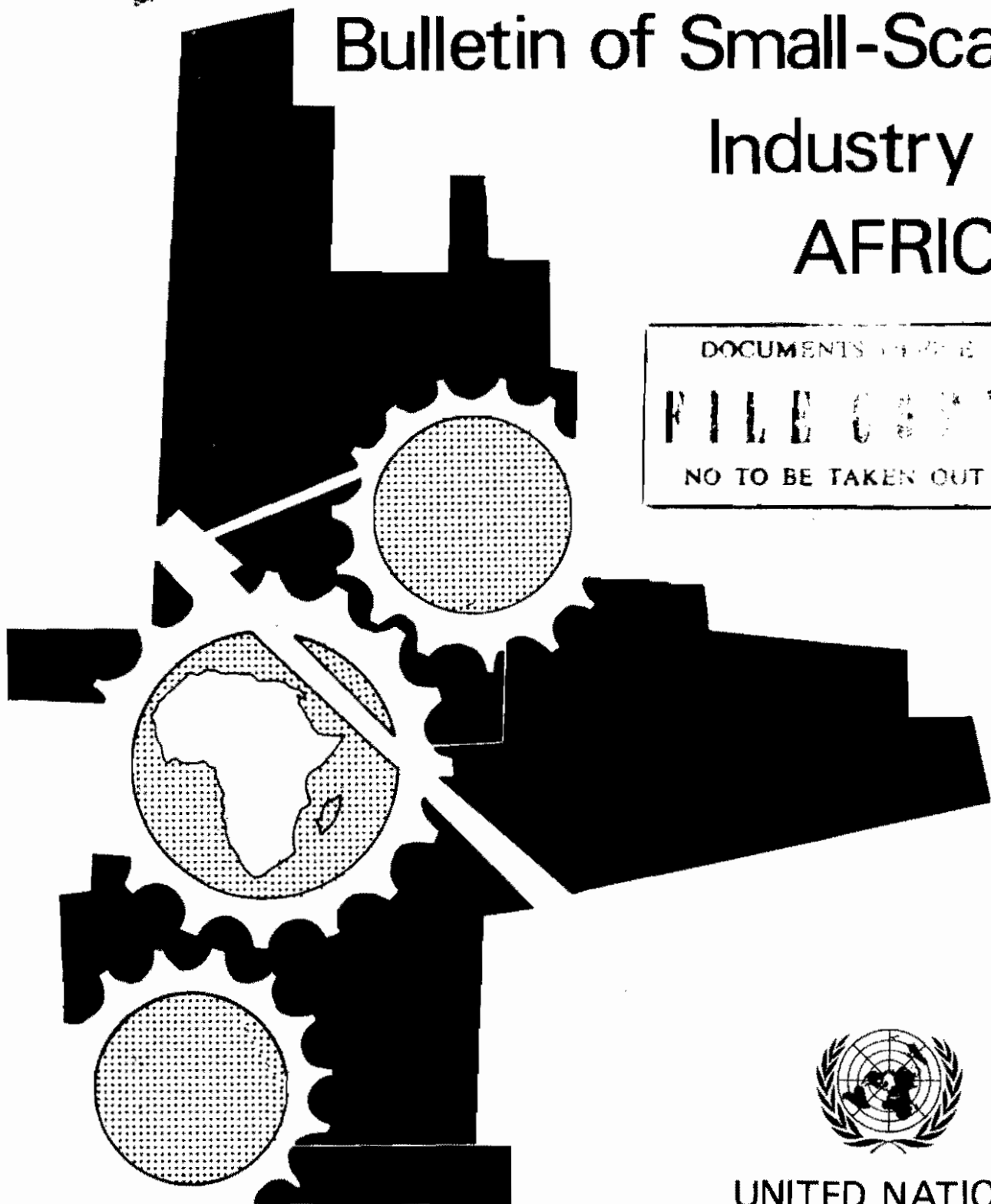


Bulletin of Small-Scale Industry in AFRICA

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FOREWORD BY THE EXECUTIVE SECRETARY

It is recognized that small-scale industries play an important role in the economies of both developed and developing countries. In many African countries, small-scale industries account for a major share of total industrial output and of employment in the manufacturing sector. African Governments accord high priority in their industrial development plans and programmes to the promotion of small-scale industries, in recognition of the fact that they contribute significantly to the generation of incomes and employment and that they provide an effective means for integrating and consolidating the national market. Moreover, small-scale industries foster the growth of entrepreneurship and the efficient utilization of available capital, technological know-how, skills and natural resources.

The Economic Commission for Africa has paid particular attention to the promotion and development of small-scale industries in Africa. A number of studies on policies, programmes and projects have been conducted and some of the Commission's initiatives have led to the creation of national and multi-national small-scale industry development centres. Fairs and exhibitions have been organized, and publications have, from time to time, been issued listing sources of small-scale machinery and equipment. Currently, in co-operation with UNIDO, advisory assistance is being provided to member States of the Commission in respect of various aspects of the problem of small-scale industrial development.

An important aspect of the work of the Commission is the dissemination of information on experience with small-scale industrial development, including successful programmes, projects, institutions and technology for small-scale industries. In order to strengthen this service and to bring to a wider range of people information on experience gained both within and outside Africa, the Commission has decided to publish regularly a Bulletin of Small-Scale Industry in Africa. This is the first issue of a publication which ECA plans to issue twice a year as a single and consolidated source of information on a vital area of industrial development in Africa.

In introducing the Bulletin, I should like to take this opportunity to invite African small-scale industrial development centres and similar institutions to contribute to future issues, articles on the experience they themselves have gained. Such articles will be of great value for other countries which face similar problems and share common objectives.

Adebayo Adedeji
Executive Secretary

WHAT IS SMALL-SCALE INDUSTRY

A universally accepted definition of "small-scale industry", has not been found so far. Notwithstanding this difficulty one can identify some characteristics of small-scale industry and differentiate it from traditional crafts on the one hand, and medium and large industries, on the other. Some of the criteria are:

- (a) use of motive power for manufacturing in a small modern factory or plant;
- (b) capital investment up to a maximum of US 100,000;
- (c) capital investment per worker not exceeding US 1,000;
- (d) functional polyvalency of the manager;
- (e) employment up to a maximum of 100 workers.

As these criteria are not immune from controversy they need to be clarified further.

The use of motive power to manufacture articles is an essential element because it is the factor which distinguishes small-scale industry from traditional craft.

In this Bulletin the term "small-scale industry" denotes an undertaking which uses mechanized equipment to manufacture products, although the size of its output is limited in comparison with the production of medium and large-scale industries. Furthermore, the production of goods is undertaken in a factory which differentiates it from the non-factory manufacturing by artisan workshops. The premises for a small-scale industry, therefore, may be either rented or owned by the manufacturer, but is different from his residence and is used specifically for industrial production.

The second criterion for a small-scale industry is the utilization of low capital investment. Although the basic understanding is for low capital investment, there is no common yardstick for investment for a project to be classified as "small". It all depends on the nature of the project, its requirement in machinery, equipment, raw material, location, physical plant requirement and so on. The ceiling of total investment has been somewhat arbitrarily fixed at US 100,000 where, in addition to fixed capital in machinery and equipment, investment on physical plant and facilities of the factory is also included. As for Africa, small-scale industry has been defined in an ICA publication entitled "Small-scale industries in Africa" as an enterprise with a capitalization per worker of under US 1,000 and a fixed capital in machinery not exceeding US 50,000".

Experience in other developing countries such as India, Pakistan and Philippines, has shown that through economic changes, this ceiling on capital investment can easily be raised to even over US 100,000 for machinery alone. Another reason for this trend is the inflation experienced throughout the world economy. Prices of machinery equipment, raw materials and other inputs are increasing rapidly so that it may not be surprising to see this ceiling on fixed capital investment raised in Africa in the near future. However, as most of the small-scale industries, especially those which are likely to

be set up by African entrepreneurs, are expected to be of relatively small size, at least for some time to come, they may not necessarily need to put up their own building facilities. They can still be profitably located in rented buildings, possibly, in industrial estates constructed for the purpose by governments concerned. In view of such possibilities, it is assumed that the maximum amount of fixed capital investment envisaged will be enough to cover any eventuality for running a profitable small-scale industrial venture.

This limit on fixed capital investment, moreover, will allow some flexibility for a variety of projects within the scope of the small-sized modern industrial plants. Admittedly, for some African countries, a total investment of over US 50,000 might be classified as medium sized industrial undertaking. For instance, the three member States of the East African Community Kenya, Tanzania and Uganda, define small-scale industry as "manufacturing undertakings with a capital of up to approximately US 28,000 and employing 40 to 70 workers". As can be seen from the article in the ECA publication referred to above, a number of other developing countries such as India, Pakistan and Philippines, have different limits on capital inputs and number of workers in their small-scale industries. This indicates that no yardstick can be given for any country for formulating a definition of small-scale industry. Its concept varies from country to country and within a country from time to time depending on its economic development stage as well as on the prevailing world market for machinery, equipment and other inputs.

Automation requiring less labour but more capital-intensive equipment and machinery makes it necessary to indicate the third criterion for small-scale industry, that is the limitation of US 1,000 capital investment per worker. There are highly capital-intensive manufacturing plans employing less than 50 workers but their capital-labour ratio might reach as high as US 10,000 or more per worker. To avoid misunderstanding, therefore, in small-scale industry this amount should not exceed US 1,000 per worker.

A significant factor for indicating the size of an industry is the common characteristic of manager-cum-owner of the enterprise who undertakes all the managerial activities required. Generally, in a small-scale industry the owner handles overall management of the undertaking. In other words, he is the personnel purchasing, production and marketing manager all rolled into one. There is no functional managerial specialization as the enterprise cannot afford it.

Again, the fixing of the limit of employment to 100 workers is entirely arbitrary. The original concept of scale covered by the number of workers employed in an enterprise came from USA and UK for which countries it was designated as under 100 persons, while for Japan it was under 300, for Korea under 200 and for many other countries it was under 50. In the case of Egypt, the number of persons employed goes as low as under 10. The trend is now to avoid any specification on the number of people employed but to insist on the limit of capital input. For African statistical reference purposes, however, firms employing less than 50 persons could be taken to represent the small-scale sector.

It has been argued that as one of the objectives of small industry development is to provide gainful employment at a lower capital cost per unit, the limit on number of persons employed to characterize small-scale should be withdrawn. According to this theory, the limits should be only on capital invested, on machinery and on capitalization per worker, and, finally on the lack of specialization of managerial functions.

Until more opinions are gathered from African countries to enable the further refinement the definition of small-scale industry in Africa, the criteria enumerated above could be retained as constituting a broad framework.

Regardless of an exact and generally accepted definition of small-scale industry, it is recognised that this sector plays an important role in the economy of every developing country. The small-scale industry is a tool, inter alia, to substitute imported commodities by home-made ones, rationally utilize locally available raw materials, absorb abundant labour and create new employment opportunities in non-agricultural undertakings also to stimulate indigenous entrepreneurship, afford better dispersal of industries in various regions of a country, and thus reduce the influx of people to the urban centres, and, finally, to provide a better income distribution and acceleration of capital formation.

SMALL-SCALE TECHNOLOGIES

For some time now, the Intermediate Technology Development Group (ITDG) of London has been carrying out research on "intermediate", "appropriate" or "relevant" technology which might be adapted by the developing countries. Whether these technologies are appropriate is determined by the findings of the Group's own research, or that carried out by others, on simple, cheap, and labour-intensive technological devices, utilizing possibly locally available raw materials, for the use by developing countries as a substitute for more complex and expensive imported ones. Most of these technologies may not generally be derived from new inventions. They are in fact quite often simple tools of improved designs which could perform a substantially better job than the traditional tools so far used in rural areas or of the developing countries. In a country where on one hand capital and skills are scarce and on the other, unskilled, underemployed or unemployed labour is abundant and relatively inexpensive, such intermediate technologies can play an important role in improving the productivity and efficiency of workers. Despite some inherent limitations of this approach the use of appropriate technology can and should represent at least a partial answer to industrial development problems of the developing countries.

The ITDG has among other things carried out extensive research particularly in the field of low-cost building construction, inexpensive building materials, simple agricultural tools and hospital equipment for developing countries. From this applied research many countries could benefit from the establishment of a small-scale lime production unit at a village level; a 20 tons/per day portland cement manufacturing plant; pozzolana manufacturing by grinding a burnt clay to a fine powder; the production of a burnt clay bricks, tiles and corrugated asphaltic roof sheets.

Proposals for the establishment of a small-scale lime production/plant for Tanzania with a note on other building materials is contained in an ITDG report entitled "Suggestions for the establishment of a production training centre for small-scale lime production in Tanzania", August 1974".

Project proposed for the manufacture of clay pozzolana as carried out in India is included in chapter III of this Bulletin as a model scheme for further adaptation and use in African countries.

Moreover, IITD has started disseminating information on a number of items of interest to developing countries through its recently established quarterly publication entitled "Appropriate Technology". There are articles contained in its volume 1 number 3 regarding the technology of low-cost building, solar water heater from Bardoli, the "Basulia" bladed Roller Thresher and many similar items which could be of interest.

ENCOURAGEMENT TO ENTREPRENEURS IN ETHIOPIA, KENYA AND SENEGAL

Development of entrepreneurs in developing countries is one of the key factors for both commercial as well as industrial establishments. The more so because almost all these countries, due to various historical and educational reasons, were practically excluded from this kind of activity during the colonial era.

However, it is a fact that many developing countries have potential entrepreneurs who, if given assistance, can come forward with enough drive to take up projects under their own responsibilities and manage them properly.

The lack of assistance in feasibility studies, training facilities in modern management and lack of easy access to credits have not deterred the emergence of entrepreneurs.

This being the case for most of the African entrepreneurs what is then done on their behalf?

During the last few years a number of attempts have been made by various African countries to remedy the obvious deficiencies in the field of training local entrepreneurs ¹. Some of these attempts were as follows:

1) Management Training Facilities in Ethiopia

In 1968 the Ethiopian Government, in collaboration with the UNDP and ILO, established the Centre for Entrepreneurship and Management, (C.E.M.). The Ethiopian Government assigned the responsibility to run C.E.M. to the Ministry of National Community Development and Social Affairs while ILO provided technical assistance and UNDP the funds. The Ethiopian Government met 40 per cent of the running cost of the centre of salaries of Ethiopian expert counterparts, rental of premises etc. C.E.M. is set up to provide training management and entrepreneurship for the personnel of both large, and small industrial enterprises.

Since its inception six years ago C.E.M. has organized seminars and short training courses for about 3,500 participants. Furthermore, about 300 enterprises have received consultancy services from the Centre almost half of which were small undertakings. Similarly half of the participants in the seminars and training courses came from small companies.

¹ See: Bulletin Mensuel by the Chambre d'Industrie de Cote d'Ivoire, April 1974 No. 95 p. 17; and Small Industry Development Network Newsletter, Vol. 1, No. 4 2nd Quarter 1975 p.4.

The courses and seminars covered:

- basic principles of management
- salesmanship
- book-keeping and costing
- creative thinking
- starting and expanding business
- control of materials
- benefits and techniques of advertising
- business opportunities in hides and skins processing
- quality control
- personnel management
- Office methods study

Courses are conducted for an average group of 20 participants, and each course generally lasts about one week. A nominal fee of Lth.15.00 is paid by each participant. The average number of such courses held in a year is five. In addition to these regular courses, C.E.M. organises a number of business forums and specialized lectures for members of co-operatives, associations, students and other individuals. These forums have been attended by some 600 participants so far.

Between July 1968 and December 1972, C.E.M. organised over 100 training courses with a total of 2311 participants. The following subjects were covered.

<u>Training courses</u>	<u>No. of courses</u>	<u>No. of participants</u>
- General Management	15	465
- Accounting	19	467
- Industrial engineering	16	330
- Marketing and sales	19	259
- Personnel management	13	391
- Development of small enterprises	16	263
- Leather processing enterprises	8	136
Total	<u>106</u>	<u>2311</u>

Out of a total of 2311 participants, 648 (28.1 per cent) were of a high management level, 1365 (59.1 per cent) middle level and 298 (12.8 per cent) lower level.

These job-oriented training courses have been undertaken by the staff of C.E.M. in collaboration with other experts invited from Government institutions, labour organization, industry and higher educational institutions. The basic objective of the course is to improve existing industrial and commercial undertakings suggesting ways and means to problems encountered and to give guidance for setting up new enterprises.

Over 50 per cent of all courses have devoted their main attention to the starting or expanding of existing small-scale industries. C.E.M. believes that a number of improvements have resulted from the training given. Since a year or so, C.E.M. together with the Agricultural and Industrial Development Bank, has allocated a sum of money, for investing in small-scale industrial enterprises, as an experiment to emphasise the setting up of new small-scale industrial ventures. In line with this policy, C.E.M. carries out feasibility studies

and entrepreneurs wishing to benefit from A.I.D. Bank loans have to ensure that they receive the recommendations of the C.E.M. on their managerial training and abilities. By using this method for the preparation of feasibility studies, training on management and the access to loans it is hoped to minimize the risk of failure. It is reported that a few small-scale industrial projects are at the implementation stage.

ii) Management Training in Kenya

In addition to institutions for higher level formal training, Kenya has set up the Management Training and Advisory Centre in Nairobi. Main objectives of this Centre are to provide training in small business management and in middle management level. The training is available for middle management and supervisory personnel, owner-managers and small-scale entrepreneurs. The duration of courses varies from one week to two months depending on the level of training. Programmes offered, inter alia include:^{1/}

- post-experience executive development courses
- training courses for foremen and supervisors
- management research activities
- management consulting services, and
- small business management courses and extension service

It is planned to establish training facilities at district level through the "Small Business Promotion Centres Programmes" to cater for management training of local businessmen.^{2/}

iii) Management Training in Senegal

Under the aegis of SONEPI (Societe Nationale d'Etudes et de Promotion Industrielle) Senegal has also instituted similar training programmes for existing and potential entrepreneurs. These programmes are locally known as "stages de formation" for the promotion and development of small-scale industries. Main topics of these training courses are:

- analysis of the problems of small-scale enterprises based on "case studies",
- organization of the manufacturing sector (what exists and what should exist),
- book-keeping and study of the industrial operation: balance sheet, operational accounts, profit and loss accounts etc.,
- problems of personnel management: productivity as a result of personnel management, lines of command, training of personnel etc.

1/ Directory of African Management Education and Training Institutions and Management Associations, prepared by ECA, p.24-25.

2/ ibid.

The trainees have found the courses very useful in their job and the techniques learnt at the courses are consistently applied.

SMALL-SCALE INDUSTRY DEVELOPMENT IN KENYA

1) Present Situation

In the three State members of the East African Community "small-scale industry" is defined as manufacturing undertakings with a capital of approximately KUS 28,000 and employing 40 to 70 workers. Based on these criteria, it would seem that the manufacturing sector in Kenya is characterised by a predominance of small-scale industries. Available figures show that the size structure of firms remained stable between 1963 and 1968 at 78 per cent of the total number of establishments. In fact, this percentage refers only to those establishments employing 5 to 49 workers. If it had included firms employing 50-70 workers the percentage would have increased further. The distribution of firms by size in Kenya and the relative importance of each category was indicated by the census of industrial production carried out in 1963 which, as will be shown later, did not differ substantially from a similar census undertaken five years later.

Table 1: Distribution of Establishments, Employment, Sales and Value
Added by size of firms in 1963
Size of establishments (No. of Employees)

	5-19	20-49	50-99	100-499	500 & over	Total
No. of establishments ^{1/}	53	24	10	11	2	100%
No. of employees	9	11	11	36	33 =	100%
Sales	9	13	10	43	25 =	100%
Value added ^{2/}	8	12	9	46	25 =	100%

1/ Statistical Abstract 1964, by Economics and Statistics Division
Ministry of Finance & Economic Planning, Government of Kenya
Table 108 p. 79 and other information available at the ECA.

2/ Gross value added, inclusive of depreciation.

From this table it can be seen that although employment and production were highly concentrated in the establishments with 100 or more workers the largest establishments with 500 or more employees accounted for a much smaller share in gross sales and value added than those employing 100-499 workers.

Kenya is one of the few African countries which provide sufficient basic statistical data on their industrial establishments on an annual basis. The "Statistical Abstracts" published annually give detailed information on industrial production, number of establishments, number of persons engaged, labour costs, gross production, industrial costs, value added and net output. However, no breakdown is given of these indicators for small-scale industries with the exception of the "size of firms" and the number of persons employed in each of these categories. Had these indicators been given for the small sized industrial groups, it would have been possible to get a more complete picture of the development of small-scale industries in Kenya.

Accordingly, this article is an attempt to assess the development of small-scale industries in Kenya based on two factors, the distribution by size of firms and the number of persons employed. These data are reproduced in tables 2 to 5 for the years 1968, 1971 and 1972.

It can be seen from these tables that the large number of small industrial firms is probably exaggerated by the fact that repair shops are included in manufacturing statistics.

Significantly, the tables show that a high proportion of industrial firms belong to the small-scale sector, i.e. those employing 10-49 persons. Their share ranges from an average of 87 per cent in 1968 to 91 per cent in 1972 of total industrial undertakings. Between 41 per cent (in 1968) to 70 per cent (in 1972) of these, however, would fall under the sub-sector of very small plants, i.e. employing 0-4 workers. In fact, the share of small-scale industries would have been even much greater if units employing 50 to 70 persons were taken separately.

Another characteristic is the disproportionate number of small units in the non-food manufacturing plants, followed by those producing intermediate and capital goods. The three tables thus indicate that a number of artisanal and cottage industries and repair shops are included in the very small units. Furthermore, there is a concentration of small firms in the category of industries producing miscellaneous items. These range between a minimum of 40 per cent to a maximum of 65 per cent of the total in their respective groups.

With regard to the number of workers employed, the biggest employers are the few large-scale manufacturing plants. In order to have a more balanced picture of the industrial structure and development in Kenya, an attempt has been made to visualise the situation during the period of ten years, from 1963 to 1972, if the very small units, i.e. those employing 0-4 workers, were excluded. This is shown in table 6 where comparative distribution of establishments and employment by size is given as percentage of the totals. The table is self-explanatory and points to a remarkable constancy of the size of establishments, as well as that of employment, for the years mentioned in almost every group, despite a doubling of the numbers of both firms and workers during the period.

In fact, the number of firms employing 5 persons and more has increased from 650 in 1963^{1/} to 1294 in 1972^{2/} while the number of persons employed has increased from 49829^{3/} to 91507^{3/} respectively.

^{1/} See: Statistical Abstract 1964, op.cit. table 108 p.79.

^{2/} " Table 4 in this article.

^{3/} " Statistical Abstract 1965, op. cit. table 104 p. 74. This figure includes those employed in the smaller categories.

Table 6 shows that the structural variations within each group, both related to the number of firms and that of employers, are insignificant and that there appears to exist an almost perfect correlation between the percentage increase in the number of firms and that of employment. This correlation becomes even more regular as one follows their scales, i.e. the larger the scale, the more regular the pattern of both factors. In other words, in the group of firms employing 5-9 workers, where the variation is relatively wider, 25 per cent to 31 per cent units would employ between 2-3.5 per cent in the second size group of manufacturing plants, 24-25 percent, employ 4-5 per cent; in the third group, 24-26.5 per cent, provide employment opportunity to 11-12 per cent workers, and, in the largest group 22-29 per cent of the firms employ 80-82 per cent of workers. To conclude, about three quarters of the total industrial establishments in Kenya belong to small-scale industry, and they provide employment for about 20 per cent of the total working force in industry.

2) Kenya Industrial Estates

In its endeavour to speed up the rate of industrial development in the country in general and that of small-scale industry in particular, the Kenyan Government set up the Kenya Industrial Estate Ltd. in 1967 with the main purpose of encouraging indigenous entrepreneurs to play an increased role in industrial production and management.

The Kenya Industrial Estates Limited is entrusted with the responsibility of establishing and running urban, as well as rural, industrial development programmes.

The main functions of the Kenya Industrial Estates Limited are:

- (a) to provide well-planned factory premises to small potential entrepreneurs at reasonable rental;
- (b) to propose viable small and medium scale projects;
- (c) to conduct market surveys, select suitable machinery and equipment and prepare free, complete, feasibility studies for the entrepreneurs;
- (d) to provide, through Industrial and Commercial Development Corporation, up to 10% per cent loans at reasonable rates of interest for the purchase of machinery and equipment, so that entrepreneurs provide only the working capital;
- (e) to provide common facilities and services at cost;
- (f) to provide marketing assistance and other extension services.

Suitable technical, managerial and financial assistance, including training and demonstration facilities, are also provided to potential rural entrepreneurs in the small towns since the establishment in 1971 of the Rural Industrial Development Centres within the Kenya Industrial Estates.

According to the latest information available (1972), two industrial estates, one in Nairobi and one in Nakuru, have already been built while three more industrial estates in Mombasa, Kisumu and Eldoret are at different stages of construction.

In the rural industrial development programme, four centres have been set up, at Machakos, Nyeri, Kakamega and Embu, of which the first two are already built while the others were under construction in 1972. Each centre is situated on a 6-acre plot and the buildings in each case are reported to include an administrative block, a classroom and four workshops at an estimated total cost shs.1,860,000 in addition to staff houses costing shs.860,000 for the four centres. Moreover, the total cost of machinery and equipment for the four centres was estimated at shs.1,240,000. There is a plan to establish over 20 such centres in various parts of the country by 1980.

Technical, as well as financial, assistance has been secured by Kenya for the implementation of industrial estates from the Governments of the Federal Republic of Germany, India and Sweden, while the Governments of Denmark and Norway have provided support in the establishment of Rural Industrial Development Centres.

The first phase, started in June 1969, consisting of 25 units of various sizes, an administration block and a technical, service centre, was built at a cost of shs.9,283,973 or approximately US 1.3 million. This sum includes the cost of buildings, machinery and equipment, working capital and the cost of the tool-room machinery in the technical service centre.

Breakdown of the costs of Phase I of the Nairobi Industrial Estate is.

Buildings	Shs.3,021,696	US 423,207
Civil works	" 852,277	119,380
Total	" 3,873,973	542,587
Machinery & equipment	" 3,005,000	420,868
Working capital	" 1,880,000	263,305
Tool-room machinery	" 525,000	73,525
Grand total	" 9,283,973	1,300,285

Local entrepreneurs who operate their undertakings in the industrial estate get a 100 per cent loan for their machinery and equipment from Industrial and Commercial Development Corporation (ICDC) and pay a reasonable rent for the factory premises they occupy. It is up to them, however, to find the required working capital for their business.

1/ Rate of conversion shs. 7.12 = US\$1.00

As the Nairobi Industrial Estate was built as a pilot project it is a general purpose estate containing different types of small-scale industries, ranging from modern, though relatively less capital-intensive, machines producing import substitution consumer goods, to repair and service units.

As of June 1971 there were 22 factories occupying 24 premises broadly grouped into six main categories:

- (1) Wire products: staple pins, paper pins and paper clips;
- (2) Textile products and accessories: ready-made garments, buttons, zip fasteners and shoe laces;
- (3) Wooden products: furniture, coat hangers and cloth pegs;
- (4) Printing presses and allied services: printing of books, magazines, litho plates etc;
- (5) Metal products: hinges, scales assembly, sheet metal goods;
- (6) Miscellaneous: curios, handbags etc.

The successful completion, despite some initial difficulties, of Phase I of the Nairobi Industrial Estate has encouraged work to go ahead on Phase II of the scheme which comprises 24 additional standard, and three special, at a total cost of shs.13 million or about US\$20,728.

Development Indicators

	1970	1971	1972
No. of factories	16	22	27
Capital investment (million shs.)			
a) Fixed capital (excluding building)	2.219	3.005	4.173
b) Working capital	1.681	1.880	2.050
Total	3.900	4.885	6.223
Percentage increase	-	25%	27.5%
No. of workers employed	250	370	404
Percentage increase	-	48%	11%

Other Broad Economic Indicators (in million shillings)

	1969/70	1970/71	1971/72
Value of output	4.002	4.900	5.620
Percentage increase in output	-	22.5%	15%
Value added by manufacture	1.493	2.300	2.916
Value added by manufacture as percentage of output	37.5%	47%	51%
Value of exports ^{1/}	0.133	0.294	0.516

1/ Small quantities of the goods manufactured by the Nairobi Industrial estate firms, such as butt hinges, staple pins, paper clips, etc. have been exported to some neighbouring African countries as well as to Italy, Germany and Japan.

The endeavour, however, seems to be rewarding.

Sources: Kenya Industrial Estates Ltd., Annual Reports 1970/71, 1971/72
K.I.E. - Nairobi Industrial Estate

During 1972 three more firms engaged in shoe eyelets manufacturing, screen printing and shoe-making, were added and the firm which failed was replaced by a more promising venture. On the other hand, there are quantitative indications of improved performance judged by capital-output ratio, labour-capital ratio, labour-output ratio and the value added by manufacture as percentage of output.

The second industrial estate at Nakuru was implemented during the 1971/73 fiscal year at a total cost of 11 million shillings. The buildings consist of 20 factory sheds of four different sizes. It was reported that by 1972, capital expenditure incurred on the buildings amounted to Shs. 2,788,215.

During the first years of operation of the Nairobi Industrial Estate some problems were identified by way of inadequacy of working capital, lack of a scheme for bulk purchase of raw materials, technical personnel for the preparation of projects, long delivery periods for machinery and materials.

However, due to the precautions taken by the proponents of this pilot scheme, it can be said that they have ensured the success of the project. Training is also provided to the entrepreneurs at the Technical Service Centre.

Although this is not the total picture, it shows bright prospects of the development of small-scale industries in Kenya in the long run, because the Government has taken decisive measures.

Table 2: Distribution of Industrial establishments, by size of firms (Number of firms and percentage of the total, 1968)

Category of industries	Size of firms	0-4	5-9	10-19	20-49	50-49	50 & over	Total
<u>Consumer goods</u>								
Food	No.	58	29	38	84	(209)	3	212
	%	27.4	13.7	17.9	39.6	(98.6)	1.4	100
Beverages & tobacco	No.	5	4	9	11	(29)	11	40
	%	12.5	10.0	22.5	27.5	(72.5)	27.5	100
Non-food	No.	300	79	22	25	(425)	43	469
	%	64.0	16.8	4.7	5.3	(90.8)	9.2	100
Sub-total	No.	363	112	69	120	(664)	57	721
	%	50.4	15.5	9.6	16.6	(92.1)	7.9	100
<u>Intermediate goods</u>								
	No.	182	109	98	95	(484)	118	602
	%	30.2	18.1	16.3	15.8	(80.4)	19.6	100
<u>Capital goods</u>								
	No.	167	110	60	77	(414)	64	478
	%	34.9	23.0	12.6	16.1	(86.6)	13.4	100
<u>Miscellaneous</u>								
	No.	60	20	8	6	(94)	5	99
	%	60.6	20.2	8.1	6.1	(95.0)	5.0	100
Grand Total	No.	772	351	235	298	(1,656)	244	1,900
	%	40.6	18.5	12.4	15.7	(87.2)	12.8	100

Source: Statistical Abstract 1969 by the Statistics Division, Ministry of Economic Planning & Development of the Republic of Kenya.
Data extracted and re-grouped into the above four major categories from table 67 (a) p. 71.

Table 3: Distribution of Industrial Establishment, by size of firms (Number and percentage of the total 1971)

Category of industries	Size of firms	0	1-4	5-9	10-19	20-49	50-99	100 & Over	Total
<u>Consumer goods</u>									
Food	No.	91	67	36	33	4	(275)	48	323
	%	28.1	20.7	11.0	10.2	15.0	(85.0)	15.0	100
Beverages & tobacco	No.	6	8	4	3	8	(29)	11	40
	%	15.0	20.0	10.0	7.5	20.0	(72.5)	27.5	100
Non-food	No.	572	278	73	26	27	(976)	34	1,010
	%	56.6	27.5	7.2	2.6	2.7	(96.0)	3.4	100
Sub-total	No.	669	353	113	62	83	(1280)	93	1,373
	%	48.7	25.7	8.2	4.5	6.1	(93.2)	6.8	100
Intermediate goods	No.	316	220	110	121	131	(398)	168	1,061
	%	29.8	20.7	10.4	11.4	12.3	(84.6)	15.4	100
Capital goods	No.	293	160	102	62	84	(701)	86	787
	%	37.2	20.3	13.0	7.9	10.7	(89.1)	10.9	100
Miscellaneous	No.	102	93	27	12	9	(243)	10	253
	%	40.3	36.8	10.7	4.7	3.5	(96.0)	4.0	100
<hr/>									
Grand Total	No.	1,380	826	352	257	307	(3122)	358	3,474
	%	39.7	23.8	10.1	7.4	8.9	(89.9)	10.1	100

Source: Statistical Abstract 1972, op. cit.

Data extracted and re-grouped from table 78 (a) p. 84.

Table 3: Distribution of Industrial Establishments, by size of firms (Number and percentage of the total 1971)

Category of industries	Size of firms	0	1-4	5-9	10-19	20-49	50 & over	Total
<u>Consumer goods</u>								
Food	No.	91	67	36	33	48	(275)	48 32
	%	28.1	20.7	11.0	10.2	15.0	(85.0)	15.0 100
Beverages & tobacco	No.	6	8	4	3	8	(29)	11 40
	%	15.0	20.0	10.0	7.5	20.0	(72.5)	27.5 100
Non-food	No.	572	278	73	26	27	(976)	34 1,010
	%	56.6	27.5	7.2	2.6	2.7	(96.6)	3.4 100
Sub-total	No.	669	353	113	62	83	(1280)	93 1,373
	%	48.7	25.7	8.2	4.5	6.1	(93.2)	6.8 100
<u>Intermediate goods</u>								
	No.	316	220	110	121	131	(898)	163 1,061
	%	29.8	20.7	10.4	11.4	12.3	(84.6)	15.4 100
<u>Capital goods</u>	No.	293	160	102	62	84	(701)	86 787
	%	37.2	20.3	13.0	7.9	10.7	(89.1)	10.9 100
<u>Miscellaneous</u>	No.	102	93	27	12	9	(243)	10 253
	%	40.3	36.8	10.7	4.7	3.5	(96.0)	4.0 100

Source: Statistical Abstract 1972, op. cit.

Data extracted and re-grouped from table 78 (a) p. 84.

Table 4. Distribution of Industrial Establishments, by size of firms (Number and percentage of total, 1977)

Category of industries	Size of firms	•	1-4	5-9	10-19	20-49	50-49	50 & over	Total
<u>Consumer goods</u>									
Food	No.	176	59	35	27	52	(349)	54	403
	%	43.7	14.6	8.7	6.7	12.9	(86.6)	13.4	100
Beverages & tobacco	No.	17	7	3	5	4	(36)	12	48
	%	35.4	14.6	6.3	10.4	8.3	(75.0)	25.0	
Non-food	No.	818	260	71	29	29	(1207)	35	1242
	%	65.9	21.0	5.7	2.3	2.3	(97.2)	2.8	100
Sub-total	No.	1011	326	109	61	85	(1592)	101	1693
	%	59.7	19.3	6.4	3.6	5.0	(94.0)	6.0	100
<u>Intermediate goods</u>									
	No.	695	146	96	123	128	(1188)	167	1355
	%	51.3	10.8	7.1	9.1	9.4	(87.7)	12.3	100
<u>Capital goods</u>	No.	304	130	81	84	92	(691)	100	791
	%	38.4	16.5	10.2	10.6	11.6	(87.3)	12.7	100
<u>Miscellaneous</u>	No.	282	86	31	12	13	(424)	11	435
	%	64.8	19.8	7.1	2.8	3.0	(97.5)	2.5	100
<hr/>									
Grand Total	No.	2,292	688	317	280	318	(3895)	379	4,274
	%	53.6	16.1	7.4	6.6	7.4	(91.1)	8.9	100

Source: Statistical Abstract 1973, op. cit.

Data extracted and re-grouped from table 78 (a) p. 91.

Table 5: (cont'd)

Category of Industries		Size of Firms						
		0-4	1-4	5-9	10-19	20-49	50 & over	Total
Capital goods								
1968	No.	396		753	848	2,488	(4,485)	12,730
	%	2.1		4.4	5.0	14.5	(26.0)	74.0
1971	No.		344	703	889	2,984	(4,920)	21,466
	%		1.3	2.7	3.4	11.3	(18.7)	81.3
1972	No.		306	529	1,145	3,264	(5,244)	21,399
	%		1.1	2.0	4.3	12.3	(19.7)	80.3
Miscellaneous								
1968	No.	144		140	105	147	(536)	594
	%	12.7		12.4	9.3	13.0	(47.7)	52.6
1971	No.		201	188	157	252	(798)	1,138
	%		10.4	9.7	8.1	13.0	(41.2)	58.8
1972	No.		189	209	153	336	(887)	1,416
	%		8.2	9.1	6.6	14.6	(38.5)	61.5
Total								
1968	No.	1,764		2,345	3,307	8,080	(15,494)	54,536
	%	2.5		3.3	4.7	11.6	(22.1)	77.9
1971	No.		1,842	2,357	3,624	9,991	(17,814)	74,170
	%		2.0	2.6	3.9	10.9	(19.4)	80.6
1972	No.		1,584	2,068	3,860	10,390	(17,902)	75,189
	%		1.7	2.2	4.1	11.2	(19.2)	80.8

Source: Ibid, op. cit.

Comparative Distribution of Establishments and Employment
in 1963, 1968, 1971 & 1972 (per cent of Totals)

Size of firms	5-9	10-19	20-49	50 & over	Total
No. of Establishments:					
1963	28.0	24.6	24.0	23.4	100
1968	31.0	21.0	26.4	21.6	100
1971	27.8	20.2	24.2	27.8	100
1972	24.5	21.6	24.6	29.3	100
No. of Employees:					
1963	9.0		11.0	80.0	100
1968	3.4	4.8	11.8	80.0	100
1971	2.6	4.0	11.1	82.3	100
1972	2.3	4.2	11.4	82.1	100

Sources: Calculated from various op. cit. above

WITH INCENTIVES - SMALL-SCALE INDUSTRIES CAN FLOURISH

Under the policy of the government to encourage the promotion of small-scale industries, the services to be provided can be classified into two major groups.^{1/}

i) The management improvement triad

- a) industrial advisory services (extension or counselling services)
- b) training of entrepreneur-managers and supervisory personnel
- c) industrial research services

ii. Development facilities

- a) development finance
- b) factory sites and buildings (industrial estates)
- c) common facility services
- d) facilitating the procurement of materials and equipment
- e) marketing aids
- f) labour relations services
- g) interfirm contracts and assistance

The first group deals with key factors i.e. counselling, training and research. All the above listed measures are closely inter-related. For better efficiency and results all the services should be put into effect together.

As small firms lack specialization in their management, counselling plays an important role in filling this gap. Counselling services will range from product planning, production techniques, purchasing, sales and personnel to finance management technique.

Experts on small industry suggest that an industrial extension service will be called on for (i) economic guidance on promising new lines of manufacture, for expansion of existing firms or entry of new ones; (ii) technical advice on such problems as selection of machinery, improved processes, and better use of machines and materials; (iii) production and business management, etc. and (iv) assistance in product design and improvement.^{2/}

Most African entrepreneurs suffer of hardship when they apply to financing institutions for loans for their working capital, simply because they do not have an appropriate book-keeping system. Counselling and training on simple book-keeping systems are some of the most felt needs by African entrepreneurs for efficient management of their businesses.

^{1/} See: Modern Small Industry for Developing Countries by Staley & Morse, McGraw-Hill, Inc. 1965, p. 356.

^{2/} See: ibid. p. 359.

Likewise, training of entrepreneur-managers and supervisory personnel has brought about a greater confidence and ability on the part of people concerned with the management of their enterprises in many developing countries. Undoubtedly, learning by actually doing the job is a sound training ground, yet experience has shown that modern management techniques require further suitable theoretical knowledge if better products at competitive prices are to be achieved. Small undertakings are often a one-man show. The entrepreneur alone carries the burden of management of his enterprise from planning up to the stage of selling his goods. Hence the need for the knowledge of basic managerial skills.

Courses in management for entrepreneurs can be formal or informal. Their substance however should include all essential items and more important they should be geared to real in-plant problems encountered by industrial extension advisers. That is to say the contents of courses should be carried out on the basis of actual problems faced by existing entrepreneurs and related to finding solutions. Mere academic training on management, unless related to realities, may not have fruitful results.

The third important factor for the promotion of small industry is the industrial research service. Although a number of people might have the potential for business drive, they generally lack the technical know-how to put their "project-ideas" into practice. They are not technically qualified to prepare the feasibility studies for their projects, nor do they have the necessary amount of money to have such a study prepared for them by experts or consultants.

In such a case what usually happens is that the entrepreneur either relinquishes his idea and goes on investing his savings in non-manufacturing undertakings, such as investment in real estate, or, he goes ahead and invests his money on the project without any feasibility study. The result either way is a waste of scarce resources because a good investment opportunity in manufacturing may be missed or savings may be invested in an unplanned manner with the risk of either the investment being lost or the capital wasted by over-investing in some areas and under-investing in others. The existence of an industrial research service, therefore, is indispensable for the promotion of small-scale industries in any developing country.

Industrial research can play the essential role of undertaking economic, engineering, financial and marketing studies for projects to be implemented by small entrepreneurs. This research is crucial for the development of small firms which, because of financial limitations, are not able to have their projects prepared by consultants. The outcome of industrial research, serves not only the small manufacturer himself, who needs information about the market, cost of the product, availability of suitable raw materials, machinery and equipment, and other management techniques, but also the government policy-maker who needs the same data for programming and planning purposes.

No matter how this research centre is organized, the fact remains that it is indispensable. It is only with the formation of such a nucleus of applied industrial research that a reasonable success in the development of small-scale industries can be achieved. In fact, the bottleneck to their development is to be found in the lack of "bankable projects" rather than in the shortage of capital which is often the complaint of developing countries. The main task of the industrial research service is to find out projects which can be made or are bankable.

Countries which possess the essential industrial advisory service, training facilities for entrepreneur-managers and supervisory personnel and an industrial research centre, can claim to be heading towards the development of small-scale industries. In addition, developmental services, such as easy access to capital sources and credit facilities, industrial estates, common service facilities, common procurement of materials and equipment, marketing, labour relations services and assistance with inter-firm contracts must also be available to small entrepreneurs.

Although a number of African countries have financial institutions geared to assisting industrial development ventures, when it comes to lending money to a small entrepreneur they normally tend to be reluctant. In addition to their institutional conservatism, they advance various reasons for such a behaviour. They say small entrepreneurs do not present proper feasibility studies, accounting systems, adequate guarantee, etc. for their projects and the servicing for such loans by virtue of their individual size is costlier than in large enterprises. So, lending money to such entrepreneurs as a rule becomes a risky and costlier proposition to the bankers.

To alleviate these objections, however, a number of developing countries have resorted to a variety of ways which, although they may not totally dispel the suspicions of the financial institutions, nevertheless can meet their requirements. Of such nature is the assistance provided to small entrepreneurs by way of training in modern business management techniques; the industrial research services, including the preparation of feasibility studies; industrial advisory services; the establishment of industrial estates; government mutual guarantee systems, etc. Most of these measures can provide adequate security to the financial institutions, while at the same time making the loans given to small entrepreneurs less risky and less costly. Where such common facilities do not exist, satisfactory solutions could also be found by adopting either a co-operative system for small entrepreneurs or by constituting supervised credit systems, as is done in agriculture.

In many respects, a focal point for small-scale industry development is represented by the creation of an industrial estate. An industrial estate is a tract of land on which a number of factory premises, with adequate common service facilities, are built for use by small entrepreneurs. These premises are normally rented to the entrepreneurs but are sometimes sold to them on a hire-purchase basis.

The factories are provided with common services, such as water and electricity supplies, sewage disposal, banking and post office facilities, common repair of workshop and the like. These facilities play an important role in many ways for the promotion of small undertakings. Where such facilities do not exist, small enterprises are often housed in cramped and dirty quarters of a city - a situation not conducive to higher productivity. Lack of adequate access to the quarters can hamper transportation facilities in and out of the overcrowded premises. Accidental fire breakouts can easily destroy these firms without any hope for rescue.

The existence of an industrial estate enables many small firms to work on complementary transactions among themselves. It can provide common service facilities at a reduced cost, and the undertakings can benefit from bulk purchasing of raw materials and also the sale of their products in common, as in an emporium. Bankers and financial institutions can easily lend them money for working capital and so on. The benefits which could be derived by the creation of an industrial

estate are numerous and of a great value and assistance to a small entrepreneur. An industrial estate also reduces, to a large extent, the need for the small industrialist to invest on the premises and related costs. He finds these ready made for him to install his machines and equipment and is able to start quickly manufacturing his products. The establishment of an industrial estate is, therefore, one of the greatest incentives given to any small entrepreneur in a developing country. It is a powerful tool for the development of small-scale industries as confirmed by experiences in many developing countries, including Africa, e.g. Kenya, Nigeria.

Other incentives which may directly derive from the establishment of an industrial estate are of the existence of common facility services, common procurement of materials and equipment, marketing assistance (such as preference purchases for government supplies), inter-firm contracts and assistance and labour relations services.

In addition, fiscal measures such as customs duty free importation of machinery and equipment, or raw materials, tax holiday for new investments for a given period of time and protection from unfair competition by importers for the infant industries can stimulate further the rapid development of small-scale industries.

When any government provides such a healthy environment for industrial activity, promotion and development of small-scale industries by indigenous entrepreneurs becomes almost automatic. The initial expense of the government is compensated in a relatively short period by a rapid growth of industries, increased employment and productivity, reduced dependence on imports and eventually by increased export earnings and greater taxation possibilities.

MODEL SCHEMES

POZZOLANA CAN GIVE POSITIVE RESULTS

Pozzolana are silicious materials which are not cementitious themselves but, in finely divided form and when moisture is present, chemically react with hydrated lime to form compounds which have cementitious properties.

When clay, which is abundant in reactive clay minerals, is mixed with lime in the correct proportions and then calcined under controlled conditions, lime pozzolana concrete is produced. The pozzolana possesses almost the same strength as that of cement and sand mortars.

Even on a small-scale, therefore, the production of clay pozzolana can help solve the shortage of cementitious materials. The method is so flexible that any type of clay can be used, to produce an endproduct that is of a uniform quality.

The system offers reduced fuel consumption, and the compactness of the fluid bed calciner means that little maintenance is required. It also has the added advantage that all the components required for the calciner can easily be made locally by any skilled mason.

Details of the preliminary project proposals for the manufacturing of clay pozzolana, as worked out in India, are given below:^{1/}

Capacity: 20 tons of clay pozzolana/day
Working hours: 300 days per annum of 3 shifts.

A - Capital Investment

(1)	Land and development	US 32,920.-
(2)	Buildings	5,295.-
(3)	Plant and machinery	15,529.-
(4)	Electrical installation	2,353.-
(5)	Contingencies	7,788.-
(6)	Working capital	6,235.-
(7)	Interest on fixed capital	2,153.-
		<u>US 35,293.-</u>

B - Cost of Production

(1)	Cost of production per ton of clay pozzolana	US 6.-
(2)	Selling price per ton of clay pozzolana	6.95
(3)	Percentage return of the capital	16%

A - Capital Investment

(1)	<u>Land and Development</u>	
	(a) Land about 167 m ² at US 1.40 per m ²	US 2,338.-
	(b) Development charges	602.-
		<u>2,940.-</u>
(2)	<u>Building</u>	
	(a) Calciner sheds with a covered area of 210 m ² at US 5.69 per m ²	1,176.-
	(b) (i) Store room and office area 930 m ² at US 4.43 m ²	4,119.-
	(ii) Furniture, stationery and other auxiliaries	<u>5,295.-</u>
(3)	<u>Plant and Machinery</u>	
	(i) Fluidised bed calciner say 40 x 40 cm square section with height of 80 cm. The material construction is fire clay bricks having min. 50 per cent alumina for burning zone and min. 30 per cent alumina for the fluid bed column.	4,119.-

^{1/} Courtesy of National Buildings Organization, New Delhi, India
Figures are approximately calculated.

(ii)	Combustion Equipment (Burner, Blower and other accessories)	US 941.-
(iii)	Bucket elevator with screw feeder	2,353.-
(iv)	Temperature Indicator with thermocouple	588.-
(v)	Sieving & grinding equipment for clay and the finished product (Sieve 10-20 Mash Ball Mill, capacity - 1 ton/hour).	3,529.-
(vi)	Laboratory equipment	1,353.-
(vii)	Piping, fittings, valves, oil reservoir, heating coil, etc.	588.- 13,471.-
(viii)	Erection and supervision charges at 15 per cent on item (i) to (vii) on US 13,471.-	2,020.- 15,491.-
	Say	US 15,500.- =====

(4) Electrical Installation

(i)	Transformer, L. Switchgear, control Board	2,118.-
(ii)	Erection charges, Service, Connection Charges, Cables, Earthing, etc.	235.- 2,253.-

(5) Contingencies

Contingencies at 3 per cent on item 1-4
on US 26,074.- 782.-

(6) Working Capital

(On the basis of 60 working days) 624.-

(7) Interest

Interest on fixed capital at 8 per cent
on US 26,905.- 2,153.-

Total capital investment
(1 + 2 + 3 + 4 + 5 + 6 + 7) Say US 35,300.-
=====

B - Cost of Products

No.	Particulars	Total amount JUS	Cost per ton of clay pozzolana JUS
1.	1. Raw materials (clay)	3,824.-	1.46
	2. Fuel (Furnace oil)	8,941.-	1.49
	3. Power and Light	5,824.-	1.-
	4. Management and labour	7,123.-	1.19
	5. Depreciation	2,565.-	0.43
	6. Maintenance and Repair		
	7. Interest on Working capital		
	8. Provident Fund, Bonus, etc.	2,553.-	0.43
	9. Insurance on Plant and Machinery		
	Grand Total	<u>35,836.-</u>	<u>6.00</u>

Total production of clay pozzolana/

year = 6,000

Cost of production of clay pozzolana/

ton = 35,836

6,000.-

Selling price of clay Pozzolana/ton 6.00 + 0.90

(taking 15 per cent profit) or say

Percentage return of capital 16 per cent

6.-

6.90

7.-

7.-

Breakdown of Cost of Production

1. Raw material (clay)

Cost JUS

Clay 7,500 tons/year at JUS1.18 per ton

taking 10 per cent losses during transport

and handling and 10 per cent during firing.

3,850.-

2.2. Fuel (Furnace oil)

Oil required for calcining 6,600 tons

of clay is 230 tons. Taking 10 per cent

losses on transit and handling, actual

requirement of fuel oil will be 253 tons.

Cost at 35.30/tons.

8,931.-

3. (a) Power

Power required for Ball Mill = 40 HP.

Power required for Compressors = 10 Hk.

Cost for 24 x 45 x 300 kwt.

at 10.018 per kwt.

45 KW

5,647.-

(b) Light

Total unit required at 20 unit/day

6000 units

Cost at 0.029/unit = 6000 x 0.029

174.-

4. Management, Supervision and Labour:

(i)	One Manager - cum-Analyst at 88.20 p/m x 12	1,058.-
(ii)	One clerk-cum-typist at 41.17 p/m x 12	494
(iii)	Three foremen or shift incharge at 53.- p/m p/head	1,908.-
(iv)	Two guards-cum-messenger at 29.40 p/m	706.-
		<u>7,106.-</u>

Total Management, Supervision and Labour
(i to iv) = US 7,106 or say 7,200

5. Depreciation:

(i)	On calciner at 15 per cent on 4,119.- say	620.-
(ii)	On Burner, Blower etc., at 10 per cent on 941.-	94.-
(iii)	On Bucket Elevator and Screw Feeder at 10 per cent on 2,353.-	235.-
(iv)	On Temperature Indicator at 10 per cent on 588.-	59.-
(v)	On sieving and grinding equipment at 10 per cent on 3,529.-	353.-
(vi)	On Laboratory Equipment at 10 per cent on 1,353.-	135.-
(vii)	On piping, fittings, valves, oil reservoir, heating coil, etc. at 10 per cent on 588.-	59.-
(viii)	On electrical installation at 4 per cent on 2,118.-	85.-
		<u>1,640.-</u>

6. Maintenance and Repairs:

(i)	On plant and Machinery at 5 per cent on 13,471.-	674.-
(ii)	On electrical installation at 3 per cent on 2,353.-	71.-
(ii)	On buildings, sheds, etc., at 3 per cent on 5,295.-	159.-
		<u>904.-</u>

7. Interest on Working Capital at 10 per cent in 6,235.- 624.-

8. Provident Fund, Gratuity, Bonus, etc. at 26 per cent on 7,200.- 1,870.-

9. Insurance on Plant and Machinery at $\frac{1}{2}$ per cent on 15,500.- 78.-
2,572.-

CHARCOAL CAN SOLVE ENERGY PROBLEMS

With the rapid increase in oil prices, and a growing expenditure on foreign exchange to meet import bills, it is natural for developing countries to look around at their own local resources to see if any possibilities lie there to ease energy supply problems. Most countries, when they look around, will find wood and wood can produce charcoal.

The use of charcoal as a fuel has been known to man for a long time. Charcoal was used in metallurgy before the discovery of coal and coke and is still in use for domestic cooking and heating, and for industrial applications, e.g. ore reduction or as raw material in the chemical industry.

Charcoal - A fuel with by-products

As a fuel charcoal has several advantages. It is derived from wood - a renewable material. It has a high calorific value (7,000 big calories by kilogramme) and a unit price per calorie less than fuel oil (calorific value 10,000 big calories) and coke (8,000 big calories). During its production process, useful by-products can be obtained: tar, which gives creosote, for impregnating poles and sleepers pitch, for road surfacing or boat protection and methanol, acetic acid and wood oils, used in chemical and food industries.

As a spin off too, the making of the metal kilns, which are the type mainly used nowadays for the production of charcoal, can help develop a useful metal fabrication industry especially if the work is integrated with a sheet rolling works for making containers, boilers or vehicle coachwork, etc.

Kiln Fabrication

The fabrication of a metal kiln is quite simple, but as the specified life of the kiln depends on the quality and thickness of the steel sheets used, it is advisable to use inoxydable sheets with a thickness of three to four millimeters. This type of steel sheet can better resist damage by the high temperature reached in the kiln - at times 450°C - and corrosion due to weathering and rain.

Equipment needed for production is a simple press to give form to the sheet, hand cutters and welding unit preferably electric. The finished product is completed with a coat of aluminium paint.

Kiln size is usually four to five steres capacity - one stere is a volume of firewood equivalent to one cubic meter.. The real volume of wood is only 0.7 cubic metre.

Life of the kiln is at least 20 years or 200 firings.

The Tranchant Kiln

The earliest kilns used for the production of charcoal were, in effect, earthen mounds. About 50 years ago, however, small metal kilns were introduced, having a capacity of $\frac{1}{2}$ to 2 cord. More recently the Tranchant kiln has made its appearance.

This kiln, named after its inventor and constructor, was adopted during the second world war by the French forestry service, to produce a supply of fuel for the gazogen engines (vehicles and fixed types).

It consists of two tronconic sections, placed one on top of the other, surmounted by a cover. This cover has a central opening which itself can be closed by another cover - usually called a hat (see Fig. 1).

The kiln has four air inlets, to allow air to enter the kiln for the carbonization process and four adjustable flue pipes, to allow gas and smoke out. On these flue pipes can be placed the recovery apparatus for condensing tar and wood oil products.

The kiln has the virtue of being easily moved around. Each of its parts can be carried by two or three workers and it can be placed anywhere, especially in a forest, provided a firm, level clearing, free from vegetation, is chosen.

It operates most efficiently when wood from man-made firewood plantations (eucalyptus), with equal, or nearly so, stump diameters are used. But all kinds of wood species can be used, with diameters less than 15 cm. Bigger pieces must be split down to the required size.

The wood to be used should be felled two or three months in advance of use, when it has 20 to 40 per cent moisture content.

The period of the year the timber is felled will, however, govern the moisture content. The felled wood is then left to 'season'.

The yield of charcoal from the Tranchant kiln is 18 to 22 per cent of the weight of the seasoned wood. In the earthen mound kilns, the yield is only about eight to ten per cent.

Preparation before firing

Once the site for the kiln has been chosen, small size logs (12 to 15 cm diameter) are laid out, arranged like a star, see Fig. 2. The star has a central space, where the chimney for the firing will be erected. The chimney is constructed with small wood pieces (charbonette), crossed horizontally, to build a vertical square hole in the centre of the kiln, see Fig. 3.

Chimney size should be 40 cm. x 40 cm. and its height should be slightly less than that of the kiln. Care must be taken to ensure that the chimney flue corresponds exactly with the central opening of the cover, through which the initial ignition will take place.

The bottom section of the kiln is now placed on the small size log base and packing of the kiln can begin. In the bottom section, the wood is stacked vertically, or as near so as possible. Big pieces are stacked close to the chimney and the small ones near to the wall. As can be seen from Fig. 4, the top ends of the big pieces form the 'floor' of the top section of the kiln.

The top section of the kiln is now placed on the bottom section (as in Fig. 1) and the charging of the kiln completed by filling the top section with smaller pieces of wood (80 cm. to 100 cm. in length and 8 to 12 cm. in diameter) laid horizontally on the top ends of the big pieces in the bottom section. Any space left over in top section is filled with small wood pieces (charbonettes), but

Firing

Initial firing of the kiln is effected with dry kindling, brands or dry chips placed at the base of the chimney and set alight by dropping red embers on to the material, through the central opening of the cover. When the fire is well established, the smoke goes out via this opening. About half-hour after the initial firing, when the kiln is correctly burning, the draughts are reversed. The 'hat' is put over the central opening of the cover and the smoke is now taken away by the lateral flue pipes.

Carbonization

The carbonization process has now started. A part of the wood in the kiln is burnt and this provides enough heat to distillate the rest of the wood, which is converted into charcoal. The process continues, the heat of the gas and volatile combustion providing the distillation, without burning the wood. Carbonization starts from the top and centre of the kiln and progresses down along the walls. When red embers are seen through the air inlets, the operation is finished. The air inlets are now closed off.

The whole process of carbonization is easily controlled by regulation of the air inlets. However, an experienced burner can follow the process simply by the smell, or colour, of the smoke. He can also check the wall temperature by drawing up his hand alongside the kiln wall-without, of course, touching it!

The process takes about 24 hours after the initial firing. The kiln is then closed up and allowed to cool.

Unloading the kiln

The kiln usually takes a day and a half to cool. The cover and top section can then be removed and the charcoal, amassed in the bottom section, collected.

Good charcoal is blue-black and bright. When two pieces are knocked against each other they should emit a crystal clear ring.

The charcoal should now be spread out for 24 hours in a well ventilated shed and a watch kept for any smoke or spontaneous burning. If this occurs the burning must be extinguished.

When the charcoal is completely cool, it is screened to eliminate fine pieces and dust, then bagged in 30 to 35 kg. bags, depending on common usage. It is then ready to sell.

Economics of the metal kiln system

As has been stated, by using a metal kiln of the Tranchant type, as opposed to an earthen type, the yield of charcoal, from a given quantity of wood, can be doubled. From a production point of view it is best to work a battery of 4 to 5 kilns, served by 4 workers. In this way a daily production of charcoal can be achieved and the manpower is always fully occupied.

Training workers in the use of the kilns and to operate them in battery fashion, does not take long. Within two weeks they can become efficient burners.

Figures show that the production of charcoal can be a profitable exercise for an investor. Allowing for the cost of a 5 - steres kiln to be between US 3,500 to US 4,000 and taking the life of a kiln to be 2 years or two hundred firings, his return on invested capital is more than fifty per cent.

The system then, offers opportunities for local entrepreneurs as well as helping to ease energy problems in developing countries.

NEWS FEATURES

PROMOTION OF AFRICAN-OWNED ENTERPRISES IN THE ENTENTE COUNTRIES

In 1972, the Mutual Aid & Loan Guaranty Fund of the Entente Council countries (i.e. Danomey, Ivory Coast, Niger, Togo and Upper Volta), aware of the need for special efforts to be undertaken to encourage African entrepreneurs in promoting their own small industrial undertakings, launched a series of contacts between the national services concerned. It conducted various studies to define the needs for financing and technical assistance and to draw up a programme. Consequently, the Fund came up with a joint programme of financial and technical assistance for the development of african-owned small enterprises after securing a loan of US 7.5 million from the US Agency for International Development (USAID) in January 1973. These funds were distributed to the six development banks of the group.

Following this arrangement, the USAID granted a subsidy of US 350,000 to the Fund as a first consignment and the fund undertook technical assistance to the banks, to the national promotion centres and to the national entrepreneurs after the signature of the loan by the parties concerned in April 1974.

According to the latest information the programme was in full operation by 1974 and at the end of March 1975, 206 projects had received financing within the framework of the programme and over two-thirds of the loan had already been put at the disposal of the development banks of the respective countries.

Encouraged by these results, the Fund has negotiated, and obtained, an agreement in principle from the US government for a larger loan amounting to US 10 million which was expected to be implemented by the middle of 1975.

For the management of this operation the Fund has established a regional office at Abidjan staffed by a director-financial analyst, an expert in training and two specialists in the promotion of small and medium-scale industries the office is financed from the fund's resources to the extent of 40 million F CFA for both 1974 and 1975 but it is also assisted by some short-term consultants in markets studies and other technical assistance to be given to local entrepreneurs.

1/ See: Bulletin Mensuel by the Chambre d'Industrie de Côte d'Ivoire, April 1974 No.95 p. 17; and Small Industry Development Network Newsletter, Vol. 1 No. 4 2nd Quarter 1975 p.4.

MORE CASH FOR TECHNICAL ASSISTANCE

In its resolution 3086 (XXVIII), of 6 December 1973, the UN General Assembly, welcomed inter alia, the recommendation contained in decision I (VII) of the Industrial Development Board to increase the planning level and budget of the regular programme of technical assistance of UNIDO from US 1.5 million to US 2 million as of 1975, and to introduce this increase in the Programme Budget Document of the United Nations for 1974-1975 and for the subsequent years. The supplementary resources resulting from this increase, will be devoted to special measures in favour of the least developed countries.1/

According to the information from UNIDO Headquarters, the breakdown of this sum, by type of activity, of resources from the proposed 1975 regular programme will be:

	<u>U.S. dollars</u>
- Training of developing country personnel in various industrial fields	660,000.-
- Regional and inter-regional advisers	690,00.-
- Special activities for the least developed of the developing countries (LDCs)	500,000.-
- Promotional and operational activities designed to encourage industrial co-operation among the developing countries	50,000.-
- Consultations with governments and advisory services to developing countries	100,000.-
Total	<u>2,000,000.-</u>

Out of the proposed budget for 1975, the sum of US 410,000.- is allocated to training activities for specialised personnel in the field of formulation and implementation of industrial development strategies in developing countries. From this sum US 150,000 is earmarked for fellowships to Africa. This training programme is to be carried out by UNIDO "on demand" basis, i.e. each country will request use of the money as particular training needs arise. This approach represents a departure from the practice of previous years, viz. allocating an amount of money to each country in advance. The new "on demand" training facility will provide more flexibility.

Since most of the least developed of the developing countries are to be found in Africa, the larger share of the sum of US 500,000 will also be used in 1975 in this region. The amount is earmarked for projects related to solving the special needs of development confronting the LDCs, such as problems related to the actual implementation of industrial projects, once their viability has been confirmed by a feasibility study, and a decision taken to implement them.

1/ See: UNIDO Regular Programme of Technical Assistance,
ID/B/C.3/17, March 1974.

ETHIOPIA'S FIRST SEMINAR ON SMALL-SCALE INDUSTRY

The small-scale, cottage and handicraft industries department of the Ministry of Commerce, Industry and Tourism held its first seminar on this very important subject from 23 to 30 June 1975 at Africa Hall, Addis Ababa.

Main objectives of this seminar were to bring together a number of organizations interested in the promotion of small-scale industries in Ethiopia and to formulate clear guide-lines for policy and development. A national definition for small-scale, cottage and handicraft industries was made and some resolutions and recommendations agreed pertaining to the organizational structure of the Department to enable it to tackle more efficiently problems faced by this sector. Many organizations, including some international ones such as ECA, ILO, UNDP and UNIDO, actively participated in this seminar.

The findings and agreements reached at the seminar, if approved by the higher authorities, will have a far reaching impact on the promotion and development of this sector in Ethiopia.

ITDG EXPERT JOINS THE JOINT ECA/UNIDO INDUSTRY DIVISION

Since July 1975, the Joint ECA/UNIDO Industry Division has established an Intermediate Technology Unit as the first phase for the setting up of an Advisory Group on Industrial Technology, within the Secretariat.

The Unit will undertake surveys, in selected African countries, to identify requirements for appropriate low cost intermediate technologies; assist these countries in the selection and development of appropriate local technologies and of suitable policies for a technology centre for technological research programmes in co-operation with local universities and other institutions and promote the dissemination of information about small-scale appropriate technologies by stimulating and assisting in the publication of informative material. The Unit will also advise on the acquisition of equipment for both urban and rural small-scale industries, whenever requested.

The Unit will have the full support of the ECA secretariat and the Intermediate Technology Development Group Ltd. of London.

FIGURE 1

FOUR TRANCHANT
TRANCHANT KILN

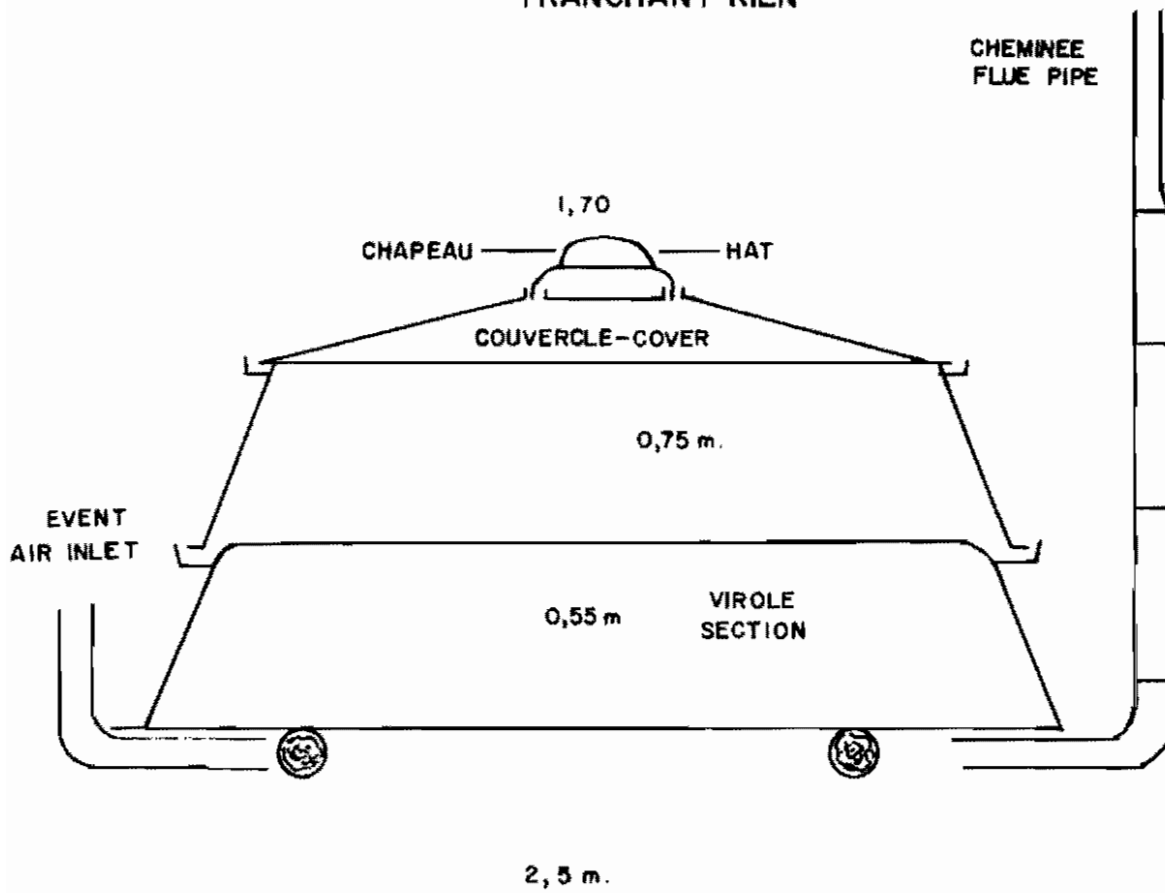


FIG. 2

VIROLE INFERIEURE POSEE SUR DES RONDINS
INFERIOR SECTION PUT ON SMALL SIZE LOGS

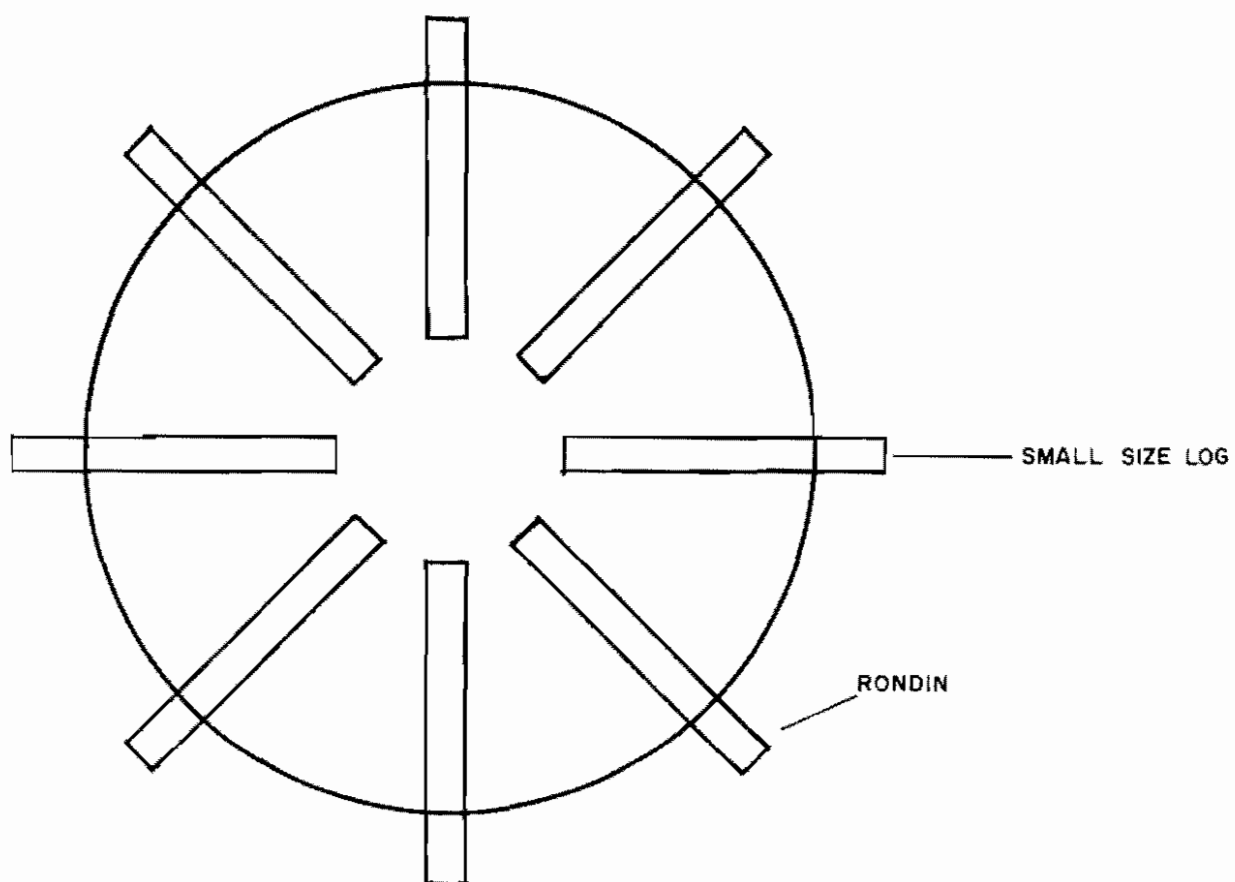


Fig. 3

CONSTRUCTION DE LA CHEMINEE CENTRALE
CENTRAL CHIMNEY CONSTRUCTION

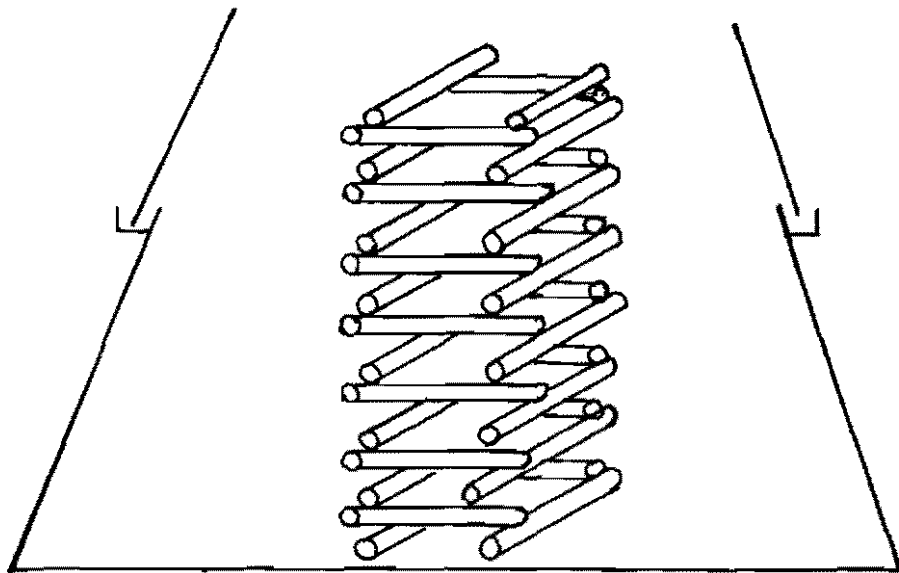


Fig. 4

RANGEMENT DU BOIS DANS LA VIROLE DU BAS
WOOD STACKING IN THE INFERIOR SECTION

