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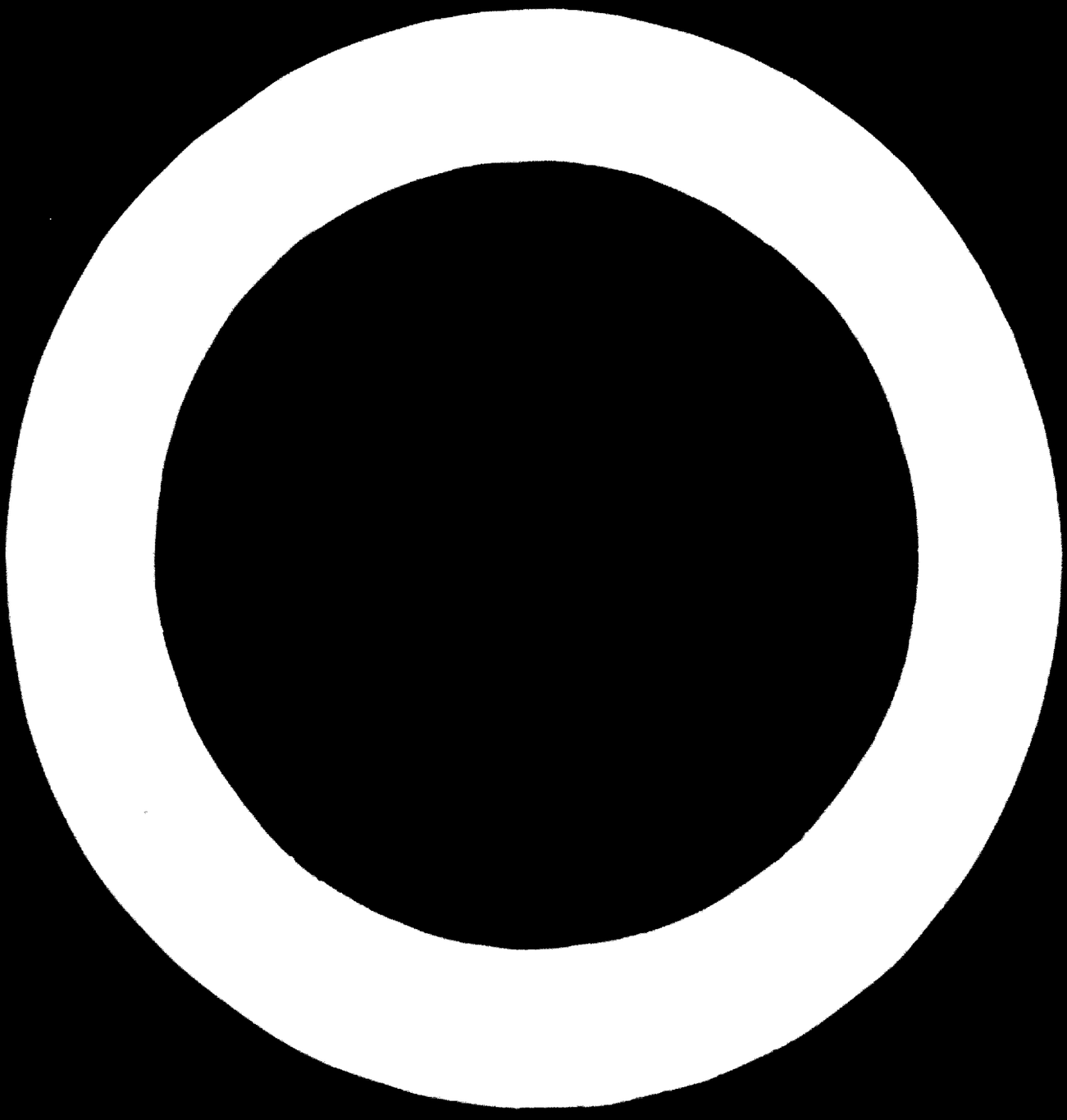
PROPOSAL FOR THE CONSTRUCTION OF A CERAMICS FACTORY IN THE IVORY COAST 1/

prepared by

The Economic Commission for Africa

14.70-5612



Summary

There is potentially a considerable market, capable of expansion, for ceramic articles in the Ivory Coast. In 1966, imports of ceramics came to 3,700 tonnes and the rate of growth of consumption over the period 1960-1967 has been of the order of 9-13 per cent per year. A consumption of 5,200 tonnes can be forecast for 1975, and it is estimated that consumption in 1980 will be about 7,300 tonnes. In addition, there would also appear to be a good market for ceramic products in neighbouring countries (Niger, Upper Volta, Liberia, Togo and Dahomey), which imported about 3,300 tonnes of ceramic articles in 1966.

Deposits of the main raw materials exist in the Ivory Coast, and fuel oil and electric power are also available there. A feasibility study indicates that a ceramics factory in the Ivory Coast would be perfectly viable and could dispose of an initial output of 5,000 tonnes per year at the rate of 80 per cent on the internal market and 20 per cent on the export market.

The investment climate in the Ivory Coast is quite favourable: there is provision for exemption from customs duties on imported equipment, spare parts and materials, and tax exemption for the first five years of operation. It should also be possible to obtain further advantages, since the proposed ceramics factory would be the first one to be set up in the country.

The profits picture and the break-even point for the proposed factory are as follows, bearing in mind the initial capacity:

Pro-forma statement of profits during first year of normal production

(thousands of US$)

	Tax free sales		1,725
(a)	Raw materials		273
(b)	Labour		146
(c)	General costs:		
	Fuel	72	
	Electric power	50	
	Water	3	
	Amortization	354	
	Insurance	32	
	Indirect labour	38	
	Indirect materials	65	
	Maintenance	70	
	Total	684	684
	Production costs		1,103
	Net profits		622
	General costs and management expenses		42
	Sales costs		22
	Total		64
	Operating profit		558
	Interest (long-term loans)		48
	Interest (short-term loans)		30
	Total		78
	Net income before taxation		480
	Net income before taxation, as a percentage of sales		27.8%
	Net income before taxation, as a percentage of overall capital investments		15.0%

Break-even point for sales

(thousands of US$)

Tax free sales			1,725
Fixed costs:	General and management costs	42	
	Sales costs	22	
	Indirect labour	38	
	20% of direct labour costs	29	
	Interest on long-term loans	48	
	Interest on short-term loans	30	
	Amortization	354	
	Insurance	32	
	Total		595
Variable costs:			
	Raw materials	273	
	80% of direct labour costs	117	
	Indirect materials	65	
	Maintenance	70	
	Fuel	72	
	Electric power	50	
	Water	3	
	Total		650
	Sales	1,725	100.0%
	Less variable costs	- 650	37.68%
	Contribution	1,075	62.32%
	Less fixed costs	- 595	
	Net income before taxation	480	

$\frac{595,000}{62.32\%}$ = 954.750 = break-even point

Sales at break-even point	= $954.750
Variable costs at 37.68 per cent	= $359.750
Fixed costs	= $595.000
Total costs	= $954.750
Profits	= -

The output considered in this report is 80 per cent of capacity, to take account of market fluctuations. If the market stays at a constant favourable level, then the factory can operate at 96 per cent of capacity: that is to say, it can increase production by 20 per cent. In this case, the net income would be as follows (in thousands of US$):

Production	6,000 tonnes per year
Sales	2,070
Less sales at break-even point	- 955
	1,115
Less proportionate variable costs	- 420
Net income (96 per cent of capacity)	695
Net income (80 per cent of capacity)	480
Difference	215

Basic details of the proposed factory

Capacity:

Initial production	5,000 tonnes per year
	5,000 tonnes per year, made up of:
	1,000 t of sanitary ware
	700 t of household ceramic ware
	3,000 t of wall and floor tiles
	300 t of industrial ceramic ware

Planned expansion: to 10,000 t/year (final capacity)

Location of factory: Ivory Coast, vicinity of Abidjan

Raw materials: (for an average output of 5,000 t/year):

				including imports of:
Ordinary quarts	250 t/yr	at 12-18	$/t	-
Pegmatite or nephelinic syenite	750 "	" 17-20	$/t	-
Ordinary kaolin and plastic clay	1,425 "	" 14-21	$/t	-
Glazes and metallic colours	75 "	" 300	$/t	75 t/yr
Pure quartz	250 "	" 20	$/t	120 t/yr
Pegmatite	750 "	" 28	$/t	-
Washed kaolin and fine clay	1,500 "	" 60	$/t	200 t/yr
Glazes and metallic colours				
Liquefying materials	150 "	" 300	$/t	150 t/yr
Fine gypsum	250 "	" 40	$/t	-
Fireclay	175 "	" 100	$/t	-

Fuel: Heavy fuel oil, about 2,100 t/yr

Electric power: About 800,000 - 1,100,000 kWh/yr depending on the raw materials.

Fresh water: About 30,000 m^3/yr

Labour: 200 workers

Investments: Of the order of 3.2 million $US (for a production capacity of 5,000 t/yr)

Production cost: Average of US$ 340 per tonne, depending on the type of ceramics manufactured.

Action Schedule:

1970-71 : Research, studies and planning

1971-72 : Construction

1973 : Start-up

1975-85 : Expansion of production to 10,000 t/yr.

Proposal by ECA concerning the construction of a ceramics factory

Introduction:

In the Ivory Coast, around Gounioubé, there are kaolin clays which bake white.

There are also several deposits of feldspar and pure sand in the Ivory Coast, and for this reason the question of the national production of ceramics should be studied with a view to making use of domestic raw materials, improving the balance of payments by reducing imports and exporting locally manufactured ceramics to neighbouring countries, and creating new jobs. Finally, the market for ceramics in the Ivory Coast is developing and has already reached a point which justifies a proposal for the establishment of a ceramics factory.

The products which it is proposed to manufacture, classified according to the BTN and SITC, are in partioular:

BTN	SITC	
69.07	662.4.4	Unglazed ceramic setts, flags and tiles;
69.08	662.4.5	Glazed ceramic setts, flags and tiles;
69.11	666.4	Porcelain or ohina household ware;
69.12	666.5	Household ware of other ceramic materials;
69.13	666.6	Ornaments and furnishing goods of porcelain, china or other ceramio materials;
69.10	812.2	Sinks washbasins, bidets, bath and other sanitary and plumbing fixtures and fittings of ceramic materials.

The factory can also be expected to produce equipment and articles for chemical and technical uses, ceramic insulators, hollow glassware and bottles for the pharmaceutical industry.

The proposed factory will be established in the locality of Abidjan and will use washed kaolin and white-baking clay from Gounioubé. It will be necessary to establish a plant for washing the kaolin directly at the deposits. The washing capacity of this plant will exceed the requirements of the ceramics factory and it will supply washed kaolin for other industries, such as the pharmaceutical industry, the chemical industry, the insecticides industry, the rubber and paper industries

and other users of kaolin. Refractory bricks of the highest quality can be produced from kaolin of the lowest quality. This report will not deal with the kaolin washing plant, however, but only with the ceramics factory.

The products considered in this report are the following:

(i) Stoneware: Stoneware is manufactured from suitable clays whose properties between the softening point and the melting point make a great difference to the baking process. It is possible to make a clay which is not suitable for the manufacture of stoneware into one which is suitable by adding flux such as nephelinic syenite or feldspar to it. Stoneware always develops more or less colour during baking. Typical stoneware products include: flags, some wall tiles, some household ware, products for industrial and agricultural uses.

(ii) Pressed earthenware, glazed pottery or porcelain articles prepared by the dry or wet methods. These products include wall tiles, some household ware, and some products for industrial uses. The raw materials used are: white-baking clay with suitable properties for forming, white-baking kaolin, feldspar, nephelinic syenite, pure sand or ground quartz, and limestone.

(iii) Earthenware, glazed pottery or porcelain articles manufactured by casting slip in plaster moulds. Products made in this way include some crockery, sanitary ceramic ware, and artistic and ornamental articles. The raw materials used are the same as for (ii).

The present situation

In the Ivory Coast, present ceramic requirements are filled entirely by imports and by pottery produced by artisans from red-baking clay.

Imports of ceramics into the Ivory Coast now exceed 3,700 tonnes per year. Imports of ceramics by neighbouring countries over the period 1966-1967 were of the following order:

Sierra Leone	200 tonnes per year	
Liberia	2,300 tonnes per year	(estimated from 1963 value of imports of 680,000 dollars)

Mali	400 tonnes per year	Project for a ceramics factory with an initial capacity of 550 tonnes per year, with proposed expansion to 2,500 tonnes per year
Upper Volta	340 tonnes per year	
Ghana	2,000 tonnes per year	Project for a ceramics factory at Saltpond with a capacity of 1,500 tonnes of tiles and 600 tonnes of sanitary ceramic ware per yard.
Togo	500 tonnes per year	
Dahomey	500 tonnes per year	
Ivory Coast	3,708 tonnes per year	Proposal to build a ceramics factory with a capacity of 2,000 tonnes per year.
Niger	220 tonnes per year	

When the ceramics requirements of neighbouring countries, especially Upper Volta, Liberia, Togo, Dahomey, and Niger, are taken into account, there appear to be ample grounds for building a ceramics factory in the Ivory Coast with an initial production capacity of 4,000-5,000 tonnes per year. Studies made by ECA show that the Ivory Coast is in a very advantageous position on the Gulf of Guinea and has a railway line to Ouagadougou, which will be extended some time in the future to Niamey. The Ivory Coast has an oil refinery, and above all the necessary basic raw materials.

Imports of ceramics by West African countries over the period 1960-1967, in value and weight, were as follows (classification groups 666; 662.4.4; 662.4.5; 812.2).

Imports of ceramics (metric tons)

	Dahomey	Ghana	Ivory-Coast	Liberia	Mali	Mauri-tannia	Niger	Nigeria	Senegal	Sierra Leone	Togo	Upper Volta
1960			2, 134							103*		
1961		3, 395	2, 001				285		2, 578	98*	180	594
1962	595	1, 945	3, 257		307	578	195		2, 045	109*	268	386
1963	596	3, 948	2, 319		252	227	243	6, 510	2, 448	58*	396	518
1964	432	2, 204	2, 418		417	75	214	6, 778	2, 958	141	229	371
1965	576	7, 566	2, 897		526	116		6, 140	2, 658	187	503	319
1966	288	3, 079	3, 708		234	137		6, 370	1, 745		338	340
1967		1, 306	3, 286						1, 664		504	
1968	541	1, 532	4, 614					2, 579	1, 867		706	

No details available

Imports of ceramics (thousands of US dollars)

1960			587	242						72		
1961		1, 401	606	424			73		342	66	59	153
1962	142	859	1, 895	1. 082	82	168	57		547	73	70	107
1963	150	1, 064	694	672	99	75	68	2, 107	619	39	112	140
1964	117	723	754		183	24	72	2, 462	709	97	85	124
1965	170	2, 103	957		92	49		2, 393	701	120	158	105
1966	84	1, 044	1, 051		70	56		2, 291	468		128	113
1967		638	1, 003						432		149	
1968	161	511	1, 369					970	509		211	

* Estimated figures

Imports by the Ivory Coast itself were as follows:

Floor and wall tiles: 1965 - 2,009 tonnes
1966 - 3,006 tonnes
1967 - 2,401 tonnes

Ornamental and household ceramic goods:
1965 - 252 tonnes
1966 - 252 tonnes
1967 - 355 tonnes

Sanitary ceramic ware: 1965 - 536 tonnes
1966 - 450 tonnes
1967 - 530 tonnes

ECA assumes that the rate of growth of consumption of ceramic goods over the period 1964-1980 will be as follows:

- Ceramics for private household use: 6.3 per cent per year
- Ceramics for industrial use: 15.8 per cent per year
- Ceramics for the construction industry: 9.3 per cent per year

The consumption of ceramic goods in the Ivory Coast would then be as follows (in tonnes per year):

	1964	1970	1975	1980
Tiles and sanitary ware	2,217	3,200	4,340	5,890
Household ceramic ware	276	470	730	1 140
Industrial ceramic goods	25	60	120	260
Total	2,518	3,730	5,190	7,290

The above figures on the consumption of ceramic articles do not include electrical insulators, which can also be produced in the proposed factory. ECA proposes the construction of a ceramic factory in the locality of Abidjan, with a practical capacity of 5,000 tonnes per year, made up initially as follows:

	1,000 tonnes of sanitary ceramic ware
	700 tonnes of kitchen and table ceramic goods
	300 tonnes of industrial ceramic goods
	3,000 tonnes of tiles
Total	5,000 tonnes

It is envisaged that production capacity will be expanded by 5,000 tonnes per year to give a final production capacity of 10,000 tonnes per year in about 1985.

Raw materials

The following raw materials are used in the manufacture of ceramic articles:

Stoneware: Kaolin (ordinary quality) costing about 21 dollars per tonne
Clay, costing about 14 dollars per tonne
Pegmatite or nephelinic syenite, costing about 17-20 dollars per tonne
Quartz costing about 18-20 dollars per tonne
Metallic colouring costing about 200-300 dollars per tonne

Finer-quality ceramics:
Kaolin (superior quality or good quality), costing about 60 dollars per tonne
Pegmatite, costing about 28 dollars per tonne
Quartz, costing about 20 dollars per tonne
Glazes and colouring costing about 300 dollars per tonne
Gypsum, costing about 40 dollars per tonne
Fireclay, costing about 100 dollars per tonne

The usual composition, the fuel and power requirements and the productivity will be as follows:

Stoneware tiles or flags:

Quartz	10 per cent at $18 per tonne = $1.8
Pegmatite or syenite	30 per cent at $20 per tonne = $6.0
Kaolin or clay	57 per cent at $21 per tonne = $12.0
Colouring and glaze	3 per cent at $300 per tonne= $9.0
	$28.8 $/t

Unglazed tiles: 72 kWh/t; 50 tonnes per year per worker; 2,000 kcal/kg.

Industrial and agricultural stoneware:

Quartz	10 per cent at $12 per tonne =	$1.2
Pegmatite or syenite	20 per cent at $17 per tonne =	$3.4
Kaolin or clay	68 per cent at $14 per tonne =	$9.5
Glaze and colouring	2 per cent at $300 per tonne=	$6.0
		20.1 $/t

Electric power	80 kWh/t
Fuel	1,800 kcal/kg
Productivity	70 tonnes per year per worker.

Fine quality ceramics

Quartz	10 per cent at $20 per tonne =	$2.00
Pegmatite	30 per cent at $28 per tonne =	$8.40
Kaolin (and clay)	60 per cent at $60 per tonne =	$36.00
		46.40 $/t

In addition, per tonne:

Glaze and colouring	6 per cent at $300 per tonne =	$18.00
Gypsum	10 per cent at $40 per tonne =	$4.00
Fireclay	7 per cent at $100 per tonne =	$7.00
		75.40 $/t

SITC	Electric power	Fuel	Productivity
662.4	100 kWh/t	2,800 kcal/kg	20 t/y per worker
663.9	130 kWh/t	3,300 kcal/kg	5 t/y per worker
666	120 kWh/t	3,800 kcal/kg	10 t/y per worker
812.2	110 kWh/t	3,400 kcal/kg	20 t/y per worker

	Stoneware	Fine ceramics
662.4.4	1,850 t = 37%	450 t = 9%
662.4.5	500 t = 10%	200 t = 4%
663.9	150 t = 3%	150 t = 3%
666.4		60 t = 1.2%
666.5		600 t = 12%
666.6		40 t = 0.8%
812.2		1,000 t = 20%
	2,500 t = 50%	2,500 t = 50%

The electric power requirements for the proposed manufacturing programme will be 95 kWh/t.

The heat requirements will be 2,720 kcal/kg.

The productivity will be 25 tonnes per year per worker.

The mean cost of the raw materials will be 52 dollars per tonne.

Requirements for raw materials, power and fuel will be as follows:

		Proportion Imported
Ordinary quartz	250 t/yr at $ 12-18 per tonne	-
Pegmatite or nephelinic syenite	750 t/yr at $ 17-20 per tonne	-
Ordinary kaolin and plastic clay	1,425 t/yr at $ 14-21 per tonne	-
Glaze and metallic colouring	75 t/yr at $ 300 per tonne	75 t/yr
Pure quartz	250 t/yr at $ 20 per tonne	120 t/yr
Pegmatite	750 t/yr at $ 28 per tonne	-
Washed kaolin and fine clay	1,500 t/yr at $ 60 per tonne	200 t/yr
Glaze and metallic colouring		
Liquefying materials	250 t/yr at $300 per tonne	150 t/yr
Fine gypsum	150 t/yr at $40 per tonne	
Fireclay	175 t/yr at $100 per tonne	
Electric power	1,000,000 kWh/year	
Heavy fuel oil	2,100 t/yr	
Process-quality fresh water	30,000 m^3/yr	

Approximate breakdown of ceramics manufacturing costs
(figures rounded off to thousands of dollars)

Production capacity:		5,000 t/yr	
Made up of:		1,000 t/yr of sanitary ware	
		700 t/yr of household ware	
		300 t/yr of industrial ceramic ware	
		3,000 t/yr of tiles	
Unit investment cost		$640 per tonne per year	
Equipment/buildings ratio:		55/45%	
Total investments (thousands of dollars)		3,200	
Made up of:	Equipment	1,760	(including $1,440,000 imported equipment)
	Buildings, land, etc.	1,440	(including $350,000 imported items)
Depreciation:	16 per cent on equipment	282	
	5 per cent on buildings	72	
	Total	354	
Maintenance:	6 per cent on equipment	106	(including $60,000 for imported spare parts)
	2 per cent on buildings	29	(including $1,000 for imported materials)
	Total	135	
Interest:	6 per cent on 25 per cent of the investments	48	
Insurance and miscellaneous costs (1% of investments):		32	
Productivity		25 t/yr per worker	
Total number of employees		200 workers	
Made up of:			
	Management staff	6	(including 3 expatriate staff for 5 years)
	Technicians	8	(including 2 expatriate staff for 5 years)
	Shop supervisory staff	8	
	Office staff	9	

Skilled workers	80
Semi-skilled workers	63
Other personnel	26

Annual wage per worker and total wage bill:			(thousands of $US)
	$930 p.a. per worker x 200	=	186.00
Made up of:			
Management staff	$6,500 p.a. per man x 6	=	39.00
Technicians	$3,250 p.a. per man x 8	=	26.00
Shop supervisory staff	$2,020 p.a. per man x 8	=	16.16
Office staff	$ 970 p.a. per man x 9	=	8.73
Skilled workers	$ 590 p.a. per man x 80	=	47.20
Semi-skilled workers	$ 570 p.a. per man x 63	=	35.91
Other personnel	$ 500 p.a. per man x 26	=	13.00

Social welfare costs, holidays, etc., (33 per cent of wage bill)	$62,000 p.a.	
Profits (15 per cent of investments)	$480,000 p.a.	
Raw materials		
($52 per tonne x 5,000 tonnes + 5 per cent)	$273,000 p.a.	(including $81,900 for imported materials)
Fuel: 2,100 tonnes x $34 per tonne	$72,000 p.a.	
Electricity: 1,000,000 kWh x 5 cents	$50,000 p.a.	
Water: 30,000 m^3 x 10 cents	$ 3,000 p.a.	
Working capital fund	$300,000 p.a.	
10% interest on working capital fund	$30,000 p.a.	
Total wages and social welfare costs	$248,000 p.a.	
Made up of:		
direct	$146,000 p.a.	
indirect	$ 38,000 p.a.	
OAA	$ 64,000 p.a.	

Recapitulation (thousands of US dollars)

		Proportion in foreign currency
Depreciation	354	
Wages and salaries	186	48 (for 5 years)
Social welfare costs	62	
Profits	480	
Added value	1,082	48
Maintenance	135	65 (spare parts)
Interest	48	
Insurance and miscellaneous costs	32	
Fuel	72	
Electricity	50	
Water	3	
Raw Materials	273	82
Interest on working capital fund	30	
Intermediate cost	643	
Turnover	1,725	195 for 5 years 147 after 5 years

Breakdown of investments (thousands of dollars)

		In foreign currency
Ground	200	-
Buildings and construction work	1,240	350
Equipment	1,200	1,200
Installation work	340	240
Start-up costs	220	110
	3,200	1,900

Pay-out time

According to the formula $\frac{I'}{Fa} = t$, the pay-out time will be five years

According to the formula $\frac{I}{Pn+A+P}$ = t2, the pay-out time will be 3.6 years

Where: I = investments, I' = investment without borrowed capital

Pn = net profits

A = depreciation

P = interest on loans

(Continued from page 18)

* Comparison of this figure of US$ 1.72 million with the turnover of US$ 1.71 million shows that the ceramic products manufactured in the proposed factory will be competitive on the West African market and there are grounds for assuming that ceramics can be exported to neighbouring countries, especially Upper Volta, Niger, Togo, Dahomey and Liberia.

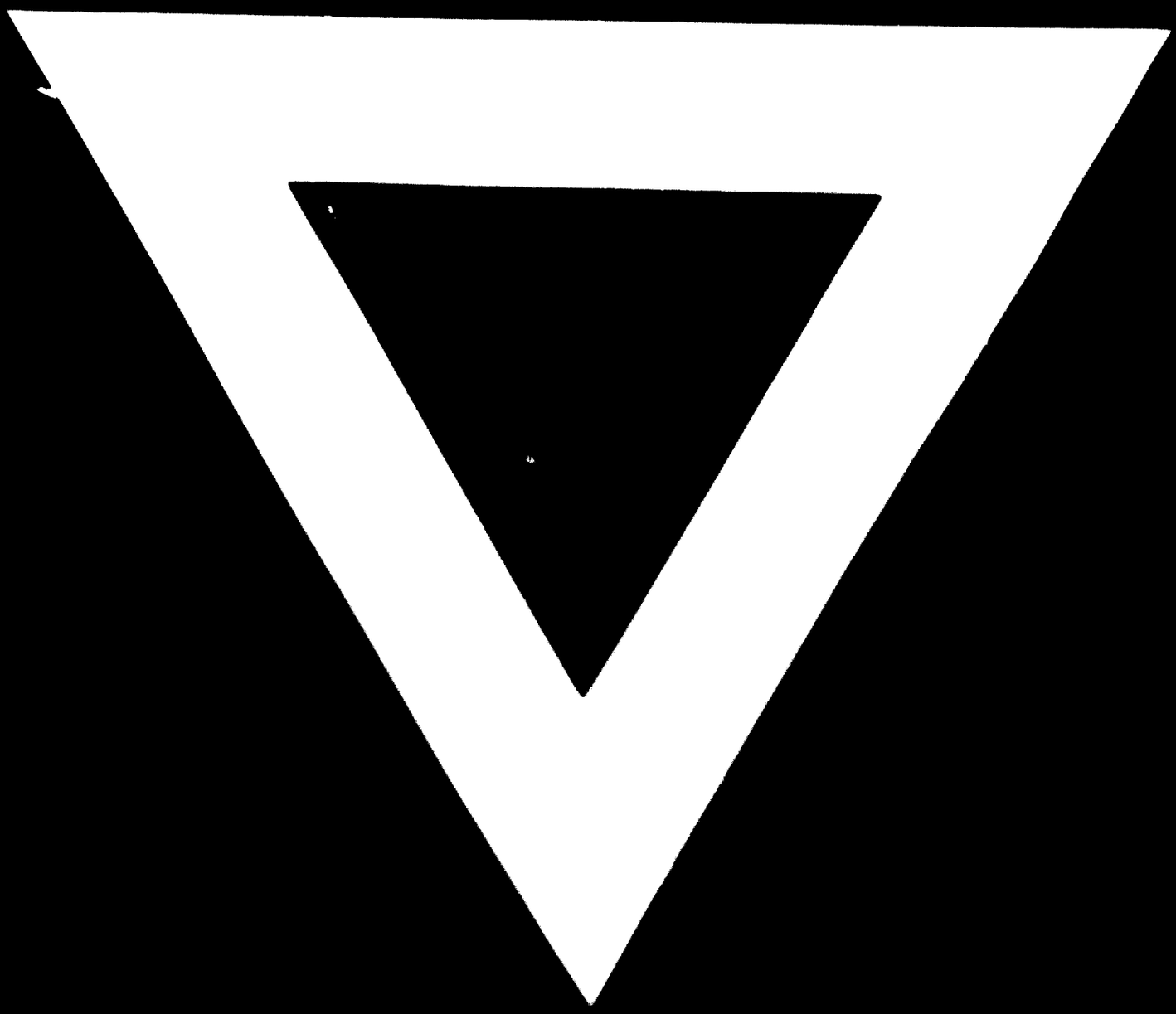
The CIF prices of imported ceramics, in US dollars per tonne, averaged:

		Dahomey	Ghana	Ivory Coast	Mali	Mauritania	Niger	Nigeria	Senegal	Sierra Leone	Togo	Upper Volta	Average for all countries
662.4.4	Unglazed tiles and flags	205	226	208	189	233	217	242	201	-	209	222	210
662.4.5	Glazed tiles and flags	220	240	243	337	240	270		212	-	225	243	237
66.4	Porcelain household ware	1,000	264	1,467	649	2,444	1,000	350	1,000	578	795	2,666	356
666.5	Household ware of other ceramic materials	455	440	514	698	1,000	750	340	402	928	596	587	430
666.6	Ornaments and furnishing goods of porcelain, china or other ceramic materials	857	862	1,258	1,000	-	1,000	594	1,024	667	1,084	1,043	865
812.2	Sanitary ceramic ware	471	546	439	572	532	444	520	237	617	510	441	490

The breakdown of the proposed production, expressed in terms of the CIF prices of imported ceramic goods, is:

1,000 tonnes of sanitary ceramic ware	at $490/t	=	$490,000
700 tonnes of ceramic household ware	at $430/t	=	$301,000
300 tonnes of artistic and industrial ceramic products	at $700/t	=	$210,000
3,000 tonnes of floor and wall tiles	at $240/t	=	$720,000
Total production			$1,721,000

* Continued page 17



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