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9. ABSTRACT
Research results in Sierra Leone reveal that gara dyeing is an economically profitable, small scale industrial activity with a large potential for future growth. The four objectives of this study were to: describe the existing methods of gara dyeing in Sierra Leone; analyze the efficiency and profitability of different production methods in the gara industry; identify constraints on management, production, and marketing; and discuss the policy implications of the study. Gara dyeing is the only industrial activity which is dominated by females. The analysis shows that gara cooperatives will operate more efficiently only if they overcome present organizational and marketing problems. More initiative is needed on the part of private and cooperative producers to market their goods. International marketing of gara cloth is constrained by the lack of adequate knowledge on how to reach foreign markets. This report describes the technology of gara dyeing, production inputs, material inputs, management inputs, microeconomic analysis of gara firms, marketing of gara cloth, survival of the gara industry, and policy implications. One of the measures that has been adopted for promoting small scale industries in developing countries is import duty rebates on imported raw materials. Import duty relief has been mentioned as the most important factor in the promotion of small scale industries by the United Nations. The policy of granting import duty rebates to gara dyers could result in an increase in the number of gara dyeing firms, gara outputs, employment and exports by 122%, 37%, 50% and 41% respectively.

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THE ECONOMICS OF THE GABA (TIE-DYE)
CLOTH INDUSTRY IN SIERRA LEONE

by
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THE ECONOMICS OF THE GARA (TIE-DYE)
CLOTH INDUSTRY IN SIERRA LEONE

by

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FOREWORD

The African Rural Economy Program was established in 1976 as an activity of Michigan State University's Department of Agricultural Economics. The African Rural Economy Program is a successor to the African Rural Employment Research Network which functioned over the 1971-1976 period.

The primary mission of the African Rural Economy Program is to further comparative analysis of the development process in Africa with emphasis on both micro and macro level research on the rural economy. The research program is carried out by faculty and students in the Department of Agricultural Economics in cooperation with researchers in African universities and government agencies. Specific examples of ongoing research are, "Poor Rural Households, Income Distribution and Technical Change in Sierra Leone and Nigeria," "Rural and Urban Small-Scale Industry in West Africa," "Dynamics of Female Participation in the Economic Development Process in West Africa," and "The Economics of Small Farmer Production and Marketing Systems in the Sahelian Zone of West Africa".

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I. INTRODUCTION

The Government of Sierra Leone has recently begun to emphasize the development of small-scale, labor-intensive industries [Sierra Leone, Government of; 1974]. A recent study of small-scale industries in Sierra Leone [Chuta and Liedholm, 1975] revealed that there are about 360 small-scale, private gara dyeing establishments² and seven gara dyeing cooperatives in Sierra Leone employing about 1,600 people. Although previous studies of rural³ industries have contended that such industries would decline in the course of economic development [Hymer and Resnick, 1969], the results of our research in Sierra Leone reveal that gara dyeing is an economically profitable⁴ small-scale industrial activity with a large potential for future growth [Liedholm and Chuta, 1976]. Also, gara dyeing is the most labor-intensive industrial activity in Sierra Leone [Liedholm and Chuta, 1976].

In addition, other factors such as export potential [Blydenstein, 1975; Okaror, 1975], and female participation [Spencer, 1976, p. 30], are important features of the gara industry. The results of the survey of Sierra Leone small-scale industries in 1975/1975 revealed that about 18

¹See page 3 for the meaning of "gara."

²One of the prime objectives of the United National Industrial Development Organization (UNIDO) projects in Sierra Leone in 1975 was the improvement and expansion of gara cloth production [Blydenstein, 1975.] A principal component of the program for developing small-scale manufacturing and handicrafts in Sierra Leone is the formation and expansion of industrial cooperatives [Sierra Leone, Government of; 1974, p. 186].

³The classification of localities into rural and urban varies with countries. For the Sierra Leone study, the United Nations definition of rural (ie. localities with less than 20,000 people) was adopted.

⁴The analysis of Sierra Leone data on small-scale industries (industries employing less than fifty people) reveals that gara dyeing earned the highest rate of economic profit when compared to other major small-scale industrial activities such as tailoring, carpentry, blacksmithing, and baking. See Liedholm and Chuta [1976, p. 94].

percent of gara cloth are exported [Liedholm and Chuta, 1976].¹ Also, women constitute over 80 percent of the total number of proprietors among gara dyeing firms, and female labor contributes over 70 percent of the labor input in gara dyeing [Chuta, 1977].

1.1. Objective of the Study

The four objectives of this study are to: 1) describe the existing methods of gara dyeing in Sierra Leone; 2) analyze the efficiency and profitability of different production methods in the gara industry; 3) identify constraints on management, production and marketing; 4) discuss the policy implications of the study.

1.2. Sources of Data

The data on gara dyers in Sierra Leone were collected by the author of this paper during the 1974/1975 small-scale industry survey² in Sierra Leone. A total of 22 gara firms out of 360 (6 percent) were selected for study as well as almost all the gara cooperatives were enumerated. For the purpose of the survey, detailed questionnaires were designed to obtain information on 1) daily input-output data over a one-year period, 2) the existing technology of gara production, and 3) organization, production and marketing aspects of gara dyeing firms. Field enumerators were trained to gather the input-output data under close supervision.

¹A linear programming analysis of small-scale industries in Sierra Leone revealed that given the appropriate policy measures, up to 45 percent of annual production of gara cloth could be exported [Chuta, 1977].

²The small-scale industry survey was one component of the Rural Employment Research Project directed by Dr. Dunstan Spencer at Njala University College, the University of Sierra Leone.

II. THE TECHNOLOGY OF GARA DYEING¹

2.1. The Meaning of Gara

The word "gara" refers to the leaves of the leguminous plant (*Lonchocarpus Cyanescens*), a straggling shrub or woody climber 10 to 12 feet high [Perkin and Everest, 1918] which grows in the Northern Province of Sierra Leone (see Figure 1). The young leaves of these leguminous plants are collected along with some more mature ones and pounded, dried outside or molded into small balls before being dried. In that state, the gara is sold² to dyers for preparing the indigo dye solution. To most people in Sierra Leone, "gara" refers to any cloth dyed of the natural indigo dye extracted from the leaves of the leguminous plant or any cloth dyed with synthetic dye.

2.2. Evolution of Gara Dyeing in Sierra Leone

Gara dyeing appears to have been started in Sierra Leone around the middle of the nineteenth century.³ Gara production was probably introduced into Sierra Leone by the Madingos and Susus who migrated from Guinea into Sierra Leone and then settled in the Northern Province of Sierra Leone.

¹For a detailed treatment of this topic, see Chuta and Steacy [1975].

²Sometimes, the Lebanese merchants store the gara in sacks weighing 40 pounds and gara workers purchased the gara in that form at a price range of Le 6 (Le 1.00 = \$1.10 U.S.) to Le 12 (at the time of the survey), depending on location.

³Information concerning the origin of gara craft was supplied by Mr. M.A. Tunis, the head of the Small-Scale Industry Division, Ministry of Trade and Industry, Freetown. Christopher Fyfe [1962] contends that gara cloth was not produced in the 1850's when the Madingos and Susu first migrated into Sierra Leone. In the Trade Exhibition of February 28, 1865, which took place in Water Street, Freetown, Fyfe referred to the sales of country cloth rather than gara. Thando Gwebu [1971] points out that in the early 1920's, Chief of Rogbane allocated the central part of Makeni called Manikala to the Madingo migrants, who were skilled gara dyers. This area still remains the center of gara production in Makeni (see Figure 1).

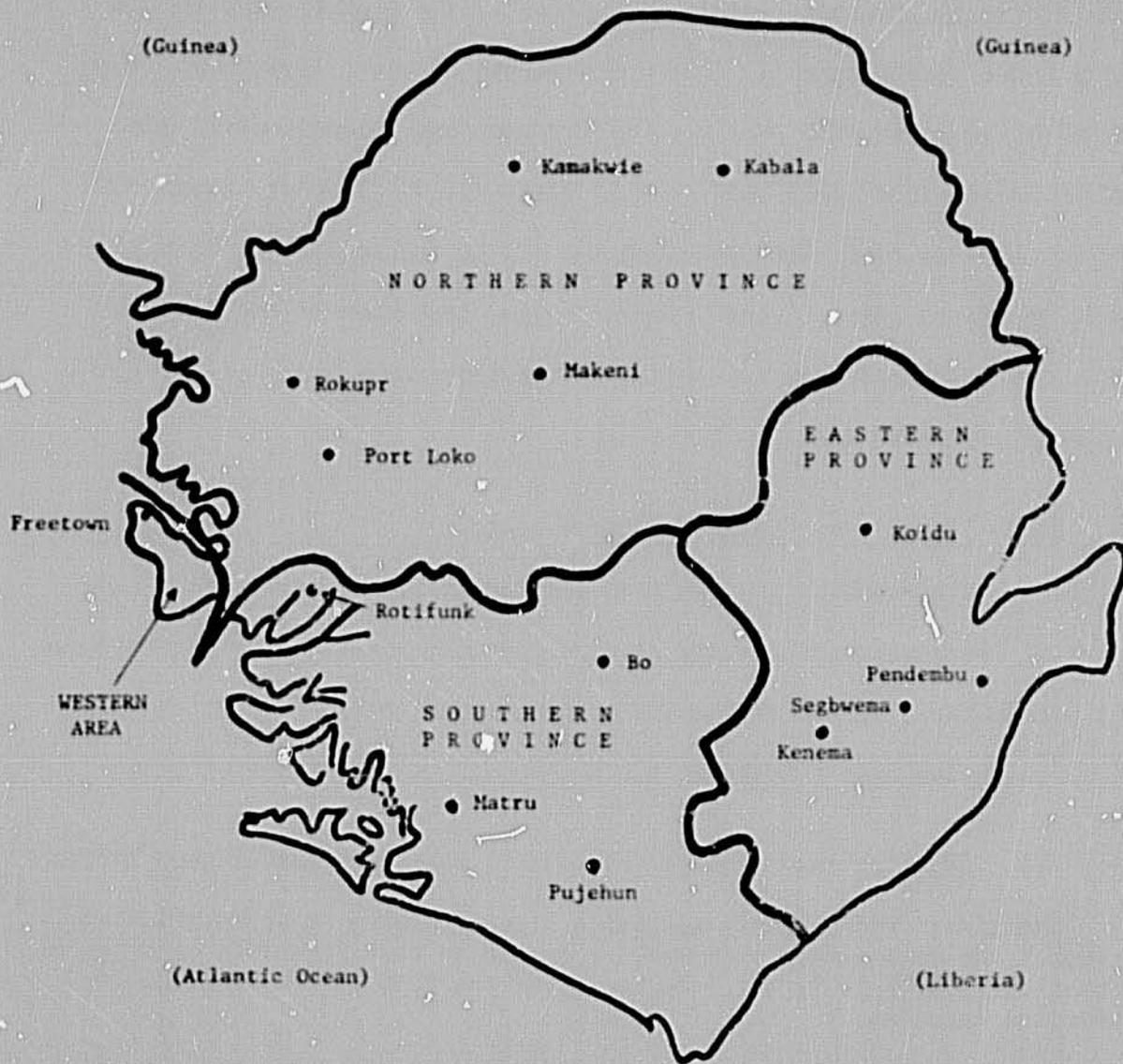


Figure 1. Sierra Leone: Small-Scale Industry Sample Localities

By the 1920's, tie-dyeing had reached the southern parts of Sierra Leone, e.g., Bo and Pujehun (see Figure 1). Today, many Sierra Leoneans, numbering over 1,600 of different tribal origins, are engaged in gara production [Chuta and Liedholm, 1975].

2.3. The Use of Synthetic Dyestuff in Sierra Leone

It is most probable that gara dyers in Sierra Leone depended on the use of natural indigo dyes¹ until the early part of the 1950's. Natural indigo dyes have some disadvantages. First, they are limited in color variety. Gara dyers can produce lappas² with only white, blue or dark blue color combinations. Second, the use of natural indigo dyes involves a lengthy process of preparing the dye solution. Third, since it is difficult to control the concentration of the dye liquor at all times, natural indigo dyes often produce uneven results.

Due to the limitations of the natural indigo dyestuff, gara dyers in Sierra Leone have begun using synthetic dyes. Today, the most commonly used synthetic dyes in Sierra Leone are indanthren and caledon which are imported from the German Federal Republic and the United Kingdom, respectively. Other dyes used by gara dyers include the Procion-H (I.C.I.) and Dylon dyes, both imported from the United Kingdom.³

¹Another traditional dye used in Sierra Leone is the kola nut (*cola acuminata*) dye. This dye is obtained by pounding kola nuts in a mortar, mixing the pounded kola nut with water, and sifting the concentrated dye solution. When a fabric is dyed with the native indigo and kola nut dye solutions, the resultant colors after dye migration are dark green or dark brown shades.

²Lappas mean the same as wrappers. One lappa is equivalent to about two yards of cloth which may be of varying widths.

³For more details, see Chuta and Steacy [1975].

2.4. Some Inefficiencies in the Use of Synthetic Dyestuff

Although the use of synthetic dyes has become widespread in Sierra Leone there are many inefficiencies in the dyeing process such as variations in dye solution-fabric ratios, dye-soda-sulphite¹ ratios, and water-soda-sulphite ratios. These critical ratios affect the shades and color fastness. Although the dye dealers² in Freetown recommend that dye, soda and sulphite should be combined in the ratio of 1:1:1, most dyers were observed to pay little attention to measuring the dyes. In addition, most dyers lack knowledge about the proper storage of dye solution. Leftover dye is often poured down the drain rather than preserved and reinforced for later use.

2.5. Methods Used in Producing Patterns

The most commonly used methods of producing patterns include machine sewing, hand stitching with needle, dripping or stamping of wax or candle onto the fabric, bunching (marbling), tying or binding with cord, gathering, folding, and pleating or a combination of any of the methods. The key element in these methods is the production of dye-resist areas on fabric.

The most popular designs that are produced by gara dyers include the "cow-eye", "blade", "45-record" and "LP-record"--all produced by the hand stitching or sewing methods. With the tying or binding techniques, designs such as "Apollo" or sunburst and the "rainbow" are produced. The

¹Soda here refers to caustic soda (sodium hydroxide) and sulphite refers to sodium hydrosulphite.

²The Major and Company in Freetown sells Indanthren vat dyes while the New Company sells the Caledon vat dyes.

"siti" or cloud design is the result of the marbling technique. Stamping of wax or candle onto fabric yields the popularly known "batik" designs.

The dyeing process will depend on the exact pattern to be produced. In general, the dye solution has to be prepared first. The native indigo dye solution takes about seven to fourteen days to prepare while the synthetic dye solution takes only ten to fifteen minutes. While the native indigo dye solution lasts about six months once prepared, the synthetic lasts only a few days before being exhausted. After the dye solution is prepared, the patterned fabric is immersed in the dye bath. The duration of the immersion is longer with the native indigo dye than with the synthetic dye.

The finishing process depends to a great extent on the technique of pattern production. In the case of bound or sewn designs, the thread or cord have to be removed. Some respondents very carefully untie the cord, while others cut the cord with a knife or razor blade. Some respondents simply pull the material apart--thus breaking the threads used for making the design. With stamped fabric, the wax has to be melted off after the dyeing has been completed. In general, final finishing stages include soap treatment of the dyed fabric to remove excess salt, soda and unfixed dye from fabric, rinsing in cold water, addition of starch to fabric, sun drying and stick ironing.

III. PRODUCTION INPUTS

Broadly speaking, gara production inputs include labor (mostly adult female), capital, material and management inputs.

3.1. Labor

Our field survey generated data on labor inputs by hours of work. The bulk of the labor input into gara production is proprietor and family labor. The proprietors contribute about 53 percent of total labor input while male, female and child family labor constitute about 12 percent, 16 percent and 2 percent of total labor input respectively.¹ Hired labor for tying designs onto fabric contributes about 15 percent of total labor input. Apprentice labor is negligible in gara dyeing. Most gara dyers learned the craft from their parents before attaining the age of fifteen years.

The most labor-intensive aspect of gara cloth production is the dyeing process. With the use of synthetic organic dyestuff, the dyeing process alone accounts for between 65 and 80 percent of total time allocation. When traditional indigo dye are used the dyeing process accounts for about 90 percent of total time allocated to gara production.² For most gara dyers, stick ironing of fabric constitutes about 5 to 18 percent, while bunching, folding and tying of designs³ account for about 2 to 9 percent

¹About 80 percent of gara dyeing proprietors are women while over 70 percent of total labor input is female labor.

²For more details, see Chuta and Steacy [1975].

³The amount of tying time depends not only on pattern desired but importantly on type of fabric. Some cotton fabrics will take an individual about fifteen minutes to tie a lappa. But, one individual will require a maximum of one day, working ten hours to tie patterns on a dozen lappas of satin fabric. The cost of tying by hand for instance varies from Le 0.20 to Le 2.00 for one lappa depending on the complexity of the pattern to be tied.

of the entire labor input.

The traditional indigo dyeing is time-consuming in the following way. First, fabric is immersed in the indigo dye contained in the 44 gallon drum for about one and one-half hours. Then the fabric is stirred with a big stick and removed from the drum after squeezing out the dye. The fabric is then spread on a cement floor or green grass for oxidation to take place for about thirty minutes. The process is then repeated about three times. This is a marked contrast from the synthetic dyeing process which lasts at most one hour.

3.2. Capital

In this paper, capital includes working capital, equipment and buildings. Working capital is defined as the value of the inventories of material inputs and finished outputs held by the enterprises. The most important equipment for the traditional dyers is the 44 gallon drum¹ used for preparing the native indigo dyestuff. Users of synthetic dyestuff possessed dye basins. Other equipment items utilized by gara dyers included wooden sticks for ironing, rubber gloves, kettles, buckets, baskets, and carved wooden stamps for stamping patterns on fabric. Since most of the gara dyeing activities in Sierra Leone are undertaken outside, either in front of or behind residential buildings, little or no building costs are involved. In general, the annual value of capital² services for most gara dyers is about Le 24.

¹Such drums were purchased second-hand at a cost of about Le 4.00 (\$4.40). The number of drums used depends on the volume of activity.

²All the tools and equipment stock items have been converted into annual capital service flows using the capital recovery formula.

3.3. Material Inputs

Expenditure on fabric constitutes about 80 percent of material input purchases for gara dyeing. The three ingredients which are necessary for forming the synthetic dye solution, i.e., sodium hydroxide (caustic soda), sodium oxide or sodium hydrosulphite and the synthetic organic dye-stuff constitute about 14 percent of total material input purchases.¹ For mixing the native indigo dye solution, the important ingredients include the local gara leaves, other leaves, roots and tree bark, caustic soda and a few tins of ICI synthetic indigo. Kola nuts must be purchased for the preparation of kola nut dye.

Textile fabrics (which are all imported) available to most dyers in Sierra Leone, range from shirtin and poplin, costing about Le 0.45 to Le 0.65 a yard respectively, to the expensive cotton fabrics costing Le 1.2 per yard for the "omega", "santos" and "satin brands and Le 3.6 per yard for the "super" brand.² A recent innovation in gara dyeing is the use

$$R = \frac{rV}{1 - (1 + r)^{-n}}$$

where R is the constant annual capital service flow, V is the original (undepreciated) market value of the asset, r is the discount rate and n is the life expectancy of the capital. The opportunity cost of working capital was obtained by applying r, a discount rate of 20 percent, to the total inventory values of output and material input.

¹An ad valorem customs duty of about 36.5 percent is imposed on the importation of these ingredients. Also, the prices per cwt. (Freetown, C.I.F.), of synthetic organic dyestuffs and caustic soda (sodium hydroxide) have risen at annual rates of 16 percent and 4.4 percent respectively, between the period 1963 and 1973 [Sierra Leone, Government of; 1963-1973].

²The quoted prices are relevant for the 1974/1975 survey period. "Santos", "omega" and "super" brands were sold in widths of 50 inches to 52 inches; "satin" in 36 inch widths; poplin in 31 inch to 32 inch widths and shirtin in 27 inch to 28 inch widths.

of fabrics such as lace, corduroy, velvet and polyesters.

On the basis of the input-output information provided by ten of our respondents,¹ it was estimated that the gara industry could produce a maximum of about 750,000 linear yards of fabric annually.² If a maximum fabric width of 52 inches is assumed, then 750,000 linear yards of gara output will convert to approximately a maximum of about 937,350 square yards of gara cloth output annually.

3.4. Management Inputs

The study of small-scale industry in Sierra Leone revealed that only about 13 percent of private gara producers in Sierra Leone had any formal schooling and that over 50 percent of gara producers did not keep any kind of business records [Liedholm and Chuta, 1976]. Only three out of the five gara cooperative societies kept up-to-date records of their business transactions. In fact, only two of the five cooperatives were registered, three were being managed by local personnel while two were under the management of both expatriate (missionary) and local personnel.

¹Only ten out of the 22 selected firms had reliable input-output data for a twelve month's period.

²Blydenstein's [1975] "guesstimate" of 4.5 million square yards of annual gara production in Sierra Leone is probably too optimistic. Given an average fabric production of 2,083 linear yards with a standard deviation of 1,906 and a population of 360 gara firms, an upper confidence limit of fabric production is about 1,504,000 linear yards (or approximately 1,880,550 square yards) where $n = 10$ and $t_{\alpha/2}$ or $t_{.005} = 3.3$. Even the linear programming prediction of Le 1,079,091 of gara output [Chuta, 1977] for 1974/1975 in Sierra Leone converts into 599,495 linear yards (or 749,369 square yards) of fabric, assuming a weighted average output-fabric ratio of Le 1.8.

IV. MICROECONOMIC ANALYSIS OF GARA FIRMS

4.1. Classification of Representative Firms

In order to examine the pattern of resource use and profitability of gara firms in Sierra Leone, five representative firms have been delineated (see Table 1). The criteria for classifying gara firms into representative firm types are the technique of production, institutional setup, location and the quality of inputs that enter the production process. Thus, ten out of the twenty-two firms that were initially sampled and one cooperative gara firm yielded input-output information that were good enough for constructing representative firms.¹ The firm types A, B, C, and D represent 4 percent, 42 percent, 50 percent and 4 percent of private gara producers in Sierra Leone (as shown in Table 1). The use of representative firms in the micro-economic analysis of gara industry in Sierra Leone has the advantage of enabling us to analyze the economic behavior of the individual firm as a decision-making unit, without necessarily examining each individual firm within the industry [Buckwell and Hazell, 1972].²

¹The bulk of the gara cloth produced in Sierra Leone originates from private small-scale entrepreneurs who are scattered over the country. However, production is also carried out by cooperatives. At least five such cooperatives or voluntary associations were identified during the 1974/1975 survey of small-scale industries.

²The representative firm approach also has some limitations. For details of such limitations, see Day [1963], Miller [1966], Marengo [1961] and Paris and Rauser [1975].

TABLE 1
 REPRESENTATIVE FIRM TYPES FOR GARA FIRMS
 IN SIERRA LEONE, 1974/1975

Firm ^a Type	Number of Firms in Sample	Percentage of Establishments in the Population	Characteristics of Representative Firms
A	2	4 percent	Use the traditional native indigo dye and medium-priced ^b fabric located in both large and small towns.
B	4	42 percent	Use synthetic organic dyestuff and medium-priced fabric. Located mainly in large towns.
C	2	50 percent	Use synthetic organic dyestuff and cheap fabric. Located mainly in small rural towns.
D	2	4 percent	Use synthetic organic dyestuff and very expensive fabric. Located mainly in cities.
E	1	--	Cooperative production unit, use synthetic organic dyestuff and medium-priced fabric. Located both in large and small towns.

SOURCE: Survey data.

^aFirm types A, B, C and D represent private small-scale producers. Members of gara cooperatives also operate their private gara establishments.

^bLarge towns will include localities with greater than 20,000 people and will include Freetown, Bo, Koidu, Kenema and Makeni (see Figure 1).

4.2. Budget Analysis of the Representative Firms

In order to analyze the economic profitability or viability of gara representative firms, three concepts--economic profit, economic rate of profit and returns to proprietor--will be utilized. The measure of economic profit has been obtained for the representative firms by subtracting from the gross value of output (column p in Table 2), all material input costs (columns j through m or column n), annual capital costs (column i) and labor costs (columns e through g or column h) valued at their opportunity cost respectively.¹ The measure of returns to proprietors, i.e., income of proprietors (column r), was derived by subtracting from the gross value of output, the opportunity cost of all production inputs but proprietor and family labor. The economic rate of profit (column s) has been obtained by dividing the total capital stock of each representative firm into the economic profit.

An examination of Table 2 reveals that apart from firm type E, the cooperative, all private gara producing representative firm types generate average annual incomes of Le 800 to Le 3,000 (see column s).² Also the representative firm types A, B and D (see Table 1) are generating positive economic profits of Le 89.1, Le 179 and Le 1,491.6 and hence positive economic profit rates of 120 percent, 107 percent and 117 percent respectively. On the other hand, while the firm type C (see Table 1) is generating a negative economic profit of about Le 168 (even though the returns to proprietor is positive) and negative economic profit rate of -142 percent, the firm type E (see Table 1) is generating negative eco-

¹The annual rental price of capital has been estimated at a discount rate of 20 percent. Proprietor, family, apprentice and hired labor were valued at the value of the marginal product of those labor types in gara production. See Liedholm and Chuta [1976].

²Le 1.00 equals U.S. \$1.10.

TABLE 2
BUDGETS OF GARA DYEING REPRESENTATIVE FIRM TYPES, 1974/1975

Representative Firm Types	Annual Labor Input				Annual Labor Costs				Annual Capital Costs	Material Input Costs				
	P	A	H	Total	P	A	H	Total		Fabric	Soda	Dye and Sulphite	Other	Total
	hr.	hr.	hr.	hr.	le.	le.	le.	le.	le.	le.	le.	le.	le.	le.
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)
A	1,780	--	118	1,898	1,495.2	--	17.7	1,512.9	24.0	706	8	74.0	104	892.0
B	1,317	15	288	1,620	1,106.0	.15	43.0	1,150.0	20.0	3,278	35	239.0	12	3,554.0
C	1,192	61	4	1,257	1,001.3	.61	0.6	1,002.5	24.0	1,195	18	20.5	107	1,529.5
D	1,815	--	805	2,620	1,524.6	--	120.8	1,645.4	264.0	2,930	21	209.0	30	3,190.0
E	1,600	--	9,360	10,960	1,600.0	--	1,404.0	3,004.0	2,604.0	8,646	270	1,815.0	270	10,995.0

TABLE 2 - CONTINUED
 BUDGETS OF GARA DYEING REPRESENTATIVE FIRM TYPES, 1974/1975

Representative Firm Types	Total Economic Costs Le.	Value of Output Le.	Economic Profit Le.	Economic Rate of Profit %	Returns to Proprietor le.	Output Labor Ratio le. per hr.	Output Fabric Ratio le. per linear yard	Output-Dye Ratio le.	Average Total Cost le.
	(o)	(p)	(q)	(r)	(s)	(t)	(u)	(v)	(w)
A	2,428.9	2,518.0	89.1	120	1,584.3	1.3	3.2	34.0	0.96
B	4,724.0	4,903.0	179.0	107	1,286.0	1.4	1.5	21.4	0.96
C	2,556.0	2,388.5	-167.5	-142	833.8	1.9	1.6	11.4	1.10
D	5,099.4	6,591.0	1,491.6	117	3,016.0	2.5	6.7	31.5	0.77
E	16,603.0	12,600.0	-4,003.0	-33	201.0	1.1	1.8	6.9	1.30

SOURCE: Survey data.

NOTES: P = proprietor and family labor; A = apprentice labor; H = hired labor. P, A and H have been valued at Le 0.84, Le 0.08 and Le 0.15 per hour respectively. These values equal the value of marginal products of those categories of labor in para production. See Liedholm and Chuta [1976]. Output was valued at sales price at the establishment.

conomic profits (-Le 4,003) negative returns to proprietors (-Le 999) and also negative economic rate of profit (-33 percent).

One major explanation for the high economic profit rates and returns to proprietors of firm types A, B and D is their high output-dye (column v) ratios. In these firms situations, each leone worth of dye utilized in gara production generates a higher value of output than firm types C and E. Specifically, firm type A reduces its cost by relying on the use of the traditional indigo dye. A 44-gallon drum, containing 10 pounds of gara dye and costing about Le 10.0 could last for about 4 to 6 months before the dye concentration is exhausted. Also, since firm type A utilizes traditional dyes, its products appeal more to tourists who will pay high prices for those products. The firm type D represents the relatively more educated class of gara dyers.¹ With some knowledge of color theory, they are able to combine primary colors to produce color varieties that are nonexistent in the market and are thus expensive if purchased. Second, the D type of gara dyers reduce their costs by devising appropriate methods of storing used synthetic dye solutions, a practice not common among most gara dyers in Sierra Leone. In general, firm types B and D enjoy high output-dye ratios because of their locational advantage. Being situated in large urban towns, they are able to purchase dyestuffs from the dealers at reasonable prices.

A close examination of column u of Table 2 reveals that although the firm type D utilizes the most expensive fabric, it enjoys the highest output-fabric ratio of Le 6.7 per linear yard. Being a high quality entrepreneur, this firm type commands a high labor productivity of Le 2.5 (column t). Their pro-

¹Some of these class of dyers are in possession of sources of information, such as Ann Maile, Tie-and-Dye as a Present Day Craft, 1965.

ducts command higher prices not only in the domestic market, but more especially in international markets.¹ Besides, the firm type D represents the class of innovative dyers in Sierra Leone. They originated the dyeing of T-shirts, bed covers, window and door blinds, table covers and export-oriented designs such as "basket of flowers" which serve as gift items.² In addition, these categories of dyers have started experimenting gara dyeing with fabrics such as velvet, corduroy and polyesters which require special skills for achieving dye penetration and retention.

Although the firm type C receives positive returns, its negative economic profits and economic profit rates stem from the fact of being a high cost producer. For example, it costs the firm type C Le 1.1 (column w) to produce a leone worth of gara cloth. When compared with firm types A, B and D, firm C possesses the least output-fabric and output-dye ratios. Because this firm type utilizes the lowest priced fabric, it therefore sells cheaply, mostly to localized consumers. However, being located in rural small towns, the cost of dyestuffs is higher since purchases of materials are made from small retailers who buy their goods from distant larger towns. Moreover, these firm types incur high dyeing costs due to lack of some knowledge of color theory.

As Table 2 reveals, the firm type E (which represents the cooper-

¹While the average price per lappa for firm types A and B range between Le 2.00 and Le 3.00 and Le 3.00 and Le 3.50 respectively, firm type D sells each lappa for Le 10.00 to Le 12.00.

²In fact, most gara dyers in the D category receive orders for gara cloth by telephone. Thus, the market for their output is guaranteed, even at higher prices.

ative production of gara cloth)¹ makes negative economic profits when resources are priced at their opportunity cost. Table 2 reveals that labor productivity in this firm type is least (Le 1.1), the average total cost of producing Le 1.0 worth of gara cloth is highest (Le 1.3), output-dye ratio is also lowest (Le 6.9) while output-fabric ratio is low (Le 1.8) when compared to firm types A and D.

A major reason that could be responsible for the low labor productivity and high cost of production of the E firm type is the lack of participation in decision-making by members of the cooperatives. Members do not take part in decisions relating to the purchasing of material inputs or disposal of dyed fabric. In one of these societies, good quality dyed fabric was purchased from the gara women at a flat, non-market determined price of about Le 3.50 per lappa. The women were allowed to sell the poor quality fabric for themselves. The purchased lappa was utilized for sewing dresses, handbags, etc., for sale domestically and abroad. In the other gara society, the women simply received fabric purchased for them, dyed the fabric and handed over the entire dyed fabric to the expatriate personnel who arranged for the sewing of the dyed fabric into dresses, etc., for later disposal. The women then received 15 cents per linear yard of dyed cloth produced. It is therefore easy to see that the members of type E cooperative firm have a feeling that they were working for someone else, rather than for themselves as members of the cooperative.

¹Complete input-output information was available for only one out of the two cooperative societies that were managed by expatriate (missionary) personnel.

V. MARKETING OF GARA CLOTH

The marketing of Sierra Leone gara will be discussed at both the domestic and international levels. Domestically, market outlets exist in the homes of private producers, as middlemen, in private fancy shops and in the craft shop of the Ministry of Trade and Industry in Freetown. At the international level, Sierra Leone gara is marketed in African countries such as Liberia, Guinea, Mali, Zaire, Kenya and Zambia, etc., and United Kingdom, United States and Europe.

5.1. Domestic Marketing

Private gara producers in Sierra Leone market their products in either one or a combination of ways. First, they stock the finished products in their homes while buyers visit to make purchases. Second, they distribute their finished products to relatives in large towns for disposal. Third, middlemen buy wholesale from producers and retail the gara cloth through their sons and daughters who travel around with piles of cloth on their heads or shoulders. Fourth, some male gara dyers spend 50 percent of their time producing gara cloth and the other 50 percent traveling from village to village selling their products. Finally, some private producers retail their products in market squares or through fancy shops or the Ministry of Trade and Industry craft shop in Freetown.

Some private producers have adopted price discriminatory practices. For example, one of our respondents who dyes fabric with the native indigo dye in Makeni sells gara cloth at wholesale prices of Le 2.0 per lappa to Makeni traders but Le 3.0 to Le 4.0 to traders in Kono--the rich diamond mining district of Sierra Leone. If one assumes that the demand for gara cloth in Kono is price inelastic but price elastic in Makeni, then

such a pricing practice is bound to maximize revenues of gara cloth in both markets. Apart from price discrimination between locations, private gara producers price-discriminate between individual sets of buyers. Usually, tourists or foreigners end up paying higher prices per lappa vis-a-vis residents even after bargaining has taken place.

5.2. International Marketing

Gara cloth is marketed internationally by private producers in at least four ways. International visitors transacting business in Sierra Leone often purchase cloth. During our survey, two of our respondents reported sales to traders from Liberia and Guinea. On the other hand, gara producers also travel to Ghana and Liberia to sell their gara cloth. Gara producers have identified potential markets in African countries by sending samples of their design to relatives living in Zambia, Mali and Zaire. By so doing, orders were placed and exports of gara developed. However, such transactions have been handicapped by the lack of adequate knowledge about international markets. For example, during our survey, it was discovered that one of our respondents had Le 800 worth of gara cloth impounded because of the lack of appropriate trade documents. Exports of gara cloth into the United States, United Kingdom and Europe also do take place. But, sometimes, in order to effect an urgent delivery, gara cloth is shipped to the United States by air rather than by sea. Since the landed price of air shipments almost doubles that of sea shipments, serious marketing problems have resulted.

5.3. The Cooperatives and Gara Marketing

The marketing of dyed fabric has constituted a serious production bottleneck, especially for gara cooperatives managed by local personnel.

Two of the cooperative societies have extensively relied on the efforts of missionaries for the disposal of gara cloth through agents in Sierra Leone and overseas. The missionaries have even introduced the use of dyed fabric for sewing school uniforms. But the other two gara societies have relied solely on the capacity of the Ministry of Trade and Industry craft shop in Freetown to dispose of their products either through purchases by tourists who visit Sierra Leone or shipments abroad. Unfortunately, such shipments did not occur regularly. As a result, these gara societies worked only two and three weeks respectively during the survey period, thus operating at low rates of capacity utilization.

VI. SURVIVAL OF THE GARA INDUSTRY

There is every indication that the gara industry will not decline. In addition to the potential international market, there is also a large domestic demand for gara cloth. For example, the result of a consumption study in Sierra Leone [Byerlee and King, 1976] revealed that the cash expenditure elasticity of demand for gara cloth in Sierra Leone is +1.41. This means that if the income of purchasers of gara cloth in Sierra Leone increases by 1 percent, their expenditure on gara cloth purchases will increase by 1.41 percent. The results of the analysis of the entrepreneurships revealed that the number of gara firms has grown at an annual rate of 7 percent while the attrition rate among gara firms was about 2 percent.¹ In other words, the number of gara firms grew at a net rate of 5 percent. When compared with other small-scale industries, gara firms had the highest growth rate and the lowest rate of attrition.

Although the available evidence indicates that the gara industry has growth potentials, official government textile policies have had adverse effects on the tie-dye industry. For example, tie-dyeing suffered a setback at the end of the nineteenth century in India when fabric printers sold cheap copies of the "bandhana designs"² [Maile, 1965]. During the late 1960s in Nigeria, the cheap Japanese prints of "Akwete cloth"

¹Each of the 253 small-scale entrepreneurs who gave information during the 1974/1975 survey reported on the date the firm was established. Secondly, when any of the original sample size of 366 firms dropped from the sample, further probing was undertaken to find out why the respondents dropped from the sample. Generally, business closure due to lack of demand and capital shortage or high cost of material was regarded as attrition of the firm.

²The "bandhani" in India were girls who tied cloth into four to six thicknesses.

designs tended to displace the locally produced handicrafts. In view of such historical incidents, the proposal to establish a textile factory in Freetown to undertake the dyeing and/or printing of fabric, might have adverse effects on the gara industry, especially, if actual gara designs are copied by the textile firm. On the other hand, a second proposal to establish a dressmaking company (Kunick West Africa Limited) in Freetown to import fabric abroad, purchase locally produced gara cloth and sew dresses for the export market, might be an asset for the gara industry.¹

¹This information was supplied by a senior official of the National Development Bank in Sierra Leone.

VII. POLICY IMPLICATIONS

This study highlights some constraints on the production and marketing of gara cloth in Sierra Leone.

7.1. Production Policies

On the production side, efficient production can be ensured in two ways. First, if the gara cooperative societies are to produce efficiently, they have to be organized along the lines of self-management. In other words, members of gara cooperatives have to participate in decisions relating to the purchasing of inputs, production and marketing of the finished products. In order to ensure an improved organization and self-management of gara cooperatives, there should be close contact¹ between government cooperative officials and the local managers and members of the cooperatives. Such a contact was completely absent in the cooperative societies of Pejehun, Kpaka and Yoni. Second, steps should be taken to improve the output-fabric ratios, output-dye ratios, output-labor ratios of producing units and also attain some export production specifications.² These efficiencies can be introduced by the use of industrial extension agents³ who possess technical knowledge of dyes, fabric, dye storage, color theory and communication. Extension services

¹Such close contact could be in the form of official supervision, prior to official registration. For the advantages to be gained from such close contact, see Khan [1974, p. 44].

²Don Jordan [1972] after his surveys of European and Australian markets recommended some export production specifications like longer fabric lengths, wider variety of basic fabrics, greater flexibility of usage, improved quality and more distinctive patterns of colors.

³This suggestion has already been put forward in Sierra Leone [Blydenstein, 1975].

should be organized and information disseminated in official Crio and native languages with the help of visual aids. In addition, the industrial extension agents could be an adequate vehicle for developing the practice of record keeping among gara producers.

7.2. Marketing Policies

The problem of marketing should be tackled at both the domestic and international levels. Domestically, the government should take the leadership in utilizing gara cloth for decorating public buildings. Then, the initiative already demonstrated by the Catholic sisters should be encouraged by the introduction of gara cloth uniforms at both primary and secondary school levels. The recent establishment of the Export Promotions Council in Sierra Leone, to foster the international marketing of gara cloth, is praiseworthy. But, such a council should work cooperatively with the proposed industrial (gara) extension agents for identifying high quality dyed fabric, buying and collecting such fabric from the provinces and shipping these to Freetown.

While effort is being made to identify markets in Africa and Europe for Gara cloth, attention should also be directed to the dissemination of information relating to accessibility to foreign markets. Problems relating to foreign currencies, exporting agents, appropriate trade documents and payment arrangements exist and are not known by most small-scale entrepreneurs. Knowledge relating to these problems can be diffused through the proposed industrial extension agents.

The effort of the government and voluntary agencies to identify domestic and foreign markets for gara cloth should not be a substitute for individual initiative, either on the part of private small-scale produ-

cers or cooperatives to market their own produce. Some incentive mechanism should be devised for inducing all production units to market their gara cloth. Increased effort on the part of producers to market their products would not only lead to a fuller utilization of existing resources and higher profits, it would also mean a training in self-reliance for the cooperatives. The only incentive given to exporters in Sierra Leone is the rebate of customs duties on imported inputs [Okafor, 1975].

7.3. Customs Duty Rebates--An Incentive Mechanism

One of the measures that has been adopted for promoting small-scale industries in developing countries is import duty rebates on imported raw materials [Schippers, 1970]. In fact, import duty relief has been mentioned as the most important factor in the promotion of small-scale industry [United Nations, 1974]. A recent study of small-scale industries in Sierra Leone [Chuta, 1977] has revealed that import duty relief¹ is the most effective short-run and long-run policy for increasing the profits of small-scale industrial entrepreneurs in Sierra Leone. The study revealed that a policy of granting import duty rebates² to gara dyers could result in an increase in the number of gara dyeing firms, gara output, employment and exports by 122 percent, 37 percent, 50 percent and 41 percent respectively.

¹Over 95 percent of material input purchases in gara production is imported. Grey and bleached white fabric and synthetic dyes used as major intermediate inputs by gara dyeing industry are subject to import tariffs of approximately 22 percent (based on the U.S. cloth prices in 1974/75) and 36 percent ad valorem, respectively.

²The author has not overlooked the administrative problems of implementing the policy of import duty refunds, even as outlined by Okafor [1975].

8. SUMMARY AND CONCLUSIONS

A recent study of small-scale industries in Sierra Leone [Liedholm and Chuta, 1976] has revealed that gara dyeing is the most labor-intensive and economically profitable industrial activity in the small-scale industrial subsector of Sierra Leone, with good prospects of growth and foreign exchange earnings. Gara dyeing is the only industrial activity which is dominated by females.

The word "gara" refers to the leaves of a leguminous plant which grows in the Northern Province of Sierra Leone. The craft of gara dyeing was probably introduced into Sierra Leone around the middle of the nineteenth century by the Madingos and Susus who migrated from Guinea. Although gara dyeing originally started with the use of native indigo dye-stuff, the use of synthetic dyes has become widespread today.

The methods used in producing patterns on fabric include machine sewing, hand stitching with needle, dripping or stamping of wax or candle onto fabric, bunching (marbling), tying, binding, gathering, folding and pleating. The most popular designs which gara dyers produce in Sierra Leone include the "cow eye", "blade", "45-record", "LP-record", "Appollo" or "sun burst", "rainbow", "siti" or cloud and some variants of "batik" designs. Although mostly cotton textile fabrics are being used by gara dyers in Sierra Leone, a recent sophistication in gara dyeing involves the use of fabrics such as lace, corduroy, velvet and polyesters.

About one million square yards of gara cloth are produced annually in Sierra Leone. Most of this is produced by private small-scale producers. There are also about seven gara women's cooperatives or voluntary societies that are engaged in gara production.

The major inputs into gara production include labor (mostly female), capital and materials. About 83 percent of total labor input in gara production is proprietor and family labor and over 70 percent of annual labor input is female. The most labor intensive aspect of gara production is the dyeing process which accounts for 60 to 80 percent of the entire time allocation with synthetic dyeing, and over 90 percent with the native indigo dyeing. Other labor-intensive aspects of gara production include texture designing and the finishing process.

The most important equipment items in gara dyeing include 44-gallon drums for setting the native indigo dyes, dye basins, kettles, buckets, rubber gloves, wooden stamps and clubs for stick ironing of fabric. The total capital costs required for starting gara dyeing may not exceed Le 30.

Purchases of textile fabric account for about 80 percent of total cost of material input purchases in gara production. The three ingredients--sodium hydroxide, sodium oxide or sodium hydroculphite and synthetic organic dyestuffs account for 14 percent of material input purchases. About Le 60.0 of working capital is required to enter the gara dyeing industry.

A significant result of the economic analysis of gara production in Sierra Leone is that all private gara producers in Sierra Leone earn incomes between Le 800 and Le 3,000 annually. But what is even more significant is that when all productive inputs are priced at their opportunity cost, traditional dyers who use the native indigo dye earn the highest economic rate of return on capital. Another significant result of the analysis is that about 50 percent of gara dyers in Sierra Leone need im-

proved efficiencies relating to the combination of important inputs that enter the production process. The analysis also highlights the fact that gara cooperatives will operate more efficiently only if they overcome present organizational and marketing problems.

On the domestic marketing of gara cloth, more initiative is needed on the part of private, but especially the cooperative producers, to market their goods. International marketing of gara cloth is constrained by the lack of adequate knowledge on how to reach foreign markets.

Since the results of our study reveal that the number of gara firms in Sierra Leone grew at an annual net rate of about 5 percent since 1970, that the expenditure elasticity of gara cloth in Sierra Leone is about +1.41, and that about 190,000 square yards of gara cloth are exported each year, it follows that the gara industry has a large growth potential.

The policy recommendations required for improving the performance of gara dyers in Sierra Leone include the following: (1) utilizing a well trained team of extension agents for improving the ratios in which gara dyers combine inputs, and developing practical knowledge among gara dyers about the storage of used dyestuff and the derivation of secondary colors from primary ones; (2) improving the present organization of gara cooperatives so that they become self-managed and self-reliant, and maintaining a close contact between the government cooperative officials and members of the cooperatives to ensure close supervision and the eventual registration of the cooperatives; (3) improving the knowledge of both private and cooperative producers of gara cloth concerning international marketing and finance; and (4) granting import duty rebates on imported intermediate inputs as an incentive for increased production and marketing of gara cloth.

BIBLIOGRAPHY

- Blydenstein, H.J. 1975. "Assistance in Improving and Expanding the Existing Production of Cotton "Gara" and "Country" Cloth in Sierra Leone," Terminal Report prepared for the Government of Sierra Leone, Freetown, Sierra Leone.
- Bray, Jennifer. 1969. "The Economics of Traditional Cloth Production in Iseyin, Nigeria," Economic Development and Cultural Change. 17.
- Bucknell, A.E. and P.B.R. Hazell. 1972. "Implications of Aggregation Bias for the Construction of Static and Dynamic Linear Programming Supply Models," Journal of Agricultural Economics. 23.
- Byerlee, Derek and Robert King. 1976. "Employment and Locational Impacts of Rural Consumption Patterns," African Rural Economy Working Paper, Department of Agricultural Economics, Michigan State University, East Lansing, Michigan (forthcoming).
- Chuta, Enyinna. 1977. "A Linear Programming Analysis of Small Scale Industries in Sierra Leone." Ph.D. Dissertation. Michigan State University.
- _____ and Carl Liedholm. 1975. "The Role of Small-Scale Industry in Employment Generation and Rural Development: Initial Research Results from Sierra Leone," African Rural Employment Paper No. 11, Department of Agricultural Economics, Michigan State University, East Lansing, Michigan.
- Chuta, Enyinna and Mirian Steacy. 1975. "A Case Study of Gara (Tie-Dye) Technology in Sierra Leone," Department of Agricultural Economics and Department of Home Economics, Njala University College, The University of Sierra Leone, Freetown, Sierra Leone (draft paper).
- Day, R.H. 1963. "On Aggregating Linear Programming Models of Production," Journal of Farm Economics. 65.
- Fyfe, Christopher. 1962. A History of Sierra Leone. Oxford: Oxford University Press.
- Gwebu, Thando. 1971. "A Study of Gara Industry in Makeni," B.Sc. Project Paper, Department of Environmental Studies and Geography, Njala University College, University of Sierra Leone, Freetown, Sierra Leone.
- Hymer, Stephen and Stephen Resnick. 1961. "A Model of an Agrarian Economy with Nonagricultural Activities," The American Economic Review. 59: 493-506.
- Jordan, Don. 1972. "Small Scale Production--Which Way?," Small Industry Bulletin for Asia and Far East (United Nations). 9
- Khan, Akhter Hameed. 1974. "Reflections on the Comilla Rural Development Projects," OLC Paper No. 3, Overseas Liaison Committee, American Council on Education, Washington, D. C.

- Liedholm, Carl and Enyinna Chuta. 1976. "The Economics of Rural and Urban Small Scale Industries in Sierra Leone," African Rural Employment Paper No. 14, Department of Agricultural Economics, Michigan State University, East Lansing, Michigan.
- Maile, Anne. 1965. Tie-and-Dye as a Present Day Craft. London: Mills and Boon, Ltd.
- Marenco, G. 1961. "Exact Aggregation with Linear Programming Models-- A Note on the Sufficient Conditions Proposed by R.H. Day," Journal of Farm Economics. 51: 684-686.
- Miller, Thomas A. 1966. "Sufficient Conditions for Exact Aggregation in Linear Programming Models," Agricultural Economics Research. 18: 52-57.
- Okafor, Charles P.N. 1975. "Foreign Trade Division of the Ministry of Trade and Industry: Scope, Functions and Organizations," Ministry of Trade and Industry, Government of Sierra Leone, Freetown, Sierra Leone.
- Paris, Quirino and Gordon C. Rauser. 1975. "Sufficient Conditions for Aggregation of Linear Programming Models," Journal of Farm Economics, 55: 659-666.
- Perkin, A.G. and A.E. Everest. 1918. The Natural Organic Colouring Matters. London: Longman, Green and Company.
- Schippers, F. 1970. "Development and Promotion of Small Industry Sector," Small Industry Bulletin for Asia and Far East (United Nations). 7.
- Sierra Leone, Government of. 1963-1973. Quarterly Trade Statistics (Central Statistics Office).
- _____. 1974. National Development Plan, 1974/1975 to 1978/1979 (Government Printer).
- Spencer, Dunstan S.C. 1976. "African Women in Agricultural Development: A Case Study in Sierra Leone," African Rural Economy Working Paper No. 11, Department of Agricultural Economics, Michigan State University, East Lansing, Michigan.
- United Nations. 1974. Rural Industrialization. New York: Department of Economic and Social Affairs, United Nations.

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