sector can be categorised into three groups on the basis of sophistication of equipment, machinery and technology. At the topmost level are the public-sector factories, while the small scale or informal sector occupies the lowest position. In between are mostly private sector units, working ~~at~~^{on} medium level technology. The most important problem facing the sub-sector is the widespread incidence of idle capacity due to lack of orders. Underutilisation has resulted in the cost of indigenous products exceeding that of imported ones. Hence, import-substitution, a main SAP objective, has lagged behind. A linkage based development and investment strategy has been presented in this Report, which prescribes a comprehensive Action Plan. The investment involved in this Plan has been worked out on the basis of commercial viability. Its implementation is targetted to eliminate idle capacity in the sub-sector, reduce imports, and establish a foundation for the growth of the manufacturing and agricultural sectors in Nigeria.

1. INTRODUCTION

1.1. The Report is the outcome of Desk Research and Plant Visits followed by an intense interactive exercise. Two groups were formed among the participants attending the ITAP Workshop, Buyer-Seller Meet and Investment Clinic held between 17th to 19th, August, 1992 at PAD, Ibadan. Their mandate was to deliberate and formulate consensus recommendations and action plans in respect of the two major facets of the Foundry-Forge Sub-Sector in Nigeria namely ;

First Working Group (FWG): Investment, Demand, Production and Import, Demand-Supply Gap.

Second Working Group (SWG): Infrastructure Requirement and Policy Package.

These groups consisted of (i) civil servants, including research persons and academics (ii) end-user industries (iii) manufacturers (iv) PAD officials and consultants. The Convenors were drawn from the managerial level of private sector industries.

1.2. The two papers presented by the UNIDO Consultant in the Investment Clinic (IC) entitled: "A Blue Print for Inter and Intra Industry Linkage for the Nigerian Foundry and Forge Industries", and "Modernisation / Technology Upgradation Schemes Appropriate for Nigeria", along with the IMP Report, the SCG Report, the UNIDO Consultant's Review Comments, and the viewpoints presented by the manufacturers and sellers at the BSM/IC formed the background material for the Working Groups.

1.3. This Report thus incorporates (a) the gist of the interaction in the BSM/IC; (b) the report of the two Working

Groups and the main recommendations presented in the IC papers, which were accepted, with certain modifications, by the concerned Working Groups. The linkage based growth models and investment strategies presented in this paper thus contains a set of feasible, viable and consensus proposals, for the development of the foundry-forge industries, that has emerged out of an intense interaction within and outside the sub-sector.

2. SUB-SECTOR CATEGORISATION

2.1 A structural cluster analysis of the Nigerian foundry - forge sub-sector revealed the existence of three broad groups or categories of installations. This is shown in fig. 1.

2.2 Top Level Units

With the large and modern casting and forging facilities at the Ajaokuta Steel Company (ASC) and the Delta Steel Company (DSC) going on steam, the country has developed capacity to produce the most complicated castings and forgings to international standards. After the commissioning of the foundry, now under construction, at the Nigeria Machine Tools (NMT) at Osogbo, there would be in 1993, about 12,000 to 15,000 tonnes of installed capacity for ordinary and alloy steel castings/forgings; and grey, malleable, SG iron, and non-ferrous castings, which can be produced to the required end-users' standards, provided the appropriate know-how and show-how are available. The fact that this entire capacity is in the public sector has an important bearing on its performance, as will be shown later

This group of three public sector foundries occupy the top position in the sub-sector, on the basis of sophistication of

technology, plants and machinery. This position is below the state-of-art of world technology, but is more or less equivalent to the high 1970-75 level of world technology.

2.3. Lowest Category

At the bottom of the sub-sector is the so called Small Scale or Informal Sector (IFS), which reportedly is the largest in terms of numbers, comprising about 60% of the total population. These units are in the small scale, cottage or "tiny sector" (as it is now called in India), and have primitive installations, capable of producing only low grade products. On a rough scale of sophistication, these group of foundries lie at the bottom as indicated in Fig. 1. The level of technology is pre-1950

2.4 Medium Level Units

In between the above two groups is the major category of plants, which are mostly in the private sector and which possess a medium level of plant and technology sophistication. In terms of individual capacity, these foundries are in the medium scale sector. The total installed capacity in this group, roughly comprising about 10-15 foundries, fall between 25000 to 30000 tonnes per year.

3. PERFORMANCE

3.1 Group I Foundries

Both ASC and DSC have started manufacturing castings and forgings. It was reported at the BSM that these companies are supplying to the automobile and mining industries; and municipal corporations, in grey and alloy and ordinary/alloy steel. The capacity utilisation was reported to be less than ten per cent. The main problem is the lack of orders, a major reason for which was reported to be the absence of a vigorous marketing strategy, lack of in-depth interaction with the end-users and the absence of a commercial culture in the organisations. A linkage based development model for this group is presented in Fig. 4 (p!03.)

3.2 Group II Foundries

Two major units in this category, namely, the Nigerian Foundries Limited (NFL) and Adebowale, presented comprehensive details about their supplies to the cement, municipal, water supply sectors. Foundries in this group operate in a commercial environment. The incidence of idle capacity, which was rather glaring in Group I, is not that overwhelming. However, for the sake of sustained viability there should be more in-dept utilisation and hence these foundries should be encouraged to specialise and diversify. For this purpose it will be necessary to install, wherever appropriate the latest plants and machinery and adopt new techniques, with or without revamping so that these companies can upgrade their product-base. Of particular importance, is the installation of quality control laboratories and improving the quality systems which are weak. The linkage

model Fig.5. (p.104), shows a major role for this group of foundries, in servicing the growth of the end-user industries which span the entire manufacturing sector of the Nigerian economy. The development of this group has been predicted along specialised lines, linked to one or more industries. Of interest, is the potential, that exist within this group, for export of ungraded castings.

3.3 Group III Foundries

The consensus opinion of the FWG was that the capacity of the IFS, or small scale sector, will be difficult to assess and therefore any quantification at this stage will not be justified. The presence of an unorganised sector, growing willy-nilly is a common feature of the third world. Fawole's paper (ref/7..) is an interesting expose'. The ability to produce cast iron and non-ferrous components from a home-made 25 kg crucible and the breakdown study of 15 agricultural field machines, constitute sufficient evidence of the innovative role and capacity for improvisation of this sector. Such an ability is necessary for (a) rural employment generation, (b) reverse engineering and product development in lower grade areas of spares/components. A linkage model for this group has been suggested in Fig.6. (p.105.)

4. MAJOR RECOMMENDATION OF THE FWG

4.1 Overall Demand

The FWG assessed the current demand to be around 50,000 tonnes per year for all types of castings and 5,000 tonnes for forgings. The demand-supply gap was estimated at about 50 per cent of requirements. The ultimate demand was predicted to rise

to 100,000 tonnes annually.

4.2 The Group was convinced that the requirement for castings and forgings from the agricultural and manufacturing industries was quite high, and can be supplied by developing local foundry and forges, be it in the large, medium or small scale sector. The manufacturers should target their supplies to meet specific requirements of particular end-users.

4.3 Demand from Cement, Sugar and Paper Industries

Notable features of this demand is the low annual tonnage, less than 25-30 tonnes per year of brass, bronze, C.I. and steel castings required for maintaining a sugar mill with a capacity of 200 tonnes per day (savannah) and about 60-70 tonnes for all types of castings for the Nigerian Paper Mill at Jebba, which is one of the largest in West Africa. The demand for grinding media, the most important item of consumption by Cement companies was placed at 3000 tonnes per year. It is evident that just maintenance items cannot constitute a sufficient source of load for the foundry/forge industries. This point has been discussed later in detail (7.5). It is not necessary to set-up new foundries to supply only spares to sugar, cement and paper mills as their current demand is not large enough. Existing foundries could supply their requirement by bringing in the know-how or developing spare parts by reverse engineering and mutual cooperation between the Buyer and the Seller.

4.4 Demand from Railways

Due to its low profile in Nigeria the demand from the Railway Corporation currently appears to be limited to low grade

items as cast-iron brake shoe etc. which are being manufactured locally. The fortunes of the railways have apparently taken a nose dive. The Corporation is being reorganised under direction from TCPC, into three separate companies; so that there is hope for future growth. The foundry/forge cannot look for the type of heavy castings and forgings that are required by an active and large railway industry, as in India. Indian Railways, in fact, is one of the largest source of orders for steel castings, forgings and iron castings in India. Nigerian foundries will have to wait for the manufacture of railway bogies, wagons, coaches, and locomotives, in order to secure similar load.

4.5 Supply, Demand - Supply Gap

The FWG assessed the installed capacity of the sub-sector at 50,000 tonnes for castings of all types, and 5,000 tonnes for forgings. This figure matches that given in the Executive Summary of the IMP Study. However, the FWG did not finalise the estimate of industry-wide capacity utilisation. This varied widely; from 5% (Bamford) and 10% (ASC) to about 55% (NFL). From the assessment made by the author, during his plant visits, and discussions with suppliers and users at the BSM/IC, it appears that actual capacity utilisation in the Nigerian foundry industry will be about 20-25%, and to a similar extent in the forges. In other words, local production would be around 12,000-14,000 tonnes for all types of castings. Import, both visible and invisible, would be around that figure. So that it appears that only around 50-60% of the current demand is being met as suggested by the FWG. The position with respect to the forging

industry is worse. The total shortfall in supply is one of the causes for the underutilisation of the entire Nigerian manufacturing sector which is operating at about 35-40% of its capacity.

4.6 Quality

Both the Buyers and the Sellers in the sub-sector agreed that the castings/forgings in many cases failed to satisfy metallurgical specifications or meet delivery and other quality requirements, and accepted the need for intensive improvement. In fact, it was agreed that imports of high technology items must be allowed freely.

4.7 Lack of Orders

The FWG reported that the main reasons for the lack of orders is the poor patronage by the Nigerian end-use industries. It was strongly felt that, once locally manufactured products meet end-users quality standards, their use should be made mandatory. Tariff concessions, government incentive and support systems, were recommended for procuring items like raw materials, consummables, machinery and instrumentation. Intensive use of BSM technique was advocated to narrow down the information gap that currently exists between information in respect of what is needed and what is being produced in the sub-sector.

4.8 DEVELOPMENT AND INVESTMENT STRATEGIES

The development model and the "Blue Print for Linkage Based Investment" suggested by the UNIDO Consultant for the growth of the sub-sector (Fig.2), was accepted as a technically feasible and economically viable model. The FWG considered that a multi-faceted investment strategy is necessary for growth,

which should encompass all procurement, start-up and working capital, funded by the private sector as well as by the government. The "Blue Print", was approved in principle with certain adjustment namely, reduction in the provision against mini steel, plants, and in the new forging shop; increase in the provision for the automobile foundry/forge complex and elimination of provision for a non-ferrous forging and extrusion facility. These modifications have been incorporated in the Investment profile recommended in this paper (Table III).

4.9 In the following sections, the linkage-based development strategies (Fig. 4, 5, 6, and 7) which will restructure the sub-sector, providing it with both technical and commercial muscle to meet SAP objectives, have been described (P...)

5. ACTION PLAN

5.1 The aim of such strategies is to reduce, indeed, if possible, to eliminate idle capacity which is widespread across the entire span of the sub-sector, in spite of the fact that there is a potential for manufacturing, medium to heavy spares in the Group I foundries, and light to medium spares in the Group II foundries. While idle capacity persists, the end-users continue to import their components. Unless this pernicious situation is rectified, the industry, cannot be viable. Lack of viability will not attract private sector investment; and further government investment, when many of the existing public sector companies are running at a loss, cannot be justified.

While it is appreciated that an interventionist government policy is necessary to protect local manufacturers, the solution

is not that simplistic. The following vital issues will have to be addressed first:

5.2 Upgradation, revamping and modernisation of the existing units will be necessary to ensure delivery of products of the right quality in the right time. Is the private sector ready to fund this exercise from its own cash generation? If not, does the government have the wherewithal to provide the funds?

5.3 The adoption of a vigorous marketing strategy will be necessary to establish a strong Buyer-Seller linkage based operation. The largest Buyers are Federal, States and Local government and their parastatals. They have to be motivated to source locally. In this context it should be noted that the majority ownership of PAN, a large consumer, is Nigerian.

5.4 The introduction of a commercial culture is essential in the public sector, as advocated by its officers in the BSM. The representative of ASC and the Railway Corporation described the privatisation and corporate restructuring of their companies. For example the Refractories Shop of ASC is being separated out and is being formed into a separate company with private sector participation. The Engineering Complex of ASC can similarly be separated out and converted into a joint sector operation.

5.5 The steps advocated above should result in increased capacity utilisation and help to reduce the cost of indigenously produced castings and forgings. Local manufacturers could then compete favourably, both in terms of cost and quality, with imports. Consumers then will find it economical to shift from foreign to domestic suppliers. This import-substitution process is

therefore basically dependent on manufacturing quality and efficiency, and not just for official policies.

5.6 Import substitution is a vital objective, both within and outside the industry. The immediate priority should be in the areas of raw materials and binders, and intermediate products like billets / ingots for the foundry - forge shops. Simultaneously, the production of castings and forgings consumed by the end-user industries will have to be indigenised.

5.7 Summarising, since they are interlinked, both capacity utilisation (increasing production) and indiginisation (import - substitution) should form the bedrock of any linkage-based development MASTER PLAN, whose immediate object will be to secure more volume of orders for the foundry-forges.

The Action Plan should ultimately:

- (a) Diversify the product base of the sub-sector to provide a basis for the growth of the machine building and capital goods industry in Nigeria, as well as for export of engineering items.
- (b) set up new capacity for high-technology, high grade production of castings and forgings.

Before elaborating the LINKAGE MODELS, let us examine the Import scenario both inter and intra industry wise.

6. SUB-SECTOR IMPORTS

Not only the sub-sector units but also the end-users are heavily import-dependent. Many critical raw materials and consummables are being imported e.g. dextrine, bentonite, refractories, coke, plumbago, ferro-alloys, pig iron, crucible,

billets, dies, patterns and tackles, foundry/forging furnaces, plant, and machinery. An amusing situation arose during the BSM, when a manufacturer importing molasses was told that plenty of molasses was available as a by-product with the Nigerian sugar companies, a fact which he admitted he did not know. The position of indigenisation, product-wise, that emerged from the BSM interaction is mentioned below:

6.1 Refractories

ASC reported that its refractory manufacturing facilities, would start production by end of this year. This is a welcome development. A pilot project for developing local sources of refractories has been taken up at NMDC at Jos.

6.2 Ferro alloys and coke

The manufacture of ferro - alloys require considerable investment and will not be a viable proposition at the low scale of operation appropriate for the country's requirement. Hence, the sub-sector will have to wait further growth of the largest consumer, i.e., the Nigerian iron and steel industries, both in the intergrated as well as in the "mini" areas. Only such growth can provide the incentive for the indigenous production of various types of refractories and ferro alloys. The position of coke is similar to the Indian scenario, where coking type of coal is in short supply. Indian foundries use bee-hive coke, at higher coke ratio than possible with B.P. coke, with or without carburizer. Nigerian counterparts may emulate the Indian practice.

6.3 Pig-Iron

Indigenously produced pig-iron is expected to be available from ASC by the beginning of 1993, as reported in the BSM. A realistic assessment, made during the visit of the author to ASC, on 27th July, 1992, showed that this may be delayed to the last quarter of 1993. Government should therefore encourage import of pig-iron. without which small and medium scale foundries will not be able to survive, either at zero or low import duties. If, for any reason any further delay is envisaged in the supply of pig-iron from ASC, it would be in the interest of long term cost-benefit to the nation, to set up alternative routes for manufacture. One such route is the KORF process. Plants, in both Brazil and India, are now manufacturing pig iron, in smaller scale say, around 50,000 tonnes per year, by this process.

6.4 Plant / Machinery

Because of low volume of demand for foundry/forge plant and machinery, their local manufacture might prove costly, except in the case of simple machineries like mixers, cupolas, crucibles, presses etc., which are already being made indigenously. The major casting / forging machinery might have to be imported for the next ten years. ARCEDEM, IDC, and the IFS should develop and market the simpler machinery, demand for which is likely to grow. Die-casting machines are specially recommended.

6.5 Other Raw Materials and Consumables

There is no reason why binders like Bentonite, Dextine, Core oils, etc. cannot be developed locally. In developing countries, like India and Korea, the private sector units have played a

major role in testing and developing such raw materials. Development work cannot be left to government institutions alone, since bureaucratic procedures may delay matters. Infact, with a dominant petroleum industry, Nigerian foundry and forge suppliers should be able to locally produce phenol-based binders, in order to be able to adopt the latest core and mould making processes.

7. IMPORT BY THE END-USER INDUSTRIES

The end-users gave comprehensive details of their import in the BSM / IC. The general reasons for import were mentioned as follows:

7.1 While simple ungraded supplies were available from local units, end-users are unable to obtain from local sources their castings/ forgings, which require special properties, like corrosion resistance, heat and wear resistance, high strength (see 4.6).

7.2 In the case of public sector undertakings there is a delay in submitting quotations or responding to customers' enquiries. Instances were mentioned where responses to enquiries took more than 9/10 months. Hence, sourcing is done abroad.

7.3 Critical Areas of Import by Sugar and Paper Industries

7.3.1 Representatives from the sugar and paper industries reported that they had been forced to import phosphor bronze bearings and worm wheels, since local suppliers do not meet metal specifications. Apparently, these foundries would supply brass instead of phosphor bronze, possibly because of lack of chemical testing facilities. Thus while local supply, in one case, cost about

30,000 Naira, which was cheaper than the imported one, it had to be summarily rejected, and importation was done at a cost of 300,000 Naira.

7.3.2 The paper companies similarly complained about quality problems even in simple cast iron castings like pump housings, bearing housing, covers, wear plates etc. and in phosphor bronze, impellers, wear rings, bearing sleeves. The lack of quality is due to lack of proper know-how and testing facilities. The sugar companies are importing corrosion resistance components, like Mill Rolls etc., from U.K, either as complete or re-built units.

7.3.3 It appeared that neither the end-users nor casters were fully aware of the chemical composition for even such parts as bearings, which are one of the simplest items to make in a foundry. This is an example which clearly spells out the need for setting up testing facilities and encourage reverse engineering, which has been dealt with in detail later (see p 91--)

The onus lies with the manufacturer, as government can do very little in this area.

7.3.4 The BSM interaction revealed that the end-users do not have enough information regarding the capability of the foundries and forges in Nigeria. The reverse was also true. (see 4.7) A case in point is the "grinding media" (cast balls) consumed by the cement, power, ore mining etc. industries. (see below). Another example was the lack of knowledge regarding the capacity available at Ajaokuta. The BSM proved to an effective forum to narrow down this information gap.

7.4 Grinding Media

The President of the NFA claimed that the existing foundries can fully meet the entire requirement of the country for grinding media. The Nigerian demand has been estimated between 3,000 - 4,000 tonnes per year for the cement mills. This could be fully met by AES, NFL, BAMFORDS, and ASC. Yet it was reported in the BSM that, except WAPCO, other cement manufacturers are still importing grinding media. Nigerian Foundries Limited confirmed their capacity to meet competition from imports, in terms of both quality and prices, which was reported to be 18 naira per kg. If the private sector adopts this sort of positive approach, government should afford the necessary protection.

7.5 ISSUES INVOLVED IN IMPORT SUBSTITUTION

The requirements of maintenance castings in all grades namely, non-ferrous (mostly bronze and brass), grey iron and steel, from industries like paper, sugar and cement, do not appear to exceed 1,000 tonnes a year. (see 4.3) But such castings are required to meet stringent service conditions, which the local suppliers are apparently unable to meet. (see 4.6). As disruption in production cannot be allowed, the end-users are forced to import. Since cost of such imports have risen drastically, the users now find no alternative but to set up their own foundries, though the scale of operation may not be remunerative. An example is the proposed foundry and forge shop been set up by Savannah Sugar Company Limited, Human. IF the

local suppliers can upgrade the quality of their supply, end-users need not take the trouble of putting up their own captive units.

7.6 Machine Building

As and when cement, sugar etc. industries take up backward linkage activity, they will require castings for machine building. Such castings are sugar Mill Housings, (one tonne to 10 tonnes piece weight), heavy Drying Cylinders etc. for paper mill, and gears, and Support Rollers (1 tonne to 10 tonnes) for cement plants. Their manufacture will require pit moulding or sweep moulding facilities, which will ultimately have to be installed within the ASC and NMT layout.

7.7. IMPORT BY THE AUTOMOBILE INDUSTRIES

The largest demand in Nigeria for castings and forgings, mostly in high grade, arises from the automobile sector. One of the largest assembler of passenger cars, Messrs Peugeot Automobile Nigeria (PAN), presented excellent data in respect of their current (1992) and future requirements, which can be taken as representative for the whole sector. The summary of their demand is given in the next paragraph.

7.7.1. PEUGEOT (PAN) :

- a) Capacity is 60,000 nos per year of cars and other types of vehicles.
- b) Present production is 10,000 to 12,000 cars per year, due to import and market constraints.
- c) future demand is unlikely to fall below 10,000 to 12,000 cars per year
- d) Total demand of casting and forgings are summarised in the Table I.

Table I.

<u>Components</u>	wt per car (kg)	<u>Requirement for Annual Production of</u>	
		<u>12,000 Cars</u> wt in tonnes	<u>60,000 cars</u> wt in tonnes
1. Cast Iron Castings	137.5	1650	8250
2. Aluminium Alloy Castings (pressure/gravity die) *	50.5	610	3030
3. Cast Steel Components	16.4	200	990
4. Cast Zinc Alloy	0.85	1	3
5. Steel Forgings	95.3	1680	8390
6. Total			
	Castings:	2461	12273
	Forgings:	1680	8390

(*48 tonnes are already being die-cast locally)

7.7.2. Volkswagen Nigeria (VN)

Capacity : One hundred cars per day

Production : 8 to 10 cars per day

The details regarding VN requirements were not available with their representative. However, as the cars are more or less similar, the VN requirements is gestimated as follows:

For anual production of cars :	<u>20,000 nos</u>	<u>10,000 nos</u>
1. Cast Iron components : (tonnes):	3,000	1,500
2. Non-ferrous component: (tonnes): (Gravity / diecast)	1,000	500
Total castings	<u>4000</u>	<u>2000</u>
3. Steel forgings (tonnes)	3000	1,500

7.7.3 Total Import Burden

Considering the requirement for six other assemblers in the field, like Steyr etc. assembling trucks, buses, tractors, etc. the total current consumption for cars, buses, trucks, tractors, and other vehicles is guesstimated as follows (a) castings 9000 to 10,000 tonnes per years, (b) steel forgings around 4,000 to 5,000 tonnes per year. If both PAN and VN were to produce to their full capacity (80,000 nos per year), they would consume about 27,000 to 30,000 tonnes of castings and forgings. The import cost, for the "raw" parts should be, at present world prices around 60 million dollars or Naira 1104 million per year.

Almost the entire current requirements is being imported. PAN reported that they have found the local supply position to be extremely unsatisfactory. As of to-day, they have not been to locate any properly equipped forge shop, except the ones at Ajaokuta and Delta Steel companies, which are inadequate to meet their annual requirements for over 1000 tonnes of forgings. The case of foundries is no better. In fact of all the foundries on PAN records, only Makeri Smelting in Jos DSC at Warri and Auto Components Limited at Otta are able to supply about 10 cast components to the Kaduna Plants. Together they represent less than 1% of the value of all cast items, and indeed, less than 0.2% of the total value of the CKD packs for an average car. SAP has apparently been ineffective in a vital sector of the Nigerian economy.

7.7.4. Drainage of Foreign Exchange

With reference to 7.7.3., in order to just sustain the current low production of cars etc. in Nigeria, it would be necessary to import, around 10,000 to 13,000 tonnes per year of castings and forgings, either in raw condition or as finished or semi-finished parts in assemblies/sub assemblies. To this another 5 to 10%, i.e., about 100 to 130 tonnes of spares parts would have to be added. The import bill to maintain the vehicle

industry running at about 15-20% of its installed capacity, thus, runs into millions of Naira.

7.7.5. INVESTMENT IN AN AUTOMOBILE FOUNDRY/FORGE

There is therefore every justification, to invest in a new foundry-forge complex for the automobile industry. There will have to be a matching investment in machining facilities to sustain such an investment. To further justify this investment it would be necessary to examine in detail the linkage of the vehicle industry with the national economy.

8. LINKAGE BETWEEN THE VEHICLE AND FOUNDRY INDUSTRY IN U.K. AND WEST GERMANY

Vehicle production has assumed the role of a driver of the engineering economy in U.K., with a ripple effect affecting foundries and forge shops. The fortunes of the majority of foundries and their suppliers, in U.K. for example were shown (ref.15.) to be to some extent linked to the number of cars and commercial vehicles produced at any one time, either directly through car components or indirectly through an expanding and wealthier economy.

Fig. 9A shows the total iron, steel and aluminium casting tonnages, produced in the U.K. since 1975, (excluding ingots mould, the production of which in recent times have reduced dramatically due to end-user process changes) Fig. 10 shows the fall in weight of casting per vehicle, as a result of the reduction in weight of car parts. The decline of casting tonnage along with that of the automobile is evident in U.K. industry charts.

9. The foundry-forge industries in West Germany have similarly a very strong linkage with the automotive industries. This driver role of vehicle manufacturing is evident in the increased supply of aluminium castings, from over 240,000 tonnes in 1970 to over 400,000 tonnes in 1987. In this year the vehicle industry consumed about 57% of non-ferrous production, particularly Aluminium and zinc alloys. Other linkage for non-ferrous was with the building industry (4.6% in 1987) and electricity industry. The linkages in West Germany between its foundry industry, and the end-users are shown in table below:

Table 1

West German End-User Industries	Iron, Steel and Malleable Castings			Non-ferrous Castings
	1970 %	1980 %	1987 %	1986 %
Machinery Manufacturing	31.0	31.3	30.3	57.2
Vehicle Manufacturing	22.1	32.5	44.1	10.2
Building Industry	15.7	12.9	10.7	4.6
Iron and Steel Industry	17.5	11.7	3.6	====
Electrical Industries	----	----	----	3.0
Other Engineering Sectors	13.7	11.6	11.3	25.0
	100	100	100	100

The above Table confirms that almost 75% of ferrous castings and 67% of non-ferrous castings produced are consumed by the automobile and machinery manufacturing industries. Vehicle manufacturers are the largest consumer of ferrous castings (44%) and second largest in the non-ferrous category (10%).

10. NEW FOUNDRY-FORGE FOR THE AUTO INDUSTRY

Thus from all considerations a new foundry-forge complex along with a die-shop is fully justified for the country.

11. IMPLEMENTATION OF THE ACTION PLAN

11.1 LOADING

Orders for castings and forgings arise almost entirely out of the need to develop indigenous manufacture of spares and components for the manufacturing industries. The metal spare parts market, in money terms before the March 1992 devaluation, was equal to (as per PAD study):

Domestic supply :	250 million Naira
Import :	750 million Naira
Total :	1000 million Naira

The subsequent devaluation and rise in inflation might double the Naira burden.

11.2 The PAD STUDY had not located any substantial demand from the Defence/Railway/Machinery manufacturing/machine building sectors, as there is no significant pressure of these activities in the Nigerian economy.

11.3 We have explained earlier (p27) that only spares cannot provide enough load. "Original equipment" (OE) manufacture, which is yet to develop in Nigeria is another large source. For example

cement manufacturers in India consume 60 tonnes of steel casting for manufacturing new machinery to produce cement, per million tonnes of capacity, while about 170 to 200 tonnes of castings are consumed per million tonnes of cement produced, for maintenance. The prosperity of the Sub-Sector is therefore linked with that of the End-User industries, machine building activities.

11.4 END-USER INDUSTRIES

a) The manufacturing and agricultural sectors are the major customers of the foundry and forge industries. At the present moment the following consumers are relevant to the sub-sector in Nigeria.

b) The automobile assembly plants for cars, tractors, buses/trucks and two wheelers. Related sectors will be manufacturers of pump and agricultural diesel engines, compressors, and high horse-power diesel engines.

c) Agricultural implements and hardware.

d) Textile industry

e) Cement, Sugar, paper, oil extraction and other agro-based manufacturing plants.

f) Coal and ore mining industries.

g) Construction, water supply, municipal fittings, pipes, including toilet and pipe fittings, and earth-moving and construction equipment.

h) Power generation and transmission parts.

i) Miscellaneous Consumer durables.

j) Machine tool and industrial machinery (plastic, rubber etc.)

k) Metallurgical processing industry, steel plants including

aluminium manufacture, foundry/forge machine, rolling mills, rolls, ingot moulds etc.

12. BASIS OF INVESTMENT DECISION

12.1 The broad attributes of the products and their demand should be known before any investment decision is taken, in order to determine (a) the capacity, which will govern (b) the volume of investment, which inturn depends on (c) the type of infrastrucutral input, the process technology and on the selection of machinery and and equipment, dictated by product attributes. This systemic approach is shown in fig. 2.

12.2 Product Attributes

The product attributes in case of castings and forgings are :

- a) weight:, which can vary from a a few grammes to (say) 100 tonnes.
- b) Metal : Steel. alloy steel (stainless, heat-resistant, corrosion resistant, etc.) C.I. Malleable iron, alloys, Ductile iron, brass, bronze, copper etc.
- c) Size, shape intricacy: Automobile castings and forgings will have different characteristics and specification to meet than railway rolling stock items. This is only one among hundred of example.

12.3 Market Survey

A Market Study should be starting point of implementing a development or growth strategy both for the government and private sector (Fig.3). The final decision may be based on consideration of profits generated during the life of the project, which is perhaps the most important criteria for private sector investment; or it may be the long term social and economic benefit to the nation. This last motive is applicable to the government. The final decision may be either to create

(a) new capacity or (b) upgrade/modernise or revamp existing capacities. Both these routes apply to the Nigerian sub-sector growth model.

12.4. RESTRUCTURED MODEL OF THE SUB-SECTOR

The implementation of the Action Plan to achieve the goals/targets set-out (see 5) is targeted to restructure the sub-sector from its present one (Fig.1) to that shown in Fig.2. The features of the re-modelled sub-sector are :

12.4.1 Group III Category

No increase required in installed capacity till existing units become viable. Inputs required are shown in linkage model (Fig.6).

12.4.2. Group II Category

No expansion is recommended in the installed capacity which is partly idle. Part of the installed capacity should be modernised and revamped, particularly with input of latest technology with a specific objective to SPECIALISE in particular areas of product mix.

12.4.3 Group I Category

The growth area for this group will be

- a) Diversification
- b) Flexibility of manufacture.

The units will have to accept a commercial culture and obtain know-how in the latest process techniques like chemical sand usage, manufacturers of SG iron etc., which have been indicated in Fig. 4. No major addition to existing plants and equipment is proposed, except the addition of a Cupola at the ASC.

12.4.4. Investment in New Foundries/ Forges

In view of the close linkage between the national economy and the vehicle sector, and the almost total dependence on imported castings and forgings (see. 7.7), the BSM/IC unanimously agreed to recommend to set up new capacity, based on the latest technology, for the manufacture of high grade, high quality castings and forgings for cars, trucks, tractors, two wheelers, high H.P. diesel engines etc.

12.4.5 Linkage Based Specialisation

The sub-sector plants cannot serve a whole lot of industries, since each end-user has its own unique requirements, in terms of weights, metal grade, spares, intricacies etc. Hence, castings/forgings units have necessarily to develop specialisation, linked to one or more industries. In other words, the development model of the sub-sector is predicated on specialisation linked to end-user growth. This has been a feature in other developing countries like India, Brazil, or China. The Indian example is elaborated below.

12.4.6. Growth in India

Growth of the sub-sector in India was parallel to that of the end-user industries. Cement and Sugar manufacturers like the Associated Cement Companies Walchandnadar Industry Limited etc. started with manufacturing cement and sugar, and as their production increased, they gradually set up facilities, often as extensions to their maintenance shops, for manufacture of cement machinery and sugar plants and equipment. The latest example is the Tata Engineering and Locomotive Company, which started

assembly of trucks, with German collaboration, from CKD units in 1954, gradually increasing the local content. Around 1968-1974, it went further and developed facilities for manufacturing the very machines used for machine automobile parts, like the Transfer-Line Machines used for machine, presses etc.; so that the company achieved backward integration from product (trucks) to machinery. This "GROWTH" shop concept or approach is common in developed economies. In Nigeria this phase has commenced, as mentioned earlier, with the manufacture of sugar machinery, albeit in small way, by a sugar manufacturer in Bacita.

12.4.7 Specialised Units - Further Indian Example

In India during the two decades in 1950 - 1970, the following specialised foundry and forge units were set up by the machines/manufacturers:

(a) Bharat Heavy Electrical Limited

Forge shop and Foundries at Hardwar, Bhopal etc. for the manufacture of Electrical power generation/turbines/and motor parts, etc.

(b) HMT Limited

Cast iron foundries specialising in making machine tool castings in Hyderabad, Bangalore etc.

(c) Tata, Ashok Leyland, Hindusthan Motors etc. (Truck and car manufactured)

Automobile Foundries/Forging shop for the manufacture of truck components and spares.

(d) Mukand Iron and Steel Company/Bhartia Steel Company

Specialising in railway rolling stock castings and sub-assemblies, like bogies, couplers, draft gears etc.

12.4.8. Specialised Units - Chinese Example

The Chinese industry also show categorisation. It can be classified into three groups:

The first is the large companies such as those manufacturing lorries, heavy machinery, tractors, and ship building. They all have cast iron, cast steel and non-ferrous casting plants. The second group consists of specialised factories such as metallurgy equipment, mining, civil works, textile, machine tools, rolling stock, crane and transport equipment. All these have their own foundry and workshops, and form the majority group. The third category consist of factories which are set up in villages and small towns. They mainly produce spare parts and castings for local needs.

12.4.9 Having taken note of the necessity to link to one or more industries, as a matter of specialisation in product mix, let us examine the type of linkage relevant to the various categories of Nigerian foundries and detail the necessary inputs, (some of which have been discussed earlier) for each category.

13. Linkage with End-Users

13.1 Group I Foundries

The modern plant and machinery available with this group (ASC, DSC, and NMT) when commissioned is capable of producing heavy and medium spares for the end-users indicated in Fig.4.

We have earlier discussed the necessity of installing a cupola in the existing layout at ASC to provide technical

flexibility for diversifying in mass produced medium weight range castings. This cupola should preferably be of Devided Blast/type. Further diversification at ASC should be pit-moulding / sweep moulding of heavy items.

An important input mentioned earlier is the necessity of maintaining a commercial culture and provide training to the plant personnel in this group, at all levels. The latest know-how as well "show how", need to be a taught, for high technology production and development and should cover (a) methods and pattern design (b) SG iron (c) manufacture of Rolls (d) Full mould process (e) Cement sand/chemical sand binder usage (f) manufacture of metal patterns and dies. The layout of the NMT foundry, under construction, will require modification in order that this unit can effectively service the end-users indicated in Fig 4. The addition of a cupola, along with provision for pit-moulding/sweep moulding and the carbon dioxide process, have already been recommended to the NMT engineers.

13.2 Group II Foundries

This group should develop specialisation in the area of grinding media and wear parts for cement, ore mining, power plant and refractory industries, which will mean obtaining and developing the know-hoe in the area of austenitic and alloy cast iron, like Ni-hard etc., Hadfield steel, and low alloy steel.

With revamping, modernisation and appropriate technology support, group II foundries should be able to supply spare and

components in the light to medium weight range, for a host of industries, as indicated in Fig.5

Addition of equipment and plant will be necessary in the area of chemical sand preparations, sand slinger/turntable systems, shellmoulding, SG iron production, malleablising and HT furnaces etc., devided blast cupola, coreless induction melting furnaces and manufacture of resin and metal patterns in addition to wooden patterns.

13.3. Exports

Group II and III units can be developed to enter the export field, for ungraded products, like manhole covers, and soil pipe fittings.

13.4 Group III Foundry

This group should be developed for production of low ungraded items like manhole covers and sanitary fittings, pipe fittings, maintenance spares, i.e. flanges, bearing blocks, hardware and tools, weights and measures, and kitchen utensils, etc. Even for such a production the units will have to be given extensive support mostly institutional in all areas of technology, production, financing revamping, quality control and testing, as well procurement of raw materials, and expertise services. Basically this sector in Nigeria will have to be looked upon as a rural employment generator and supplier of locally required spares and components. The growth of this sector can be stimulated by ancilliary linkage with the vehicle, and machine tool industries.

13.5 Forging Industry

The largest consumer of forgings in Nigeria, as in other developing countries, are the Automobile and fastener industries. Railways, hand-tool manufacturers, power plants, valve manufacturers, etc., also consume lot of forgings.

Our forging industry has not developed beyond the blacksmith stage, except for a few units, about eight to ten in number, the largest being the ASC forging and metal fabrication shops.

The capacity utilisation of this industry is largely linked to the local-content development of the auto industry, both for the automobile industry as well as for the general engineering industries. A new capacity for closed-die forging was

recommended and the same has been accepted by the FWG.

In fact, the most important and immediate requirement for this industry is the development of closed-die forging practice, and manufacture of dies. At a future stage, the country will have to set up sources for non-ferrous forging. A proposal to invest 100 million in a non-ferrous, and latest machine forging, practice, did not find favour with the FWG, and have been therefore dropped for the present.

14. INPUTS FOR LINKAGE DEVELOPMENT

14.1 International Expertise for Modrnisation, Diversification, & Revamping

Specific suggestions regarding the latest techniques and processess applicable to each group of foundries/forges, have been shown in the Linkage Models (Fig 4,5,6,7). A foundry technologist, with practical expertise and knowledge of the latest international developments, along with a forging specialist, of similar grade, will have to be placed at the national level, to provide and coordinate the technology inputs involved in the development of linkage models (Fig 4,5,6,7). If such personnel is not available in Nigeria now, expatriate hiring or UNIDO/UNDP assistance may have, to be sought. Practical proficiency will have to be developed at the shop floor as well as managerial level in the sub-sector, in respect of (a) methods engineering (ii) pattern design, (iii) and latest casting/forging techinques.

REVERSE ENGINEERING / PATTERN-DIE SHOPS :

14.2 ARCEDEM, IDCS, FIIRO, along with the private sector, can all contribute to pattern making (training and manufacture) and reverse engineering. During the plant visits, most foundries in group I and II were seen to make/repair their own patterns. Since pattern and dies form the core area of casting and forging technology, they deserve priority in the sub-sector development. The foundry - forge technologist mentioned in 14.1, will be required to provide technology support to the above institution for the production of metal and wood patterns, tools, dies, and prototypes for simple foundry plants like sand mixers (mullors), continuous screw type mixers, cupolas, furnaces, roller conveyors, ladles, mould boxes, simple hand operated cranes, etc. ARCEDEM has excellent machine and fabrication shops, including die-sinking facilities and with its proposed forging (press) and casting facilities, would be an ideal place for reverse engineering.

14.3 Development of Defence Castings

An outstanding achievement in reverse engineering in India is the indigenisation of critical castings for the Vijayanta and T-54/T 72 Battle Tanks for the army. These were being imported from U.K. and Russia, and manufacturing technology were not available. In 1968, the author developed the design drawings from samples received from the army, and over a period of two years, using the Tatas facilities was able to indigenise TRACK Shoes, gear boxes, etc based on the shell moulding technique. Almost all castings for these tanks are now made in India.

14.4 Quality Control

Testing and Laboratory facilities have to extensively introduced especially in the group II and III foundries. In this context, all factories in the sub-sector should have access to the laboratory facilities at ASC, DSC, IDC, FIIRO, NMDC etc. on commercial basis. Mobile test vans should be of special significance to small scale or cottage units.

14.5 Raw Material Development

In the area of development of locally available raw materials the private sector in countries like Brazil and India have played a more dominant role than government research institutions, which are subject to bureaucratic delays. This aspect of industrial development appear to been lost in the Nigerian sub-sector. Discussions at the BSM/IC seem to lay more stress on official infrastructural support.

15 Backward Linkages Input Industry

15.1. Iron and Steel Industry

The efficient operation of the foundry/forges is retarded due to the inadequate growth of the iron and steel industry.

The lack of supply of pig iron from the ASC is the single biggest factor inhibiting the growth of the C.I. Industry in the country. This has been inicated earlier, with a recommendation for adapting the KORF process as a via-media measure.

15.2 Ship Breaking Industry

Ship breaking is a major source of scrap for developing countries like India, Pakistan etc. It is a labour intensive industry and is quite appropriate for Nigeria.

15.3 Mini Steel Plant

The mini-steel plants have produced a strong resource-base for countries like India, Pakistan, etc. which do not have enough deposit of coking coal. It is proved to be a technically feasible and economically viable route, as an alternative to the Blast Furnace type integrated steel plants. Mini Steel plants can supply, as import-substitution items :

- (a) billets / ingots for forging shops
- (b) pencil ingots for rolling mills
- (c) steel castings in ordinary and alloy composition including stainless steel, to the engineering industries

15.4 Glass and Chemical Industry

With the development of these industries the source of processed sand and sand binders, particularly chemical binders, should be readily available. However, raw sand processing, can be started on labour intensive systems, by washing, drying and sieving, using simple equipments.

16. Strategic Investments

16.1 The efficiency effectiveness and competitiveness of an industry or sub-sector depends not only of its internal functioning but also to a very large extent upon the transforming process, of inputs into outputs. It needs system for supply, distribution and transportation, financial systems, and appropriate manpower resource, all interacting together. The Linkage models, presented in this paper, link the various inputs and system in a development framework, restructuring the sub-sector. The restructuring involves substantial investments. The funds will have to come both from the private sector and the

government. The whole object of the development strategies enumerated is to make the Nigerian foundry and forging industries viable, and capable of generating surpluses, which can be plowed back into the industry. The Investment profile, which has emerged out of an interactive process, represented by the BSM/IC, is designed not only to make the sub-sector self-supporting financially but also to achieve the goals set out earlier in the paper (see 5). The details are given in Table III.

16.2 The features of Investment Profile (Table III) are :

- (i) A new automobile foundry, forging cum pattern/die shop complex of 10000 / 12000 tonnes capacity, to be set up
- (ii) preferably on a south-south collaboration, 200 million Naira.
- (iii) A new die casting unit, and a new investment casting foundry to provide a nucleus in the country for manufacture of high technology products / spares / components.
- (iv) Investment in a new closed die forging shops, for capacity building, at an investment 40 million Naira, south-south collaboration also. This will be a jobbing unit.
- (v) Investment in Mini-Steel plants for manufacturing pencil ingots have been kept at 30 million Naira, which is the optional minimum.

16.3 Marginal and or incremental Investment covers proposal for modernisation and revamping for upgrading, and diversifying the production base of the sub-sector units, particularly the grade II & III units. This also covers Diversification for group I. The total outflow on this account for all Groups, I, II, and III

Table III

TABLE IIIINVESTMENT PROFILENEW CAPACITY - FRESH INVESTMENT. Million NAIRA

* AUTOMOBILE FOUNDRY FORGE & PATTERN - DIE SHOP -(HI-TECH)	250
* INVESTMENT CASTING	30
* DIE - CASTING (NON FERROUS)	30
* CLOSED DIE FORGING SHOP	40
* CENTRIFUGAL CASTING (PIPES)	40
* PATTERN/DIE SHOP - METAL, RESIN, WOOD.	40
<u>INFRASTRUCTURE</u>	
* SHIP BREAKING (MANUAL)	5
* SAND PROCESSING (MANUAL)	5
* KORF PROCESS (PIG IRON)	*
* EXTENSION SERVICES.	30
* <u>MODERNISATION, REVAMPING & DIVERSIFICATION OF GROUP I, II, & III FOUNDRIES MARGINAL / INCREMENTAL INVESTMENT.</u>	200
* <u>ALLIED</u>	
* MINI STEEL PLANT	30
* <u>OPTIONAL</u>	
* JOBBING HI-GRADE FOUNDRY - FORGE	100

	800

** defer 1993.

units and for forging shop have been estimated at 200 million Naira. This should mostly come from the private sector.

Other incremental investments cover :

(a) Extension services e.g. Testing, Raw material development, training and R & D etc - 20 million Naira.

(b) Provision for manufacture of metal pattern, dies, tools, either in new or existing installations, 20 million Naira.

The above (a & b) are infrastructural areas and should attract government investment support

(c) Shop breaking, labour intensive method : 5 million Naira

(d) Sand washing and processing labour intensive systems : 5 million Naira

Investment in (c) & (d) are within the purview of the small scale sector

16.4 The resources for the investment suggested above should come apart from government and private sector, from the insurance companies, as suggested in the I/C and development banks. Such investment will be profitable in the remodelled sub-sector operation.

16.5 Are the source of funds have to be identified through further interactive mechanisms, it is not possible to indicate now the time frame in the Investment Profile. Present government policies have decided that investment have to be private sector led, as government priorities will have to be diverted to urgent areas of social infrastructure and public welfare. Hence, indication of any time frame will have to depend on private sector initiative. The

Buyer Seller meet held at PAD during the 18 to 19th August is a small step in this direction. The implementation of the Linkage models will represent a giant leap on the part of the Nigerian public and private sector.

17. POLICY AND INFRASTRUCTURE SUPPORT

An essential facet of development strategies is the formulation of a suitable policy package to back-up implementation of the strategies. The SWG deliberated at great length on the policy package necessary for the development of the sub-sector and arrived at consensus proposals which are enumerated below:

17.1 MATERIAL PROCUREMENT :

Material procurement centres should be set up for small scale foundries where essential materials can be easily procured.

17.2 TECHNICAL KNOW-HOW :

Courses in foundry technology should be available in Universities/Polytechnics to facilitate the acquisition of high technology know how to help foundry industries.

17.3 QUALITY CONTROL FACILITIES :

Provision of quality control laboratories located all over the country to help the quality assurance of foundry products.

17.4 TECHNICAL SUPPORT

Research and development centres in the industries as well as government research establishments should be encouraged to

take up product development challenges.

17.5. LINKAGE / COMUNICATION

The Nigerian Foundry Association should be strengthened to embrace all practitioners in foundry forges sector.

17.6 SUBSIDY FOR ENERGY :

Special rates for electricity and gas for foundry industries should be implemented. NEPA should allow units to draw power from each other in case the same cannot be supplied by NEPA.

17.7 SUBSIDY FOR EQUIPMENT PROCUREMENT:

Preferential interest rate should be implemented.

17.8 ASSISTANCE IN RESTRUCTURING EXISTING INDUSTRIES

Assistance in procurement of facilities like water and other municipal facilities should be implemented.

17.9 COOPERATIVE OF SMALL SCALE FOUNDRIES :

Provision of pool facilities to take care of interests of small scale foundries should be established.

17.10 MANPOWER DEVELOPMENT

Establishments like IDC should come together with technical colleges to implement training programmes.

17.11 TARIFF :

Importation should be discouraged through tariff protection for proven good.

18. RECOMMENDATION :

- * The Investment Profile (Table (ii)) amounting to an investment of Naira 800 million is recommended for the strategic development of the sub-sector to both the Private Sector and

the government.

- * The policy package formulated by the group on Policy and infrastructure at the Seminar (17.1 -17.11) is also recommended for implementation by the appropriate agencies.
- * These recommendations may be widely circulated among civil servants, policy-makers, industrialists and entrepreneurs, development bankers since it will prove useful against in further implementation of the second and third phase of the SMID / IMP PROJECT.

100

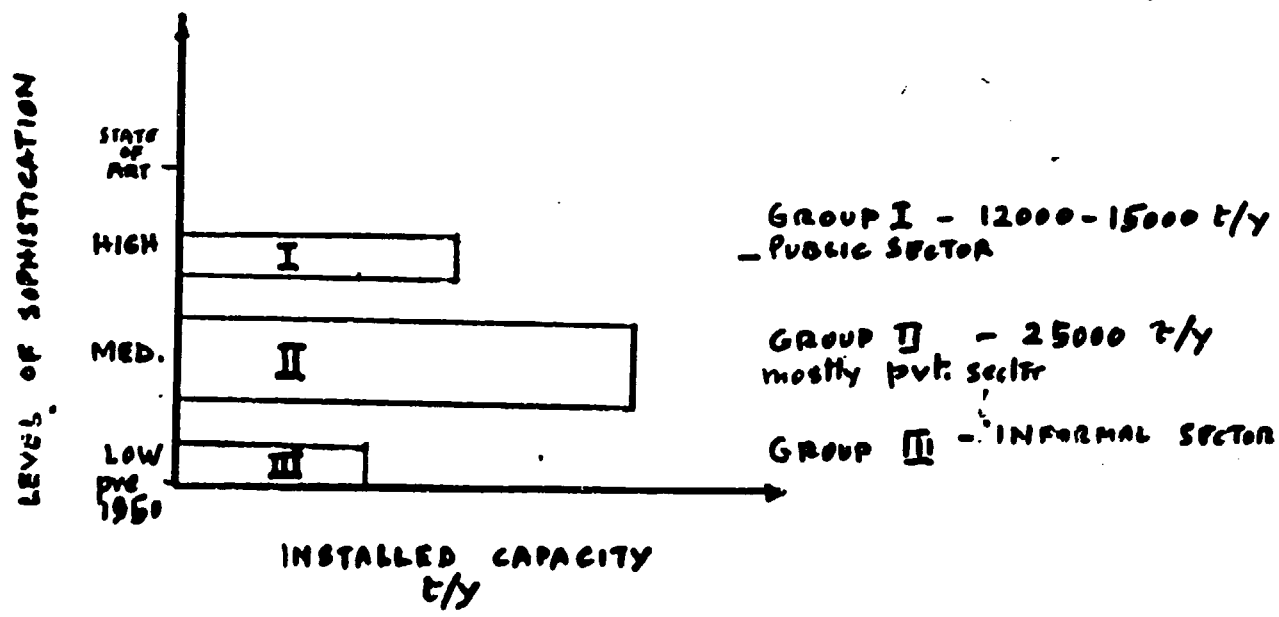


FIG 1.
NIGERIAN FOUNDRY INDUSTRY
(CLUSTER ANALYSIS)
1992/93

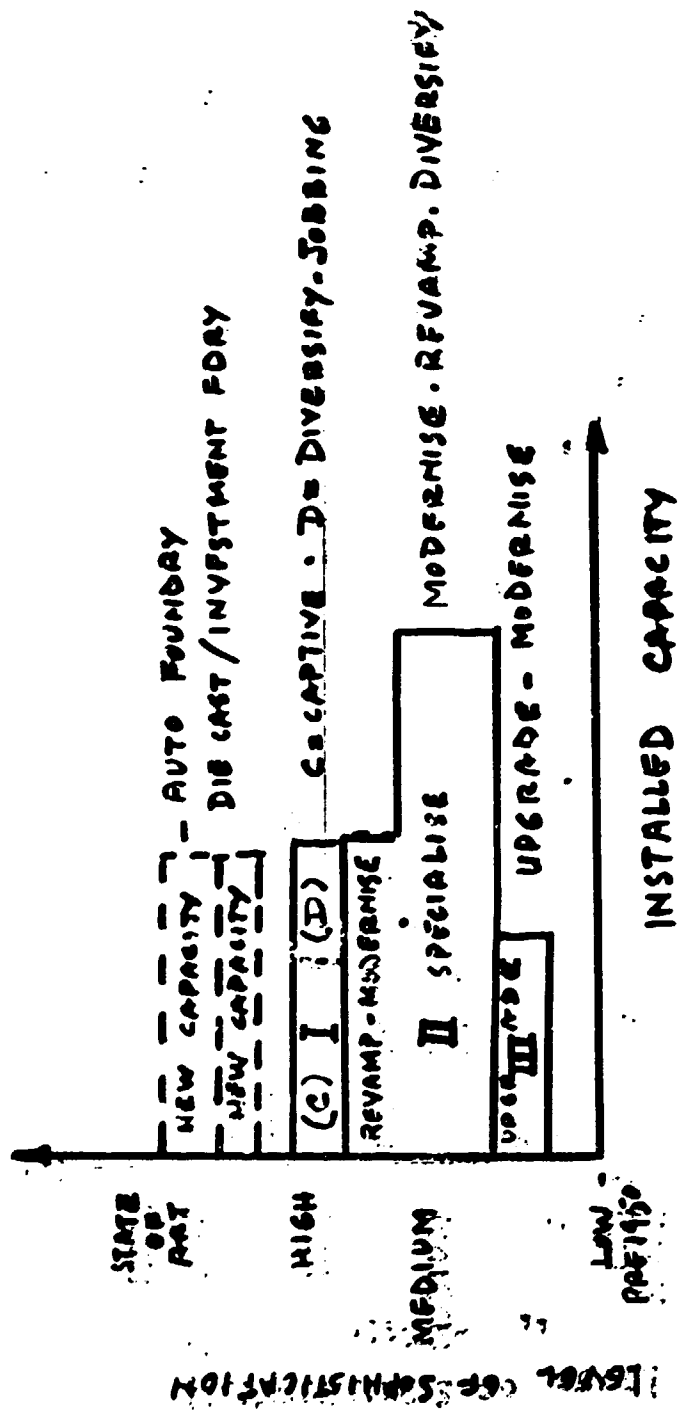


FIG 2
GROWTH MODEL FOR NIGERIAN
FOUNDRIES.

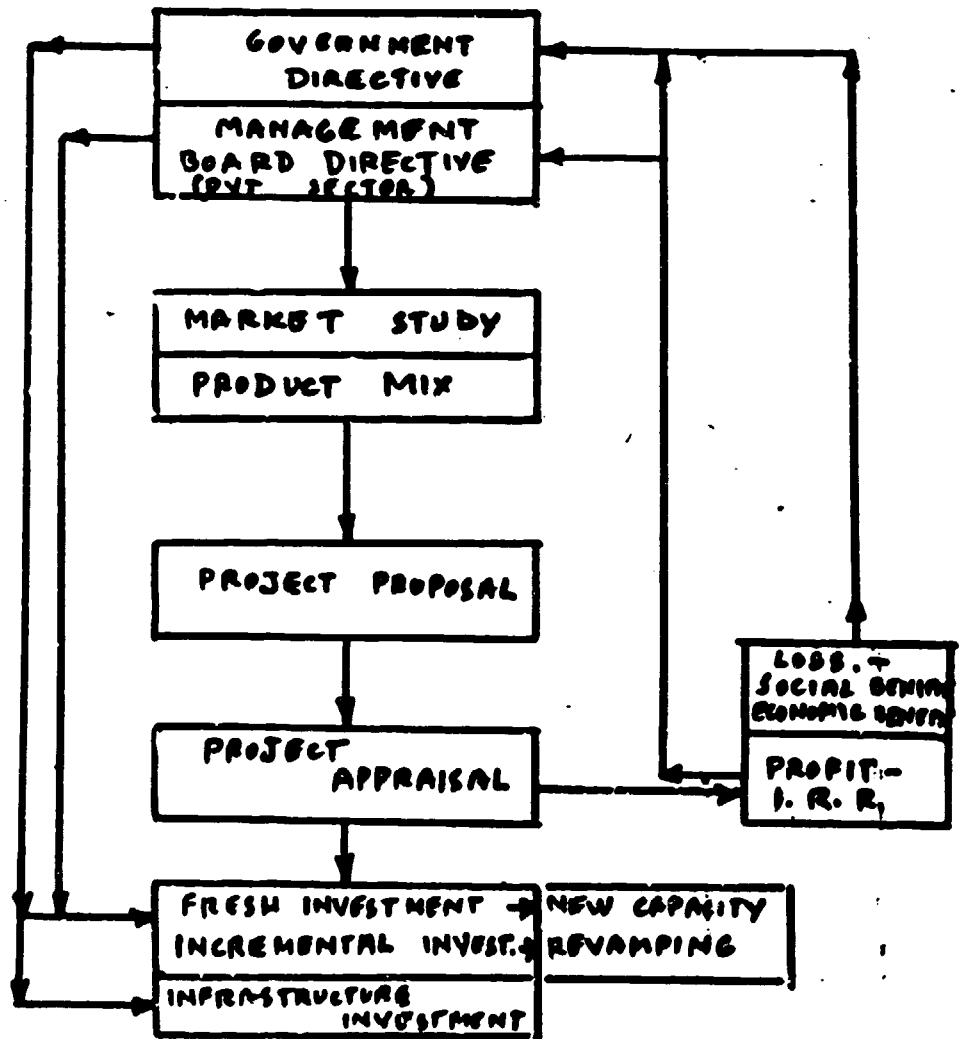


FIG 3
INVESTMENT - PRODUCT MIX
LINKAGE

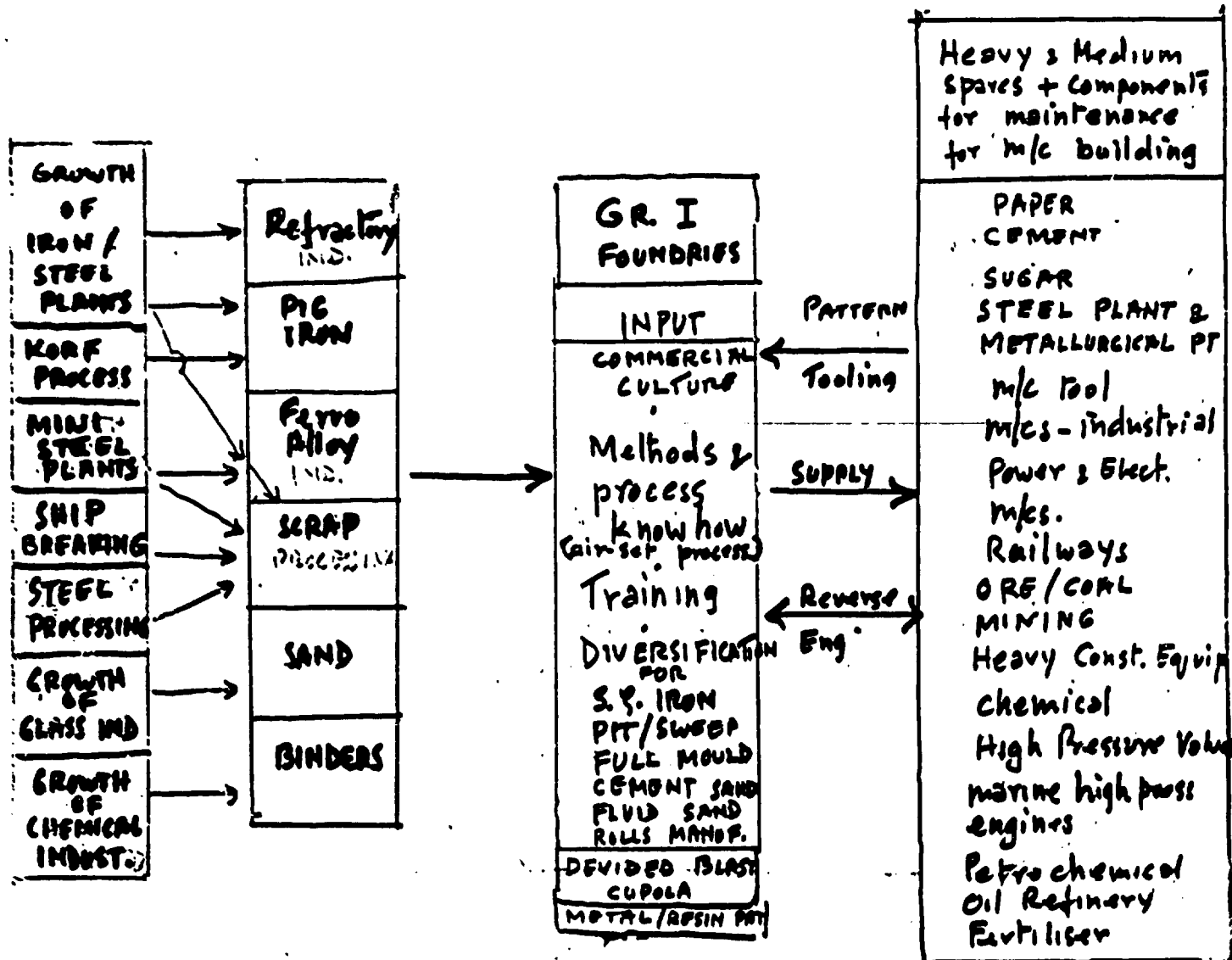


FIG 4
GROUP I FOUNDRIES'
LINKAGE

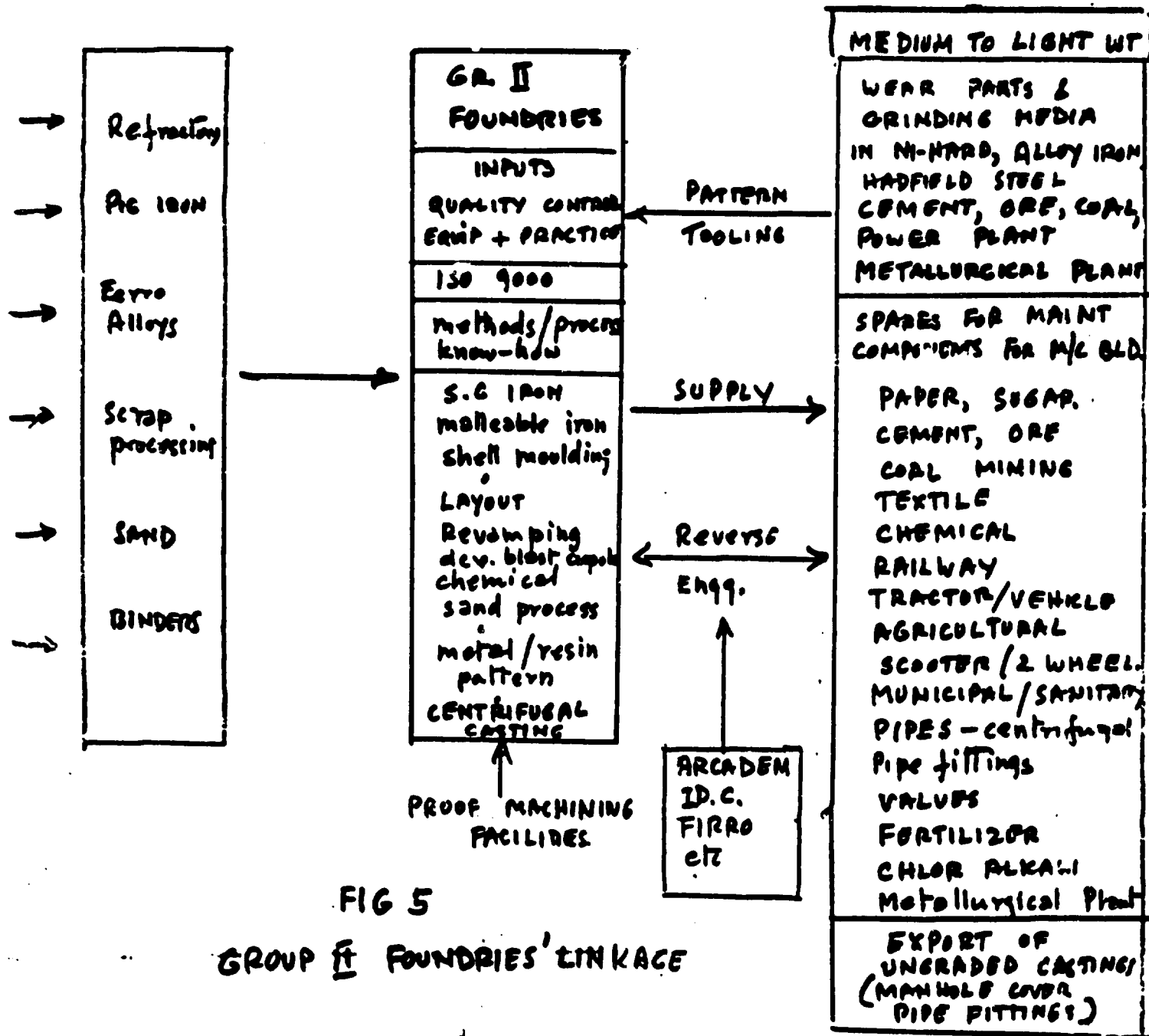


FIG 5
 GROUP II FOUNDRIES' LINKAGE

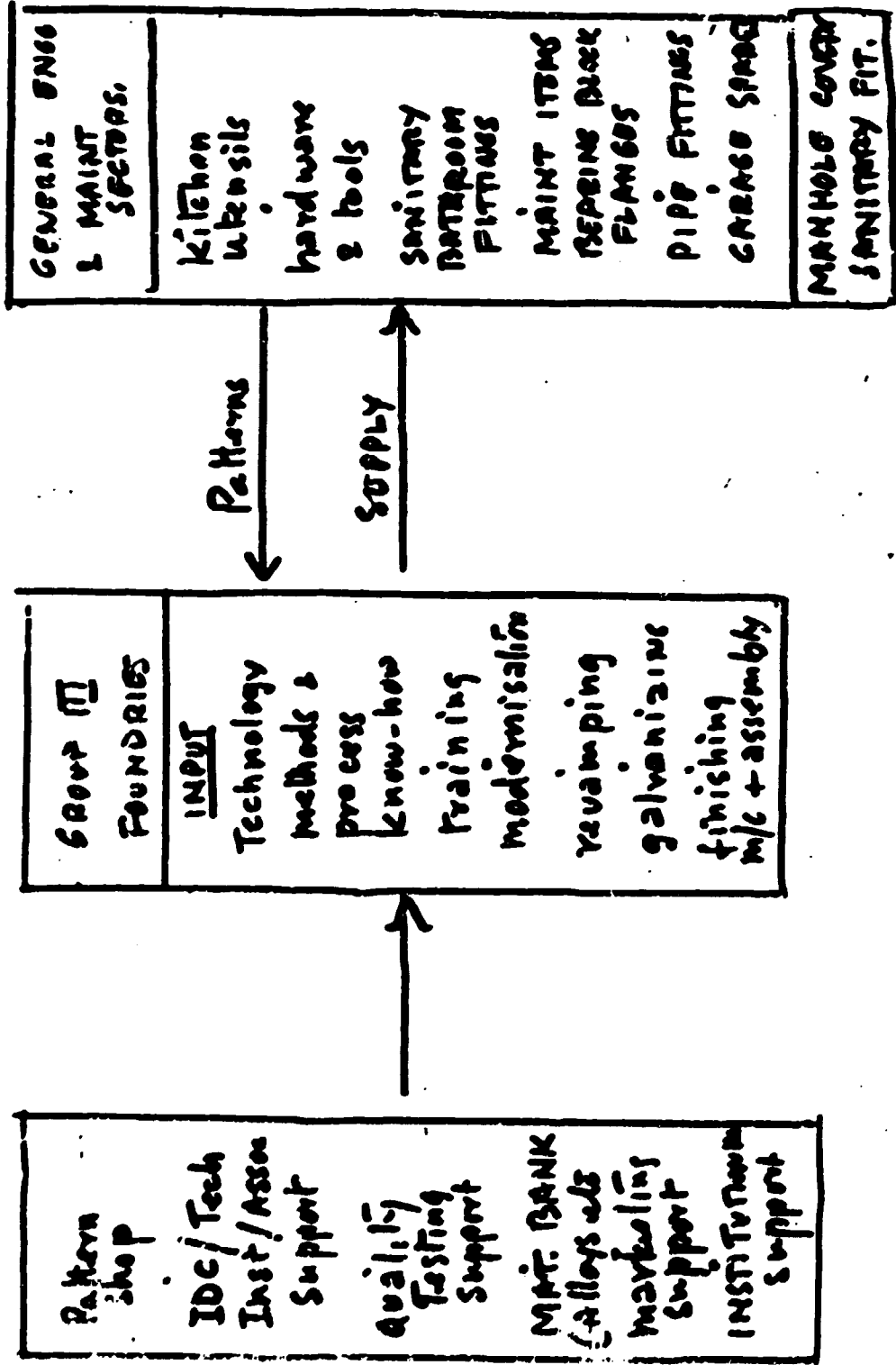
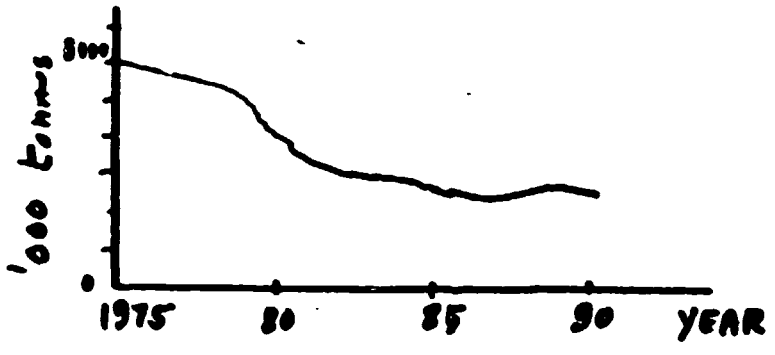


FIG 6

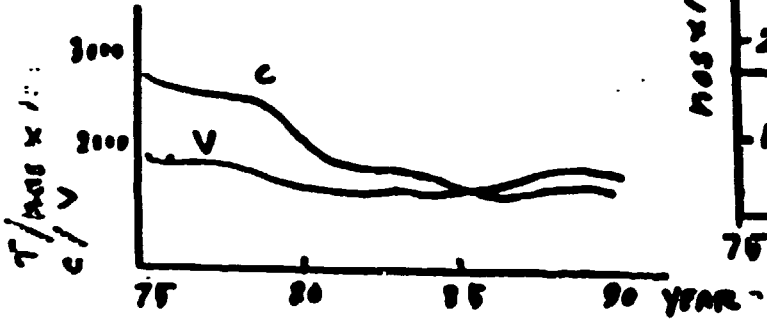
GROUP III FOUNDRIES LINKAGE



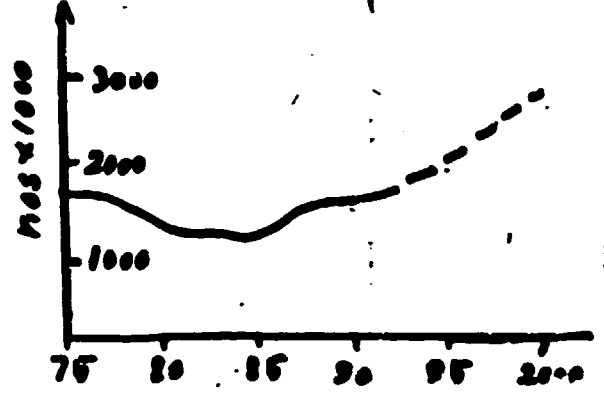
Total Iron + Steel + Al castings
(exc. Ingot moulds)

FIG 9 A

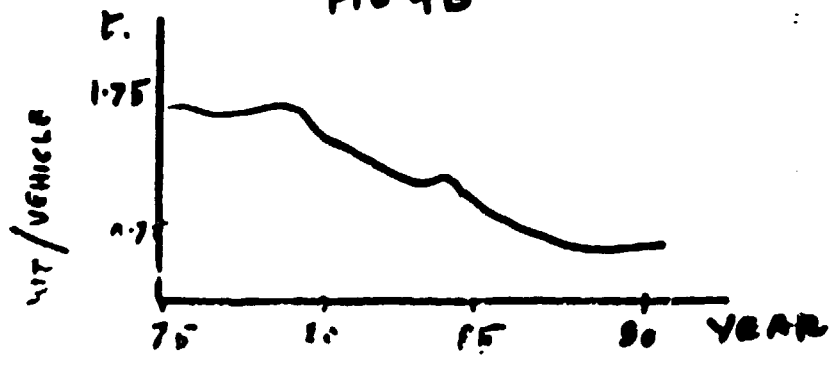
U.K. FOUNDRY
VEHICLE
LINKAGE.



Vehicle & Casting
FIG 9 B



Vehicle Production
(Projection)
A28



Total casting/vehicle

FIG. 10.

VI. MANUAL

A suitable Contents for the Manual was proposed by the UNIDO Consultant vide copy of his letter dated 26th August, 1992 to the ITAP Coordinator (Annexure 12.) after prior discussion on the subject. As all the documents/materials were available, only editing and compilation being necessary, it was suggested that the Manual be completed in draft form by 9th to 10th September, 1992. A copy of this letter was sent to the Backstopping officer (Annexure 13...) at Vienna.

PAD, at this time, organised the CONCLUDING SEMINAR OF THE FIRST PHASE OF THE ITAP at Abuja between 1st to 3rd September, 1992. At this Seminar, three volumes of selected papers, pertaining to ALL THE SUB-SECTORS were issued. The papers on the foundry-forge sub-sector, covered a communique; a report on BSM; the Executive Summary, and papers presented by Prof. Salami, Dr. Ogunleye et al. The UNIDO Consultant was not involved in the above compilation. As no reply to my letter dated 26.8.92 has been received till date, and as ITAP Coordinator is away at Abuja, it is not clear whether the above compendium of papers will be considered by PAD as the MANUAL. In that case, this part of the job-description may be considered as complete. If not, then the Manual can be finished as per the suggestion given in my letter to the ITAP Coordinator dated 26th August, 1992 within two weeks depending on the initiative taken by PAD.

Chapter III, IV, V, of this Report can provide useful guidelines to organisers of seminars linked to SMID, and can be considered as part of the training manual.

RECOMMENDATION

The recommendations have already been enumerated
in details in Chapter y the summary being given in
Para 18, (Pages 98 - 99).

Annexure 1

JOB DESCRIPTION

DP/NIR/84/020/11-02/J 12413

POST TITLE Expert in production of foundries and forges

DURATION 3 months

DATE REQUIRED November 1991

DUTY STATION Abuja, Nigeria

PURPOSE OF PROJECT To strengthen the Policy Analysis Department (PAD) of the Federal Ministry of Industry and Technology (FMI&T) and support the available team of PAD in upgrading industrial sub-sector reviews and in designing and carrying-out seminars at national level on industrial economics and sub-sector concepts and development alternatives.

DUTIES The expert will be attached to the Management of PAD/FMI and would work closely with the counterpart(s) in foundries and forges sub-sector, and the respective Strategic Consultative Group. Specifically, the expert would be involved in:

1. Review of the study elaborated on foundries and forges in the framework of the IMF project;
2. Occasional plant visits;
3. Preparation of training concept and materials including manuals for participants;
4. Design of curriculum of the seminar;
5. Preparation of logistics for seminar;
6. Implementation of the seminar; and
7. Finalization of the manuals

QUALIFICATION A university graduate in mechanical engineering (or equivalent qualification) who should have several years of professional experience. Post-graduate qualification and field experience in Nigeria foundries and forges would be of advantage.

LANGUAGE English

Annexure 2SENIOR COMTERPART STAFF

Dr. Mike Kwanashie, ITAP Project National Coordinator and
Coordinator, training unit, PAD. Federal Ministry of Industry and
Technology Ibadan.

Mrs. M.T. Ogunbona

Research Officer, PAD. Federal Ministry of Industry and
Technology. Ibadan.

Annexure 3

1. Olusola A. Kayode
Assist Director
Federal Ministry of Industry and Technology
Abuja.
2. Alhaji (Engr) Hamid Gbadamosi
Deputy Governor of Oyo State
Nigeria
3. John Barberopoulos
Managing Director
Nigerian Foundries Limited
Lagos.
4. B.R.A. Stephens
Coordinator Adeoyo Community Bank
Ibadan.
5. Dr. Sanusi A. Mohammed
General Manager/Chief Executive
Jos Steel Rolling Co. Ltd.
Jos.
6. Chitta Sen
Plant Manager
Adebowale Engineering Services Ltd.
Sango Otta.
7. I.O. Agboola
Manager Engineering Operations
Nigerian Machine Tools Ltd.
Osogbo,
8. Dr. M. Farouk Abdel-Rahman
Executive Director
ARCEDEM
Ibadan.
9. Engr. Ifeanyi B. Okeke
Asst. General manager (steel making)
Delta Steel Company Ltd.
Warri
10. Manesh Jairamdas
Asst. Admin Manager
Bouygues Nig. Ltd.
Abuja

11. Chris Idowu
Planning Research manager
West African Portland Cement PLC
Ikeja Lagos.
12. Anthony Dallison
Production Manager
BAMFORDS International Nig. Ltd.
Jos.
13. Arthur Madueke
Manager Project Development
Volkswagen of Nig. Ltd.
Lagos.
14. Rasheed Adegbenro
Manager Public Relations
Volkswagen of Nig. Ltd.
Lagos.
15. U.A. Abubakar
Principal Officer, Research and Development
Peugeot Automobile Nig. Ltd.
Kaduna
16. Jean Rojon
Asst. General Manager
Purchase Local content Development
Peugeot Automobile Nig. Ltd.
Kaduna.
17. Lawrence O. Fawole
Consultant
Purethrought Engineering Co. Ltd.
Ibadan
18. G.J. Atere
Chairman Managing Director
Somine (Nig.) Ltd.
Osogbo.
19. Mike M. Iribhogbe
Manager Foundry
Ajaokuta Steel Co. Ltd.
Ajaokuta.
20. P.A. Adamolekun
Ajaokuta Steel Co. Ltd.
Ajaokuta.
21. Mr. S. Odesola
Manager (P.P.C.)
Ajaokuta Steel Co. Ltd.

22. Engr. Kunle Mokuolu
Asst. Sec. General
Nigerian Society of Engineers
Lagos.
23. The President
Nigerian Society of Engineers
Lagos.

Annexure 4**List of Invitation Letters to Participants**

1. NIGERIAN PAPER MILL
P.M.B. 581,
JEBBA.
KWARA STATE.
2. GASKIYA TEXTILE MILLS LTD.
PLOT 583, NABABA BADAMOSI
BOMPI, P.M.B. 3481.
KANO.
OR.
KANO TEXTILE INDUSTRIAL LTD.
P.O. BOX 2893
KANO.
3. SUDIT ALUMINIUM MANUFACTURING CO. LTD.
KM. 10 IJEBU - ODE ROAD.
P.O. BOX 1789,
IBADAN.
4. SIDEF GROUP
S7/144A, OLORUNWA LAYOUT
FELELE.
P.O. BOX 6344 AGODI POST OFFICE
IBADAN.
5. SOLEL BONEH
OYO ROAD, OPP. UNIVERSITY OF IBADAN.
IBADAN.
6. ARCEDEM,
KM. 9, IWO ROAD
P.M.B. 19, U.I. P.O.
IBADAN.
7. ADISS ENGRING LIMITED
P.O. BOX 2645
PLOT 9, BLOCK 11 ISOLO INDUSTRIAL ESTATE
ISOLO, LAGOS.
8. FEDERAL INSTITUTE OF RESEARCH (FIIRO)
P.M.B. 21023
IKEJA.
LAGOS.
9. ASSESAN ENGINEERING CO. NIG. LTD.
15, ONABOLA STREET
PEDRO BARIGA
LAGOS.

10. FEDERAL MINISTRY OF MINES, POWER AND STEEL
GARKI.
ABUJA.
11. PRIMLAKS NIGERIA LIMITED
P.O. BOX 11305,
PLOT 84, SHARAD INDUSTRIAL ESTATE
PH II
KANO.
12. QUALITY METAL INDUSTRY LIMITED
25, SHADARE STREET,
OREGUN INDUSTRIAL ESTATE,
P.O. BOX 71.
EBUTE META. LAGOS.
13. HENKEL CHEMICAL COMPANY LTD.
P.O. BOX 4000.
PLOT 7, BLOCK
INDUSTRIAL SCHEME, ISOLO.
LAGOS.
14. SAVANNAH SUGAR COMPANY LTD.
P.M.B. 2230
YOLA.
15. TATE INDUSTRY PLC.
P.O. BOX 1420
47/48. ERIC MORE ROAD
IGANMU INDUSTRIAL ESTATE
LAGOS.
16. KANO SUGAR INDUSTRIAL LIMITED
5, SHARADA INDUSTRIAL ESTATE
PHASE 11.
KANO.
17. LAFIAGI SUGAR PROJECT
BACITA ESTATE
P.M.B. 65
BACITA.
18. NIGERIAN MACHINE TOOLS,
KM. 8, IKIRUN ROAD
P.M.B. 4343,
OSOGBO
OSUN STATE.
19. NATIONAL FERTILIZER CO. LTD.
P.M.B. 5180, ONYE
NAFCON PLANT COMPLEX
PORT-HARCOURT.

20. N. N. P. C.
FALOMO OFFICE COMPLEX.
P.M.B. 12701
IKOYI
LAGOS.
21. NYCIL SYNTHETIC RESINS,
P.O. BOX 1187,
PLOT 5-8, OGUN STATE
OR
CORPORATION INDUSTRIAL ESTATE
KM 6, OTTA-IDIROKO ROAD.
OGUN STATE.
22. BAGAUDA TEXTILE MILL,
P.M.B. 3190
17, JARARD ROAD
BOMPAI
KANO.
23. NATIONAL DIRECTORATE OF EMPLOYMENT
PLOT 1623, SAKA JOJO STREET
P.O. BOX 71649
VICTORIA ISLAND.
LAGOS.
24. BALMORE TRADING COMPANY
181, CLUB ROAD
P.O. BOX 62.
KANO.
25. BORNO ENGINEERING AND STEEL
MANUFACTURING LIMITED.
P.O. BOX 6,
2, AVNO ROAD.
MAIDUGURI.
26. BROSSETTE NIGERIA LIMITED.
P.M.B. 1135
APAPA.
311, APAPA ROAD
LAGOS.
27. CONCRETE STRUCTURES LIMITED
KM. 9, LAGOS IBADAN ROAD.
P.O. BOX 108.
IBADAN.
28. DORMAN LORG & AMALGAMATED ENGR. LTD.
20, AGEGE MOTOR ROAD.
P.O. BOX 256
SURULERE.
LAGOS.

29. ROAD EQUIPMENT MANUFACTURES LTD.
50, IJORA CAUSEWAY,
P.O. BOX 51989.
FALOMO.
LAGOS.
30. ROOFCO NIGERIA LIMITED
P.M.B. 2207
PLOT 214
KANURI INDUSTRIAL ESTATE
31. TOWER GAHLANSED PRODUCTS
NIG. LTD.
P.M.B. 2213, PLOT 9C IND.
32. METOXIDE NIG. LTD.
P.O. BOX 1821
MILE 59, LAGOS/ABEOKUTA ROAD
OGUN STATE.
33. AREWA METAL CONTEINERS LTD.
MUHAMMED LADAN ROAD
P.O. BOX 4589
KANO.
34. MIDLAND GAHANIZING PRODUCTS LTD.
P.M.B. 2153
KM 10, ABEOKUTA/ LAGOS ROAD.
ABEOKUTA.
OGUN STATE.
35. GRITTAL-HOPE NIG. LTD.
P.O. BOX 28, IKEJA.
13, AGEGE MOTOR ROAD,
MUSHIN LAGOS.
36. CALABAR CEMENT CO. LTD.
P.M.B. 1092.
SPRING ROAD, OBUTONG TOWN
CALABAR.
37. THE NIGERIAN CEMENT CO. LTD.
P.O. BOX 331
NKALAGU-ISHIELU LOCAL GOVERNMENT
ENUGU.
38. BENUE CEMENT CO. LTD.
P.M.B. 063
KM.72, MARKURDI-YANDEU ROAD
GOKO.
BENUE STATE.

TEXTILE

39. UNITED NIG TEXTILE LTD.
P.O. BOX 365.
PLOT O, KADUNA SOUTH INDUSTRIAL ESTATE
KADUNA
40. TEXTON INDUSTRIES NIG. LTD.
P.O. BOX 6411
PLOT 9E LSDPC IND. ESTATE
APAPA OSHODI EXPRESS WAY
AMUWO ODOFIN.
LAGOS.
41. PEUGEOT AUTOMOBILE NIG. LTD.
3. KANTA ROAD
TURAKI ALI HOUSE
KADUNA
42. VOLKSWAGEN NIG. LTD.
KM. 18, LAGOS EXPRESS WAY
P.M.B. 12663
IGANMU LAGOS.
43. ENGINEERING SERVICES LIMITED
(FOUNDRY & METAL FABRICATION DIVISSION)
KM 38, ABEOKUTA MOTOR ROAD
P.O. BOX 743,
SANGO OTTA
44. FEDERATED MOTORS INDUSTRIES
17, GREEK ROAD
P.O. BOX 376
APAPA.
45. AJAOKUTA STEEL COMPANY
P.M.B. 1000
AJAOKUTA
KOGI - STATE
46. NIGERIAN RAILWAY CORPORATION
EBUTE META / IJORA
LAGOS.
47. DELTA STEEL COMPANY LIMITED.
OVWIAN - ALADJA
P.M.B. 1220
WARRI.
48. NASSI
NEW BODIJA
IBADAN.

49. NIGERIAN HOESCHST PLC.
PLOT 144, OBA AKRAN AVENUE
P.O. BOX 261
IKEJA
LAGOS.
OR
HOESCHST PIPE MILLS
P.M.B. 21149
HENRY CARRBTR
IKEJA LAGOS.
50. NIGERIAN FOUNDRIES LIMITED
ILUPEJU,
LAGOS.
51. LEVENTIS MOTORS
P.O. BOX 390
APAPA
LAGOS.
52. NIGERIA BANK FOR COMMERCE & INDUSTRY LTD.
26 IDEJO STREET
VICTORIAL ISLAND
LAGOS.
53. COMMERCIAL BANK OF AFRICA LTD.
17/19. ALLEN AVENUE,
P.M.B. 21744
IKEJA
LAGOS.
54. JOS STEEL ROLLING COMPANY LTD.
P.M.B. 2701
JOS.
55. UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
(UNIDO)
11, OYINKAN ABAYOMI DRIVE
IKOYI. P.O. BOX 2075,
IKOYI, LAGOS.
NIGERIA.
56. BAMFORDS INTERNATIONAL NIG. LTD.
P.O. BOX 673,
RAYFIELD,
JOS. PLATEAU STATE
NIGERIA.
57. BOUGUES NIGERIA LTD.
PLOT 932, IDEJO ISLAND
P.O. BOX 6513, LAGOS.
OR
AREA 8, PLOT 654,
P.O. BOX 1669,
GARKI ABUJA.

58. WEST AFRICAN PORTLAND CEMENT PLC.
ASSBIFI ROAD
CENTRAL BUSINESS DISTRICT
ALAUSA, IKEJA,
P.O. BOX 1001.
LAGOS.
NIGERIA.
59. PEUGEOT AUTOMOBILE NIGERIA LTD.
KAKURI INDUSTRIAL ESTATE
P.M.B. 2266, KADUNA.
- OR
- 19 AGORO ODIYAN STREET
OFF ADEOLA ODEKU STREET
VICTORIAL ISLAND
LAGOS.
60. NIGERIAN SOCIETY OF ENGINEERS
1, ENGINEERING CLOSE
VICTORIA ISLAND,
LAGOS.
61. JIMEX NIGERIA LTD.
UMUANUKA VILLAGE
OTOLO,
P.M.B. 5005
NNEWI
62. SOMINIE (NIG) LTD.
NO. 1, GAFARU SALAMI ATERE
KM 7, IKIRUN ROAD.
P.O. BOX 180
OSHOGBO
63. NIGERIAN MACHINE TOOLS
LIMITED
KM. 8, IKIRUN ROAD.
P.M.B. 4343,
OSHOGBO
OSUN - STATE.
63. ABA MACHINE TOOLING & MANUFACTURING CO. LTD.
PLOT 77B, TRANS-AMADI IND. ESTATE,
P.O. BOX 23,
PORT-HARCOURT.
64. ART-TECH DESIGNS LTD.
PLOT 21, BALE ANIMASHAUN ROAD,
ALAKUKO - AGEGE,
LAGOS.

65. BEZER ENGINEERING LTD.
KM. 7. ONITSHA OWERRI ROAD.
ONITSHA,
P.O. BOX 1448.
ONITSHA.
66. C.N. ONUSELOGU ENTERPRISES LTD.,
BRIDGE HEAD, ONITSHA,
P.O. BOX 272,
ENUGU.
67. EZEKOSTAR NIGERIA LTD.,
1, OLUAWO'S COMPOUND,
IJOMU - ORO,
KWARA STATE.
68. FIDELITY ENGINEERING CO. NIG. LTD.,
PLOT 68, IKORODU INDUSTRIAL ESTATE.
P.M.B. 464,
IKORODU,
LAGOS.
69. LAKMAN'S METAL IND. NIG. LTD.,
PLOT 4, BLOCK E, ISOLO INDUSTRIAL ESTATE,
ISOLO,
LAGOS.
70. NISI IND. PROJECT LTD.,
120, ORLU ROAD,
P.O. BOX 768,
OWERRI.
71. ROADSIDE ENGINEERING & FOUNDRY AVENUE,
29, INDUSTRIAL AVENUE,
ILUPEJU,
LAGOS.

FEDERAL MINISTRY OF INDUSTRIES
POLICY ANALYSIS DEPARTMENT

PAIB No

Telegrams

Telephone



Ref. No 1

Date

WORKSHOP ON FOUNDRY & FORGE SUB-SECTOR: AUGUST 17 - 19, 1992.

INVITATION TO PARTICIPANT

The Federal Ministry of Industry and Technology (FMI & T), Policy Analysis Department (PAD), is in the process of formulating policies to help the development of Foundry and Forge industries in Nigeria. This sub-sector recognized as constituting a bottleneck to the growth of Nigerian industrial sector. The Government, in collaboration with UNIDO, is keen in encouraging the participation of both the Private and the Public Sectors in its development.

We are therefore organizing a Workshop, which will be a comprehensive programme of interaction between the Suppliers of Raw Materials and Accessories/Producers/End Users of Castings/Forgings, along with Policy Makers and Civil Servants of the Federal and State governments.

The Workshop will be held between 17th and 19th of August at the PAD office, Opposite University of Ibadan Main Gate, Agbowo Shopping Complex, Third Floor, Ibadan. This will offer considerable opportunity for an interface between both the Private Sector and the Government Machineries to discuss the difficulties and constraints faced by the industries. It will also afford the private sector the opportunity to participate in policy making process which will help the growth and viability of the industries.

During this Workshop, a 'Buyer-Seller Meet' and an 'Investment Clinic' is being organized. This is designed to help the Suppliers of Raw Materials and Accessories, Producers, and Users of the Castings/Forgings to discuss and identify their problems and proffer solutions as well as help policy makers in appreciating the position of the Private Sector in relation to government policies. It will also be an opportunity for the policy makers to know the effect of government policy on the level of performance of the industries both in the short and long term.

You are major Producer of Foundry and Casting Products and your involvement is very important to us. We are investigating the problems and constraints facing the growth of this industry. We also want know from prospective entrepreneur, the type of support they would require from the government and developing institutions so that they can invest in Foundry and Forge Shop as our study shows that there are huge prospects in Nigeria. There is need to indigenise and substitute imports of spare parts in all sectors of Nigeria Industries. There is also scope for exportation of ordinary ungraded castings and forgings to earn valuable foreign exchange. We therefore, invite you to join the "Investment Clinic" where the participants will meet with the

- producers of casting and forging;
- users of Casting and Forging e.g. Cement, Textile Companies;
- government, policy makers, consultants;
- prospective entrepreneur;
- representatives of MAN, NASSI, and
- representatives of financial institutions and banks.

You are welcome to give a two-page write-up about your proposal for creating new capacity for foundry and forge, requirement for plant and machinery, funds and loans, proposal to indigenise the imported Casting.

We would like you to present the above write-up in the 'Investment Clinic (programme attached). You are also invited to participate in 'Buyer-Seller Meet' which is a gathering of

- Foundry and Forge producers;
- Users of casting and forging;
- Government, policy makers, etc.

Your presentation can include the policies and strategies you would want the Government to consider in relation to the expansion and growth of your sub-sector.

You may please come with your slides and transparency sheets since overhead projector would be provided.

Regards.

M. T. Ogunbona (Mrs.)
for ITAP National Project Coordinator.

Lnc:

FEDERAL MINISTRY OF INDUSTRIES
POLICY ANALYSIS DEPARTMENT

PMB No

Telegram

Telephone



Ref. No: 2

Date

WORKSHOP ON FOUNDRY & FORGE SUB-SECTOR: AUGUST 17 - 19, 1992.

INVITATION TO PARTICIPANT

The Federal Ministry of Industry and Technology (FMI & T), Policy Analysis Department (PAD), is in the process of formulating policies to help the development of Foundry and Forge industries in Nigeria. This sub-sector recognized as constituting a bottleneck to the growth of Nigerian industrial sector. The Government, in collaboration with UNIDO, is keen in encouraging the participation of both the Private and the Public Sectors in its development.

We are therefore organizing a Workshop, which will be a comprehensive programme of interaction between the Suppliers of Raw Materials and Accessories, Producers/End Users of Castings/Forgings, along with Policy Makers and Civil Servants of the Federal and State governments.

The Workshop will be held between 17th and 19th of August at the PAD office, Opposite University of Ibadan Main Gate, Agbowo Shopping Complex, Third Floor, Ibadan. This will offer considerable opportunity for an interface between both the Private Sector and the Government's Machineries to discuss the difficulties and constraints faced by the industries. It will also afford the private sector the opportunity to participate in policy making process which will help the growth and viability of the industries.

During this Workshop, a 'Buyer-Seller Meet' and an 'Investment Clinic' is being organized. This is designed to help the Suppliers of Raw Materials and Accessories, Producers, and Users of the Castings/Forgings to discuss and identify their problems and proffer solutions as well as help policy makers in appreciating the position of the Private Sector in relation to government policies. It will also be an opportunity for the policy makers to know the effect of government policy on the level of performance of the industries both in the short and long run.

You are a major User of Foundry and Casting Products and therefore, your involvement with us at this stage is very important. We would appreciate if you could kindly participate in the 'Buyer-Seller Meet/Workshop which is being organized between 17th and 19th August, 1992 (programme attached).

You are also requested to kindly send us urgently a two-page write-up based on the following;

- Detail of Castings and Forgings you are purchasing or importing;
- Proposal to indigenise the imported castings and forgings (You may think of a collaboration with the Private Sector in setting up a Foundry in Nigeria. You may please discuss the proposal for the manufacture of Castings and Forgings and the machining);
- The total quantity in tonnes/year;
- Physical description, size, quality requirement and metal specification of castings/forgings purchased;
- Where are they bought from, local/indigenous/import? Name of suppliers
- What is the annual value purchased from local and imported suppliers?
- What are your future plans?
- Do you propose to expand/manufacture your business, hence your purchase? If so, give details.
- Do you recommend that public/private sector set up new Foundry and Forge capacity? If so, how much capacity can you absorb.

We would like you to present your two-page write-up during the 'Buyer-Seller Meet' being held on the 18th, to the gathering of

- Foundry and Forge producers;
- Users of casting and forging;
- Government, policy makers, etc.

You may kindly make the paper available to us on the 4th of August, 1992.

You may please come with your slides and transparency sheets since Overhead Projector would be provided.

Regards.

M. T. Ogunbona (Mrs.)
for ITAP National Project Coordinator.

Enc.

FEDERAL MINISTRY OF INDUSTRIES
POLICY ANALYSIS DEPARTMENT

P.M.B. No

Telegrams

Telephone



Ref. No.

3

Date

WORKSHOP ON FOUNDRY & FORGE SUB-SECTOR: AUGUST 17 - 19, 1992.

INVITATION TO PARTICIPANT

The Federal Ministry of Industry and Technology (FMI & T), Policy Analysis Department (PAD), is in the process of formulating policies to help the development of Foundry and Forge industries in Nigeria. This sub-sector recognized as constituting a bottleneck to the growth of Nigerian industrial sector. The Government, in collaboration with UNIDO, is keen in encouraging the participation of both the Private and the Public Sectors in its development.

We are therefore organizing a Workshop, which will be a comprehensive programme of interaction between the Suppliers of Raw Materials and Accessories/Producers/End Users of Castings/Forgings, along with Policy Makers and Civil Servants of the Federal and State governments.

The Workshop will be held between 17th and 19th of August at the FAD office, Opposite University of Ibadan Main Gate, Agbowo Shopping Complex, Third Floor, Ibadan. This will offer considerable opportunity for an interface between both the Private Sector and the Government Machineries to discuss the difficulties and constraints faced by the industries. It will also afford the private sector the opportunity to participate in policy making process which will help the growth and viability of the industries.

During this Workshop, a 'Buyer-Seller Meet' and an 'Investment Clinic' is being organized. This is designed to help the Suppliers of Raw Materials and Accessories, Producers, and Users of the Castings/Forgings to discuss and identify their problems and proffer solutions as well as help policy makers in appreciating the position of the Private Sector in relation to government policies. It will also be an opportunity for the policy makers to know the effect of government policy on the level of performance of the industries both in the short and long run.

Your participation in the "Investment Clinic" is of importance to us since it is proposed to provide interaction between Producers/End Users/Prospective Entrepreneur/Government policy makers and financial institution. No industry the world over, has grown without support from the basics industries, i.e Foundry and Forge. Our study shows that there is considerable prospect for investment in this sub-sector, both for import substitution as well as for export. We are therefore, soliciting your presence in this Seminar as your contribution is of high value to us.

Please, kindly confirm by telephone (022 - 410621). There is no Course fee.

Regards.

M. T. Ogunbona (Mrs.),
for ITAP National Project Coordinator.

ANNEXURE 5.4
FEDERAL MINISTRY OF INDUSTRIES
POLICY ANALYSIS DEPARTMENT

P.M.B. No.

Telegram:

Telephone:



Ref. No. 4.

Date

WORKSHOP ON FOUNDRY & FORGE SUB-SECTOR: AUGUST 17 - 19, 1992.

INVITATION TO PARTICIPANT

The Federal Ministry of Industry and Technology (FMI & T), Policy Analysis Department (PAD), is in the process of formulating policies to help the development of Foundry and Forge industries in Nigeria. This sub-sector recognized as constituting a bottleneck to the growth of Nigerian industrial sector. The Government, in collaboration with UNIDO, is keen in encouraging the participation of both the Private and the Public Sectors in its development.

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12

You are major Supplier of Inputs to the Foundry and Casting Sub-sector and your involvement is very important to us. We are investigating the problems and constraints facing the growth of this industry. We also want know from prospective entrepreneur, the type of support they require from the government and developing institution so that they can invest in Foundry and Forge Shop which our study shows as having great prospect in Nigeria. There is need to indigenise and substitute imports of spare parts in all sectors of Nigerian industries. There is also scope for exportation of ordinary ungraded castings and forgings to earn valuable foreign exchange. We therefore invite you to join the "Investment Clinic" and "Buyer-Seller Meet" where the participants will meet with the

- Supplier of Raw Materials and Accessories;
- Prospective entrepreneur;
- Foundry and Forge producers;
- Representative of MAN, NASSI;
- Users of casting and forging e.g. Cement, Textile Companies;
- Government, policy makers, etc.
- Representative of Financial Institutions and Banks;

You are most welcome to give a two-page write-up about your proposal for creating new capacity for foundry and forge shops, any requirement for plant and machinery, funds and loans. Information on the following may kindly be included,

- Source of material;
- If imported, can it be sourced locally?
- If yes, what are the constraints;
- List materials, specification;
- Demand and supply position;
- Problems and Constraints;
- Effect of government policy and strategy on your level of purchase

We would like you to present the above write-up in the 'Buyer-Seller Meet' being held on 18th (programme attached) as a part of the Workshop which is a gathering of

13

- Foundry and Forge producers;
- Users of casting and forging;
- Government, policy makers, etc.

Your presentation can include any suggestion regarding government policies and strategies that you would desire the government to consider in relation to the expansion and growth of your sector.

We may kindly make the paper available to us on the 27th of August, 1992.

When you please come with your slides and transparencies. A projector overhead Projector would be provided.

Yours,

Agribona (Mrs.),
TAP National Project Coordinator.

Enc.

ANNEXURE 6

- * CIVIL SERVANTS AND INDUSTRIAL POLICY MAKERS
- * MANUFACTURERS OF CASTINGS AND FORGINGS
- * INDUSTRIES REQUIRING CASTINGS AND FORGINGS
- * SUPPLIERS/AGENTS/TRADERS CATERING TO FOUNDRY AND FORGE SHOPS

INVITED TO ATTEND THE

WORKSHOP, BUYER-SELLER MEET AND
INVESTMENT CLINIC ON FOUNDRY & FORGE
SUB-SECTOR IN NIGERIA

- DATE: 17th August to 19th August, 1992
- VENUE: Policy Analysis Department
Federal Ministry of Industry & Technology,
Agbowo Towers, Opposite U.I.
Main Gate. Ibadan.
- REGISTRATION: Contact Counter at venue on 17th August,
before 9.00 a.m. Registration is free

ORGANISED BY THE POLICY ANALYSIS DEPARTMENT
FEDERAL MINISTRY OF INDUSTRY & TECHNOLOGY
WITH ASSISTANCE FROM THE UNDP/UNIDO

P. K. SANDELL
B. Tech (Hons), F.I.B.F (U.K)
CONSULTANT TO UNIDO

UNITED NATIONS INDUSTRIAL DEVELOPEMENT
ORGANISATION (U.N.D.P.)
LAGOS/ABUJA, NIGERIA

Original Sent by EMS to Abuja
URGENT.

5th August, 1992.

Dr. M. Kwanashie
ITAP COORDINATOR
PAD., FMI & T, IBADAN

Reference my discussion with you on 5/8/92, regarding issue of invitation letters to delegates/participants for the Foundry Forge Sub-Sector seminar/Buyer Seller meet.

The invitation letters to participants (End-users, suppliers and producers), were ready, before I left for plant visits on 18/7/92.

The position of despatch of these letters as reported is as follows :

(a) Letters despatched as per list (copy handed over to you on 5.8.92) confirmed by the Secretary (Mrs. Adesina)	84
Less Duplicate/incorrect address in the above list :	11
Number of parties invited :	73
Out of above, BANKS invited who are not concerned with seminar :	18
Net numbers pf parties invited :	55

The 55 parties consist about 12 parties personally met by the undersigned with either yourself or Mrs. Ogunbona, and who have confirmed participation. Some of the other parties are not directly linked with this sub-sector. No registration has been received so far. Hence, as it appears, we may not get more than 20-30 delegates for the Seminar & Buyer seller meet. We have discussed that remedial action can be taken as follows :

- (1) Issue fresh letters of invitation to concerned parties. This job may be delegated to a responsible officer, who can check the list of addresses before dispatch (by courier as, there is no time).
- (2) Press, Radio and Television advertisements may be issued, through UNIDO, who will take Seven days, latest by 13th instant. In other words the press material should reach UNIDO by 6th or 7th instant.
- (3) Officers may be delegated to collect "presentation" papers from various parties, as discussed with you,

before 10th or 12th instant. UNIDO has agreed to fund these local travel (vide telex 27/7/92)

(4) An officer may be delegated to check that lecture hall requirements are purchased through UNIDO and make ready before 15th (Projector, Screen, Tape-recorder, Cassettes etc.)

(5) An officer may be delegated to complete arrangement for purchase of folders and make folders ready by 16th with CONTENTS for issue in 17th morning (contents are : Cyclostiled papers, Pen, Pencils, Writing pads etc.). UNIDO has already agreed to fund above.

(6) May I suggest daily co-ordination meetings with delegated officers as time is short and considerable organisation work is pending.

(7) The present Secretarial staff may please be reinforced urgently in view of the large amount of Typing/Duplication/Photostat work involved. No background material so far is ready for issue to delegates.

Above suggestions are for urgent consideration please.

Best regards.

P.K. Sandell

P.K. SANDELL

✓ Copy: UNIDO. Lagos: Mr. Country Director, Mr. R. Mueller
UNIDO Vienna.

This letter was discussed with Dr. Owosekun, Director, PAD. in the absence of Dr. M. Kwanashie on 7/8/92. Dr. Owosekun assured the UNIDO consultant that all necessary steps will be taken to implement the suggestions given above and ensure the success of the Seminar to be held on 17 - 19th August. The letter was discussed with Dr. Kwanashie on 10/8/92 to confirm that extra staff will be shifted from Abuja to Ibadan to complete all pending organisation work for the workshop.

ANNEXTURE 8

LIST OF THE PARTICIPANTS

S/NO.	NAME	ADDRESS
1.	MR. ICHUGU I. P.	SAVANNAH SUGAR COMPANY FACTORY DEPARTMENT P.M.B. 2230 YOLA ADAMAWA STATE
2.	MR. I. B. BASHIR	FOUNDRY SECTION FEDERAL INSTITUTE OF INDUSTRIAL RESEARCH. OSHODI, P.M.B. 21023 IKEJA
3.	MR. P. O. ATANDA	NIGERIAN MACHINE TOOLS LTD. KM. 8 IKIRUN RD. P.M.B. 4343 OSOGBO
4.	MR. D. O. OPATOLA	NIGERIAN MACHINE TOOLS LTD. KM. 8 IKIRUN RD. P.M.B. 4343 OSOGBO
5.	MR. A. Q. SULEIMAN	FEDERAL MINISTRY OF INDUSTRY & TECHNOLOGY POLICY ANALYSIS DEPT. P.M.B. 231, GARKI ABUJA.
6.	MR. L O. KEKEMA	DIRECTORATE OF COMMERCE AND INDUSTRY, ASABA DELTA STATE
7.	MR. UMEMEZIA ANTHONY	DIRECTORATE OF COMMERCE AND INDUSTRY, ASABA DELTA STATE
8.	ENGR. L. O. FAWOLE	PURETHOUGHT ENGINEERING COMPANY LTD. P. O. BOX 8127, MAPO IBADAN
9.	MR. J. O. BOGUNJOKO	PAD FMI & T P.M.B. 5 U.I. P. O. IBADAN
10.	MR. J. N. IGWENEME	NNPC. ETD NO 9 WHARF ROAD APAPA LAGOS
11.	MR. SILAS O. ATTAMA	NIG. PAPER MILL LTD. P.M.B. 561 JEBBA

- | | | |
|-----|-------------------------|--|
| 12. | ENGR. A. F. AKINBINU | POLICY ANALYSIS DEPT.
FEDERAL MINISTRY OF
INDUSTRY AND TECHNOLOGY
P.M.B. 231, GARKI
ABUJA |
| 13. | DR. ODE OJOWU | POLICY ANALYSIS DEPT.
FEDERAL MINISTRY OF
INDUSTRY AND TECHNOLOGY
P.M.B. 231, GARKI
ABUJA |
| 14. | ENGR. O. O. ONUGU | NNPC LTD.
NO 9 WHARF ROAD
APAPA LAGOS |
| 15. | MR. I. O. ONUOHA | NBCI, NO. 19
ADEOLA HOPE WELL STR.
VICTORIA ISLAND LAGOS |
| 16. | ENGR. I. O. ADEGUN | POLICY ANALYSIS DEPT.
FEDERAL MINISTRY OF
INDUSTRY AND TECHNOLOGY
P.M.B. 231, GARKI
ABUJA |
| 17. | MR. ROMEO BARBEROPOULOS | NIG. FOUNDRIES LTD.
ILUPEJU INDUSTRIAL
ESTATE, LAGOS |
| 18. | MR. S. O. OLUBODE | A.I.B.
OKE-BOLA IBADAN |
| 19. | MR. ABIODUN G. B. | NEPA HQ,
MARINA, LAGOS |
| 20. | ACIBONG ENEOBONG | NO 5 IGHODARO ROAD
JERICHO, IBADAN |
| 21. | CHITTA SEN | ADEBOWALE ENGINEERING
SERVICES
KM 38 ABEOKUTA MOTOR RD
P. O. BOX 743 SANGO OTA
OGUN STATE |
| 22. | MR. O. O. SHOLAJA | ADEBOWALE ENGINEERING
SERVICES
KM 38 ABEOKUTA MOTOR RD.
P. O. BOX 743 SANGO OTA
OGUN STATE |
| 23. | MR. MIKE M. IRIBHOGBE | AJAOKUTA STEEL COMPANY
LTD. AJAOKUTA |

24. ENGR. DR. A OGUNLEYE MATERIALS INTERNATIONAL
74, AJILOSUN STREET,
P. O. BOX 1500
ADO-EKITI
ONDO STATE
25. PROF. L. A. SALAMI FACULTY OF ENGINEERING
UNIVERSITY OF BENIN
DELTA STATE
26. ELDER B. ADELAJA NASSI, OYO STATE
27. MR. T. RAJI MINISTRY OF FINANCE &
INDUSTRY, IBADAN
28. MR. J. F. AJAO (F.M.I. & T.) INDUSTRIAL
DEVELOPMENT CENTRE
P.M.B. 1035 SAMARU
ZARIA
29. MR. DAIKWO EBENE EBIJE ALIYU F.M.I. & T. (INDUSTRIAL
DEVELOPMENT CENTRE
P.M.B. 1035 SAMARU
ZARIA
30. DR. AKINOLA A. OWOSEKUN POLICY ANALYSIS DEPT.
FEDERAL MINISTRY OF
INDUSTRY AND TECHNOLOGY
P.M.B. 231 GARKI,
ABUJA
31. MR. P. A. R. STEPHEN NASSI OYO STATE
SANGO IBADAN
32. MRS. M. T. OGUNBONA POLICY ANALYSIS DEPT.
FEDERAL MINISTRY OF
INDUSTRY AND TECHNOLOGY
P.M.B. 5 U. I. P. O.
IBADAN
33. MR. F. I. IYANYA POLICY ANALYSIS DEPT.
FEDERAL MINISTRY OF
INDUSTRY AND TECHNOLOGY
P.M.B. 5 U. I. P. O.
IBADAN
34. ENGR. A. ABUBAKAR PAN LTD. KAKURI
INDUSTRIAL ESTATE
P.M.B. 459 KADUNA
35. ENGR. S. M. OGUNKELU NEPA HQ
P.M.B. 12030 MARINA
LAGOS

36. MR. O. I. OKOYE
POLICY ANALYSIS DEPT.
FEDERAL MINISTRY OF
INDUSTRY AND TECHNOLOGY
P.M.B. 231 GARKI
ABUJA
37. MR. D. T. ADEOSUN
POLICY ANALYSIS DEPT.
FEDERAL MINISTRY OF
INDUSTRY AND TECHNOLOGY
P.M.B. 231 GARKI
ABUJA
38. MR. M. O. ILORI
N.P.C IBADAN ZONE
39. MR. O. A. OLALEYE
NIGERIAN RAILWAY CORP.
EBUTTE METTA
LAGOS
40. MR. I. C. OSUJI
DEPT. MECH./ELEC. ENGR.
NIGERIA RAILWAY CO.
EBUTTE METTA
41. ENGR. O. LAWAL
NO. 14 ITIRE ROAD
MUSHIN
42. CHIEF A.A. IBIKUNLE
NIYI IBIKUNLE INDUSTRIES
LIMITED OSOGBO
43. ALHAJI A.K. TAIWO
ADEBOWALE ENGINEERING
SERVICES COMPANY LIMITED
SANGO OTTA
44. PRINCE A.J. JOHN
ADEBOWALE ENGINEERING
SERVICES COMPANY LIMITED
SANGO OTTA.
45. ENGR. A. S. YUSUFU
NIGERIAN PAPER MILL LTD.
P.M.B. 581 JEBBA
46. MR. I. O. LADELE
NPC IBADAN ZONAL
OFFICE
47. MR. ARTHUR MADUEKE
VOLKS WAGON OF NIG.
LTD. LAGOS
48. PROF. S. Y. AKU
AHMADU BELLO
UNIVERSITY ZARIA
49. DR. JAMES EWULE
DEPT. OF INDUSTRIAL
DESIGN ABU ZARIA
50. MR. S. O. SALAMI
ADEBOWALE ENGINEERING
SERVICES COMPANY LTD.
SANGO OTA

- | | | |
|-----|------------------|--------------------------------------|
| 51. | DR. TUNDE DADA | AHMADU BELLO UNIVERSITY
ZARIA |
| 52. | MR. P.A. OKWOR | IDC OSOGBO |
| 53. | DR. M. KWANASHIE | ITAP NATIONAL PROJECT
COORDINATOR |
| 54. | MR. P.K. SANDELL | UNIDO CONSULTANT |

ANNEXURE 9

PROGRAMME

Monday, 17th August, 1992.

0.9. ____ 10.30	INAUGURAL FUNCTION
	— ARRIVAL AND REGISTRATION
	— WELCOME ADDRESS:
	— KEYNOTE ADDRESS:
	— VOTE OF THANKS
	— COFFEE / TEA BREAK
10.30 ____ 11.00 a.m.	
11.00 ____ 12.00 noon	— SESSION 1
	OVERVIEW: Role of Foundry and Forge Sub-Sector in the Economic and Industrial Development of Nigeria.
12.30 ____ 02.00 p.m.	LUNCH
	— SESSION II
	— SUB-SECTOR STRUCTURE REVIEW: Foundry & Forge Industry Performance & Structure:
02.20 ____ 03.00 p.m.	— Discussion
03.00 ____ 03.20 p.m.	— Import of CKD/SKD, components, spares, including castings/forgings and problems of indigenisation.
03.40 ____ 04.00 p.m.	Manpower/HRD: current scenario, IDCs and R & D facilities (present/future)
04.00 ____ 04.20 p.m.	— Technology & Equipment : Present level import of machine and equipments, ARCEDEM facilities and infrastructure support.
04.20 ____ 05.30 p.m.	— Discussion

Tuesday, 18th August, 1992

09.00 ____ 10.30 A.M.	INAUGURAL FUNCTION
	WELCOME ADDRESS
	INAUGURAL ADDRESS
	VOTE OF THANKS
10.30 ____ 11.00 a.m.	COFFEE/TEA BREAK

BUYER-SELLER MEET**SESSION I**

11.00 A.M. — 01.00 P.M.

— Presentation by Buyers/
End-User Industries.

01.00 — 02.30 P.M.

— LUNCH

SESSION II

02.30 — 04.30 P.M.

— Presentation by
Manufacturers of castings
and forgings

04.30 — 05.30 P.M.

— Discussion (Session & III)

Wednesday, 19th August, 1992**INVESTMENT CLINIC**

09.00 A.M. — 09.30 A.M.

— Nigeria's Foundry & Forging
Industry:
A Blue Print for Inter and
Intra Industry Linkage:
UNIDO Consultant.

09.30 A.M. — 10.00 A.M.

— Modernisation/Technology.
Upgradation Schemes
Appropriate for Nigeria
UNIDO Consultant

11.00 A.M. — 11.30 A.M.

COFFEE/TEA BREAK

11.30 A.M. — 11.30 A.M.

Overview of Current
policy Affecting the Sub-
sector.

11.30 A.M. — 12.30 P.M.

Discussion

12.30 P.M. — 02.00 P.M.

LUNCH

02.00 P.M. — 03.00 P.M.

Presentation by Investment

Bankers/Association i.e.,
Manufacturers Association of
Nigeria:

Nigerian Society of Engineers

Nigerian Foundry Association:
Small scale Industries
Association

CONCLUDING

Group Discussion and
Recommendation: (Three
Groups).

Presentation of Summary of
Group recommendations/
Manual for the Sub-sector
Dr. Mike Kwanashie.

ANNEXURE 10

BUYER - SELLER MEET - 18TH AUGUST, 1992

PROGRAMME

MORNING SESSION :KIND = USERSCOMPANY NAMES

Mr. Umar A. Abubakar	Peugeot Automobile (Nig.) Ltd. Kaduna.
Mr. Ichugh, F.P.	Savannah Sugar Company Ltd., P.M.B. 2230, Yola.
Silas O. Attama	Nigerian Paper Mill, Ltd., Jebba.
Mr. P.O. Atanda	Nigerian Machine Tools Company, Oshogbo.
Mr. O.A. Olaleye	Nigerian Railway Corporation, Lagos.

L U N C H

AFTERNOON SESSIONMANUFACTURER

Mr. Roneo Barberopoulos	- Nigerian Foundries Lagos.
Mr. Chitta Sen.	Adebowale Engineering Services Sango Otta.
Mr. M.M. Iribnogbe	Ajaokuta Steel Co.
Mr. J.F. Ajao	I. D. C. Zaria.
Mr. D.O. Opatola	Nigeria Machine Tools, Oshogbo.

D I S C U S S I O N

ANNEXURE 11

GROUP I: Buyer Seller Meet / Investment Clinic - ITAP Foundry Forge Sub-Sector workshop

Topic : Investment, Demand, Production and Import, Demand-Supply gap

Date : 19/8/92

Time : 3-4 pm.

COMPANY / ORGANISATION / REPRESENTATIVE

1. PAN LTD. KADUNA - (Umae A. Abubakar) - Convenor.
2. SAVANNAH Sugar, Yola - (Mr. Ichugh, I.P.)
3. Nigeria Machine Tools, Oshogbo - (Mr. P.O. Atanda)
4. Directorate of Commerce and Industry - (Mr. Umemezia Anthony)
5. Purethought Engineering Co. Ltd. Ibadan -(Engr. I.O. Fawole)
6. Nigeria paper Mill Ltd., Jebba - (Mr. Silas O. Attama)
7. P.A.D., Abuja - (Engr. B. Akinbinu)
8. ETD/NNPC, Apapa - (O.O. Onugu)
9. NBCI, Lagos - (I.O. Onuoha)
10. Adebowale Engineering Service Otta, (Chitta Sen)
11. Ajaokuta Steel Company - (Mr. M. Iribnogbe)
12. IDC, ZARIA - (J.F. Ajao)
13. NASSI, Oyo State - (Elder B. Adelaja)
14. NEPA Head Quarter, Lagos - (Engr. S.M. Ogunkelu)
15. P.A.D. (J.O. Bogunjoko)
16. Nigerian Railway Corporation - (Mr. O.A. Olaleye)
17. National Productivity Centre, Ibadan - (Mr. Oladele)
18. Nigerian paper Mill, Ltd., Jebba - (Engr. A.S. Yusuf)
19. Volkswagen of Nigeria, Lagos - (Arthur Madueke)
20. Prof. Aku, S.Y.
21. P.A.D. (Mr. Suleiman, A.Q.)

**GROUP II : Buyer Seller Meet / Investment Clinic - ITAP Foundry
Forge Sub - Sector workshop**

Topic : Infrastructure Requirement and Policy package

Date : 19/8/92

Time : 3 - 4 pm.

COMPANY / ORGANISATION / REPRESENTATIVE

1. Nigerian Foundries Ltd. Lagos (Romeo Barberopoulos)
2. FIIRO - (Mr. J.B. Bashir)
3. Nigeria Machine Tools, Oshogbo - (Mr. D.O. Opatola)
4. Directorate of Commerce and Industry Asaba - (Mr. Lekema)
5. NNPC, Apapa - (Mr. John N. Igweneme)
6. A.I.B., Okebola Ibadan - (Mr. S.O. Olubode)
7. NEPA Head quarter - (Abiodun G.B.)
8. MAN - (A. Eneobug)
9. Prof. L.A. Salami
10. Engr. (Dr) Ogunleye
11. Ministry of Finance and Industry - (T. Raji)
12. IDC, Zaria - (Daikwo Egene Edije Aliyu)
13. NASSI Oyo State - (Mr. P.A.R. Stephen)
14. National Productivity Centre, Ibadan - (Mr. M.O. Ilori)
15. P.A.D. (Engr. I.O. Adegun)
16. P.A.D. (Mrs. M.T. Ogunbona)
17. Nigerian Railway Corporation - (Mr. Ikenna C. Osuji)
18. Adebowale Engineering Service, Otta - (Mr. Solaja O.O.)
19. Industrial Development Centre, Oshogbo - (Mr. P.A. Okwor)
20. Mr. James Ewule

26 - 8 - 92

Dr. M. Kwanashie
Coordinator ITAP,
Policy Analysis Department
Federal Ministry of Industry & Technology
Ibadan.

Dear Dr. Mike,

PREPARATION OF THE FOUNDRY MANUAL

This note incorporates my suggestions regarding the Foundry-Forge Sub-Sector manual which we have discussed earlier.

Two working Groups were formed in the Workshop, & Buyer - Seller Meet / Investment Clinic, held at Policy Analysis Department during 17th - 19th August 1992. These groups consisted of civil servants, including research persons and academics, End-Users Industries, Manufacturers and Policy Analysis Department officials. The conveners were managerial persons from the automobile and Foundry Industry. The participants list of the two groups are attached herewith, which indicate that the groups were eminently capable to recommend Sub Sector goals and action plans.

The groups had the following background material as reference points for discussion and finalisation of their recommendations:

- (a) Executive Summary of the IMP Study
- (b) Buyer/Seller Interaction/Papers
- (c) The three papers presented at the Investment Clinic on 19th August, which summarised comprehensively the discussions during the first two days namely:
(i) MACROECONOMIC POLICY ENVIRONMENT, (ii) A BLUE PRINT FOR INTER-INDUSTRY LINKAGE AND (iii) MODERNISATION ROUTE FOR NIGERIAN COUNTRY FORGES

The working groups submitted their reports on the 19th evening which has been tape recorded and are available with the undersigned. In the concluding session, the groups recommended that:

The Manual should include the BLUE PRINT and "MACROECONOMIC POLICY ENVIRONMENT", along with their reports.

The participants' response Poll conducted after the Seminar confirmed the following:

- (1) Usefulness of Buyer - Seller Meet : Answer: Very Useful / Useful : 100%
- (2) deliberation / Topic most Informative / Useful to participants :
 - (a) Macroeconomic Policy Environment 20%
 - (b) Blue Print for Inter-Industry Linkage ...)
 - / Diversification of product Mix 60%
 - (c) almost all topics 20%

In view of this feedback from the response poll and the group consensus suggestion, I recommend that the Manual contents be as indicated in the attached Annexure.

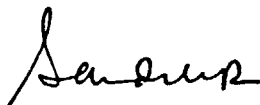
ALL THE MATERIAL ARE AVILABLE WITH US. THEY HAVE TO BE EDITED, COMPILED, PRINTED OR CIRCLOSTYLED AND BOUND TOGETHER IN THE FORM OF A BOOK. THIS CAN BE DONE WITHIN TWO WEEKS.

May I suggest 9th September as the target date I would be delighted if I can carry the Draft or a Mac-k-up of the Manual as an advanced copy to give to Mr. Mueller.

I am enclosing a copy of this note to Akram at UNIDO, with a request that UNIDO may raise an L.P.O. for printing the Manual, the cost of which will be covered by the budgeted amount which we have not spent on such items as Media/Press publicity etc.

I hope to leave for Vienna around the 10th September. Best regards and good wishes for the fine work you are doing.

Your sincerely,



P.K. Sandell

cc. Mr. R. Mueller

Country Director, UNIDO.

ANNEXURECONTENT OF THE MANUAL ON FOUNDRY FORGE SUB-SECTOR

This will be in Four parts.

Part ISeminar Preparation:

- (a) List of Persons / Companies Invited
- (b) Copies of standard letters to participants (End-Users, Producers, Suppliers, Banks) Copies of standard letters to resource persons. List of delegates attending the Seminar with full addresses. Copy of Seminar Programme. Copy of Buyer-Seller Programme (eight presentation), Gist of opening address by Dr. A. Owosekun and Dr. M. Kwanashie.

Part II

Foundry - Forge : Elementary Technical Information, (Process Description: Product-Mix examples (photograph); Elementary machinery & Plant description; raw materials specification in simple language)

The entire content should be copied from the Guidelines for a Demonstration Foundry, published by UNIDO (available in NISER Library - reference no given to Ogunbona).

(b) Photographs of castings can be taken from page 23-35 of the hand Book on Malleable Iron castings published by Oxford (available with P.K.S.)

(c) Photographs of Forgings and simple description of Elementary forging processes may be copied from the Manual on Forging and Metals, available with the undersigned.

Part III

Nigerian Foundry Forge Sub-Sector. The following papers can be compiled after editing to eliminate duplication (a) Executive Summary which has been updated in the light of the extensive feedback received at the Buyer-Seller meet / Investment Clinic. I do not recommend inclusion of the SCG reports, which has many factual errors and requires drastic revision of its investment proposals.

(b) A Chapter on LINKAGE BASED DEVELOPMENT MODEL FOR THE NIGERIAN FOUNDRY FORGE SUB-SECTOR (This will consist of the working groups reports, gist of the various discussion in the BUYER-SELLER MEET and INVESTMENT CLINIC and summary of the two papers presented by UNIDO consultant. This chapter is ready. (c) The MACROECONOMIC POLICY ENVIRONMENT^(d) edited version of the paper presented by the Users and Manufacturers (PAM) Savannah Sugar, Nigerian Machine Tools, Nigerian Paper Mill, Nigerian Foundries, Adebowale

Engineering Services, Ajaokuta Steel Company, Railway Corporation and Nigerian Bank for Commerce and Industry (NBSI). All the above materials are available.

TABLE II

- (a) Glossary : to be copied from the Malleable Iron Castings Hand book.
- (b) The BIBLIOGRAPHY will include all the papers presented in all the Seminars on the Sub-Sector held so far. (c) The Acknowledgment at the end can list all the Speakers, Resource persons, presenters.

The foreword can be written by Dr. Owosekun or yourself.

I suggest that no authors name be mentioned against any of the chapters in Honour for obvious reasons, except for the Policy Paper which may go under your name in view of its importance.

A. A. A.

C. E. (S) 11

ANNEXURE 13

150

Z. K. SANDELL

B. Tech (Hons), F.I.B.F.(U.K)

MANAGING DIRECTOR

JOSNA CASTING CENTER ORISSA (P) LTD, INDIA

CALCUTTA, INDIA, Tel: 789934

UNIDO CONSULTANT
IBADAN.

27-8-92

MR. R. MUELLER

Senior Industrial Development Officer,

Vienna International Centre,

P.O. Box 300

A - 1400 Vienna, Austria.

It was a great pleasure meeting you on the 14th and 15th August, '92 at Ibadan, when I had the opportunity of explaining to you the position regarding the Seminar, Buyer Seller Meet and Investment Clinic, which was subsequently held on the 17th - 19th August, at Policy Analysis Department.

I attach herewith the printed programme. The "Introduction" was written by me and approved by Dr. M. Fwanashile.

The Buyer Seller Meet and the Investment Clinic were a smashing success. For the first time, the majority of participants consisted, besides civil servants, the representatives of the Private and Public sector, Manufacturers, and End-Users. (Automobile, Cement, Paper, Sugar, Railways, Machine Tools etc. Industries). In addition the standard groups of Policy Analysis Department officials, ABU/Benin University professors, and State Government and Federal Government, Civil servants, the Manufacturers Association of Nigeria, Nigerian Association of Small Scale Industries, and the Nigeria Foundry Association also sent delegates.

In fact the President of the NFA openly declared that for the first time they were getting details of the requirement of the Foundry^{ies}/ Forging by Peugeot etc. He said it was pity that they could not think of such Buyer Seller Meet earlier, and thanked UNIDO for advising and helping in organising the Buyer Seller Meet.

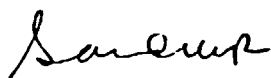
I attach herewith the answer to RESPONSE POLL, which will tell you about the Interest generated in the Buyer Seller Meet and to Investment Clinic.

The Response Poll shows that the paper on Blue Print for an Inter-Industry Linkage was found useful and informative. This indicates that not only civil servants, but manufacturers, End Users and Banks etc. are not just interested in having general lectures from academic persons; they want to understand, know about details of Foundry - Forge business, technology, production, generation of surplus, specific Investment proposals etc, based on SMID principles, all of which were linked together and woven in a framework, for presentation in the Workshop/ *the BLUE PRINT.*

herewith), regarding the Manual. This letter is self explanatory. It will now depend on PAD's initiative to complete the manual by the 9th September as planned. I have just finished writing the most important chapter to be included in the Manual entitled "LINKAGE BASED DEVELOPMENT MODEL FOR THE NIGERIAN FOUNDRY - FORGE SUB-SECTOR." I have now taken up writing my report and hope to send you the same by 7th September through the UNIDO Lagos Office.

With my best regards.

Your sincerely,



P.K. SANDELL.

cc. Response Poll (27 nos. received out 34 questionnaires issued).

Printed Programme

List of Groups 1 and 2

ANNEXURE 14Participant's Response Poll

ON WORKSHOP, BUYER-SELLER MEET & INVESTMENT CLINIC ON FOUNDRY &
FORGE SUB-SECTOR IN NIGERIA (17TH-19TH AUGUST 1992)

Comment's from: End-User

Name: ENGR. O.A. OLALEYE

Company/Organisation
or Ministry : NIGERIAN RAILWAY CORPORATION LAGOS.

Q1 Have you attended a Buyer Seller meet earlier?

Answer : NO

Q2 Have you found the Buyer Seller meet useful? If yes, in what respects. If No, What should be done in future?

Answer : YES. IT HAS AFFORDED ME THE OPPORTUNITY TO SOURCE THE INDUSTRIES WHERE MY CASTINGS CAN BE DONE.

Q3a. What have you/your Company/Ministry/Organisation gained from the Seminar?

Answer : IT WILL IMPROVE ON THE PRODUCTION TECHNIQUES PRESENTLY EMPLOYED.

b. Which deliberation/topic was most informative/useful?

Answer : GOVERNMENT POLICIES AND THE DEVELOPMENT OF FOUNDRY INDUSTRY IN NIGERIA

Q4. In what area can you/your organisation/company contribute to the development of the Foundry-Forge industries in Nigeria?

Answer : IN THE AREA OF CASTING OF MACHINE PARTS

Q5a. Would you like a Directory on Foundry-Forge Industry in Nigeria to be published?

Answer : NO

b. Will you purchase copy if the Directory is priced?

Answer : YES IF PRICE IS MODERATE

Participant's Response Poll

ON WORKSHOP, BUYER-SELLER MEET & INVESTMENT CLINIC ON FOUNDRY &
FORGE SUB-SECTOR IN NIGERIA (17TH-19TH AUGUST 1992)

Comment's from: ASSOCIATION (PRODUCTIVITY COUNCIL)

Name: OLADELE I.O.

Company/Organisation
or Ministry : NATIONAL PRODUCTIVITY CENTRE

Q1 Have you attended a Buyer Seller meet earlier?

Answer : NO

Q2 Have you found the Buyer Seller meet useful? If yes, in what
respects. If No, What should be done in future?

Answer : ADEQUATELY EXPOSED & EDUCATED

Q3a. What have you/your Company/Ministry/Organisation gained from
the Seminar?

Answer : THE IMPORTANCE OF THE SECTOR TO TECHNOLOGICAL/ECONOMIC
GROWTH

b. Which deliberation/topic was most informative/useful?

Answer : MACRO-ECONOMIC POLICY ENVIRONMENT

Q4. In what area can you/your organisation/company contribute to
the development of the Foundry-Forge industries in Nigeria?

Answer : AWARENESS CREATION

Q5a. Would you like a Directory on Foundry-Forge Industry in
Nigeria to be published?

Answer : YES

b. Will you purchase copy if the Directory is priced?

Answer : YES

Participant's Response Poll

ON WORKSHOP, BUYER-SELLER MEET & INVESTMENT CLINIC ON FOUNDRY &
FORGE SUB-SECTOR IN NIGERIA (17TH-19TH AUGUST 1992)

Comments from: CONSULTANT

Name: ENGR. DR. AJIBADE OGUNLEYE

Company/Organisation
or Ministry : MATERIALS INTERNATIONAL, ADO-EKITI

Q1 Have you attended a Buyer Seller meet earlier?

Answer . NO

Q2 Have you found the Buyer Seller meet useful? If yes, in what
respects. If No, What should be done in future?

Answer : YES, IT AFFORDS ON OPPORTUNITY TO RECONCILE
DIFFERENT VIEWS SO FAR EXPRESSED BY THE INDIVIDUAL

Q3a. What have you/your Company/Ministry/Organisation gained from
the Seminar?

Answer : ESTABLISHED A NEED TO REVIEW THE DATA EMANATING
FROM THE EXECUTIVE SUMMARY AND THE SCG REPORTS

b. Which deliberation/topic was most informative/useful?

Answer : ALL THE PRESENTATIONS WERE MEANINGFUL

Q4. In what area can you/your organisation/company contribute to
the development of the Fooundry-Forge industries in Nigeria?

Answer : ACT AS A CONSULTANT TO DISSEMINATE INFORMATION AT
LOCAL GOVERNMENT STATE LEVELS AND DELIVER SPECIALIST
LECTURES TO SPECIFIC RELEVANT TARGETS E.G ICAN,NIPPS

Q5a. Would you like a Directory on Foundry-Forge Industry in
Nigeria to be published?

Answer : YES

b. Will you purchase copy if the Directory is priced?

Answer : YES

Participant's Response PollON WORKSHOP, BUYER-SELLER MEET & INVESTMENT CLINIC ON FOUNDRY &
FORGE SUB-SECTOR IN NIGERIA (17TH-19TH AUGUST 1992)

Comment's from: END-USER

Name: ONUFU ONYEKACHI OMAKA

Company/Organisation
or Ministry : ETD/NNPC APAPA NO. 9, WHARF RD. APAPA.

Q1 Have you attended a Buyer Seller meet earlier?

Answer : NO

Q2 Have you found the Buyer Seller meet useful? If yes, in what respects. If No, What should be done in future?

Answer : YET TO BE HELD

Q3a. What have you/your Company/Ministry/Organisation gained from the Seminar?

Answer : Apart from knowing that Foundry Association of Nigeria exists to and requires encouragement, I have gained fair knowledge on foundry technology

b. Which deliberation/topic was most informative/useful?

Answer : I will like to say that very many of the topics presented have been useful and informative

Q4. In what area can you/your organisation/company contribute to the development of the Foundry-Forge industries in Nigeria?

Answer : By being one of the major users of products from Foundry - Forge industries.

Q5a. Would you like a Directory on Foundry-Forge Industry in Nigeria to be published?

Answer : YES

b. Will you purchase copy if the Directory is priced?

Answer : YES

Participant's Response Poll

ON WORKSHOP, BUYER-SELLER MEET & INVESTMENT CLINIC ON FOUNDRY &
FORGE SUB-SECTOR IN NIGERIA (17TH-19TH AUGUST 1992)

Comment's from: PRODUCER

Name: MIKE M. IRIBHOGBE

Company/Organisation
or Ministry : AJAOKUTA STEEL COMPANY LIMITED.

Q1 Have you attended a Buyer Seller meet earlier?

Answer : NO

Q2 Have you found the Buyer Seller meet useful? If yes, in what respects. If No, What should be done in future?

Answer : This workshop will be more workable if there is pressure - group to convey these deliberations to the highest quater in all respects.

Q3a. What have you/your Company/Ministry/Organisation gained from the Seminar?

Answer : All areas on diversification of products-mix and equipment.

b. Which deliberation/topic was most informative/useful?

Answer :

Q4. In what area can you/your organisation/company contribute to the development of the Fooundry-Forge industries in Nigeria?

Answer : Heavy castings - Steel Iron and Non-ferrous

Q5a. Would you like a Directory on Foundry-Forge Industry in Nigeria to be published?

Answer : YES

b. Will you purchase copy if the Directory is priced?

Answer : YES

Participant's Response Poll

ON WORKSHOP, BUYER-SELLER MEET & INVESTMENT CLINIC ON FOUNDRY &
FORGE SUB-SECTOR IN NIGERIA (17TH-19TH AUGUST 1992)

Comment's from: SMALL SCALE INDUSTRIES ASSOCIATION

Name : MR. P. R. STEPHENS.

Company/Organisation
or Ministry : NIGERIAN ASSOCIATION ON SMALL SCALE
INDUSTRIALIST (NASSI), OYO STATE

Q1 Have you attended a Buyer Seller meet earlier?

Answer : NO

Q2 Have you found the Buyer Seller meet useful? If yes, in what
respects. If No, What should be done in future?

Answer : YES, very useful. The Buyer Seller meeting has
given me the much information on relevant to establish
a foundry in the near future. Indeed I am joining the
Foundry Association of Nigeria Courtesy of this
workshop.

Q3a. What have you/your Company/Ministry/Organisation gained from
the Seminar?

Answer : We have gained a lot. It is too numerous to
qualify. The papers submitted by Mr. Sandell UNIDO
Consultant and Mrs. Ogunbona's presentation interest me
most.

b. Which deliberation/topic was most informative/useful?

Answer : as above

Q4. In what area can you/your organisation/company contribute to
the development of the Foundry-Forge industries in Nigeria?

Answer : Through enlightenment and education of N.A.S.S.I.
members. I will also take to Foundry and Forge in the
near future.

Q5a. Would you like a Directory on Foundry-Forge Industry in Nigeria to be published?

Answer : YES

b. Will you purchase copy if the Directory is priced?

Answer : YES

Participant's Response PollON WORKSHOP, BUYER-SELLER MEET & INVESTMENT CLINIC ON FOUNDRY &
FORGE SUB-SECTOR IN NIGERIA (17TH-19TH AUGUST 1992)

Comment's from: END-USER

Name : ARTHUR MADUEKE

Company/Organisation
or Ministry : VOLKSWAGEN NIGERIA LIMITED LAGOS.

Q1 Have you attended a Buyer Seller meet earlier?

Answer : NO

Q2 Have you found the Buyer Seller meet useful? If yes, in what respects. If No, What should be done in future?

Answer : YES, It has brought awareness on product availability, investment problems and possible means of ameliorating the problems.

Q3a. What have you/your Company/Ministry/Organisation gained from the Seminar?

Answer : Since my organisation is interested in setting up a Foundry / Forge we have gained a lot of insight into the industry especially foundry/forging for the automotive industry.

b. Which deliberation/topic was most informative/useful?

Answer : Found all presentations interesting.

Q4. In what area can you/your organisation/company contribute to the development of the Foundry-Forge industries in Nigeria?

Answer : As state we are studying the feasibility of setting up a Foundry/Forge.

Q5a. Would you like a Directory on Foundry-Forge Industry in Nigeria to be published?

Answer : YES

b. Will you purchase copy if the Directory is priced?

Answer : YES

Participant's Response Poll

ON WORKSHOP, BUYER-SELLER MEET & INVESTMENT CLINIC ON FOUNDRY &
FORGE SUB-SECTOR IN NIGERIA (17TH-19TH AUGUST 1992)

Comment's from: PRODUCER / END-USER

Name : ATANDA, P.O.

Company/Organisation
or Ministry : N.M.T. LIMITED, OSOGBO.

Q1 Have you attended a Buyer Seller meet earlier?

Answer : NO

Q2 Have you found the Buyer Seller meet useful? If yes, in what
respects. If No, What should be done in future?

Answer : YES. It gives me the insight of the customers needs.

Q3a. What have you/your Company/Ministry/Organisation gained from
the Seminar?

Answer : The need to always meet customers demand at Delivery
time

b. Which deliberation/topic was most informative/useful?

Answer : Investment Clinics.

Q4. In what area can you/your organisation/company contribute to
the development of the Fooundry-Forge industries in Nigeria?

Answer: By trying always to produce finally castings.

Q5a. Would you like a Directory on Foundry-Forge Industry in
Nigeria to be published?

Answer : YES

b. Will you purchase copy if the Directory is priced?

Answer : YES

Participant's Response Poll

ON WORKSHOP, BUYER-SELLER MKET & INVESTMENT CLINIC ON FOUNDRY &
FORGE SUB-SECTOR IN NIGERIA (17TH-19TH AUGUST 1992

Comment's from: PRODUCER / END-USER

Name : DAVID O. OPATOLA

Company/Organisation
or Ministry : NIGERIA MACHINE TOOLS LTD. OSOGBO.

Q1 Have you attended a Buyer Seller meet earlier?

Answer : NO

Q2 Have you found the Buyer Seller meet useful? If yes, in what
respects. If No, What should be done in future?

Answer : YES, Informative; problems identifying

Q3a. What have you/your Company/Ministry/Organisation gained from
the Seminar?

Answer : It has helped to interest with people having the same
problems and how such problems can be solved.

b. Which deliberation/topic was most informative/useful?

Answer : Buyer/Seller session especially on castings and
forges requirements by various industries

Q4. In what area can you/your organisation/company contribute to
the development of the Fooundry-Forge industries in Nigeria?

Answer : By May, 1993, we shall have enough facilities to
train people in area of pattern design and foundry; as
well as produce alloyed steel castings in area of
comparative advantages to buyer of cast products.

Q5a. Would you like a Directory on Foundry-Forge Industry in
Nigeria to be published?

Answer : YES

b. Will you purchase copy if the Directory is priced?

Answer : YES

Participant's Response Poll

ON WORKSHOP, BUYER-SELLER MEET & INVESTMENT CLINIC ON FOUNDRY &
FORGE SUB-SECTOR IN NIGERIA (17TH-19TH AUGUST 1992)

Comment's from: PRODUCER

Name : R. BARBEROPOULOS & PRESIDENT, NIGERIAN FOUNDRY ASS.

Company/Organisation
or Ministry : NIGERIAN FOUNDRIES LIMITED

Q1 Have you attended a Buyer Seller meet earlier?

Answer : YES

Q2 Have you found the Buyer Seller meet useful? If yes, in what
respects. If No, What should be done in future?

Answer : YES. In appreciating Buyer problems

Q3a. What have you/your Company/Ministry/Organisation gained from
the Seminar?

Answer : Information

b. Which deliberation/topic was most informative/useful?

Answer : Most

Q4. In what area can you/your organisation/company contribute to
the development of the Foundry-Forge industries in Nigeria?

Answer : Interaction Buyer SELLER through Foundry
Association of Nigeria.

Q5a. Would you like a Directory on Foundry-Forge Industry in
Nigeria to be published?

Answer : Very much so.

b. Will you purchase copy if the Directory is priced?

Answer : YES.

Participant's Response Poll

ON WORKSHOP, BUYER-SELLER MEET & INVESTMENT CLINIC ON FOUNDRY &
FORGE SUB-SECTOR IN NIGERIA (17TH-19TH AUGUST 1992)

Comment's from: END-USER

Name: ENGR. JOHN NNAMDI IGWENEME

Company/Organisation
or Ministry : NNPC. 9 Wharf Rd. Apapa Lagos.

Q1 Have you attended a Buyer Seller meet earlier?

Answer : NO

Q2 Have you found the Buyer Seller meet useful? If yes, in what
respects. If No, What should be done in future?

Answer : In the exchange of ideas.

Q3a. What have you/your Company/Ministry/Organisation gained from
the Seminar?

Answer : YES.

b. Which deliberation/topic was most informative/useful?

Answer : A Blue print for inter & Intra Industry linkage
for the Nigerian Foundry & Forge Industries.

Q4. In what area can you/your organisation/company contribute to
the development of the Foundry-Forge industries in Nigeria?

Answer : Patonised them in some of our Spare parts.

Q5a. Would you like a Directory on Foundry-Forge Industry in
Nigeria to be published?

Answer : YES

b. Will you purchase copy if the Directory is priced?

Answer : YES

Participant's Response Poll**ON WORKSHOP, BUYER-SELLER MEET & INVESTMENT CLINIC ON FOUNDRY &
FORGE SUB-SECTOR IN NIGERIA (17TH-19TH AUGUST 1992)**

Comment's from: Civil Servant

Name: L.O. KEKEMA

Company/Organisation Directorate of Commerce & Industry, Asaba
or Ministry

Q1 Have you attended a Buyer Seller meet earlier?

Answer Yes

Q2 Have you found the Buyer Seller meet useful? If yes, in what respects. If No. What should be done in future?

Answer Yes it is useful, for it provides an opportunity to identify some production and commercial problems.

Q3a. What have you/your Company/Ministry/Organisation gained from the Seminar?

Answer In the first place, it provides a forum to meet industrialists, especially sellers. Problems were identified from production and commercial perspective. Policy input could be projected or modified as a way of removing bottlenecks and accelerating industrialisation

3b. Which deliberation/topic was most informative/useful?

Answer

Q4. In what area can you/your organisation/company contribute to the development of the Foundry-Forge industries in Nigeria?

Answer: The major area where my organisation can contribute to foundry development is essentially in the area of policy formulation?

Q5a. Would you like a Directory on Foundry-Forge Industry in Nigeria to be published?

Answer Yes

b. Will you purchase copy if the Directory is priced?

Answer Yes.

Participant's Response Poll

ON WORKSHOP, BUYER-SELLER MEET & INVESTMENT CLINIC ON FOUNDRY &
FORGE SUB-SECTOR IN NIGERIA (17TH-19TH AUGUST 1992)

Comment's from: End-User

Name: Ikenna C. Osuji

Company/Organisation
or Ministry: Nigerian Railway Corporation

Q1 Have you attended a Buyer Seller meet earlier?

Answer: No

Q2 Have you found the Buyer Seller meet useful? If yes, in what respects. If No, What should be done in future?

Answer: Yes, it has offered us communication access to air our problems and capabilities. Also solution offered through this interaction.

Q3a. What have you/your Company/Ministry/Organisation gained from the Seminar?

Answer: We have come to know companies to source some of our materials locally

b. Which deliberation/topic was most informative/useful?

Answer Solution to our foundry problems and ways of expansion

Q4. In what area can you/your organisation/company contribute to the development of the Fooundry-Forge industries in Nigeria?

Answer: Production of spare parts through casting. forging and fabrication

Q5a. Would you like a Directory on Foundry-Forge Industry in Nigeria to be published?

Answer Yes

b. Will you purchase copy if the Directory is priced?

Answer: Yes

Participant's Response Poll

ON WORKSHOP, BUYER-SELLER MEET & INVESTMENT CLINIC ON FOUNDRY &
FORGE SUB-SECTOR IN NIGERIA (17TH-19TH AUGUST 1992)

Comment's from: Civil Servant

Name: J.F. AJAO

Company/Organisation
or Ministry: I.D.C. Zaria

Q1 Have you attended a Buyer Seller meet earlier?

Answer: No

Q2 Have you found the Buyer Seller meet useful? If yes, in what respects. If No, What should be done in future?

Answer Yes An opportunity to sheer views with other experts in foundry and forging industries

Q3a. What have you/your Company/Ministry/Organisation gained from the Seminar?

Answer Useful informations on how to improve our present standard

b. Which deliberation/topic was most informative/useful?

Answer Presentation of Mr. P. K Sandell & Contributions from Dr Ogunleye, & Mrs Ogunbona's Paper.

Q4. In what area can you/your organisation/company contribute to the development of the Fooundry-Forge industries in Nigeria?

Answer In the area of deseminating information and materials to would be investors all over the federation through our usual functions.

Q5a. Would you like a Directory on Foundry-Forge Industry in Nigeria to be published?

Answer Yes

b. Will you purchase copy if the Directory is priced?

Answer Yes

Participant's Response PollON WORKSHOP, BUYER-SELLER MEET & INVESTMENT CLINIC ON FOUNDRY &
FORGE SUB-SECTOR IN NIGERIA (17TH-19TH AUGUST 1992)

Comment's from: Civil Servant - Ministry

Name: Umemez A. Anthony

Company/Organisation
or Ministry Directorate of Comm. & Indu. Delta State.

Q1 Have you attended a Buyer Seller meet earlier?

Answer NO

Q2 Have you found the Buyer Seller meet useful? If yes, in what respects. If No, What should be done in future?

Answer: Yes, it provided a thorough insight into the sub-sector.

Q3a. What have you/your Company/Ministry/Organisation gained from the Seminar?

Answer Proper guidance and information can now be given to would be entrepreneurs and consumers

b. Which deliberation/topic was most informative/useful?

Answer Government policies and the development of foundry industry in Nigeria by the President of Foundry Association of Nigeria.

Q4. In what area can you/your organisation/company contribute to the development of the Foundry-Forge industries in Nigeria?

Answer: Promotional and dissemination of appropriate information

Q5a. Would you like a Directory on Foundry-Forge Industry in Nigeria to be published?

Answer Yes

b. Will you purchase copy if the Directory is priced?

Answer: Yes

Participant's Response Poll**ON WORKSHOP, BUYER-SELLER MEET & INVESTMENT CLINIC ON FOUNDRY & FORGE SUB-SECTOR IN NIGERIA (17TH-19TH AUGUST 1992)**

Comment's from: End User

Name: Ichugh I.P

Company/Organisation: Savannah Sugar Company Limited, Nuwan-
or Ministry: Nigeria.

Q1 Have you attended a Buyer Seller meet earlier?

Answer: Yes

Q2 Have you found the Buyer Seller meet useful? If yes, in what respects. If No, What should be done in future?

Answer: Yes opportunity to meet face to face with manufacturers and make comments on their products supplied to us.

Q3a. What have you/your Company/Ministry/Organisation gained from the Seminar?

Answer: I have been able to know the capabilities of the existing foundries in terms of facilities and constraints and also future plans.

b. Which deliberation/topic was most informative/useful?

Answer: (1) A blue print for inte and intra industry linkage for the Nigerian Foundry and forge industries

(2) Enhancing capacity utilization of Nigerian Foundries-Points to ponderon

Q4. In what area can you/your organisation/company contribute to the development of the Foundry-Forge industries in Nigeria?

Answer (1) By patronage

(2) Moral support

Q5a. Would you like a Directory on Foundry-Forge Industry in Nigeria to be published?

Answer: Yes

b. Will you purchase copy if the Directory is priced?

Answer: Yes

Participant's Response Poll

ON WORKSHOP, BUYER-SELLER MEET & INVESTMENT CLINIC ON FOUNDRY &
FORGE SUB-SECTOR IN NIGERIA (17TH-19TH AUGUST 1992)

Comment's from: End-User

Name: Mr. SILAS O. ATTAMA

Company/Organisation
or Ministry: NIG. PAPER MILL LTD., JEBBA

Q1 Have you attended a Buyer Seller meet earlier?

Answer: No

Q2 Have you found the Buyer Seller meet useful? If yes, in what
respects. If No, What should be done in future?

Answer: Yes In learning for the first time the operation and
existence of some possible good foundry houses,
I did not know before now.

Q3a. What have you/your Company/Ministry/Organisation gained from
the Seminar?

Answer Knowledge of where to train on prospective foundry
personnels.

b. Which deliberation/topic was most informative/useful?

Answer: A blue print for inter & intra industry linkage for the
Nigerian Foundry & Forge Industry

Q4. In what area can you/your organisation/company contribute to
the development of the Foundry-Forge industries in Nigeria?

Answer: Cut down our projected foreign sourcing.

Q5a. Would you like a Directory on Foundry-Forge Industry in
Nigeria to be published?

Answer: Yes

b. Will you purchase copy if the Directory is priced?

Answer: Yes, if the price is moderate.

Participant's Response Poll**ON WORKSHOP, BUYER-SELLER MEET & INVESTMENT CLINIC ON FOUNDRY & FORGE SUB-SECTOR IN NIGERIA (17TH-19TH AUGUST 1992)**

Comment's from: Small-scale industrialist

Name: Engr. L.O. Fawole

Company/Organisation: Pure thought Engineering Co. Ltd., Ibadan
or Ministry: (NASSI, Oyo State).

Q1 Have you attended a Buyer Seller meet earlier?

Answer: No

Q2 Have you found the Buyer Seller meet useful? If yes, in what respects. If No, What should be done in future?

Answer: Yes, product and quality preferences of the buyer is known. The buyer can then amend his process to meet the demand. But there must be a mutual resolve to grow together.

Q3a. What have you/your Company/Ministry/Organisation gained from the Seminar?

Answer: Technology acquisitions should be based on a contemporary point in the progress of world wide technology grouping of foundries and the escalator illustrating.

b. Which deliberation/topic was most informative/useful?

Answer: its progress is very useful to Policy

Q4. In what area can you/your organisation/company contribute to the development of the Foundry-Forge industries in Nigeria?

Answer: By direct participation

Q5a. Would you like a Directory on Foundry-Forge Industry in Nigeria to be published?

Answer: Yes

b. Will you purchase copy if the Directory is priced?

Answer: Yes

Participant's Response Poll

ON WORKSHOP, BUYER-SELLER MEET & INVESTMENT CLINIC ON FOUNDRY &
FORGE SUB-SECTOR IN NIGERIA (17TH-19TH AUGUST 1992)

Comment's from: Civil Servant (Research)

Name: I.B. Bashir

Company/Organisation: Fed. Inst. of Ind. Res. Oshodi
or Ministry

Q1 Have you attended a Buyer Seller meet earlier?

Answer: Yes

Q2 Have you found the Buyer Seller meet useful? If yes, in what
respects. If No, What should be done in future?

Answer: Yes

Q3a. What have you/your Company/Ministry/Organisation gained from
the Seminar?

Answer: Opportunity to interact will follow foundry practitioners

b. Which deliberation/topic was most informative/useful?

Answer: All

Q4. In what area can you/your organisation/company contribute to
the development of the Foundry-Forge industries in Nigeria?

Answer: Already we support foundries all over Lagos in R&D.

Q5a. Would you like a Directory on Foundry-Forge Industry in
Nigeria to be published?

Answer: Yes

b. Will you purchase copy if the Directory is priced?

Answer: Yes

Participant's Response PollON WORKSHOP, BUYER-SELLER MEET & INVESTMENT CLINIC ON FOUNDRY &
FORGE SUB-SECTOR IN NIGERIA (17TH-19TH AUGUST 1992)

Comment's from: Civil Servant

Name: Raji T.

Company/Organisation: Min. of Finance & Industry, Oyo State
or Ministry Ibadan

Q1 Have you attended a Buyer Seller meet earlier?

Answer: No

Q2 Have you found the Buyer Seller meet useful? If yes, in what respects. If No, What should be done in future?

Answer: Yes it afforded the buyer and seller the opportunity to interact and remove the abstract that has been causing a lot of hitches in communication

Q3a. What have you/your Company/Ministry/Organisation gained from the Seminar?

Answer: It enables my Ministry to know the viability and investment opportunities that abound in the foundry and forge sub-sector

b. Which deliberation/topic was most informative/useful?

Answer: None is useless

Q4. In what area can you/your organisation/company contribute to the development of the Foundry-Forge industries in Nigeria?

Answer: Granting of loans to interested individuals for the establishment of foundry-forge cottage industry.

Q5a. Would you like a Directory on Foundry-Forge Industry in Nigeria to be published?

Answer: Yes

b. Will you purchase copy if the Directory is priced?

Answer: No comment.

Participant's Response PollON WORKSHOP, BUYER-SELLER MEET & INVESTMENT CLINIC ON FOUNDRY &
FORGE SUB-SECTOR IN NIGERIA (17TH-19TH AUGUST 1992)

Comments from: Manufacturer's Association

Name: Asibong Eneobong

Company/Organisation: Manufacturers Association of Nigeria
or Ministry

Q1 Have you attended a Buyer Seller meet earlier?

Answer

Q2 Have you found the Buyer Seller meet useful? If yes, in what respects. If No, What should be done in future?

Answer Educative

Q3a. What have you/your Company/Ministry/Organisation gained from the Seminar?

Answer: That the Association is relevant in the economy

b. Which deliberation/topic was most informative/useful?

Answer: The blue print for inter and intra industry linkage for the Nigeria foundry and forge.

Q4. In what area can you/your organization/company contribute to the development of the Foundry-Forge industries in Nigeria?

Answer: If they are well coordinated and monitored by MAN there could be strategic planning and development.

Q5a. Would you like a Directory on Foundry-Forge industry in Nigeria to be published?

Answer: MAN should have listed them all in the MAN Directory if they were members of the Association.

b. Will you purchase copy if the Directory is priced?

Answer: MAN publishes directory once in every four years. The latest would be launched soon.

Participant's Response Poll

ON WORKSHOP, BUYER-SELLER MEET & INVESTMENT CLINIC ON FOUNDRY &
FORGE SUB-SECTOR IN NIGERIA (17TH-19TH AUGUST 1992)

Comment's from: Banker

Name: I.O. Onuoha

Company/Organisation: Nigerian Bank for Commerce & Industry
or Ministry

Q1 Have you attended a Buyer Seller meet earlier?

Answer: No

Q2 Have you found the Buyer Seller meet useful? If yes, in what
respects. If No, What should be done in future?

Answer: Yes It makes it possible for buyers and sellers to see
one another and sort out their problems

Q3a. What have you/your Company/Ministry/Organisation gained from
the Seminar?

Answer: Greater awareness for the Development of the Foundry &
Forge Industry

b. Which deliberation/topic was most informative/useful?

Answer: Foundry Industry-Linkage with Automotive Industry
delivered by P.K. Sandell.

Q4. In what area can you/your organisation/company contribute to
the development of the Fooundry-Forge industries in Nigeria?

Answer: Through proper counseling, Advising and funding of small
scale foundries

Q5a. Would you like a Directory on Foundry-Forge Industry in
Nigeria to be published?

Answer: Yes

b. Will you purchase copy if the Directory is priced?

Answer: Yes

Participant's Response Poll**ON WORKSHOP, BUYER-SELLER MEET & INVESTMENT CLINIC ON FOUNDRY &
FORGE SUB-SECTOR IN NIGERIA (17TH-19TH AUGUST 1992**

Comment's from: Civil Servant

Name: Daikwo Egewe E. Aliyu

Company/Organisation: FMIT (IDC Zaria)
or Ministry

Q1 Have you attended a Buyer Seller meet earlier?

Answer: No

Q2 Have you found the Buyer Seller meet useful? If yes, in what respects. If No, What should be done in future?

Answer: Very useful information has been achieved and I would like to be invited again

Q3a. What have you/your Company/Ministry/Organisation gained from the Seminar?

Answer: Information on foundry and forges linkage

b. Which deliberation/topic was most informative/useful?

Answer: A blue print for inter and intra foundry linkage for the Nigerian foundry and forges industries

Q4. In what area can you/your organisation/company contribute to the development of the Ffoundry-Forge industries in Nigeria?

Answer: Promotion of foundry raw materials and dissemination of the information to the small scale industrialists in Nigeria.

Q5a. Would you like a Directory on Foundry-Forge Industry in Nigeria to be published?

Answer: Yes

b. Will you purchase copy if the Directory is priced?

Answer: Yes

ANNEXURE 15**APPENDIX****IMPORTS OF FOUNDRY - FORGE AND
RELATED SUB-SECTORS**

The PAD Study on the Metal Fabrication Sub Sector (April 1992) indicate that sixty percent of Nigerias imports are products of the basic metal and engineering industries. In fact eight percent of the manufactured goods imported are classified by "iron and steel" material, equal to a value of N1400 million. (pre-devaluation rate). Five sub groups in the engineering sub-sector have been identified, e.g. Foundries and Forge, Metal Fabrication, M/C tools, Vehicle Assembly and Electric/Electronic industry.

This heavy import, which will probably reach N2 billion, after the latent devaluation, constitutes not only a huge burden on the exchequer, which is already starved of foreign exchange; it calls for urgent steps to be taken to set up the foundation of machinery manufacturing activity in Nigeria. This foundation is made up by the basic sub-sector of foundry - forge and M/C shops. These industries at present do not meet even the spares requirement for other sectors adequately - leading to heavy dependence on import to keep the industry running. The STUDY has brought out the volume of import in foundry forge and related end-user sectors very clearly as follows :

<u>IMPORT</u>	<u>VALUE</u> (million Naira-Pre devaluation)
Spare Part and Components (ref: Kwanashie)	--- 450 (average)
Machine Tool ** (806 tonnes-1986)	--- 11

<u>IMPORT</u>	<u>VALUE (million Naira pre devaluation)</u>
Foundry / Forge (RAW)*** (1987)	--- 9
Pipe and Tubes (both wrought and cast) average (1985 - 1987)*** 41000 t/y	--- 19

Out of the above, the import of spare part and components, which are, as already stated, heavily dependent on availability appropriate foundry, forge, machine shop and metal fabrication facilities, is likely to peak to an import value of 750 million Naira . (Ref: PAD study on Metal Spare Parts and Component study 1990).

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- * PAD Seminar papers on Spare Parts components. National Project co-ordinator Dr. Mike Kwanashie.
 - ** Diagnostic Survey Report.
 - *** PAD Study.

Annexure 16
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