THE ECONOMICS OF RURAL AND URBAN SMALL-SCALE INDUSTRIES IN SIERRA LEONE

by

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TABLE OF CONTENTS

		Page
PREFACE		vii
I.	INTRODUCTION	1
	Problem Setting	1
	Major Empirical Issues	4
	Major Analytical Issues	5
	Sources of Data	6
II.	DESCRIPTIVE PROFILE OF SMALL-SCALE INDUSTRY IN SIERRA LEONE	8
	Relative Magnitude of the Small-Scale Industry Sector	8
	Relative Importance of Small-Scale Industrial Categories	14
	Annual Output and Value Added	19
	Seasonal Variations in Output	21
	Material and Services Input	24
	Capital Services and Stock Inputs	26
	Initial Capital Stock Requirements	33
	Sources of Initial Capital	34
	Sources of Expansion Capital	37
	Excess Capacity	37
	Labor Input	40
	Characteristics of Apprentices	46
	Characteristics of Proprietors	49
III.	ANALYSIS OF DETERMINANTS OF DEMAND FOR AND SUPPLY OF SMALL-SCALE INDUSTRY OUTPUT AND EMPLOYMENT IN SIERRA LEONE	57
	Demand	57
	Supply--Introduction	68
	Neoclassical Production Functions for Small-Scale Industry	68
	Alternative Production Processes and Their Factor Proportions	77
	Variations in Factor Proportions by Location	85
	Variations in Factor Proportion by Firm Size	88
	Returns to Proprietor and "Economic" Profit Rate	91
	The Role of the Entrepreneur	99

Page

IV. MAJOR POLICY IMPLICATIONS 106

Credit Policies 107
Technical and Managerial Assistance 110
Fiscal Policy 111
Infrastructure Programs 114
Large-Scale Industrial Policies 116
Agricultural Policies 118

V. SUMMARY AND CONCLUSIONS 120

BIBLIOGRAPHY 127

LIST OF TABLES

Table		Page
1	Distribution of Industrial Establishments by Location and Size, 1974	9
2	Estimates of Value Added by Large- and Small-Scale Industry	12
3	Distribution of Small-Scale Establishments and Employment by Industrial Categories and Size of Location, 1974	15
4	Value Added by Small-Scale Industrial Categories by Location, 1974/1975	16
5	Annual Mean Output and Value Added by Major Small-Scale Industrial Categories and Size of Localities, 1974/1975	20
6	Annual Mean Capital Services Input by Major Small-Scale Industrial Categories and Size of Localities, 1974/1975	30
7	Annual Mean Capital Stock for Five Major Small-Scale Industrial Categories by Size of Locality, 1974/1975	32
8	Average Initial Capital Stock Requirements at Time of Establishment by Major Industrial Categories and Size of Locality, 1974/1975	35
9	Sources of Initial Capital of Small-Scale Industrial Firms at the Time of Establishments	36
10	Sources of Expansion Funds for Small-Scale Industrial Establishments, 1974/1975	38
11	Excess Capacity by Major Small-Scale Industry by Location, 1974/1975	39
12	Annual Mean Labor Hours by Small-Scale Industrial Category, Labor Type and Locality	42
13	Duration of Apprenticeship and Learning Fee by Small-Scale Industrial Category and Location	47

Table		Page
14	Percentage of Small-Scale Industry Proprietors Charging a Learning Fee to Apprentices	48
15	Percentage of Small-Scale Industrial Proprietors' Fathers Who Were Farmers by Industrial Category and Location	51
16	Percentage of Small-Scale Industrial Proprietors with Formal Education by Industry and Location	52
17	Percentage of Small-Scale Industrial Proprietors Who Keep Records	54
18	Age of Small-Scale Industrial Establishments	55
19	Cash Expenditure Elasticities of Demand by Rural Households for Major Small Industry Products, 1974/1975	60
20	Proprietors' Estimates of Change in the Number of Firms and the Output of the Firms in the Past Five Years by Industry and Location, 1974/1975	66
21	Values of the Cobb-Douglas Production Functions with Three Labor Groups Including Marginal and Average Products for Labor by Major Small-Scale Industries, 1974/1975	71
22	Value of the C.E.S. Production Functions for Major Small-Scale Industries, 1974/1975	76
23	Mean Values of the Output-Capital, Output-Labor, and Labor-Capital Ratios by Process for Major Small-Scale Industry Categories, 1974/1975	81
24	Output-Capital, Output-Labor, Capital-Labor Ratios for "Traditional" Small-Scale Industries by Industry and Location, 1974/1975	86
25	Annual Mean Return to Proprietor and Economic Profit Rate by Major Process and by Major Small-Scale Industry Category	94
26	Annual Returns to Proprietor by Major Industry and Locality for "Traditional" Processes Only	95

PREFACE

This paper has been developed as part of a three year study of rural employment in tropical Africa financed under a United States Agency for International Development contract (AID/csd-3625) with Michigan State University. The research in Sierra Leone was carried out under a subcontract to the Department of Agricultural Economics and Extension, Njala University College, Sierra Leone, under AID/csd-3625. The research program at Njala University College was also supported by a grant from the Rockefeller Foundation. The World Bank also provided support while portions of this paper were being prepared; however, the views are those of the authors and not necessarily those of the Bank.

This paper builds on two previous African Rural Employment Papers, "Research on Employment in the Rural Nonfarm Sector" by Carl Liedholm and "The Role of Small Scale Industry in Employment Generation and Rural Development: Initial Research Results from Sierra Leone" by Enyinna Chuta and Carl Liedholm. All three papers have been developed to provide insights into the "demand for labor in off-farm activities," one of the specific objectives of the African Rural Employment Study (A.I.D. Research Contract AID/csd-3625).

I. INTRODUCTION

This report summarizes and describes the major findings and conclusions of our research on rural and urban small-scale industries in Sierra Leone.[1] The primary objectives of the research were to provide a descriptive profile of small-scale industries in Sierra Leone, to analyze the key determinants of the demand for and supply of output and employment generated by these industries, and to examine the efficacy of the major policies influencing small-scale industries. In this introductory section, the problem setting for the research will be discussed, followed by an examination of the most important empirical and analytical issues relating to small-scale industries. The section will conclude with a brief review of the procedures used to collect the required data. The second section sets forth the empirical results of the research so as to provide a comprehensive, descriptive profile of small-scale industries in Sierra Leone. In the third section, the analysis of the key determinants of the demand for and supply of output and employment generated by these industries will be presented. The fourth section examines the major policy implications of the research. A final section summarizes the most important findings and conclusions.

Problem Setting

Rapid industrialization has for several decades been regarded as an attractive and effective strategy for transforming developing economies

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[1]The small-scale industry research was undertaken as one component of the Sierra Leone Rural Employment Research Project. For a complete description of the overall research project, see African Rural Employment Working Paper No. 1 [1974].

and maximizing their rates of economic growth. Indeed, many developing countries began in the early 1950s to launch industrialization drives based generally on an import substitution strategy, which usually resulted in the establishment of large-scale, capital-intensive industries in urban areas. In recent years, however, it has become apparent that this strategy has often produced disappointing results. In a number of developing countries, not only has the overall rate of growth of the economy been low, but employment in the industrial sector has failed to keep pace with population growth and, in some cases, even declined in absolute terms.[1] The poor employment performance has been the cause of particular concern, because employment generation has recently become an independent policy goal for many countries.[2]

Many developing countries have consequently become increasingly aware of and interested in assessing the role that small-scale establishments might play in their industrialization strategies. If, for example, small-scale industrial establishments are more labor-intensive, more widely-dispersed, generate more output per unit of capital, require less foreign exchange, and produce a higher "economic" profit than their large-scale counterparts, then strong economic justification would exist for promoting small-scale firms.

Unfortunately, there have been few empirical or analytical studies of small-scale industries, and thus it has been very difficult to assess the

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[1] See Morawetz [1974] and Frank [1968] for excellent reviews of the evidence.

[2] The emphasis of employment growth reflects the heightened concern for equity, the high unemployment rates and the high rates of migration. See Morawetz [1974].

role that small-scale firms might play in any development strategy. As Morawetz []974, p. 525] commented in his recent review of the industrialization literature "remarkably little is known about its composition and characteristics."

Sierra Leone's experience with industrialization has been similar to that of other developing countries. After Independence in 1961, Sierra Leone followed an import substitution strategy in which policies were designed to encourage the expansion of large-scale, urban-based, foreign-owned firms. The results of this policy proved to be disappointing. The manufacturing sector grew at a real annual rate of only 2.8 percent from 1965/66 until 1971/72, while during the same period, the number of individuals employed in "large-scale" manufacturing firms actually declined at a compound annual rate of 3.5 percent.[1] Moreover, by 1971 unemployment in urban areas had grown to almost 14 percent [Byerlee, Tommy, and Fatoo, 1976]. Consequently, a new industrial strategy has been set forth in the 1974 National Development Plan [Government of Sierra Leone, 1974], in which agro-based, labor-intensive industries are now to receive priority.

Although small-scale industries, particularly those located in rural areas, are envisaged to play an important role in Sierra Leone's development effort, the policies and programs to foster small-scale rural industry have not been specified. Instead, the National Plan stresses that "an immediate task relating to the (small-scale industry) subsector is to conduct an economic survey to assemble data on its size, composition, structure of

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[1]See Chuta and Liedholm [1975] for more details. "Large-scale" in these figures reflects the Ministry of Labor's definition and includes those firms employing six or more workers.

inputs and outputs, development problems, and potential. The survey is essential for evolving a detailed development programme" [Government of Sierra Leone, 1974, p. 185]. Small-scale industry research is thus a clearly articulated priority of the Government of Sierra Leone.

Major Empirical Issues

Although a wide array of data will be examined in this paper, the most important empirical issues should be set forth. One of the key empirical issues centers on the labor intensity of small-scale industries. Do small-scale industries, for example, possess a higher labor-capital ratio than large-scale industries? Moreover, which of the small-scale industrial groups and processes are the most labor intensive? The answer to these questions will be useful in guiding those formulating employment policies in Sierra Leone.

A second, important empirical issue relates to the output generated per unit of capital by small-scale industries. Given the output objective and the apparent relative scarcity of capital, do smaller firms use less capital to produce a given value of output than the larger firms? Additionally, which of the various small-scale industry groups and processes generate the largest value of output per unit of capital? Indeed, if those industries or processes possessing the highest output-capital ratios also possess the highest labor-capital ratios, then both employment and output can be jointly maximized, and the much discussed conflict and trade-off between output and capital disappears, at least in a static sense.[1]

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[1]See Morawetz [1974] for an excellent discussion of the employment-output trade-off. The World Employment Conference of the ILO [1976] has recently stressed the need for choosing employment given such a trade-off.

A third empirical issue of importance is whether or not the various small-scale industry groups and processes generate positive "economic" profits, when all factors are valued in terms of their opportunity costs. An examination of profits will not only reveal the underlying strength of this sector, but also permit one to ascertain if there is any relationship between factor intensity and the level of economic profits.

The final empirical issue of major importance is whether or not there are seasonal and locational variations in small-scale industrial activity. The findings relating to this particular issue will indicate the extent to which time and space must be incorporated into small-scale industry surveys and policies.

Major Analytical Issues

Since the analytical framework has been outlined in two previous papers [Liedholm, 1973], [Chuta and Liedholm, 1975], only the most important analytical issues are highlighted in this sub-section. One of the key analytical issues centers on the nature of the demand for small-scale industry. Hymer and Resnick [1969], in their seminal article on an agrarian economy with nonagricultural activities, argue that the only source of demand for rural small-scale industries is farm income. Moreover, they contend that these industrial products are "inferior" goods and thus the demand for and production of these goods will decline as farm incomes increase. Thus, one important component of the overall Sierra Leone study involves the estimation of the sign and magnitude of the income elasticity of demand for locally produced, small-scale industrial commodities and services. In addition, it will be important to verify whether sources of demand other than those related to income are of any significance. Specifically, the magnitude of the demand for small-scale intermediate goods stemming

from forward linkages to agriculture or large-scale industry must be determined as well as the demand originating from foreign sources. If these sources of demand prove to be important, the Hymer-Resnick model should be modified accordingly.

On the supply side of the analysis, one of the important issues is whether significant process or technical choices do exist within the major small-scale industries. If such choices are found to exist, then changes in factor prices could have an important impact on the processes chosen in each industry. To shed light on this issue, neoclassical production analyses as well as an examination of individual production processes will need to be undertaken. Another important supply issue centers on whether or not significant scale economies exist within the industrial sector, a question that the results of the production function analysis may help answer. A final supply issue of importance is whether or not entrepreneurship plays a significant role in determining the economic profitability of these small-scale firms. To accomplish this task, a regression analysis will be employed to attempt to identify those entrepreneurial characteristics that appear to be related to profits.

Sources of Data

Since the details of the data gathering process have been presented in an earlier report [Chuta and Liedholm, 1975], only the most salient features will be briefly outlined in this report. A two phase survey procedure was used to obtain the required small-scale industry data. In phase 1, which began in March 1974, a census of Sierra Leone's small-scale industry sector was undertaken to estimate the population or the total number of small-scale industrial establishments in the country.

was designed to generate more detailed economic data from a selected sample of industrial establishments over a one-year period--August 1974 to July 1975. The results of the phase 1 survey were used to assemble the frame from which the sample of firms could be chosen. Two-thirds of the 270 firms selected in those localities with 2,000 or more inhabitants were chosen on a random basis to ensure that a reasonable approximation of the underlying population would be obtained.[1] The remaining one-third were chosen in a purposive fashion to ensure that a complete spectrum of production techniques could be obtained.

One major survey difficulty, however, centered on the transitory nature of some of the small-scale industrial firms. Approximately 20 percent of the initial firms selected for inclusion in phase 2 dropped out during the survey period.[2] The problem was partially solved by replacing the dropouts with new firms.

Three major types of data were collected during the phase 2 of the survey. Firstly, stock data were obtained at the beginning and end of the survey period for buildings, tools, equipment and furniture, material inputs and outputs. Secondly, data on sales, output, labor used, and material inputs purchased were collected twice weekly. Finally, more detailed information with respect to entrepreneurship and the apprenticeship system were obtained during a single interview. The descriptive profile of small-scale industries in Sierra Leone generated by these data will now be examined.

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[1]The ninety-six establishments selected from the twenty-four village "enumeration areas" were all selected randomly. Each "enumeration area," which was an artificial grouping constructed by the Central Statistical Office for the 1963 population census, contains an estimated 200 families.

[2]Forty percent of those firms that dropped out did so because of what they called "bad business," which was usually attributed to such factors as lack of demand or capital.

II. DESCRIPTIVE PROFILE OF SMALL-SCALE INDUSTRY IN SIERRA LEONE

The descriptive profile of small-scale industry in Sierra Leone will be presented in this section. The relative magnitude of the small-scale sector will be examined first, followed by a discussion of the annual output and value added by the individual industries. Seasonal variations in the output levels will then be treated. Finally, the material and services inputs, the capital inputs and the labor inputs for the individual industries will each be examined in some detail.

Relative Magnitude of the Small-Scale Industry Sector

One of the important findings of the research is the discovery that the industrial sector[1] in Sierra Leone is much more extensive than had been previously recognized. This result is apparent from Table 1, which presents the revised distribution of industrial establishments and industrial employment by location and size. These figures reveal that in 1974 approximately 50,000 industrial establishments employed almost 93,000 individuals.[2] The Government of Sierra Leone, on the other hand, had assumed that only 52,000 individuals would be employed in this sector in

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[1]The "industries" examined in this study include only those establishments that specifically engage in the production and repair of "manufactured goods" and this excludes those establishments engaged in mining, construction, trading, transport, financial, social and personal services. Agricultural processing is also excluded since it is analyzed in a separate study. For a more extensive discussion of the industry definition, see Chuta and Liedholm [1975, p. 8].

[2]The revised figures are somewhat higher than the initial results presented in African Rural Employment Paper No. 11 [Chuta and Liedholm, 1975] where 47,000 establishments and 87,000 individuals were estimated for small-scale industry.

TABLE 1
SIERRA LEONE: DISTRIBUTION OF INDUSTRIAL ESTABLISHMENTS BY LOCATION AND SIZE, 1974

Location and Firm Size	Number of Establishments	Percent	Employment	Percent
A. Small-scale industry				
1. Localities with population less than 2,000[a]	45,000	89.7	73,000	78.8
2. Localities with population from 2,000-4,999[b]	1,704	3.4	4,164	4.5
3. Localities with population from 5,000-20,000	834	1.7	1,995	2.2
4. Localities with population from 20,000-100,000 (Bo, Kenema, Koidu, Makeni)	1,189	2.3	4,368	4.7
5. Localities with population over 100,000 (Freetown)	1,408	2.8	5,039	5.4
Total small-scale	50,135	99.9	88,566	95.6
B. Large-scale industry				
Total large-scale	28	.1	4,111	4.4
Total large- and small-scale industry	50,163	100.0	92,677	100.0

SOURCE: Small-scale industry data collected during Phase I of small-scale industry component of African Rural Employment Project, Njala University College. Data for large-scale industry were obtained from employment lists of the Ministry of Labor for December 1973, supplemented by data collected by the authors.

[a]Estimate based on projection from preliminary data received from twenty-four sample enumeration areas. These data include those individuals who engaged in industrial activities on a part-time basis.

[b]The actual establishments and employment figures obtained were doubled since only half the localities in this size range were examined.

1974.[1] Thus, the phase 1 survey results indicated that their industrial employment estimate should have been increased by three-fourths.

The surveys also reveal that the small-scale industrial establishments dominated the industrial sector in terms of both the number of firms and total employment. "Small scale" was defined in this study to include those establishments employing less than fifty persons.[2] Using this definition, there were only 28 large-scale establishments in Sierra Leone and those firms employed only 4,111 individuals.[3] In those localities with populations in excess of 2,000, on the other hand, there were approximately 5,000 small-scale industries employing approximately 15,000 individuals (see Table 1). Moreover, it was projected that there were approximately 45,000 small-scale establishments employing 73,000 persons in those localities with populations less than 2,000.[4] Thus, these results indicate that small-scale establishments account for over 95 percent of the employment in Sierra Leone's entire industrial sector.

The average size of the industrial establishment in Sierra Leone was very small. The "average" industrial firm, for example, employed only 1.8 workers.[5] Indeed, 98.9 percent of the firms employed less than

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[1] Government of Sierra Leone [1974, p. 27].

[2] For a more complete discussion of the small-scale industry definition used in this study, see Chuta and Liedholm [1975, p. 9].

[3] Data obtained from employment list of the Ministry of Labor for December 1973 and supplemented by data on eight large-scale firms not included on this list.

[4] These estimates were obtained by multiplying the actual number of industrial establishments and industrial employment in each of the 24 sample village "enumeration areas" by a figure reflecting the representation of that "enumeration area" in that particular agricultural region. It should be further noted that individuals engaged in industrial activities on a part-time basis are included in these data.

[5] Computed from Table 1.

5 individuals, 0.7 percent employed from 5 to 9 individuals, 0.3 percent employed from 10 to 49 individuals and only 0.1 percent employed over 50 individuals.[1] Thus, in terms of employment the vast majority of firms in Sierra Leone were concentrated at the lowest end of the small-scale industry size continuum.

Another useful indicator of the relative importance of small-scale industry is "value added." In the Sierra Leone study, the annual value added of the small-scale industrial establishments has been estimated from the output and cost data collected from firms on a twice-weekly enumeration. The mean value added for each of those firms in the small-scale industrial category in each locality group was calculated and then blown up according to the number of establishments in each area.[2] The resulting estimates for small-scale industry as well as the various estimates for small- and large-scale industry prepared by the Government of Sierra Leone are summarized in Table 2.

Table 2 reveals that small industry in 1974-75 accounted for approximately Le 13 million[3] or 2.9 percent of Sierra Leone's Gross Domestic Product. This estimate is surprisingly close to the value added estimate prepared by the Central Statistics Office for the National Accounts, an estimate which was not based on an extensive survey and which was admittedly "very rough" [Government of Sierra Leone, 1973, p. 31].

When the value added for small-scale industry is compared with the

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[1]The average size of firm, in terms of the number employed, is larger in Freetown (3.5 workers) than in the enumeration areas (1.6 workers).

[2]The breakdown of the individual mean value added is described in detail below.

[3]1 Le (Leone) = $1.10 U.S. during the survey period.

TABLE 2
SIERRA LEONE: ESTIMATES OF VALUE ADDED BY LARGE- AND SMALL-SCALE INDUSTRY

	Government Estimate		Authors' Estimate	
	1970/1971	Percent GDP	1974/1975	Percent GDP
	(Leones Million)			
Small-scale industry	11.1	2.9	13.2	2.9
Large-scale industry	8.5	2.3	17.4[a]	3.9
Total industry	19.6	5.2	30.6	6.8
Gross domestic product	375.3		450.4	

SOURCE: 1970/1971 data from Government of Sierra Leone [1973].

[a]The large-scale industry value added figure for 1974/1975 was obtained by subtracting all indirect taxes from the large-scale industry value added estimate presented in the Second Annual Plan [Government of Sierra Leone, 1975, Chapter X].

latest estimate of the value added of large-scale industry (Le 17.4 million or 3.9 percent of Sierra Leone's Gross Domestic Product in 1974-75), the small-scale establishments are revealed to contribute approximately 43 percent of the entire industrial sector's value added. Although the value added percentage of small-scale (43 percent) is much lower than the percentage employed in small-scale (i.e., 95 percent) relative to large-scale industry the study shows that small-scale establishments are a significant component of Sierra Leone's industrial sector.

Moreover, the small-scale component of Sierra Leone's industrial sector appears to be relatively large when compared with other developing countries. Data on the very small industrial firms in most countries are not generally collected and thus, of necessity, only a limited number of comparisons are possible. Small-scale industry employing less than 50 workers accounted for 95 percent of the manufacturing employment in Sierra Leone, but only 70 percent in Nigeria [Aluko, 1973], 71 percent in Tunisia [IBRD, 1974], 79 percent in the Philippines [ILO, 1974] and 69 percent in Colombia [Berry, 1972].[1] The corresponding contribution of small-scale industries to value added in manufacturing, on the other hand, was 43 percent in Sierra Leone, 32 percent in Colombia, and only 14 percent in the Philippines. In these countries the percentage contribution of small-scale industries to value added was thus substantially less than employment; indeed, the value added contribution was less than one-half that of employment.[2]

In terms of both employment and value added, however, the relative

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[1] In the more industrialized countries, the share is lower and ranges from 12 to 34 percent [Morawetz, 1974].

[2] For the explanation for these results, see above.

importance of small-scale industry in Sierra Leone appears to be somewhat greater than elsewhere. This result is perhaps traceable, in part, to the extensive effort made in our Sierra Leone survey to include the small rural establishments, which are often overlooked and thus are underestimated in surveys. In addition, there may also be economic reasons, such as the small size of the Sierra Leone domestic market, that account for the relatively large numbers of very small-scale industrial enterprises in Sierra Leone.

Relative Importance of Categories of Small-Scale Industry

An examination of the composition of the industrial activities undertaken in Sierra Leone can provide additional insights into the nature of the industrial sector. The number of establishments, the number of employed, and value added are used in this monograph to portray the distribution of industries by industrial category as well as by size of locality. Although the preliminary results of this distribution by employment and enterprises were presented in African Rural Employment Paper No. 11 [Chuta and Liedholm, 1975], the final results have now been obtained and consequently are presented in Table 3. The industrial composition by value added is presented in Table 4.

One of the most salient findings is the dominant position of tailoring activity in Sierra Leone's industrial sector. Tailoring accounted for 31 percent of the employment, 33 percent of the establishments and 37 percent of the value added within the small-scale industrial sector. This finding is consistent with studies of small-scale industry in other African countries and elsewhere, which have also revealed that tailoring is the

TABLE 3

SIERRA LEONE: DISTRIBUTION OF SMALL-SCALE ESTABLISHMENTS AND EMPLOYMENT BY INDUSTRIAL CATEGORIES AND SIZE OF LOCATION, 1974

I.S.I.C.[a]	Type of Activity	Localities Less Than 2,000 Inhabitants		Localities 2,000-5,000		Localities 5,000-20,000		Localities 20,000-100,000 (Bo, Kenema, Koidu, Makeni)		Localities Over 100,000 (Freetown)		Total		Percent of Total	
		Estab.	Empl.	Estab.	Empl.	Estab.	Empl.	Estab.	Empl.	Estab.	Empl.	Estab.	Empl.	Estab.	Empl.
31	Food														
3117	Baking	1,500	3,500	104	206	40	119	17	120	11	164	1,672	4,109	3.3	4.6
32	Textiles and wearing apparel														
3211A	Spinning and weaving	4,000	6,000	86	126	15	26	2	2	0	0	4,103	6,154	8.2	6.9
3211B	Gara dyeing	c	c	180	760	50	114	110	610	20	160	360	1,644	0.7	1.9
3214	Mat making	9,000	10,000	0	0	0	0	0	0	0	0	9,000	10,000	17.9	11.2
3220	Tailoring	14,000	21,000	782	1,508	457	973	656	1,839	816	2,380	16,711	27,700	33.4	31.3
3240	Shoe making and repair	1,000	1,000	16	18	21	34	24	37	81	131	1,142	1,220	2.3	1.4
33	Wood														
3319	Carving	500	1,500	24	76	4	14	4	23	3	4	535	1,617	1.1	1.8
3320	Carpentry	5,500	12,500	226	666	117	391	135	628	75	345	6,053	14,530	12.1	16.4
37-38	Metal														
3720	Goldsmithing	1,500	2,500	22	32	14	43	17	47	20	54	1,573	2,676	3.1	3.0
3811	Blacksmithing	6,000	13,000	74	180	28	63	14	46	12	37	6,128	13,326	12.2	15.1
3819	Welding and fitting	0	0	6	20	3	7	9	50	19	86	37	163	0.1	0.2
951	Repair services														
9512	Radio	c	c	10	12	7	14	19	44	20	61	56	131	0.1	0.2
9513	Vehicle	c	c	20	98	26	102	54	609	66	578	166	1,387	0.3	1.6
9514	Watch	c	c	10	16	15	22	28	40	56	76	109	154	0.2	0.2
3909	Others	2,000	2,000	144	446	37	73	100	273	209	963	2,490	3,755	5.0	4.2
	Total	45,000	73,000	1,704	4,164	834	1,995	1,189	4,368	1,408	5,039	50,135	88,566	100.0	100.0

SOURCE: Data collected during Phase 1 of small-scale industry component of African Rural Employment Project, Njala University College.

[a]International Standard Industrial Classification.

[b]Final estimate based on projection from data obtained from the twenty-four sample "enumeration areas". The estimates were obtained by multiplying the actual number of industrial establishments and industrial employment in each "enumeration area" by figures reflecting the representation of that "enumeration area" in that particular agricultural region.

[c]Included in "others".

TABLE 4

SIERRA LEONE: VALUE ADDED BY SMALL-SCALE INDUSTRIAL CATEGORIES BY LOCATION, 1974/1975

Industrial	Villages Less Than 2,000 Inhabitants	Localities 2,000-20,000	Localities 20,000-100,000 (Bo, Koidu Kenema, Makeni)	Locality Over 100,000 (Freetown)	Total	Percent
	(Leones)					
Tailoring	2,836,000	534,000	571,000	982,000	4,923,000	37
Blacksmithing	1,427,000	77,000	11,000	9,000	1,524,000	12
Carpentry	385,000	558,000	219,000	122,000	1,284,000	10
Baking	a	259,000	175,000	264,000	698,000	5
Gara dyeing	a	345,000	165,000	30,000	540,000	4
Other	3,062,000	480,000	257,000	477,000	4,276,000	32
Total	7,710,000 (58%)	2,253,000 (17%)	1,398,000 (11%)	1,884,000 (14%)	13,245,000	100

SOURCE: Data collected during Phase 2 of the small-scale industry component of the African Rural Employment Project, Njala University College.

[a]Included with "other" industries.

single most important small-scale industry.[1] Blacksmithing, which accounted for 12 percent of the sector's value added, and carpentry, which accounted for 10 percent, were the next most important industrial activities, but both followed tailoring by a large margin.

The composition of industries, however, varied importantly with the size and location of settlements in Sierra Leone. Although tailoring is ubiquitous in Sierra Leone, it is relatively more important in Freetown than in the smallest villages. Indeed, the more "traditional" crafts such as blacksmithing, weaving, and mat making are relatively more important in the smallest villages, while the more "modern" activities such as tailoring, vehicle repair, and metal welding are more important in Freetown.[2]

These results reflect the importance not only of including location in the analysis of industry, but also provide support for distinguishing between "rural" and "urban" small-scale industries. Although any division between rural and urban is arbitrary, 20,000 inhabitants has been adopted as the dividing line in this study. Thus, Freetown, Koidu, Kenema, Bo, and Makeni, localities with more than 20,000 inhabitants (see Spencer, May-Parker and Rose [1976]), have been classified as urban, while all other localities have been classified as rural. Using this classification scheme, 95 percent of the industrial establishments in Sierra Leone are located in rural localities, and account for 86 percent of the employment in the industrial sector.[3] Finally, 75 percent of the value added by the small-scale industries in Sierra Leone is generated in the rural rather

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[1]See Liedholm [1973] for a review of these studies.

[2]Chuta and Liedholm [1975] and Tables 3 and 4.

[3]Computed from Table 1.

than urban areas.[1] These results thus reflect the importance of rural industries and the need to include these enterprises in studies of the industrial sector of Sierra Leone. Moreover, these results also point to the need to ensure that rural industries are incorporated into industrial studies in developing countries.[2]

It is now important to examine in depth the economic parameters of the individual small-scale industrial firms in Sierra Leone. To ensure that a reasonable approximation of the underlying population is provided, annual mean values of the input and output parameters were constructed from the randomly selected firms for which data were available for the entire twelve month period.[3] Complete twelve months' data were currently available for only 111 of the original 276 randomly selected firms, and thus for some industries the number of observations proved to be somewhat low.[4] Preliminary analyses, however, revealed that the mean value of the parameters did not vary significantly between those firms with complete data

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[1]Computed from Table 4. Rural small-scale industries account for approximately 33 percent of the total industry value added.

[2]Due to the lack of comparable data in other countries, it is difficult to assert that the Sierra Leone results about the relative importance of rural industry will be found in other developing countries. A similar unpublished survey undertaken by the authors in Eastern Nigeria, however, yielded results similar to those found in Sierra Leone. Moreover, the indirect evidence relating to rural nonfarm activity reported in Liedholm [1973, p. 2] points to the relative importance of these rural industrial activities. Clearly, however, more comparative research on rural industries is needed.

[3]Some of the data presented in this section about the characteristics of apprentices and entrepreneurs, however, refer to both randomly and purposively sampled firms. These are noted in the respective tables.

[4]In a few localities, for example, several months of data could not be collected due to difficulties with the enumerators. In the enumeration areas, there were difficulties in identifying some of the nonfarm households.

and those firms with incomplete data; this fact should consequently be kept in mind when interpreting the results presented in this section.

Annual Output and Value Added

The details of the annual mean gross output and value added[1] figures for the major categories of small-scale industries in Sierra Leone are summarized in Table 5 by location. The data reveal that there were important variations in the mean output and value added generated by the various categories of small-scale industries in Sierra Leone. In those localities with 2,000 or more inhabitants, for example, the mean annual value added for baking (Le 2,288), carpentry (Le 1,625), and gara[2] dyeing (Le 1,567) was more than twice that of tailoring (Le 739) and blacksmithing (Le 754). The output variations were of a similar magnitude.

The most striking result in Table 5 was that the mean annual value added in several industries appeared to vary importantly with location. The mean annual value added of tailors, for example, varied from Le 203 in the rural villages to Le 1,204 in Freetown; carpentry and blacksmithing exhibited similar wide variations in this parameter. Analysis of variance procedures applied to these data revealed that the locational variation in the tailoring value added figures were significant at the 1 percent

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[1]The gross output value of each sample firm, for example, was obtained by specifying that all the output, including that produced for inventory, barter, or gifts, should be valued at the sales price at the firm. The material and services input value for each firm reflects the purchased value of all raw materials, lubricants, fuels (including electricity), water, indirect taxes and telephone services consumed by the sampled firm during the year. The value added for each firm is simply the resulting difference between the value of gross output and the value of matreial and service inputs.

[2]"Gara" refers to the plant from which the mature indigo dye is obtained. Gara dyeing is a form of cloth tie-dyeing.

TABLE 5
SIERRA LEONE: ANNUAL MEAN OUTPUT AND VALUE ADDED BY MAJOR SMALL-SCALE INDUSTRIAL CATEGORIES AND SIZE OF LOCALITIES, 1974/1975

(Leones)

Industrial Category	Variable	Localities				
		Less Than 2,000	2,000-20,000	20,000-100,000	Over 100,000	All Those Above 2,000
Tailors	Gross output	213.3	604.3	1,149.7	1,657.7	997.4
	Material and service input	11.0	173.6	278.6	454.1	258.6
	Value added	202.6	430.6	871.0	1,203.6	738.8
	n[a]	8	23	29	7	59
Gara	Gross output	--	--	3,484.5	--	3,484.5
	Material and service input	--	--	1,917.5	--	1,917.5
	Value added	--	--	1,567.0	--	1,567.0
	n	--	--	2	--	2
Carpentry	Gross output	78.0	3,511.0	2,187.3	--	2,452.0
	Material and service input	7.1	2,241.0	473.0	--	827.2
	Value added	70.0	1,270.0	1,713.5	--	1,624.8
	n	6	1	4	--	5
Blacksmiths	Gross output	245.5	1,361.3	706.0	1,008.0	1,084.0
	Material and service input	6.3	219.6	307.0	705.0	329.6
	Value added	237.9	1,141.7	399.0	303.0	754.0
	n	10	3	2	1	6
Baking	Gross output	--	--	5,015.5	--	5,015.0
	Material and service input	--	--	2,727.5	--	2,727.0
	Value added	--	--	2,288.0	--	2,288.0
	n	--	--	2	--	3
Goldsmiths	Gross output	--	600.0	1,591.5	767.0	958.5
	Material and service input	--	271.0	320.0	150.0	267.2
	Value added	--	329.3	1,271.5	617.0	691.3
	n	--	3	2	1	6
Watch repair	Gross output	--	--	1,249.5	185.0	894.7
	Material and service input	--	--	259.5	41.0	186.7
	Value added	--	--	990.0	144.0	708.0
	n	--	--	2	1	3
Radio repair	Gross output	--	--	1,071.0	--	1,071.0
	Material and service input	--	--	193.5	--	193.5
	Value added	--	--	877.0	--	877.0
	n	--	--	2	--	2
Shoe repair	Gross output	--	508.0	1,547.0	--	1,027.5
	Material and service input	--	63.0	495.0	--	279.0
	Value added	--	445.0	1,052.0	--	7,485.0
	n	--	1	1	--	2

SOURCE: Data were collected during Phase 2 of the small-scale industry and farm level components of the African Rural Employment Project, Njala University College.

[a] n = number of observations; randomly selected firms only.

level. Due primarily to the small number of observations, however, the locational variations in the other industries' mean value added figures were not statistically significant.

It should be noted that the low value added and gross output figures in the villages are traceable primarily to the fact that the proprietors and their families are generally engaged in farming activities as well. Indeed, the preliminary data from the farm level study reveals, for example, that tailoring output accounts for only 36 percent of the gross value of all outputs produced by the village tailoring household; farming output accounts for the vast majority of the remainder. Correspondingly, the blacksmithing output accounts for 44 percent of the total output produced by the blacksmiths' households, while carpentry output accounts for only 17 percent of the total output produced by the carpenters' households.[1] Thus, the output generated by the village small-scale industries generally represents only a portion of the annual value of total output generated by these households.

Seasonal Variations in Output

The annual value added and output data, however, mask important variations in the level of activity over the year. Indeed, one of the key reasons that data were gathered for one year in the present study was to permit these seasonal variations to be more precisely quantified.

The mean monthly variation in output of the major small-scale industry groups located outside the villages are portrayed in Figure 1. The graph reveals that all the major industrial groups were subject to large monthly fluctuations in the level of activity. Indeed, for all the

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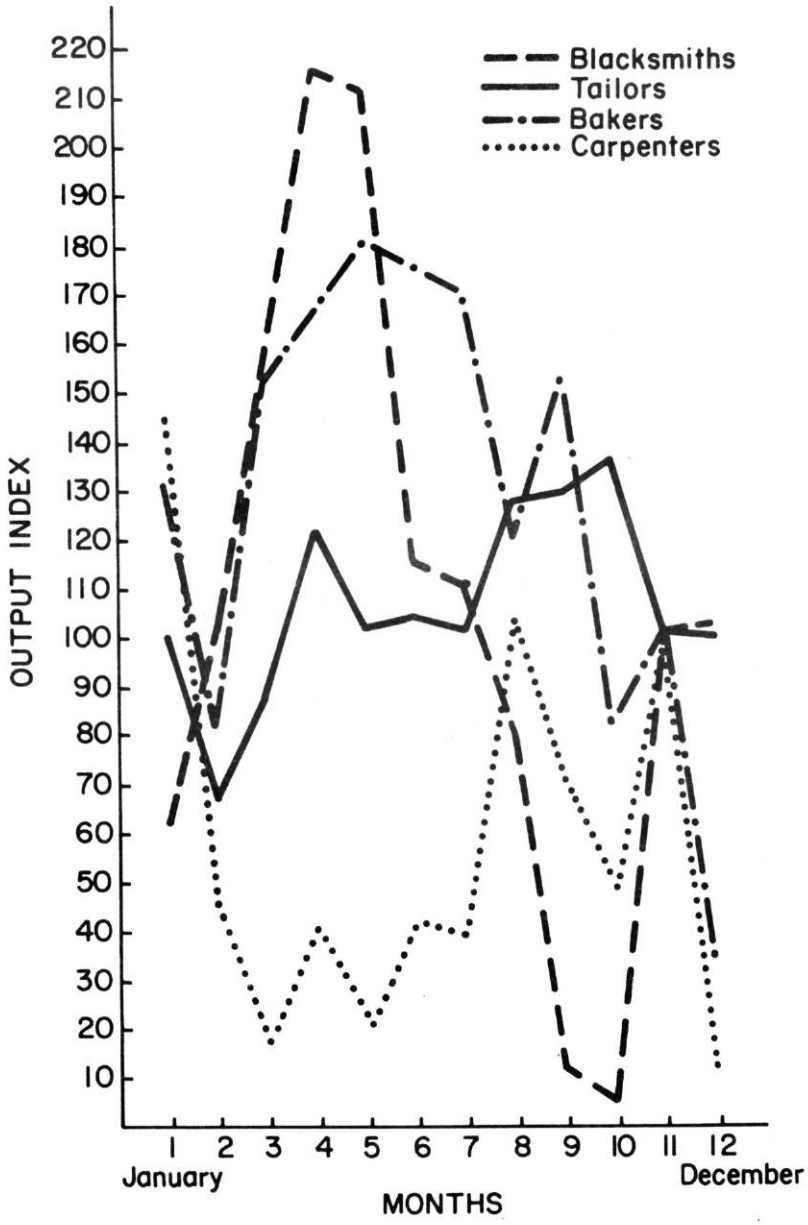
[1]Computed from farm level survey data.

Figure I. Sierra Leone: Index of Monthly Output of Major Small-Scale Industries, 1974 - 75 (November = 100[a])



Source: Survey data

Note: [a]The indexes for tailors and carpenters reflect the mean output value for all localities while the indexes for blacksmiths and bakers are limited to those localities with 20,000 - 100,000 inhabitants.

major industries, the mean output in the peak month was at least twice the mean output in the lowest month. The blacksmithing industry exhibited the largest variation in output over the year, while tailoring exhibited the least.

The seasonal pattern of output, however, is not the same for all the major industrial groups. Tailoring, the most important of the small-scale industries, for example, is most active during the last quarter of the year, the period when the major harvesting activities are occurring. The seasonal peak for tailoring may be traceable not only to the several important religious festivals and holidays that occurred during this period, but also to the fact that the farmers, who are the major customers for tailoring products in the more rural localities, earn much of their cash income at this time. The blacksmithing and baking industries, on the other hand, attain their peak levels of activity in the second quarter of the year. The seasonal peak for bread may be due to the fact that rice, which is a partial substitute for bread, may be less available and relatively more costly during this period. The main explanation for the seasonal peak for blacksmithing activity is that the farmers, who are the major demanders of blacksmithing services, engage in land clearing during the second quarter and thus require large quantities of blacksmiths' products and services at that time. In summary these results thus reflect the importance of incorporating seasonal variation into any analysis of small-scale industry and point to the potential dangers of surveys limited to one month.

There are also major variations in small-scale industrial activity in the villages as well. Our survey reveals that the seasonal variation in the villages is larger than that found in the larger localities. The

preliminary data from rural households in the Boliland area, for example, indicate that the percentage of the households' time devoted to nonfarm activity varied from a low of 0.2 percent in September, when the demand for farm labor is at its peak, to a high of 42 percent in March, when the demand for farm labor is relatively low.[1] A subsequent study will examine and analyze in more detail the farm-nonfarm interactions in these villages.

Material and Services Input

The relative importance of purchased material and services inputs varies widely from industry to industry, as an examination of Table 5 will reveal. These inputs, for example, comprise over 50 percent of the gross output value in gara dyeing, where large quantities of cloth and dyes are purchased, and baking, where flour is the dominant purchased material input. On the other hand, the purchased material and services inputs comprise less than 25 percent of the gross output value in tailoring, since tailors work primarily on cloth brought to them by their customers.

The direct import content of the material inputs used by these small-scale establishments also varies by industrial category. In the tailoring and gara dyeing industries, virtually all the material inputs, such as cloth, dyes, needles and buttons, must be imported. Thus, approximately 55 percent of the gara dyers' and 20 percent of the tailors' gross output values consist of imported inputs.[2] The material input component of the other three major small-scale industries, on the other hand, are substantially lower and vary from 2 percent of the gross output value of

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[1] Computed from the farm level survey data.

[2] These figures and subsequent import data were obtained from the input data collected during phase 2 of the small-scale industry survey.

blacksmiths to 10 percent for carpenters and bakers. The bakers use domestically produced flour, but import their other ingredients; the blacksmiths use domestically produced charcoal and scrap metal, but import other metals; and carpenters use large quantities of domestically produced nails and sawn timber, but import plywood, veneer and other woods. These results indicate that the direct import component of material inputs is clearly above zero for all the major small-scale industries in Sierra Leone and, in some cases, is quite substantial. Thus, in Sierra Leone, import policies can have an important direct impact on small-scale industries.

The small-scale industries in Sierra Leone, however, import a much smaller share of their material inputs than do their large-scale counterparts. According to data presented in the National Development Plan [Government of Sierra Leone, 1974, p. 190], 45 percent of the large-scale industries' gross output value consisted of imported material inputs. The corresponding figure for the five major small-scale industries was 17 percent. Thus, the small-scale enterprises in Sierra Leone require less foreign exchange for material inputs per unit of output than do their large-scale counterparts, a distinct advantage when foreign exchange is relatively scarce.

Finally, it should be noted that small-scale industries in Sierra Leone generally make very little use of purchased service inputs. Electricity, for example, is purchased by only 23 percent of the tailors in those localities outside the villages, and by a few bakers, blacksmiths, and carpenters using more "modern" techniques of production.[1] Moreover,

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[1]See below, page 78 for a description of these "modern" small-scale enterprises.

only the "modern" bakers purchase water. Thus, the vast majority of the small-scale establishments are not dependent upon these services inputs and thus possess more locational flexibility than do their large-scale counterparts.[1]

Capital Services and Stock Inputs

Controversy and debate still surround the definition and measurement of the capital input. Thus, the measures used to describe the capital input used in this study must first be discussed; the magnitude, composition, sources, and utilization of this capital input will then be examined.

In this study, capital has been divided into three major categories: working capital, equipment, and buildings. Working capital is defined to include only the value of the inventories of material inputs and finished outputs held by the enterprise.[2] These stocks have been evaluated on the basis of the inventory levels at the beginning of the survey year. Equipment is composed of the tools, machines and furniture that are being utilized by the establishment. These assets have been initially valued at their original purchase price on the basis of information supplied by the entrepreneur. The final capital category is buildings and reflects the value of both the building and land that are being utilized by the establishment.

If only the value of those capital assets purchased by the enterprise are included in the analysis, however, the capital figures will be

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[1]Although electricity is available in virtually all localities with 5,000 or more inhabitants, none of the small-scale establishments in localities with 20,000 inhabitants or less used electricity.

[2]This definition is somewhat more restrictive than definitions that include cash and net receivables. For small-scale establishments, however, net receivables are minimal and cash data are difficult to obtain.

understated to the extent that firms rent their buildings and equipment. The survey data, in fact, reveal that the vast majority, 70 percent, of small-scale industrial establishments in Sierra Leone rent their premises. Moreover, approximately 36 percent of the tailors in the survey rented their sewing machines.[1] Thus, if the use of capital by small-scale industries is to be measured completely, it is imperative to combine the rental value of buildings and equipment with the capital stock data.

The combination of the stock and rental capital values, however, raises the important theoretical and empirical issue of what is the correct specification of the capital input. Ideally, the capital services rather than the capital stock figure should be used in the analysis of the cost and production relationships of firms. Most studies, however, use stock as a proxy for capital services flows, but this stock measure is valid only under the restrictive assumption that the capital stock components are of the same durability and vintage.[2] Consequently, in the present study, all the building and equipment capital stock variables initially have been converted into capital services flows using the capital recovery formula:

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

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. This formula generates an annual capital service flow from the capital stock data that is equivalent to

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[1] Computed from survey data.

[2] See Yotopoulos [1967] for a good review of this issue.

the rental charge or "user cost" of capital and reflects both depreciation and the opportunity cost of the capital.

The use of the capital recovery factor, however, requires two additional parameters: (1) the life expectancy of the capital stock (n) and (2) the discount rate reflecting the opportunity cost of capital (r). Data were collected on both the age and the expected remaining lives of the equipment and buildings used by the small-scale industry establishments. To eliminate the distortions arising from incorrect or inconsistent responses supplied by individual establishments, however, the mean expected life for each component of the capital stock was calculated and used in the analysis.[1]

The appropriate discount rate is somewhat more difficult to ascertain. Ideally, one would want to use the rate of discount that reflects the opportunity cost of capital in Sierra Leone, but this rate is rather elusive. The capital market appears to be highly "fragmented"[2] with artificially low interest rates in the commercial banking sector and unduly high interest rates in the informal credit markets. The maximum discount rate charged by the commercial banks is, for example, 12 percent [Bank of Sierra Leone, 1975] while rates in the informal rural credit markets generally exceed 40 percent.[3] In view of these considerations, it has been

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[1]Not unexpectedly, the mean expected life for each component varied widely, ranging from two years for nonmetal tools used by tailors to thirty-five years for the blacksmiths' anvils. These results thus reflected the importance of adjusting the capital data for life expectancy. A similar procedure was used to calculate the mean expected life of those buildings owned by the establishments.

[2]See McKinnon [1973] for a detailed discussion of "fragmented" capital market.

[3]Linsenmeyer [1976], for example, reports that fishermen obtained loans for fixed capital at a rate adjusted for default risk of 43 percent. See also Bank of Sierra Leone [1969] for non-institutional credit rates in agriculture.

assumed initially that a discount rate of 20 provides a reasonable approximation of the opportunity cost of capital in Sierra Leone.[1] This particular discount rate is, if anything, somewhat low and thus will give the benefit of the doubt to the more capital-intensive firms.

The details of the annual mean capital services used by the major categories of small-scale industries are summarized in Table 6. The table reveals that there are wide variations in the mean annual capital services inputs. In those localities with 2,000 or more inhabitants, for example, gara dyers use only Le 18 of capital services annually while blacksmiths employ an average of Le 411 of these inputs. The annual capital services used by tailors, the largest group, falls between these extremes and amounts to an average of Le 121 per year.

The composition of these capital services also varies from industry to industry. In those localities of 2,000 or more inhabitants, for example, the building rent ranges from a high of Le 223 per year (54 percent of total capital services) in blacksmithing, to a low of zero in gara dyeing, where all production is done outdoors. Working capital services, on the other hand, range from a high of Le 38 per year (25 percent of total capital services) for carpenters to a low of Le 5 (4 percent of total capital services) in tailoring, where very small levels of materials or output inventories are retained. In general, working capital thus constitutes a relatively small percentage of the total capital actually used by these small-scale firms. This result, however,

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[1] For a more extensive discussion of the discount rate and credit markets, see below, page 108. The 20 percent discount rate was also used to convert directly the working capital stock into a figure reflecting the opportunity cost of funds tied up in such assets (i.e., stock x .2 = working capital services).

TABLE 6
SIERRA LEONE: ANNUAL MEAN CAPITAL SERVICES INPUT BY MAJOR SMALL-SCALE INDUSTRIAL CATEGORIES AND SIZE OF LOCALITIES, 1974/1975

(Leone)

Industrial Category	Variable	Localities				
		Less Than 2,000	2,000-20,000	20,000-100,000	Over 100,000	All Those Above 2,000
Tailors[a]	Building services	12	21	59	187	59
	Equipment services	27	38	61	104	57
	Working capital services	--	3	7	5	5
	Total capital services input	39	62	127	296	121
Gara	Building services	--	--	--	--	--
	Equipment services	--	--	6	--	6
	Working capital services	--	--	12	--	12
	Total capital services input	--	--	18	--	18
Carpentry	Building services	12	100	60	--	70
	Equipment services	25	48	28	--	40
	Working capital services	--	20	44	--	38
	Total capital services input	37	168	132	--	148
Blacksmiths	Building services	12	72	366	240	223
	Equipment services	26	132	168	288	178
	Working capital services	--	12	1	21	10
	Total capital services input	38	216	535	549	411
Baking	Building services	--	--	84	--	84
	Equipment services	--	--	18	--	18
	Working capital services	--	--	15	--	15
	Total capital services input	--	--	117	--	117
Goldsmiths	Building services	--	20	60	120	50
	Equipment services	--	4	18	84	22
	Working capital services	--	0	42	0	14
	Total capital services input	--	24	120	204	86
Watch repair	Building services	--	--	24	--	16
	Equipment services	--	--	60	--	40
	Working capital services	--	--	--	--	--
	Total capital services input	--	--	84	--	56
Radio repair	Building services	--	--	60	--	60
	Equipment services	--	--	36	--	36
	Working capital services	--	--	18	--	18
	Total capital services input	--	--	171	--	171
Shoe repair	Building services	--	12	48	--	30
	Equipment services	--	0	12	--	6
	Working capital services	--	0	24	--	12
	Total capital services input	--	12	84	--	48

SOURCE: Survey data.

[a]The number of observations is the same as in Table 5.

does not necessarily imply that more working capital might not be needed in order to improve the economic efficiency of these firms.[1]

Finally, the results in Table 6 indicate that there are important variations in the mean annual capital services related to location in Sierra Leone. In tailoring, for example, the annual capital services ranged from Le 39 in the rural villages to Le 296 in urban Freetown. Carpentry and blacksmithing also exhibited similar wide variations by location. Analysis of variance procedures applied to the data for these three industries, the only ones with sufficiently large numbers of observations, revealed that the locational variations were significant at the 5 percent level.

The composition of the capital services also varies by location. More specifically, the building rental component is relatively more important in urban than in rural locations, reflecting the relative premium on space in urban locations. In tailoring, for example, the building rent accounts for almost 50 percent of the capital services in urban Freetown, but only 31 percent in the rural villages. Thus, location appears to influence both the amount and composition of the capital services input and thus reinforces the importance of specifying location in any analyses of small-scale industry.

Since capital data in other countries are almost always expressed in stock rather than in service flow terms, however, the capital figures for the major small-scale industries in Sierra Leone have also been expressed in stock terms. These statistics, arrayed by industry and location, are presented in Table 7.

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[1]Unfortunately, it has not been possible to undertake analyses to ascertain the "optimum" inventory levels for these firms.

TABLE 7
ANNUAL MEAN CAPITAL STOCK FOR FIVE MAJOR SMALL-SCALE INDUSTRIAL CATEGORIES BY SIZE OF LOCALITY, 1974/1975

Industrial Category	Variable	Localities				
		Less Than 2,000	2,000-20,000	20,000-100,000	Over 100,000	All Those Above 2,000
Tailors[a]	Building	57	102	288	911	287
	Equipment	128	165	244	469	239
	Working capital	0	16	36	26	25
	Total capital input	185	283	568	1,406	551
Gara	Building	--	--	0	--	0
	Equipment	--	--	23	--	23
	Working capital	--	--	58	--	58
	Total capital input	--	--	81	--	81
Carpentry	Building	57	488	292	--	341
	Equipment	118	261	91	--	156
	Working capital	0	100	221	--	191
	Total capital input	175	849	604	--	688
Blacksmiths	Building	57	351	1,785	1,171	1,089
	Equipment	123	426	816	1,277	752
	Working capital	0	62	6	108	49
	Total capital input	180	839	2,607	2,556	1,890
Baking	Building	--	--	409	--	409
	Equipment	--	--	72	--	72
	Working capital	--	--	75	--	75
	Total capital input	--	--	556	--	556

SOURCE: Survey data.

[a]The number of observations for these five industries is the same as in Table 5.

An examination of Table 7 reveals that the mean capital stock values, including working capital, ranged from Le 81 ($89) for gara dyeing to Le 1,890 ($2,079) for blacksmithing. The "blacksmithing" figure, however, reflects the relatively high capital stock values of the two "modern" blacksmiths that entered into the random sample.[1]

When the capital stock figures for Sierra Leone are compared with capital stock data generated for small-scale industries elsewhere in Africa, however, the paucity of capital used by the Sierra Leone small-scale industries becomes apparent. A recent study of small rural industries in Kenya [Child, 1973] reports that the mean value of these firms' reported investment in fixed capital was approximately $3,245. In addition, Steel's [1976] recent study of small-scale industry in Ghana reveals that firms employing one to nine workers possessed fixed assets of approximately $5,000 while those with from ten to twenty-nine workers possessed approximately $64,000 in fixed assets. Thus, the capital stock possessed by the Sierra Leone small-scale industries would appear to be small even when compared with small industries elsewhere in Africa.

Initial Capital Stock Requirements

These capital stock input data, however, do not reveal the nature of the initial capital stock that was employed at the time these firms were established and thus do not shed light on a potential barrier to entry into small-scale industry. To analyze this aspect, initial capital stock data were obtained from the entrepreneurs during the detailed entrepreneur interviews. The initial capital stock figures relating

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[1]See page 78 for a description of these more "modern" firms. No "modern" carpenters, gara dyers or bakers were included in the random sample; thus those capital figures reflect more "traditional" processes.

to the randomly selected enterprises are presented in Table 8, where the data are arrayed by industrial category and location.

The data reveal that the initial capital stock requirements for the major small-scale industry categories were quite modest. In all the major industries, the mean initial investment required was less than Le 100. Indeed, gara dyers could enter with only Le 31 of initial capital and tailors needed but Le 56. These results it should be noted are similar to the $75 initial capital requirements reported for rural industries in Kenya [Child, 1973]. A particularly striking result presented in Table 8, however, is the indication that initial capital stock requirements do not necessarily decline as one moves to smaller, more rural localities. The mean initial capital stock requirement for tailors in the rural village, for example, is Le 68, while in urban Freetown it is only Le 50. One partial explanation is that a sewing machine rental market has developed in many urban areas which allows urban tailors to rent machines. However, almost all tailors in rural areas have to purchase machines.

Sources of Initial Capital

The sources of these initial capital funds are presented in Table 9, where the data are arranged by size of locality. The table reveals that personal savings from agriculture, trade or business provided the majority (60 percent) of the funds needed to establish small-scale industries in Sierra Leone, followed by gifts and family loans.[1] The paucity of funds obtained from either the government or the commercial banking system provides a further indication of the rather fragmented and

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[1]Similar proportions are reported by Child [1973] for Kenya and Harris [1970] for Nigeria.

TABLE 8
SIERRA LEONE: AVERAGE INITIAL CAPITAL STOCK REQUIREMENTS AT TIME OF ESTABLISHMENT BY MAJOR INDUSTRIAL CATEGORIES AND SIZE OF LOCALITY, 1974/1975

(Leones)

Industrial Category[a]	Localities				
	Less Than 2,000	2,000-20,000	20,000-100,000	Over 100,000	All Localities
Tailors	68	45	62	50	56
Gara dyeing	--	--	31	--	31
Carpenters	24	44	82	--	47
Blacksmiths	26	44	215	b	55
Baking	--	--	90	--	90
Others	22	72	65	152	63

SOURCE: Survey data.

[a]The number of observations is the same as in Table 5, except for the noninclusion of the "modern" blacksmith in Freetown due to lack of data.

[b]Data unavailable from firm.

TABLE 9
SIERRA LEONE: SOURCES OF INITIAL CAPITAL OF SMALL-SCALE INDUSTRIAL FIRMS AT THE TIME OF ESTABLISHMENT

Sources	Localities				
	Less Than 2,000	2,000-20,000	20,000-100,000	Over 100,000	All Localities
Savings from agriculture	38.2%	19.4%	7.9%		20.3%
Savings from trade or business	26.5%	38.9%	50.0%	20.0%	38.1%
Other savings	--	2.8%	2.6%	--	1.8%
Loans from commercial banks	--	--	2.6%	--	.9%
Loans from friends or family	2.9%	5.6%	--	40.0%	4.4%
Gifts	5.9%	13.9%	21.1%	40.0%	15.1%
Loans from money lenders	2.9%	--	--	--	.9%
Other	23.5%	19.4%	15.8%	--	18.3%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
n[a]	34	35	38	5	112

SOURCE: Data collected from entrepreneural questionnaire administered during Phase 2 of the small-scale industry component of the African Rural Employment Project, Njala University College.

[a]n = number of observations.

underdeveloped nature of the institutional capital market in Sierra Leone for small-scale industry.

Sources of Expansion Capital

The capital for the expansion of these establishments, on the other hand, was generated from none of these sources. As Table 10 indicates, almost 90 percent of the funds used for expansion were simply reinvested profits, reflecting perhaps both the high rates of return to these particular activities and the fragmented nature of the capital market.[1] One of the most striking results presented in Table 10 is the revelation that none of the establishments enumerated in the sample had obtained expansion funds from either the commercial banking system or the government. These results reflect the relatively nascent state of the capital market and the important role played by small-scale enterprises in generating and providing a vehicle for investing personal savings in Sierra Leone.

Excess Capacity

Finally, it was important to ascertain if the capital stocks of the small-scale industries were fully utilized.[2] Consequently, although they are difficult to quantify and subject to error, excess capacity measures were computed for the major industries by location, the results of which are summarized in Table 11. The measure was obtained by asking proprietors to state how many additional hours they would operate their

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[1]See above, page 28, for a further discussion of this point.

[2]See Winston [1974] for a good discussion of the capacity utilization issues. Excess capacity can be both planned and unplanned and caused by both demand and supply factors.

TABLE 10
SIERRA LEONE: SOURCES OF EXPANSION FUNDS FOR SMALL-SCALE INDUSTRIAL ESTABLISHMENTS, 1974/1975

Sources	Localities				
	Less Than 2,000	2,000-20,000	20,000-100,000	Above 100,000	All Localities
Reinvested profits	76.5%	87.5%	95.5%	100.0%	88.5%
Loans from commercial banks	--	--	--	--	--
Loans from cooperatives	5.9%	12.5%	--	--	3.9%
Loans from money lenders	11.8%	--	--	--	3.9%
Other	5.9%	--	4.5%	--	3.8%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
n[a]	17	8	22	5	

SOURCE: Data obtained from the entrepreneurial questionnaire administered during Phase 2 of the small-scale industry component of the African Rural Employment Project, Njala University College.

[a]n = number of observations; based on returns from only those firms that expanded.

TABLE 11
SIERRA LEONE: EXCESS CAPACITY[a] BY MAJOR SMALL-SCALE INDUSTRY BY LOCATION, 1974/1975

Industrial Category	Localities				
	Less Than 2,000	2,000-20,000	20,000-100,000	Over 100,000	All Localities
Tailors	45%	34%	29%	24%	33%
n[b]	14	24	3	8	
Gara	--	15%	31%	18%	25%
n	--	1	3	1	
Carpentry	45%	33%	25%	22%	34%
n	9	9	8	3	
Blacksmiths	43%	47%	30%	--	41%
n	8	4	3	--	
Baking	--	41%	32%	30%	34%
n	--	6	7	6	
Others	38%	44%	27%	43%	36%
n	9	16	19	5	
Weighted grand mean					35%

SOURCE: Survey data.

[a]For definition of excess capacity measures, see text.

[b]n = number of cases: includes both randomly and purposively sampled firms.

firms with the existing buildings and equipment if there were no constraints on demand or materials. The additional hours worked were then expressed as a percent of the sum of the existing and additional hours worked by the firm to produce the resulting excess capacity measure. Except for the baking industry, where the more "modern" firm normally operated two shifts, the measure reflects the single shift excess capacity of these firms.

An examination of Table 11 reveals that a substantial amount of excess capital capacity existed in all the major small-scale industries. The excess capacity varied by major industry, however, ranging from a high of 41 percent in the blacksmithing industry to only 25 percent in gara dyeing. Even more striking, however, was the indication that the amount of excess capacity varied by location. In tailoring, for example, there was 45 percent excess capacity in the villages but only 24 percent in Freetown. The highest amount of excess capacity was found to exist in rural areas in the other major industries as well. These results thus indicated that, particularly in the rural areas, the existing capital stocks of small-scale industries in Sierra Leone were generally not fully utilized.

Labor Input

The final input to be examined in detail is labor. In this section, the magnitude and composition of the labor input will be examined, followed by a discussion of the characteristics of the two most important labor components, apprentices and proprietors.

Since the stock or number of workers in small-scale industry has been discussed in a previous report as well as earlier in this paper, the labor

measure presented in this section will be the flow of labor services.[1] Specifically, the labor services were measured in terms of the number of hours actually worked in production by each category of workers; consequently, the labor services variable did not include the hours of individuals when they were simply waiting for work.[2] This method of measuring labor services was chosen because it not only produces the most suitable input for production function analysis, but also would provide an indication of an establishment's excess capacity.

The details of the mean annual labor hours used by the major categories of small-scale industries in the various localities of Sierra Leone are summarized in Table 12. An examination of this table reveals that, as with the capital services input, there are wide variations in the mean number of labor hours by the major industrial categories. In those localities in excess of 2,000, for example, the mean annual number of tailoring hours worked was only 1,572 hours, while in carpentry the mean annual number of hours worked was 6,457.

The composition of this labor input also varied by industrial category. This result is also apparent from Table 12, where the total hours of labor input by industry has been subdivided into the following categories: (1) proprietors' labor, (2) family labor (male, female, child), (3) apprentices and (4) hired labor.

The mean annual number of hours actually worked by apprentices

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[1]See African Rural Employment Paper No. 11 [Chuta and Liedholm, 1975], where it was reported that apprentices accounted for 42 percent of the labor stock used, while hired laborers and proprietors accounted for 17 and 41 percent respectively.

[2]These data were obtained from the labor input questionnaire that was administered twice weekly to firms over the period of one year.

TABLE 12
SIERRA LEONE: ANNUAL MEAN LABOR HOURS BY SMALL-SCALE INDUSTRIAL CATEGORY, LABOR TYPE AND LOCALITY

(Number of Hours)

Industrial Category	Variable[a]	Localities				
		Less Than 2,000	2,000-20,000	20,000-100,000	Over 100,000	All Localities
Tailors	Proprietor labor	474.0	869.0	840.6	1,398.4	917.9
	Male family labor	b	.6	.5	0	.5
	Female family labor	b	2.3	.1	0	.9
	Child family labor	b	0	0	0	0
	Apprentices	b	323.5	534.0	1,928.9	617.8
	Hired labor	0	18.3	52.3	15.0	36.0
	Total	474.0	1,211.3	1,431.2	3.342.3	1,572.3
Gara	Proprietor labor	--	--	1,000.5	--	1,000.5
	Male family labor	--	--	194.5	--	194.5
	Female family labor	--	--	412.5	--	412.5
	Child family labor	--	--	15.5	--	15.5
	Apprentices	--	--	0	--	0
	Hired labor	--	--	381.5	--	381.5
	Total	--	--	2,004.5	--	2,004.5
Carpentry	Proprietor labor	308	3,132.0	919.5	--	1,362.0
	Male family labor	b	0	0	--	0
	Female family labor	b	0	0	--	0
	Child family labor	b	0	0	--	0
	Apprentices	b	15,541.0	2,292.5	--	4,942.2
	Hired labor	b	0	191.3	--	153.0
	Total	308	18,673.0	3,403.3	--	6,457.2
Blacksmiths	Proprietor labor	745	1,123.0	496.0	446.0	801.0
	Male family labor	b	0	0	0	0
	Female family labor	b	0	0	0	0
	Child family labor	b	0	0	0	0
	Apprentices	b	1,691.7	631.5	775.0	1,185.5
	Hired labor	b	200.7	669.0	--	323.3
	Total	745	3,015.3	1.796.5	1,221.0	2,310.0
Baking	Proprietor labor	--	--	277.5	--	277.5
	Male family labor	--	--	754.0	--	754.0
	Female family labor	--	--	0	--	0
	Child family labor	--	--	0	--	0
	Apprentices	--	--	0	--	0
	Hired labor	--	--	3,139.5	--	3,139.5
	Total	--	--	4,171.0	--	4,171.0
Goldsmiths	Proprietor labor	--	700.0	988.5	1,486.0	927.0
	Male family labor	--	0	53.0	0	17.7
	Female family labor	--	--	0	0	0
	Child family labor	--	486.0	0	0	243.0
	Apprentices	--	395.7	550.0	812.0	517.0
	Hired labor	--	0	0	0	0
	Total	--	1,614.0	1,591.0	2,298.0	1,720.7
Watch repair	Proprietor labor	--	--	687.0	171.0	515.0
	Male family labor	--	--	0	0	0
	Female family labor	--	--	0	0	0
	Child family labor	--	--	0	0	0
	Apprentices	--	--	19.0	0	12.0
	Hired labor	--	--	10.0	0	7.0
	Total	--	--	715.0	171.0	534.0

(Continued)

TABLE 12 - CONTINUED
SIERRA LEONE: ANNUAL MEAN LABOR HOURS BY SMALL-SCALE INDUSTRIAL CATEGORY, LABOR TYPE AND LOCALITY

(Number of Hours)

Industrial Category	Variable[a]	Localities				
		Less Than 2,000	2,000-20,000	20,000-100,000	Over 100,000	All Localities
Radio repair	Proprietor labor	--	--	549.0	--	549.0
	Male family labor	--	--	0	--	0
	Female family labor	--	--	0	--	0
	Child family labor	--	--	0	--	0
	Apprentices	--	--	154.0	--	154.0
	Hired labor	--	--	0	11.0	0
	Total	--	--	703.0	--	703.0
Shoe repair	Proprietor labor	--	1,593.0	1,192.0	--	1,393.0
	Male family labor	--	0	0	--	0
	Female family labor	--	0	0	--	0
	Child family labor	--	0	0	--	0
	Apprentices	--	14.0	0	--	7.0
	Hired labor	--	0	0	--	0
	Total	--	1,607.0	1,192.0	--	1,400.0

SOURCE: Survey data.

[a]Number of observations is the same as Table 5.

[b]Included in proprietor labor figures.

differs widely by industrial category. In those localities with 2,000 or more inhabitants, for example, the mean yearly apprenticeship hours worked varies from a high of 4,942 in carpentry (76 percent of total carpentry industry hours) to zero in gara dyeing.[1] In tailoring, the mean annual number of hours worked by apprentices was 617, a number that represented 39 percent of the total tailoring hours.

Hired labor also exhibits similar wide variations by industrial category, although, in general, this labor component is used less extensively than apprentices. In those localities with 2,000 or more inhabitants, the mean annual hours of hired workers in tailoring is only 35 (2 percent of the total), while in baking the number increases to a mean yearly total of 3,346 (62 percent of the total).

The relative importance of the family labor input also varies widely from industry to industry. Indeed, in the major industrial categories, family labor is important only in gara dyeing and is negligible in the other industrial categories.

Moreover, these data reveal that the role of women in the major small-scale industrial categories included in the survey is rather small. Women appear to be engaged actively only in the gara dyeing industry, where women family members contribute 16 percent of the industry's total mean annual labor hours. In all the other major small-scale industries, however, the labor hour contribution of women either as family workers, proprietors or apprentices is small.

Finally, the data indicate that the mean number of hours worked

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[1]It should be noted, however, that in the larger, more purposive sample, a few gara dyers actually used apprentices in production, but their utilization was very minimal.

by the proprietor in the five major small-scale industries in those localities in excess of 2,000 is approximately 1,000 and ranges from a low of 800 to a high of 1,300 hours. The proprietors of those small-scale industries located outside the villages thus appear to work about the same number of hours as farm proprietors (see Spencer and Byerlee [1976]).

Both the composition and overall magnitude of the labor services input, however, varied by location. The total mean labor hours in all the small-scale industries, for example, is significantly lower in the villages than in any of the other locations. Tailoring, where the total mean labor hours ranged from 474 in the villages to 1,398 in Freetown, provides a good illustration of this variation. The low labor hour figure for small-scale industries in the villages, however, simply reflects the part-time nature of this activity in rural areas. Indeed, the preliminary analysis of the combined farm and nonfarm labor hours data indicates that 66 percent of the annual labor hours of those engaged in small-scale industry activities in the villages are devoted to farming activities. In the non-village localities, on the other hand, the total mean labor hours for carpenters and blacksmiths were largest in those localities with from 2,000 to 20,000 inhabitants, while the total mean labor hours for tailors were largest in Freetown. Finally, it should be noted that the proprietors' labor services tend to be relatively more important in the smaller, more rural localities, while the apprentices' labor services tend to become more important as one moves to the larger urban localities. Thus, once again location has an important bearing on the various small-scale industry parameters being examined.

The characteristics of the two most important labor components--apprentices and proprietors--must now be examined in more detail. The

apprentices will be considered first, followed by a discussion of the proprietors.

Characteristics of Apprentices

The apprenticeship system provides the primary vehicle for training the labor for small-scale industry. It is a system in which a young person serves a proprietor or master for a given period of time in order to learn a trade or craft. The duration of the apprenticeship varies from industry to industry as Table 13 reveals. A gara dyeing apprentice, for example, serves for only about a year and one-half, while a blacksmith's apprentice serves for an average of five years. The duration of the tailoring apprentice falls between these extremes and averages three and one-half years. The duration of the apprenticeship does not vary importantly with location; indeed, analysis of variance procedures indicated that locational variations in the duration of apprenticeship were not statistically significant at even the 50 percent level.

A large number of the apprentices are required to pay the proprietors or masters a learning fee for the training they receive during this period. Indeed, as indicated by Table 14, 53 percent of the small-scale industrial establishments charged a fee for the training given, with the percentage of firms requiring the fee in the major industrial categories ranging from a low of 17 percent in baking to 100 percent in gara dyeing.

Whether or not a learning fee was required, however, depended importantly on the location of the enterprise. In those rural localities with less than 2,000 inhabitants, for example, approximately 73 percent of the firms required a learning fee, while in Freetown only 13 percent of the firms required such a fee. This variation may be traceable to a differing underlying pattern of demand for and supply of apprentices. Since

TABLE 13
SIERRA LEONE: DURATION OF APPRENTICESHIP AND LEARNING FEE
BY SMALL-SCALE INDUSTRIAL CATEGORY AND LOCATION

Industry	Duration of Apprenticeship (Years)					Learning Fee (Leones)				
	Localities					Localities				
	Less Than 2,000	2,000-20,000	20,000-100,000	Over 100,000	All Localities	Less Than 2,000	2,000-20,000	20,000-100,000	Over 100,000	All Localities
Tailors	3.2	3.4	4.0	3.6	3.6	28.5	24.7	28.6	--	27.1
n[a]	10	32	30	7	79	11	18	18	--	47
Gara	--	1.0	2.0	1.0	1.7	--	11.3	19.7	--	15.5
n	--	1	4	1	6	--	3	3	--	6
Carpenters	4.3	4.0	5.4	5.7	4.8	24.0	45.6	42.0	--	37.5
n	4	7	8	3	22	7	9	5	--	21
Blacksmiths	5.0	4.6	5.3	--	4.9	25.0	42.3	--	--	31.9
n	10	8	4	--	22	6	4	--	--	10
Baking	--	3.8	1.0	1.0	2.0	--	13.0	20.0	--	15.3
n	--	4	2	5	11	--	2	1	--	3
Others	6.0	3.2	2.9	2.3	3.1	12.7	24.1	33.4	20.0	24.5
n	2	13	18	4	37	3	12	5	1	21

SOURCE: Survey data.

[a] n = number of observations; based on all randomly and purposively selected firms that reponded to those questions.

TABLE 14
SIERRA LEONE: PERCENTAGE OF SMALL-SCALE INDUSTRY PROPRIETORS CHARGING A LEARNING FEE TO APPRENTICES

Industry	Localities				
	Less Than 2,000	2,000-20,000	20,000-100,000	100,000+	All Localities
Tailors	79%	58%	56%	0%	54%
n[a]	10	33	34	8	85
Gara	--	100%	100%	100%	100%
n	--	3	3	1	7
Carpenters	70%	69%	75%	33%	68%
n	10	13	8	3	34
Blacksmiths	88%	50%	0%	--	55%
n	8	8	4	--	20
Baking	--	25%	25%	0%	17%
n	--	8	4	6	18
Others	43%	81%	26%	20%	46%
n	7	16	19	5	47
Weighted grand mean					53%

SOURCE: Survey data.

[a] n = number of observations; based on all randomly and purposively selected firms that responded to this question.

apprenticeship training is a basic requirement for entry into many small-scale industries, the relative entry cost relating to training appears to be higher in rural areas than in the urban areas.[1]

To ascertain the dimensions of the learning fee as a potential entry barrier, it is also necessary to examine the magnitude of the learning fee. As Table 13 reveals, the learning fees in the rural villages are rather similar for the major industrial groups, amounting to approximately Le 25 for the duration of the apprenticeship. In the large localities, the learning fee charged by those firms requiring it appears to increase somewhat for all industrial categories except tailoring. Analysis of variance procedures applied to these data, however, revealed that none of these locational variations in the learning fee were statistically significant. Thus, given the predominance of the learning fee in rural areas, the learning fee does appear to fall more heavily on the rural than on the urban apprentices.

Finally, the vast majority of the small-scale industry proprietors received their own training from the apprenticeship system. Indeed, the survey data indicate that 90 percent of the proprietors sampled had previously served as apprentices.[2] The other characteristics of the proprietors must now be examined in more detail.

Characteristics of Proprietors

There are a wide range of socio-economic characteristics that might shed direct light on the proprietor's ability to operate the firm. The occupation of the proprietor's father, for example, could provide an

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[1] It should be noted that in urban areas, the proprietors generally provide room and board for their apprentices.

[2] Computed from data collected from the entrepreneurial questionnaires.

indication not only of the intergenerational occupational mobility, but also the psychological attitude of the proprietor towards operating the firm.[1] In view of Sierra Leone's pervasive agricultural base, it is perhaps not surprising that farming was the primary occupation of the vast majority of the fathers of the industrial proprietors. Approximately two-thirds of the proprietors had fathers whose primary occupation was farming. The two-thirds figure for Sierra Leone is higher, however, than that reported for Nigerian proprietors in the surveys of both Callaway [1967] and Harris [1972].[2] One might hypothesize that the different results were traceable, at least in part, to the absence of rural proprietors from the Nigerian surveys. Table 15, for example, does indicate some tendency for the percentage of farmers to increase as one moves to the smaller rural localities. Various Chi-square tests, however, indicated that, except for bakers, these locational differences were not statistically significant at even the 10 percent level.

Another potentially important characteristic of the proprietor is the level of formal education. One might hypothesize that formal education contributes to managerial, organizational and technical skills of the proprietor. The extent of the formal education of proprietors is provided by Table 16, where the percentage of proprietors with any formal education is arrayed by industry and location. The most striking result is the low percentage of proprietors with any formal education. Seventy-seven

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[1]See Harris [1971] for an excellent discussion of the influence of social and psychological factors on entrepreneurial performance. For example, attitudes toward risk and modes of interpersonal relationships within an organization can be shaped by these social and psychological variables.

[2]Callaway found that 48 percent of the proprietors' fathers in Ibadan were farmers, while Harris reported that 25 percent of his proprietors' fathers were farmers.

TABLE 15
SIERRA LEONE: PERCENTAGE OF SMALL-SCALE INDUSTRIAL PROPRIETORS' FATHERS WHO WERE FARMERS BY INDUSTRIAL CATEGORY AND LOCATION

Industry	Localities				
	Less Than 2,000	2,000-20,000	20,000-100,000	Over 100,000	All Localities
Tailors	86%	71%	61%	100%	72%
n[a]	14	31	33	6	84
Gara	--	100%	33%	100%	71%
n	--	3	3	1	7
Carptnters	80%	83%	57%	33%	72%
n	10	12	7	3	32
Blacksmiths	75%	38%	25%	--	50%
n	8	8	4	--	20
Bakers	--	75%	80%	0%	50%
n	--	8	5	7	20
Others	25%	53%	39%	100%	48%
n	8	17	18	5	48
Weighted grand mean					63%

SOURCE: Survey data.

[a] n = number of observations; based on all randomly and purposively selected firms that responded to this question.

TABLE 16
SIERRA LEONE: PERCENTAGE OF SMALL-SCALE INDUSTRIAL PROPRIETORS WITH FORMAL EDUCATION BY INDUSTRY AND LOCATION

Industry	Localities				
	Less Than 2,000	2,000-20,000	20,000-100,000	Over 100,000	All Localities
Tailoring	21%	15%	35%	25%	24%
n[a]	14	34	34	8	90
Gara	--	0%	25%	0%	13%
n	--	3	4	1	8
Carpenters	10%	25%	38%	33%	24%
n	10	12	8	3	33
Blacksmiths	0%	0%	25%	--	5%
n	10	8	4	--	22
Baking	--	10%	29%	71%	33%
n	--	10	7	7	24
Others	0%	12%	53%	20%	26%
n	9	17	19	5	50
Weighted grand mean					23%

SOURCE: Survey data.

[a] n = number of observations; based on all randomly and purposively selected firms that responded to this question.

percent of the proprietors possessed no formal education at all, a high percentage even by African standards. In Callaway's sample of proprietors in Ibadan, for example, only 24 percent had no formal education, while Harris reported that among his Nigerian proprietors only 13 percent had no formal education. Although there was some variation in the level of formal education by industry and location, except for baking, none of these variations were statistically significant.[1] Clearly, as noted previously, nonformal education apparently provided the major source of training for small-scale industrial proprietors.

Another potential indicator of the ability of the proprietor to operate the firm is whether or not the firm keeps records or business accounts. As the data in Table 17 indicate, only 17 percent of the firms kept even a very rudimentary set of business accounts or records. The extent to which these business practices were utilized did appear to vary somewhat by industry and location, with the practice more prevalent, for example, in the larger urban locations and in the baking industry. On the basis of Chi-squared tests, however, the variation was found to be statistically significant only for bakers and tailors.[2]

Finally, the number of years that proprietors' establishments have been operating should also provide an indication of his or her ability to run the firm. The data on the number of years since the proprietors' businesses were established are summarized in Table 18, where they are arranged by location and industry. The mean number of years that these small-scale establishments have been operating in Sierra Leone is

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[1] On the basis of Chi-squared tests at the 10 percent significance level.

[2] At the 5 percent significance level.

TABLE 17
SIERRA LEONE: PERCENTAGE OF SMALL-SCALE INDUSTRIAL PROPRIETORS WHO KEEP RECORDS

Industry	Localities				
	Less Than 2,000	2,000-20,000	20,000-100,000	Over 100,000	All Localities
Tailoring	0%	3%	21%	0%	9%
n[a]	14	33	34	8	89
Gara	--	67%	50%	0%	50%
n	--	3	4	1	8
Carpenters	10%	15%	38%	33%	21%
n	10	13	8	3	34
Blacksmiths	0%	0%	25%	--	5%
n	9	8	4	--	21
Baking	--	0%	57%	86%	46%
n	--	8	7	7	22
Others	0%	6%	32%	20%	16%
n	9	17	19	5	50
Weighted grand mean					17%

SOURCE: Survey data.

[a] n = number of observations; based on all randomly and purposively selected firms that responded to this question.

TABLE 18
SIERRA LEONE: AGE OF SMALL-SCALE INDUSTRIAL ESTABLISHMENTS

Industry	Age of Business (Years)				
	Localities				
	Less Than 2,000	2,000-20,000	20,000-100,000	Over 100,000	All Localities
Tailors	14.4	11.3	12.3	7.3	11.8
n[a]	14	35	33	8	90
Gara	--	16.7	19.0	13.0	17.2
n	--	3	3	1	7
Carpenters	14.9	11.5	10.5	18.0	12.8
n	10	13	8	3	34
Blacksmiths	14.0	19.7	14.0	--	16.0
n	9	7	4	--	20
Baking	--	7.8	6.4	6.9	7.1
n	--	8	7	7	22
Other	19.3	17.4	10.8	12.4	14.6
n	8	16	19	5	48
Weighted grand mean					12.6

SOURCE: Survey data.

[a]n = number of observations; based on all randomly and purposively selected firms that responded to this question.

approximately thirteen years. The age of firms appeared to vary by location and industry, with the urban tailoring and baking establishments, for example, tending to be younger than their counterparts elsewhere. However, analysis of variance procedures applied to these data indicated that these age variations by location and industry were not statistically significant.

Several of the socio-economic characteristics of the proprietor that have been examined, however, do vary importantly by establishment, and many of the characteristics have been hypothesized to influence the performance of the firms. These hypothesized relationships will be tested and reported in a subsequent section of this paper.

III. ANALYSIS OF DETERMINANTS OF DEMAND FOR AND SUPPLY OF SMALL-SCALE INDUSTRY OUTPUT AND EMPLOYMENT IN SIERRA LEONE

The major determinants of the demand for and supply of output and employment generated by the small-scale industrial sector of Sierra Leone will be analyzed in this section. The primary factors influencing the demand for the goods and services of this sector will be analyzed first. Attention will then be focused on the supply factors influencing small-scale industry. Since the full spectrum of production choices and firm types needs to be examined, data from both the randomly and purposively selected firms will be included in the supply analyses undertaken. Various neoclassical formulations of the production function will be specified and estimated for the major small-scale industries. The production processes within each of these industries will then be examined and their relative factor proportions determined. Variations in these factor proportions by location and firm size will next be considered. The returns to the proprietor and the economic profitability of the major small-scale industries can then be estimated and analyzed. The section will conclude with an examination of those entrepreneurial characteristics that appear to be associated with the economic profitability of these establishments.

Demand

Demand considerations are important in determining the economic viability of small-scale industries. Several scholars have argued that the demand for the products of small-scale industries is severely limited and indeed have concluded that, at least in the rural areas, the demand

for these products will decline absolutely as the level of rural incomes decreases.[1] It is thus imperative that the various components of the demand for the products of small-scale industry in Sierra Leone be analyzed.

There are three major sources of demand for the products of small-scale industry in Sierra Leone. The primary source is that demand generated from the incomes of rural and urban consumers. A second source of demand arises from the backward and forward production linkages with the agricultural and large-scale industrial sectors. The final important source of demand for the products of small-scale industry is that provided by the foreign or export sector. Each of these demand sources will now be examined.

The income elasticity of demand is one of the crucial parameters required for analyzing the linkage between rural and urban incomes and the quantity of small-scale industry products demanded. Indeed, both the magnitude and sign of the income elasticity demand coefficients for small-scale industrial products are central figures in the debate over the future role of these activities. Hymer and Resnick [1969], for example, argue forcefully that in the rural areas the products of local small-scale industries (Z goods) are "inferior" goods and thus that the demand for and production of these goods will decline as rural incomes rise. In addition, these particular income elasticity parameters are important for tracing and measuring the indirect effects on small-scale industry output and employment of policies or projects designed to influence other

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[1] See, for example, the classic article on "Z" goods by Hymer and Resnick [1969].

sectors. There have been, however, virtually no empirical studies designed to verify the magnitude and sign of these important elasticities.

Fortunately, the rural consumption component [Byerlee and King, 1976] of the overall Sierra Leone project has undertaken the required rural household income and expenditure surveys to permit the income elasticities for locally produced small-scale industry commodities to be estimated. Specifically, the survey was designed to obtain a detailed breakdown of household expenditures on individual **nonfood** items by origin of production. Thus, it was possible to distinguish between those commodities produced by small-scale industry and those produced by large-scale firms or imported from abroad.

Although ultimately a wide range of functional forms and independent variables are to be used in estimating the relevant elasticities, significant results are currently available relating to the following double log form of the expenditure relationship:

$$\ln C_i = \ln A + b_1 \ln E + b_2 \ln S$$

where C_i is the value of each specific commodity purchased, E is the value of total cash expenditures, and S is the household size. In this formulation, the parameter b_1 provides an indication of the cash expenditure elasticity of demand for the rural households in Sierra Leone; moreover, the elasticity is the same for all income levels.

The initial cash expenditure elasticities for the major commodities produced by small-scale industry in Sierra Leone are summarized in Table 19. The striking result is the extremely high expenditure elasticity coefficients for the products of small-scale industry. For the products of <u>all</u> small-scale industry, for example, the elasticity coefficient was 1.60, thus indicating that, at least in the rural areas,

TABLE 19
SIERRA LEONE: CASH EXPENDITURE ELASTICITIES OF DEMAND BY RURAL HOUSEHOLDS FOR MAJOR SMALL INDUSTRY PRODUCTS, 1974/1975

Industry	Cash Expenditure Elasticity
1. Local tailoring products	+1.22 (.22)[a]
2. Local gara dyeing products	+1.41 (.32)
3. Local blacksmithing consumption products (not including farm inputs)	+0.16 (.27)
4. Local carpentry products	+1.90 (.31)
5. Local baking products	+1.55 (.31)
6. All local small-scale industry products	+1.60 (.17)

SOURCE: Data collected by rural consumption component of African Rural Employment Project [Byerlee and King, 1976].

[a]Standard errors are in parentheses.

these goods were clearly not "inferior."[1] There were, however, some important variations by industrial category. The coefficient for those blacksmithing products not used as farm inputs, for example, was very low and not statistically different than zero.[2] The elasticity coefficients for the other major small-scale industries were surprisingly high. The elasticity coefficients for these other major industries were all greater than one and ranged from 1.90 for carpentry to 1.22 for tailoring.[3] These results thus challenge the rather widely held contention that the products of small-scale industry in rural areas are all "inferior" commodities. Indeed, they indicate that, except for consumer goods produced by the blacksmiths, the demand for these products should be expected to increase strongly as rural incomes increase.[4] Thus, rather than being viewed as an overriding constraint, the demand induced from rising incomes should be viewed as a positive force for the growth of small-scale industry in Sierra Leone.

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[1]The coefficient was significantly higher than zero at the 1 percent level. A coefficient of 1.60 indicates that if incomes increase by 10 percent then the demand for small-scale industry products would increase by 16 percent.

[2]The major demand for blacksmithing products, however, was as farm inputs; this source of intermediate demand is examined below.

[3]These elasticity coefficients are all at least one standard deviation greater than one.

[4]Similar results were obtained when the log-log inverse functional form (i.e., $\ln C = \ln A + b_1 \ln E + b_2/E$) was used to estimate the total expenditure elasticities. For all small-scale industries, the total expenditure elasticity was 1.47 at the mean income level. Although the income elasticities can vary by income class in this formulation, there was no statistically significant variation in the elasticities by income level. Thus, for the range of incomes included in the survey, the income elasticities for small-scale industry did not decline as income levels increased. [Byerlee and King, 1976].

The demand for small-scale industries stemming from the backward and forward linkages with the agricultural and large-scale industrial sectors, on the other hand, must be obtained from the relevant input-output coefficients of the various sectors of the Sierra Leone economy. The required input and output data relating to the agricultural sector have been generated by the farm level component of the project (see Spencer and Byerlee [1976]), while the data relating to the large-scale industry were obtained from unpublished surveys conducted by the Central Planning Unit.

An examination of the relevant data, however, reveals that the backward and forward linkages of the small-scale industrial sector are not yet very extensive. The linkages with the large-scale sector, for example, are limited solely to the backward linkage from the small-scale bakers to the large-scale flour mill.[1] There are few forward linkages yet established from the small to the large-scale sector and thus the large-scale sector provides few sources of intermediate demand for the products of the small-scale industrial sector.[2] The general paucity of intra-industry linkages no doubt is related importantly to the low level of industrialization in Sierra Leone.

The linkages of the small-scale industrial sector with agricultural sectors, however, are more extensive than those with the large-scale industrial sector. The backward linkage from rice milling to rice production, for example, is very strong in Sierra Leone as has been outlined in a recent study [Spencer, May-Parker, and Rose, 1976]. Palm and cocoa

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[1]Indeed, except for illegal imports of flour from Guinea or Liberia, all the flour used by the small-scale firms comes from the large-scale mill in Freetown.

[2]Some carpentry products are used by large-scale industrial firms.

processing activities are also of minor importance, although these have not been examined in the Sierra Leone study.

The forward linkage from small-scale industry to the agriculture sector in Sierra Leone, on the other hand, is limited primarily to blacksmithing. Indeed, the vast majority of the products of the blacksmith are destined for use as farm inputs. As Table 4 reveals, for example, over 93 percent of the blacksmithing value added is generated in villages, while approximately 28 percent of the blacksmithing output in those localities with 2,000 or more inhabitants is also destined for the villages.[1] Moreover, a preliminary analysis of the data from the localities with 2,000 to 20,000 inhabitants indicates that approximately 90 percent of the blacksmith's output is some form of a farming input. The primary blacksmithing activities for which the agricultural sector provides an intermediate demand are farm tools, such as matchets, hoes, knives, and axes, and the repair of farm tools and equipment. Indeed, the data generated by the farm level study reveal that the average Sierra Leone farm household in 1974/75 purchased approximately Le 6 of farm tools.[2] Of these farm tools, approximately 90 percent were domestically produced by blacksmiths.[3] With the average farm household in 1974/75 producing approximately Le 481 of agricultural output, approximately Le 1 of domestic

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[1]Computed from sales data collected as part of the small-scale industrial survey.

[2]Computed from input data collected by farm level study.

[3]Shovels were the only tool not produced in large quantities locally. Cutlasses and knives were also imported, but they represented less than 10 percent of the total consumption. In 1973, for example, only 129,000 matchets were imported, while domestic production was approximately 1.4 million.

blacksmithing output was demanded for every Le 100 of agricultural output.[1] Thus, the agricultural sector provided an important source of intermediate demand for the products of the blacksmithing sector.

The final source of demand for the products of the small-scale industrial sector is the export or foreign market. Huddle and Ho [1972], for example, have argued that the international demand for traditional goods produced by small-scale industries is quite high. Indeed, their study indicated that the income elasticity of demand in high income countries for a broad group of culturally oriented products was greater than one. The data generated by the small-scale industry survey indicate that there is indeed an important international demand for the products of one Sierra Leone small-scale industry--gara dyeing. The destination of sales data of gara dyeing firms revealed that approximately 18 percent of the production of that industry was exported. Thus, failure to include the export market in an analysis of the demand for the products of small-scale industry may understate the existing and potential market size.

The analysis of the three major sources of demand for the products of small-scale industry has thus indicated that the existing and potential market is clearly much stronger than Hymer and Resnick [1969] have contended and that the inter-sectoral linkages and indirect effects are substantial. Thus, one should not necessarily presume that the demand for and production of these industries in Sierra Leone has or will necessarily decline.

Indeed, evidence about the past growth of small-scale industry in Sierra Leone reinforces the conclusion derived from the demand

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[1]Computed from initial output data generated by farm level study. The .01 input-output coefficient could be used for making projections of future demands, however, only if the marginal and average coefficients were similar.

analysis. Since time-series data on small-scale industry in Sierra Leone are nonexistent, information on the growth of industry was obtained by asking the proprietors in each locality whether or not the number of firms in their particular industry and the output of their particular firm had increased, decreased, or remained constant over the last five years.

The responses of the proprietors with respect to these questions are summarized in Table 20. The table reveals that the majority of proprietors felt that both the output and the number of firms in all industries except blacksmithing had increased over the past five years. There were substantial variations, however, in the estimated growth by industrial category. For example, 100 percent of the gara dyers believed that the number of gara firms had increased, while only 26 percent of the blacksmiths felt that the number of blacksmithing firms in their locality had increased. A similar, though less pronounced, variation by industry was obtained with respect to the output growth of the firms.[1] These results thus provide some evidence that the small-scale gara, tailoring, baking, and carpentry industries have grown in Sierra Leone over the last five years, while blacksmithing may have stagnated somewhat during this period These findings thus reinforce those derived from the previous demand analysis.

The data also indicate, however, that the growth of small-scale industries varied by location. Indeed, almost 90 percent of the proprietors in Freetown believed that the number of firms in that locality had increased, while in the rural enumeration areas only about 31 percent

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[1]These variations by industry were statistically significant at the 1 percent level on the basis of Chi-square tests.

TABLE 20

SIERRA LEONE: PROPRIETORS' ESTIMATES OF CHANGE IN THE NUMBER OF FIRMS AND THE OUTPUT OF THE FIRMS IN THE PAST FIVE YEARS BY INDUSTRY AND LOCATION, 1974/1975

Industry Categories	Output					Number of Firms				
	Localities					Localities				
	Less Than 2,000	2,000-20,000	20,000-100,000	Over 100,000	All Localities	Less Than 2,000	2,000-20,000	20,000-100,000	Over 100,000	All Localities
Tailoring										
Increased	58%	58%	59%	100%	62%	42%	71%	63%	100%	65%
Decreased	25%	38%	28%	--	28%	17%	29%	38%	--	28%
Same	17%	4%	13%	--	10%	42%	--	--	--	7%
n[a]	12	24	32	7	75	12	21	32	7	72
Gara										
Increased	--	50%	67%	100%	67%	--	100%	100%	100%	100%
Decreased	--	50%	33%	--	33%	--	--	--	--	--
Same	--	--	--	--	--	--	--	--	--	--
n	--	2	3	1	6	--	3	3	1	7
Carpentry										
Increased	43%	25%	63%	100%	55%	30%	33%	75%	100%	48%
Decreased	43%	25%	13%	--	23%	20%	33%	25%	--	24%
Same	14%	50%	25%	--	23%	50%	33%	--	--	27%
n	7	4	8	3	22	10	9	8	2	29
Blacksmith										
Increased	44%	57%	50%	--	50%	25%	14%	50%	--	26%
Decreased	33%	43%	25%	--	35%	38%	57%	25%	--	42%
Same	22%	--	25%	--	15%	38%	29%	25%	--	32%
n	9	7	4	--	20	8	7	4	--	19
Bakery										
Increased	--	100%	50%	75%	71%	--	17%	33%	100%	50%
Decreased	--	--	33%	25%	21%	--	67%	33%	--	36%
Same	--	--	17%	--	7%	--	17%	33%	--	14%
n	--	4	6	4	14	--	6	3	5	14

[a] n = number of observations; includes both randomly and purposively selected firms that responded to these questions.

believed that the number of firms had increased in the past five years.[1] When asked about the output growth of their firms in the past five years, approximately 80 percent of the Freetown proprietors indicated that their outputs had increased, while only 50 percent of the proprietors in the rural enumeration areas felt this way.[2] Thus, the small-scale industries would appear to be growing more rapidly in the larger urban areas and relatively less rapidly in the smaller rural villages. Nevertheless, the evidence indicates that even the small-scale industries of the rural villages have generally been growing. The overall finding is that the demand for the products of all the major small-scale industries, except perhaps blacksmithing, has been increasing.

Finally, the preliminary analysis of the destination of sales data indicate that there are important variations in the locational pattern of the demand within Sierra Leone for the major commodities produced by the small-scale industries. The demand for products of the tailoring and baking industries, for example, are very localized with very little of the product flowing to other localities. Indeed, 95 percent of the bread and 97 percent of the tailoring outputs remain in the locality where production occurred. The market for the outputs of gara dyers, blacksmiths, and carpenters, on the other hand, is somewhat less localized. These data indicate, for example, that 37 percent of the gara cloth, 32 percent of the blacksmiths' output, and 15 percent of the carpenters' output flow outside the locality where the commodities were

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[1]Approximately 42 percent of the proprietors in the enumeration areas felt that there had been no change in the number of firms.

[2]These variations by location were statistically significant at the 5 percent level on the basis of Chi-quare tests.

produced. It must be stressed, however, that these results are tentative and that more careful analysis is required.

Supply--Introduction

It is now necessary to examine the major factors influencing the supply of small-scale industrial commodities. Specifically, various production functions for the small-scale industry will be estimated, followed by an examination of alternative production processes and their factor proportion ratios. The effects of location and firm size on factor proportions will also be examined. The returns to the proprietor and the economic profits earned by the various small-scale industry groups will then be analyzed. An analysis of the factors influencing the supply of entrepreneurship concludes this sub-section.

Neoclassical Production Functions for Small-Scale Industry

The neoclassical formulations of the production function can yield many insights into the factors determining the supply of small-scale industry products. Specifically, empirical estimates of these production functions can provide indications of the returns to scale, the marginal productivities and efficiency of the production inputs, and the elasticity of input substitution. Thus, the relevant input and output data for the major small-scale industries in Sierra Leone have been fitted to two of the most commonly estimated neoclassical production functions, the Cobb-Douglas and the Constant Elasticity of Subsitution (C.E.S.) production functions.

The Cobb-Douglas function is the neoclassical production function that is most commonly estimated empirically. The function takes the general form $Y = AL^{\alpha} K^{\beta}$, where A is a constant, Y is output or value

added, L is labor services, and K is capital services.[1] Since there are several heterogeneous labor types, each with differing employment characteristics, it was decided to further subdivide the labor component of the relationships. Specifically, the labor input into the production function was separated into the following three groups: (1) hired laborers, who are generally paid a monthly wage; (2) apprentices, who are both receiving training and are producing commodities, but who are generally not receiving any monetary compensation; and (3) proprietors and family members, all of whom generally do not receive a formal wage.

The values of the parameters of the Cobb-Douglas function with these three labor groups explicitly specified were obtained by using ordinary least squares techniques to estimate the following stochastic formulation of the Cobb-Douglas production function:

$$\ln Y = \ln A + \alpha_{\rho} \ln L_{\rho} + \alpha_{A} \ln L_{A} + \alpha_{H} \ln L_{H} + \beta \ln K + \varepsilon_{1},$$

where L_{ρ} is the yearly hours of proprietors' (including family) labor in production, L_{A} is the yearly hours of apprentices in production, L_{H} is the yearly hours of hired workers in production, and α_{ρ}, α_{A}, and α_{H} are the estimated elasticity coefficients with respect to output for the three labor categories. The data used in the analysis were obtained from both the randomly and purposively selected firms for which twelve months of data existed. The output measure used was the yearly value

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[1] Although this particular form of the production function has no more claim to depicting the underlying production relationships than other functions, it does have some important properties that make it a useful choice. The estimated parameters of the function, α and β, are the elasticities of output with respect to labor and capital; moreover, the sum of the coefficients indicates the degree of the "returns to scale." By utilizing a Cobb-Douglas function, however, one is also making the implicit assumption that the elasticity of factor substitution is equal to one. If one is to shed additional light on the factor substitution issue and thus on the degree to which relative factor prices influence factor choice, the more general Constant Elasticity of Substitution function must also be estimated.

added for each firm[1] while the labor input was measured in terms of the yearly number of man-hours actually worked in production. Finally, capital was measured in terms of the annual flow of capital services or the yearly "user cost" of capital. Thus, all variables were measured in flow terms for each individual firm and should consequently provide a more accurate representation of production than the usual studies that use stock data from an aggregation of firms.

The results of the Cobb-Douglas production function analyses for the major small-scale industrial categories are summarized in Table 21. Except for the carpentry industry, it would appear that this function provides a reasonably good fit to the underlying data relating to the individual small-scale industries in Sierra Leone. The adjusted $\bar{R}^2$ values (except for carpentry) are reasonably high for a cross-section study and the coefficients are generally statistically significant.[2]

This production function analysis reveals that there is no empirical evidence of the existence of any increasing return to scale in the industrial categories examined. Only in the gara dyeing industry did the sum of the labor and capital coefficients even slightly exceed one (1.06) and, in this case, an analysis of variance test indicated that sum of the coefficients was not statistically different than one.[3]

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[1] By using value added, it is implicitly assumed that there are no economies of scale in the use of the purchased inputs.

[2] The various specification error tests, such as those for omitted variables, simultaneous equation problems, heteroscelasticity and non-normality, have not yet been undertaken. See Ramsey and Zarembka [1971].

[3] Based on the test suggested by Titner [1952] where the residual sum of squares of the constrained (sum of coefficients equals one) regressions are compared with the residual sum of squares of the unconstrained regression.

TABLE 21

SIERRA LEONE: VALUES OF THE COBB-DOUGLAS PRODUCTION FUNCTIONS WITH THREE LABOR GROUPS INCLUDING MARGINAL AND AVERAGE PRODUCTS FOR LABOR BY MAJOR SMALL-SCALE INDUSTRIES, 1974/1975

Industrial Category	Constant	Capital Coefficient β	Proprietor Labor			Apprentice Labor			Hired Labor			$\bar{R}^2$
			α_P	AP_P	MP_P	α_A	AP_A	MP_A	α_H	AP_H	MP_H	
Tailoring	1.1	.44 (.14)[a]	.42 (.19)	.84	.35	.07 (.03)	1.20	.08	.02 (.01)	23.7	.47	.51
Gara dyeing	-9.8	.09 (.11)	.81 (.10)	1.04	.84	.10 (.09)	b	b	.06 (.08)	b	b	.91
Carpentry	4.5	.15 (.19)	.06 (.25)	b	b	.35 (.27)	b	b	.11 (.09)	b	b	.32
Blacksmithing	.4	.12 (.04)	.70 (.27)	.42	.30	.13 (.05)	.43	.05	.04 (.09)	b	b	.62
Baking	4.5	.64	.09 (.04)	6.00	.54	.01 (.01)	b	b	.15 (.16)	b	b	.81

SOURCE: Data collected from small-scale industry survey. Includes randomly and purposively selected firms in those localities with 2,000 or more inhabitants.

[a]Standard errors in parentheses.

[b]Not computed for statistically insignificant labor coefficients (below 5 percent). The method of analysis is described in the text.

Indeed, gara dyeing, as well as tailoring, blacksmithing and baking were found to be subject to constant returns to scale during this period.[1] Thus, large firms in these industries possessed no production advantage over the smaller firms.

Another important result evident from the analysis is the indication that the estimated coefficient (α) for the three labor groups did appear to vary importantly by industry and by labor group. In particular, the estimated proprietors' elasticity coefficients (α_ρ) were significantly higher than those for apprentices (α_A) and hired workers (α_H), at least in those industries with statistically significant coefficients.

Insights into the allocative efficiency of small-scale industry and crude estimates of the opportunity cost of the labor groups can be obtained if the marginal productivities of these three labor groups are determined. These marginal products can easily be calculated from a Cobb-Douglas production function since:

$$MP_I = \alpha_I(AP_I)$$

where α_I is the estimated elasticity coefficient for any particular input that is obtained from the Cobb-Douglas function and AP_I is the average product or the output-input ratio for that particular input. Consequently, the mean average products for each labor group were calculated for each industry category (see Table 21) and used to compute the marginal productivities for each labor group.

The estimated marginal productivities for each labor group by major industrial category are presented in Table 21. An examination of the table reveals that the marginal product varies both by major industry

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[1]The sums of their coefficients were not statistically different from unity. The carpentry coefficients were not statistically different from zero.

and by labor group. The marginal productivity of proprietors, for example, was highest in gara and baking and lowest in blacksmithing and tailoring. Yet, the marginal productivity of proprietors in all industries was higher than that of apprentices. It is important to note, however, that the marginal productivity of apprentices was clearly above zero for several industries, ranging from Le .05 to Le .08 per hour worked in production. Thus, in economic analyses of small-scale industry, it may be inappropriate to value apprenticeship labor at a zero price.[1] Indeed, in the absence of more detailed information, these marginal productivity estimates for both proprietors and apprentices could provide a useful approximate estimate of the opportunity cost of these inputs.

Moreover, an initial indication of the allocative efficiency of small-scale industries can be obtained by comparing the marginal productivity of hired labor with the wage rate for hired workers.[2] The only statistically significant coefficient for hired labor, however, is found in the tailoring industry. The marginal productivity for hired workers in tailoring is Le .47 per hour actually worked and the mean number of hours actually worked per month is 70,[3] yielding a marginal product per month of Le 33. This figure is remarkably close to the actual mean monthly wage rate for hired tailoring workers of Le 32[4] and thus suggests that a

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[1]It would be important, however, to separate the training component and assess it individually.

[2]The marginal product is, in reality, the value of the marginal product since output has already been valued and expressed in terms of price. For calculating the variance of MP estimates, see Carter and Hartley [1958].

[3]Based on survey data.

[4]Based on preliminary evaluation of wage rate data. Byerlee, Tommy, and Fatoo [1976] report that the mean monthly wage rate for uneducated urban workers in small-scale industries is Le 30.

reasonably high degree of allocative efficiency exists in the small-scale industry sector in Sierra Leone.

The Cobb-Douglas production function, however, does not shed much light on the factor substitution issue, because as previously noted, one of its properties is that the elasticity of substitution (σ) is always equal to one. Thus, the more general Constant Elasticity of Substitution (C.E.S.) production function has also been fitted to these same basic data.[1] A key property of this functional form of the production function is that the elasticity of substitution parameter can range from 0 to infinity, and thus it can reflect the potential differing extent to which capital and labor can be substituted for one another in production. The elasticities of substitution of the Cobb-Douglas function, where $\sigma = 1$, and the Leontief fixed inputs coefficient function, where $\sigma = 0$, are special cases of this more general formulation.

Although several versions of the C.E.S. production function exist, the generalized function of Drhymes and Kurz [1964] has been used in this study. In this version, the function is defined as follows:[2]

$$Y = A \left[\partial_1 K^{\rho} + \partial_2 L^{\rho}\right]^{V/\rho}$$

where Y denotes output (value added); K, capital services; L, labor services; A is the neutral efficiency parameter; ∂_1 and ∂_2 are the distributive parameters; ρ is the substitution parameter; and V is the

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[1]The basic article on this particular function is Arrow et al. [1961].

[2]Note that ρ is used in this paper as the negative of the substitution parameter defined by Arrow et al. [1961]. The analysis is made somewhat more elegant by this substitution.

returns to scale parameter.[1]

Although the C.E.S. production function is usually estimated indirectly, the function in this study was estimated directly using a nonlinear maximum likelihood regression approach.[2] The stochastic formulation of the estimated model was:

$$\ln Y = V/\rho \left[\ln \left(\partial_1 L^{\rho} + \partial_2 K^{\rho}\right) + \varepsilon_1\right].$$

The value added, capital service and labor service data employed to estimate this function were the same as those used in the Cobb-Douglas formulation. The labor component, however, was not subdivided due to computational limitations.

The maximum likelihood regression results for the major small-scale industrial groups are summarized in Table 22. When compared with the Cobb-Douglas results, the C.E.S. function did not appear to have yielded a superior representation of the data. The carpentry parameters continue to be insignificant and, except for gara dyeing, the $\bar{R}^2$ and coefficient standard errors were not measurably better for the C.E.S. than for the Cobb-Douglas function.

The C.E.S. formulation, however, has provided some interesting insights into the nature of the production relationships. Firstly, none of the substitution parameters were significantly different from zero; consequently, the elasticity of substitution was not significantly different from one and the Cobb-Douglas functional form can be accepted as

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[1] It can be shown that ρ specifies the elasticity of substitution, since $\sigma = 1/1-\rho$; thus if $\rho = 0$, the elasticity of substitution is equal to one, while if $\rho = \infty$, the elasticity is approximately equal to 0.

[2] See, for example, Ramsey and Zarembka [1971] for a discussion of this technique. The neutral efficiency parameter has been dropped from the analysis.

TABLE 22
VALUE OF THE C.E.S. PRODUCTION FUNCTIONS FOR MAJOR SMALL-SCALE INDUSTRIES, 1974/1975

Industrial Category[a]	Labor ∂_1	Capital ∂_2	Scale V	Substitution ρ	$\bar{R}^2$
Tailoring	.58 (.49)[b]	.43 (.36)	.95 (.12)	.01 (.10)	.52
Gara dyeing	.69 (.45)	.16 (.07)	1.40 (.84)	.08 (.30)	.91
Carpentry	.60 (11.30)	.53 (14.00)	.50 (.25)	.02 (.50)	.30
Blacksmithing	.90 (.44)	.03 (.18)	.89 (.23)	.26 (.44)	.75
Baking	.27 (.31)	.48 (.44)	1.14 (.18)	.47 (.53)	.87
All Industries	.58 (.20)	.43 (.33)	1.02 (.36)	.21 (.36)	.78

SOURCE: Data collected from small-scale industry survey.

[a]The number of observations is the same as in Table 21.

[b]Standard errors in parentheses.

appropriately describing the data. Moreover, none of the returns to scale parameters, V, was significantly different from one, thus indicating once again the apparent lack of economies of large-scale production in these particular Sierra Leone industries. The results derived from the C.E.S. production function not only support those derived from the Cobb-Douglas, but also provide evidence of the appropriateness of the Cobb-Douglas function itself.

Nevertheless, even the Cobb-Douglas function possesses some properties that may not accurately depict the production relationships of small-scale industry. Specifically, the assumption of the Cobb-Douglas function that the underlying production isoquants are smooth and continuous may strain credulity, particularly if one believes that there are few, if any, production choices available to small-scale industry. Thus, it is important to examine the specific production process alternatives within each industry.

Alternative Production Processes and Their Factor Proportions

A process, according to Dorfman [1953], ". . . is a specific method for performing an economic task." Each process is assumed to use the input factors in fixed proportion, and thus factors can be substituted for one another only if processes can be substituted. If, as in a fixed coefficient Leontief production function, only one process is assumed to exist in an industry, no process or factor substitution is possible. On the other hand, if infinite numbers of processes are assumed to exist, as in the neoclassical formulations of production, continuous process and factor substitution is possible. To the extent that the actual number of processes utilized by any small-scale industry falls between these extremes, an examination of specific processes can provide useful,

additional insights into the nature of the production relationships. The processes or techniques of production utilized by the major small-scale industries in Sierra Leone must thus be examined to ascertain the degree of process choice currently available.

An investigation of the processes being utilized in the major small-scale industrial groups in Sierra Leone reveals that more than one, though not an infinite number of processes, can be delineated within each industry. To provide a sharper focus on the issue of process choice, however, only the two major processes within each industrial group will be discussed in this paper. For simplicity, the processes will be classified into two groups--"traditional" or "modern"--although the terms do not necessarily accurately portray the technique used.[1]

In the tailoring industry, the major process distinction arises between those more "traditional" proprietors that engage in only ordinary sewing and tailoring, producing such products as common shirts and dresses, and those more "modern" proprietors that also sew embroidery designs on fabric. Although both groups use sewing machines, those tailors that embroider require a much more sophisticated and more expensive type of machine than those who engage in ordinary tailoring work.[2] It should also be noted that even within each of these major categories there are further process subdivisions relating primarily to the kind of sewing machine used.[3]

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[1]An analysis employing the full array of processes in a complete linear programming model of small-scale industry will be discussed in a subsequent paper.

[2]A standard sewing machine costs approximately Le 100, while embroidery sewing machines can cost from Le 250 to Le 1,000.

[3]In the linear programming model of the industry fourteen different processes have been delineated within the tailoring industry.

In the gara dyeing industry, on the other hand, the main process distinction centers on the type of dyes used. The majority of establishments use imported, synthetic dyes in the manufacturing of the gara cloth. There are still, however, a few, more "traditional" establishments that continue to use the native indigo dye in the manufacturing process. It should also be noted that there are further process differences related to the type of cloth used for dyeing.

The major process distinction within the carpentry industry centers on the type of tools and equipment used. The great majority of more "traditional" proprietors use only simple hand tools such as hammers and saws. There are, however, a few more "modern" firms that employ rather sophisticated machines such as electric saws, sanders, and planes.[1]

Within the blacksmithing industry, the process distinction also centers on the type of equipment used. The vast majority of blacksmiths use the more "traditional" tools and equipment such as small, hand-operated bellows and small hammers. On the other hand, there are some more "modern" blacksmith firms, however, that use electric forges and drilling machines as well as welding equipment.

Finally, within the baking industry the main distinction between processes centers importantly on the type of oven used. There are, for example, a large number of the more "traditional" bakeries that bake bread in large mud ovens costing approximately Le 50. At the other extreme, there are several more "modern" bakers who produce bread in large electric ovens and who also use automatic mixers, kneeders and rollers.[2] It should be noted, however, that in between the two extremes,

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[1]The more sophisticated carpentry equipment, such as the Italian electrical combination machines, cost about Le 4,000.

[2]This modern equipment costs from Le 30,000 to Le 60,000.

is one baker using an intermediate form of technology in which an iron, wood-fired oven is employed.[1]

With the two major process options within each industry having been delineated, it is next of importance to ascertain whether, in fact, the factor proportions for each of these major processes differed. These factor proportions are generally measured in terms of the average ratios that relate capital, labor and output. Thus, to determine the extent of factor proportion variations, it was necessary to compute the output-capital, output-labor, and labor-capital ratios for each process within each industry.

In addition to delineating processes, however, these three economic ratios provide useful insights into the production relationships. Firstly, they provide one measure of the factor intensity of production in the various industries.[2] Secondly, they indicate the relative productivities of the factors of production.[3] Finally, they provide a clue as to the amount of output and employment generated per unit of the scarce capital input.[4]

The mean values of the output-capital, output-labor, and labor-capital ratios of the two process options for the major small-scale industry categories of Sierra Leone are presented in Table 23. The output variable, following Morawetz [1974], has been measured in terms of value added rather than gross output. Moreover, the labor and capital inputs

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[1]This is a used machine that was imported from England.

[2]See Morawetz [1974] for a good review of the relevant issues surrounding this use of the ratio.

[3]See, for example, Steel [1976] who uses the ratios for this purpose in Ghana.

[4]See Child [1973].

TABLE 23
SIERRA LEONE: MEAN VALUES OF THE OUTPUT-CAPITAL, OUTPUT-LABOR, AND LABOR-CAPITAL RATIOS BY PROCESS FOR MAJOR SMALL-SCALE INDUSTRY CATEGORIES, 1974/1975

Industrial Categories[a]	Output-Capital	Output-Labor	Labor Capital
Tailors			
"Traditional"	7.5	.46	18.3
"Modern"	6.2	.55	14.0
Gara Dyers			
"Traditional"	82.7	.84	98.0
"Modern"	72.1	.97	70.0
Carpenters			
"Traditional"	29.6	.61	68.1
"Modern"	3.0	.98	3.6
Blacksmiths			
"Traditional"	11.9	.36	42.1
"Modern"	.5	.25	2.1
Baking			
"Traditional"	27.8	.40	68.0
"Modern"	5.0	1.18	5.9

SOURCE: Survey data.

[a]Includes both randomly and purposively sampled firms in those localities with 2,000 or more inhabitants.

in this table have been measured in terms of the flow of services rather than stocks.[1]

An examination of Table 23 reveals that the factor combinations do generally appear to vary depending on type of process utilized. Indeed, analysis of variance procedures applied to these data indicated that the mean value of the economic ratios that reflect these differences in factor combinations were statistically different from one another at the 5 percent significance level. Each of the ratios relating to these processes must now be examined.

The output-capital ratio provides a useful measure of not only average capital productivity, but also an indication of the capital intensity of production. Moreover, if one assumes that capital is the only scarce factor of production, maximum output is obtained when the output-capital ratio is maximized.[2] Given the relative paucity of capital in Sierra Leone, a high output-capital ratio would thus provide a good indication that a process or industry was using this resource effectively.

One of the striking results evident from Table 23 is the indication that the output generated per unit of the scarce factor, capital, is highest for the more "traditional" processes within each major industry. Indeed, the average productivity of capital in the more "traditional" processes within carpentry, blacksmithing, and baking industries was at least five times that of the more "modern" processes.

There are also extensive variations in the output-capital ratio by industry. For "traditional" processes, for example, the output-capital

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[1]To facilitate international comparisons, however, these ratios have also been computed in terms of input stocks and are presented below.

[2]For the restrictions on this result, see Morawetz [1974].

ranges from a high of 83 in gara dyeing to a low of 7.5 in tailoring, while for "modern" processes, it ranges from 72 in gara dyeing to 0.5 in blacksmithing. Thus, "traditional" gara dyers possessed the highest average capital productivity while "modern" blacksmiths appeared to possess the lowest.

The output-labor ratios, on the other hand, do not exhibit the same amount of variation between processes or industries as do the output-capital ratios. The difference between the processes with highest and lowest output-labor ratios was less than five times, whereas the corresponding difference between the processes with the highest and lowest output-capital ratios was over 150 times.

The output-labor ratio or average labor productivity, however, is generally higher for the more "modern" process within each industry. Indeed, only in blacksmithing does the average labor productivity for the "traditional" exceed that of the "modern" process. The "modern" blacksmith possessed the lowest average labor productivity among all the processes of the major industries, while "modern" bakers and carpenters possessed the highest.

The labor-capital ratio provides another useful measure of the factor proportions and, more specifically, an indication of the labor intensity of production and the amount of employment generated per unit of capital. Given the relative capital scarcity and relative labor abundance in Sierra Leone, processes and industries with higher labor-capital ratios would generally appear, at least on a crude level, to be making the most effective use of the factors of production.

Table 23 reveals that the labor-capital ratio, or labor-intensity, is always highest for the more "traditional" process within each industry.

The differences in the factor intensity between processes in carpentry, blacksmithing and baking were particularly large.

The labor-capital ratio also varies widely by industry. For "traditional" processes, it ranges from a high of 98 in gara dyeing to 18 in tailoring; for "modern" processes, it ranges from 70 in gara dyeing to 2 in blacksmithing. These results, it should be noted, are similar to those generated by the output-capital data.

Indeed, these labor-capital and the output-capital ratios shed light on the much-discussed potential conflict between output and employment goals.[1] Such a conflict could supposedly arise, for example, if processes or industries with relatively high labor-capital ratios (i.e., relatively labor intensive) also possess relatively low output-capital ratios. However, if the relative magnitude of a labor-capital and output-capital ratio are of the same order, then the potential conflict disappears and output and employment can, at least in a static sense, be jointly maximized.

If one compares the output-capital and labor-capital ratios summarized in Table 23, there is no apparent conflict between employment and output within the small-scale industry sector in Sierra Leone. The process with the highest output-capital ratio, "traditional" gara dyeing, also possesses the highest labor-capital ratio, while the process with the lowest output-capital ratio, "modern" blacksmithing, also possesses the lowest labor-capital ratio. Indeed, if one ranks all the major small-scale industry processes in Sierra Leone in terms of both their output-capital and labor-capital ratios, the two rank orderings turn out to

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[1]See Morawetz [1974] for a recent discussion of the employment-output tradeoff.

be exactly the same. The processes that produce the highest average outputs per capital unit, such as both "traditional" and "modern" gara dyeing, "traditional" carpentry, and "traditional" baking, for example, also generate the largest amount of employment per unit of that capital, the apparent scarce factor of production.[1] Consequently, there is no conflict, at least in a static sense, between output and employment in the choice of processes either within or between industries in Sierra Leone. This result demonstrates the importance of incorporating these significant process options into analyses of small-scale industry.

Variations in Factor Proportions by Location

The foregoing discussion of processes and factor proportions, however, has been devoid of locational considerations. Consequently, it is now important to examine whether or not there are any locational variations in the factor proportions of these small-scale industries. If one hypothesizes that capital is relatively more expensive and labor is relatively less expensive in more rural locations, for example, then the rural industries would be expected to be more labor-intensive than their urban counterparts. To shed light on this issue, therefore, the relevant economic ratios for the "traditional" processes within each industry have been computed by location and are presented in Table 24.[2]

An examination of this table indicates that the factor proportions for many of the "traditional" processes did appear to vary by location.

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[1]The relationship between processes, factor intensities, and economic profitability will be examined below. These results based on these factor intensity measures will be misleading should other inputs other than capital prove to be binding constraints.

[2]The "modern" processes were not examined by location because there was an insufficient number of observations by location.

TABLE 24
SIERRA LEONE: OUTPUT-CAPITAL, OUTPUT-LABOR, CAPITAL-LABOR RATIOS FOR "TRADITIONAL" SMALL-SCALE INDUSTRIES BY INDUSTRY AND LOCATION, 1974/1975[a]

Industrial	Variable[a]	Localities			
		Less Than 2,000	2,000-20,000	20,000-100,000	Over 100,000
Tailors	Output-capital ratio[b]	5.3	7.4	8.4	2.3
	Output-labor ratio	.4	.4	.5	.3
	Labor-capital ratio	13.3	22.1	16.0	7.6
Gara	Output-capital ratio	--	--	82.7	--
	Output-labor ratio	--	--	.8	--
	Labor-capital ratio	--	--	98.0	--
Carpentry	Output-capital ratio	1.9	38.0	30.9	9.2
	Output-labor ratio	.2	.6	.8	.2
	Labor-capital ratio	8.3	94.9	52.4	53.6
Blacksmiths	Output-capital ratio	6.3	13.7	6.4	--
	Output-labor ratio	.3	.4	.3	--
	Labor-capital ratio	21.0	48.8	22.1	--
Baking	Output-capital ratio	--	31.9	19.5	--
	Output-labor ratio	--	.3	.5	--
	Labor-capital ratio	--	85.0	35.6	--

SOURCE: Survey data.

[a]Includes both randomly and purposively sampled "traditional" firms.

[b]Output is measured in terms of value added.

Indeed, analysis of variance procedures applied to these data reveal that the locational variations in the labor-capital and output-capital ratios for tailors, carpenters, and blacksmiths are significant at the 10 percent level. The labor-capital ratios in these industries, for example, increase as the size of the locality declines and reach their maximums in those localities with from 2,000 to 20,000 inhabitants. In the villages with fewer than 2,000 inhabitants, the labor-capital ratios are generally below those in the larger localities. What is even more striking, however, is the discovery that the output-capital ratios for these industries follow the same locational pattern as the labor-capital ratios. Thus, the labor-intensity and capital productivity for these "traditional" processes of small-scale industries do increase together as the size of the locality declines and both reach their peaks in the 2,000 to 20,000 size range.

In view of this tendency for these two ratios to increase as the size of localities declines, the relatively low labor-capital and output-capital ratios in the villages would appear to be anomalies. These low ratios, however, are due largely to the part-time nature of small-scale industrial activity in these areas. As a result, capital is idle for long periods and not fully utilized. It is of interest to note, however, that blacksmithing activity, which in other areas possesses the lowest economic ratios, posseses the highest output-capital and labor-capital ratios in the villages. These results thus indicate locational variations in factor porportions are important and should be incorporated into analyses of small-scale industry.

Variations in Factor Proportions by Firm Size

It would also be of interest to ascertain how the factor proportions for these small-scale industrial processes compared with those for large-scale industries in Sierra Leone as well as those for both large- and small-scale industries elsewhere in Africa and other developing areas. Since most countries and international agencies express their factor proportions in terms of the stock rather than the service flows of labor and capital, the Sierra Leone ratios for small-scale industry have also been expressed into stock terms to facilitate these international comparisons.[1]

The first issue to be examined is whether the small-scale industry is more labor-intensive than its large-scale counterpart within Sierra Leone. In this exercise, capital stock per worker rather than its reciprocal will be used as a measure of labor intensity, since the former measure is most widely used internationally. The capital stock per worker for all the major small-scale industries in Sierra Leone was Le 380 ($418) and ranged from Le 12 ($13) per worker for "traditional" gara dyeing to Le 2,504 ($2,754) per worker for "modern" bakeries.[2] "Traditional" tailors, the largest and most ubiquitous group, possessed a capital stock per worker of Le 180 ($198). The comparable figure for the 28 "large-scale" firms with over 50 workers in Sierra Leone, on the other hand, was Le 6,645 ($7,310) per worker.[3] Thus, by this measure of

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[1]The number of workers data were obtained from survey data, while the capital stock data were obtained from Table 7.

[2]The capital stock, it should be recalled, is measured in terms of its original cost.

[3]The large-scale industry coefficient was computed from the primary data supplied by the large firms to the Economic Planning Unit. The capital figure used is the original undepreciated value of fixed assets and does not include working capital; thus the capital-labor ratio for large-scale industry is somewhat understated. The ratio for individual firms ranged from $66,000 to $400.

labor intensity, the small-scale firms are approximately 17 times more labor-intensive than the larger firms in Sierra Leone.

The vast majority of industrial studies undertaken elsewhere have also reported that small firms tend to use relatively more labor-intensive techniques of production than do their larger competitors.[1] The relative degree of labor intensity of Sierra Leone's small-scale industrial establishments, however, would appear to be somewhat greater than elsewhere. Studies from such diverse countries as India cited in ILO [1974, p. 541], the Philippines [ILO, 1974, p. 541] and Ghana [1976] indicate that the differences in the capital stock per worker between large- and small-scale industries are no greater than ten times. Thus, even accounting for differing definitions, the seventeen times differential in labor intensity between large- and small-scale industries in Sierra Leone is significantly higher than those differentials reported elsewhere.

The relative labor intensity of Sierra Leone's small-scale industry also becomes apparent when the Sierra Leone results are compared with those generated from recent studies of small-scale industry undertaken elsewhere in Africa. In Steel's study of small-scale industry in Ghana [1976], for example, those firms employing no wage workers were reported to possess an original cost of capital per worker ratio of $435, while those firms with from one to nine wage workers possessed $1,218 of capital per worker. Child [1973], in a study of a sample of small rural

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[1]See Morawetz [1974, p. 526] for a review of the evidence.

industries in Kenya, found that the capital stock labor ratio for these firms was $795. Thus, even when compared with small-scale industries elsewhere in Africa, the labor intensity of Sierra Leone's small-scale industry would appear to be relatively high.

In addition to the labor-intensity comparison between large- and small-scale industries, however, it is of interest to ascertain whether or not the output per unit of capital stock for small-scale industries is higher than that for the large-scale enterprises. For the major small-scale industries in Sierra Leone, the output (i.e., value added) capital stock ratio is estimated from the survey data to be 2.1. The comparable ratio for the 28 large-scale industries in Sierra Leone, on the other hand, is no higher than 0.8.[1] Thus, small-scale industries generate over twice the amount of output per unit of the scarce factor capital than do the larger firms. The evidence from those few countries with similar data also indicates that smaller firms generally produce more output per unit of capital than larger firms, although several exceptions appear to exist.[2] Since the small firms in Sierra Leone, however, have also been shown to be more labor intensive than the larger firms, the apparent output and employment conflict once again dissolves. Small firms in Sierra Leone generate not only more employment, but also more output per unit of scarce capital than their larger counterparts. It is now necessary to determine whether the industries or processes with

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[1]The large-scale industry ratio was calculated from primary data supplied by firms for 1974 to the Economic Planning Unit. The output-capital ratio is overstated to the extent that working capital is excluded from the capital stock measure.

[2]See Morawetz [1974] for a list of these studies. The evidence from the Philippines [ILO, 1974, p. 541] indicates that the output-capital ratio increases with firm size.

these apparent efficiency and production advantages also generate the highest returns or economic profits.

Returns to Proprietor and "Economic" Profit Rate

The return to the small-scale industrial proprietors and the economic profit rate within the various small-scale industries will be examined in this section. The return to the proprietor parameter is important because it provides not only a measure of the real income earned by the proprietor, but also, to the extent that the proprietor is a scarce factor of production, an indication of the relative economic viability of the various industries and processes. The economic profit rate provides an additional measure of the relative economic viability of the various small-scale industries in Sierra Leone.

Before proceeding to examine the returns to the proprietor and the economic profit rate, it will first be necessary to specify more precisely how these measures were obtained. Since one of the primary objectives of the study was to examine the economic viability of small-scale industries, measures of the economic rather than the financial returns were required. Consequently, it was important that all inputs be valued at their opportunity rather than the actual costs. Thus, the returns to the proprietor measure for each firm was obtained by subtracting from the firm's value added figure the opportunity cost of its annual capital services and its annual nonfamily labor services. The capital services figure was obtained from Table 6 where the annual user or rental cost of capital had been estimated at a discount rate of 20 percent, the assumed opportunity cost of capital in Sierra Leone.[1] The estimate of

[1]See above for a discussion of the opportunity cost of capital.

the opportunity cost of the proprietor and family labor was obtained by combining the assumed opportunity costs of hired and apprentice labor. The opportunity cost of the hired labor was assumed to be equal to the actual money wage paid, since the earlier production function analysis had indicated that the marginal product and the wage rate of hired labor were quite similar. The production function analysis, on the other hand, indicated that the marginal product of apprentices was higher than the nominal remuneration they received; thus, in this study, the apprentices' labor was valued in terms of the estimated value of their marginal product in each industry.[1]

The "economic" profit rate measure, on the other hand, was designed to provide an indication of the return generated by the industrial firm when all inputs, including the proprietor's input, had been valued at their opportunity cost. On this basis, the "marginal," yet viable, firm would thus generate zero returns or a zero economic profit, while a firm generating a positive return would be earning a pure surplus or positive "economic" profit.[2] The "economic" profit figure for each firm was obtained by subtracting from the returns to the proprietor, the opportunity cost of the proprietor's labor. For lack of a better indicator of this parameter, the opportunity cost of the proprietor's labor was measured in terms of the approximate value of the proprietor's marginal

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[1]Thus, based on the previous marginal productivity analysis, tailoring apprentices were valued at Le .08 per hour worked, blacksmithing apprentices at Le .05 per hour worked, and gara, carpentry and baking apprentices at Le .08 per hour (assumed to be the same as tailors in the absence of a good estimate).

[2]The economic profit must be kept distinct from the accountant's concept of profit which usually includes the opportunity cost of the return on capital and proprietor's labor.

product in each industry.[1] Finally, for comparative purposes, the "economic" profits figures have been expressed in rate terms as a percentage of the total value of firm's capital stock.

The returns to the proprietor are summarized in Table 25. The table reveals the wide variation in the returns to the proprietor both by process and by industry. The returns, for example, vary from a high of Le 10,601 per year for "modern" bakers to a low of -Le 850 per year for "modern" blacksmiths. At the major industry level, bakers generate the highest proprietor's return, while tailors and blacksmiths generate the lowest return.

One of the most striking results presented in the table, however, is the indication that often the proprietor's return varies markedly between processes in the same industry. Indeed, analysis of variance procedures applied to these data revealed that except for gara dyeing and carpentry, these variations were statistically significant.[2] The more "modern" technique in each industry, it should be noted, did not necessarily yield the highest return to the proprietor. Although in tailoring and baking the more "modern" techniques produced the highest returns, in carpentry and blacksmiths the highest returns did not accrue to those proprietors using the more "modern" technique.

The returns to the proprietor, however, also varied by location. This fact is demonstrated in Table 26 where the returns to those proprietors using the more "traditional" processes are arranged by

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[1]Thus, based on previous marginal productivity analysis, tailoring proprietors were valued at Le .35 per hour, gara proprietors at Le .84 per hour, carpenters at Le .35 per hour (assumed to be the same as tailors in the absence of a good estimate), blacksmiths at Le .30 per hour and bakers at Le .54 per hour.

[2]At the 10 percent significance level.

TABLE 25
SIERRA LEONE: ANNUAL MEAN RETURN TO PROPRIETOR AND ECONOMIC PROFIT RATE BY MAJOR PROCESS AND BY MAJOR SMALL-SCALE INDUSTRY CATEGORY

Industrial Categories[a]	Annual Returns to Proprietors (Leones)	Economic Profit as a Percent of Total Capital Stock (Percent)
Tailoring		
"Traditional"	377	23
"Modern"	982	46
Gara		
"Traditional"	1,572	190
"Modern"	1,463	170
Carpenters		
"Traditional"	2,062	169
"Modern"	2,060	21
Blacksmiths		
"Traditional"	745	75
"Modern"	-850	-25
Baking		
"Traditional"	1,476	106
"Modern"	10,601	35

SOURCE: Survey data.

[a]Includes both randomly and purposively sampled firms in these localities with 2,000 or more inhabitants.

TABLE 26
SIERRA LEONE: ANNUAL RETURNS TO PROPRIETOR BY MAJOR INDUSTRY AND LOCALITY FOR "TRADITIONAL" PROCESSES ONLY

(Leones per Year)

Industrial Category[a]	Locality			
	Villages Less Than 2,000	2,000-20,000	20,000-100,000	More Than 100,000
Tailoring	164	316	465	365
Gara dyeing	--	--	1,572	--
Carpentry	33	1,365	2,680	1,514
Blacksmithing	199	779	645	--
Baking	--	1,443	1,564	--

SOURCE: Survey data.

[a]Includes all randomly and purposively selected "traditional" firms; for definition of term "traditional", see text.

locality size. The mean proprietor returns are generally highest in the intermediate size localities and lowest in the villages. For example, the tailoring proprietors engaging in ordinary sewing in those localities with from 20,000 to 100,000 inhabitants generate an annual return of Le 465, while those tailoring proprietors in the villages generate only Le 164 per year. The relatively low return to the proprietor in the villages is undoubtedly due to the fact that they also engage in farming activity. Unfortunately, it has not yet been possible to determine the income generated by the proprietor's farming activity; this interaction, however, will be the subject of a subsequent study.

The returns to the proprietor for firms in localities with 2,000 or more inhabitants, however, do shed some light on the relative income position of the proprietors. The mean annual return to the proprietor from the randomly selected firms, for example, was Le 672. The unskilled urban worker receiving the minimum wage earned approximately Le 250 per year, while the farm proprietor received a mean annual income in 1974/75 of approximately Le 475 [Spencer and Byerlee, 1976]. The mean return of small-scale industry proprietors was thus higher than that earned by individuals in these two groups. The determination of the exact relative income position of the small-scale industry proprietors must await more complete supporting data.[1]

An examination of "economic profit" rates of the small-scale industries can provide additional insights into the economic viability of these activities. The estimated "economic" profit for these firms, expressed as a percentage of their capital stock, has consequently been

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[1]Byerlee, Tommy and Fatoo [1976] report that those migrants who are self-employed earn an income almost one-third higher than that of the average employed migrant.

estimated and summarized in Table 25, where the data have been arrayed by major process and major industry. The most striking result is that, with the exception of "modern" blacksmithing, all the processes and industries generated a positive "economic" profit; thus, if the assumptions underlying the analysis have been correctly specified, all the major types of small industrial activities, except "modern" blacksmithing, must be considered economically viable.

The "economic" profit rate varied widely, however, both by process and industry. Baking, gara dyeing and carpentry, for example, generated the highest rates of economic profit, exceeding 100 percent in several instances, while tailoring and blacksmithing generated economic profit rates that were significantly lower.[1] Moreover, the "economic" profit rates differed significantly by major processes within each industry.[2] It was the more "traditional" rather than the more "modern" processes that generally produced significantly higher "economic" profit rates in these major industries. Indeed, only in the tailoring industry, did the more "modern" process, embroidery, generate an economic profit rate exceeding that generated by the more "traditional" process. Even the traditional tailors, however, earned a positive "economic" rate of profit. The analysis thus indicates that the "traditional" processes used by small-scale industries in Sierra Leone are economically viable at the present time.

Finally, it would be of interest to ascertain if the economic profit rates were related to the underlying factor intensities of the processes

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[1]Analyses of variance indicated these were different statistically at the 1 percent level.

[2]5 percent level.

utilized. Indeed, assuming that labor is relatively abundant and capital is relatively scarce, one would hypothesize that the more labor-intensive processes would generate the highest rate of economic profit. If one compares the labor-capital ratios presented in Table 23 with the economic profit rates in Table 25, one discovers that in almost every instance, the more labor-intensive process generated the highest economic profit rate.[1] The only apparent exception occurred in the tailoring industry, where the more capital-intensive processes (embroidery) appeared to generate a higher economic profit rate than the more labor-intensive process. On closer examination, however, this anomaly proved to be illusory. Within the embroidery group, there is a further important process subdivision between relatively capital-intensive and labor-intensive embroiderers. If these two groups are separated, the relatively labor-intensive embroiderers are discovered to generate high rates of economic profit, while the relatively capital-intensive embroiderers are found to generate relatively low rates of economic profit, rates that are even lower than those generated by the "traditional" tailors. Thus, the "economic" profit rate of the various small-scale industrial activities in Sierra Leone was seen to be importantly related to the relative labor intensity of the industrial processes utilized. As a result, labor intensity or capital productivity measures would appear to be useful substitutes when profit figures are not available.

The conventional factor-intensity measure, however, provides only a partial clue as to the relative economic profitability of various small-scale industrial firms. It does not fully capture, for example,

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[1]Indeed, the simple correlation coefficient relating the economic profit rate to the labor-capital ratio was +.50 and was significant at the .1 percent level.

the role played by another potentially scarce resource, the proprietor or entrepreneur. Thus, it is important to ascertain whether certain entrepreneurial characteristics can be delineated that may have some influence on the economic profit rate of small-scale industrial firms in Sierra Leone.

The Role of the Entrepreneur

Entrepreneurship is a different concept to capture and specify quantitatively. Although a large number of definitions of entrepreneurship abound, however, a common theme in all the definitions is that the entrepreneur is a key decision maker.[1] The larger the supply of such decision makers, other things equal, the better will a country's other scarce resources be combined for productive purpose and consequently the larger will be its output. The supply of effective entrepreneurial talent, however, is limited and not all firms are equally successful.

Thus, it is of importance to identify those characteristics of the entrepreneur that may influence his or her performance and to ascertain which entrepreneurial characteristics, if any, are statistically associated with successful or economically profitable firms. Such an analysis would provide not only an indication of the potential constraints to an expansion of the supply of entrepreneurs, but also provide insights into how policies might be formulated for overcoming these constraints and for expanding the quantity of effective entrepreneurial services in small-scale industry in Sierra Leone.

There are several entrepreneurial characteristics that can be hypothesized to have an important effect on the economic performance of small-scale firms. Firstly, one might hypothesize that the entrepreneur's

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[1]See Kilby [1965] and Harris [1971].

acquisition of some formal education would be expected to have a positive effect on the profits of a firm. As noted earlier, the education would be assumed to enhance the entrepreneur's managerial, organizational and technical skills and consequently influence his or her ability to operate the firm. A second hypothesis would be that entrepreneurs with greater experience or greater numbers of years operating that firm would be expected to earn higher economic profits than those with fewer years' experience. The argument is similar to that used for formal education. A third hypothesis would be that those enterpreneurs keeping records or business accounts should be expected to earn higher economic profits than those who do not. The underlying assumption is that record-keeping should enhance the managerial ability of the entrepreneur and thus affect the firm's economic profits. A fourth hypothesis is that entrepreneurs with a larger amount of initial capital would earn higher economic profits than those with smaller amounts of such capital. The underlying logic for the hypothesis is that given the imperfect capital market, one might expect a considerable advantage to accrue to the entrepreneur with access to a large amount of initial capital, which would enable the entrepreneur to start on a larger scale and better exploit the market opportunities present. A fifth and related hypothesis is that entrepreneurs expanding with only internally generated funds would have lower economic profits than those entrepreneurs expanding with the benefit of the outside capital market. The argument is similar to that relating to the entrepreneur's initial capital. A final hypothesis is that entrepreneurs whose fathers were not farmers would have higher economic profits than those entrepreneurs whose fathers were farmers. The logic underlying this hypothesis is that the father's occupation provides an indication of

entrepreneur's social and psychological attitude towards industrial activity. It is correspondingly assumed that entrepreneurs will be more favorably disposed toward industrial pursuits and be more successful if their father had been engaged in industrial or related activities rather than in farming.

These six hypotheses must now be investigated empirically. If one assumes that these characteristics are independent of one another and influence economic profits, the dependent variable, in an additive manner, these hypotheses can be investigated together by statistically estimating a single equation of the following form:[1]

$$\pi = a + b_1 Ed + b_2 Exp. + b_3 Bk + b_4 I.C. + b_5 R.P. + b_6 F.O. + \varepsilon_1$$

where π is the return to the entrepreneur, a is a constant, Ed is a dummy variable which is equal to one if the entrepreneur possesses any formal education, Exp. is the age of the business, Bk is a dummy variable which is equal to one if the entrepreneur keeps even rudimentary books or accounts, I.C. is the amount of initial capital of the firm at the time it was established, R.P. is a dummy variable which is equal to one if the firm used only reinvested profits to finance its expansion and zero if it obtained funds outside the firm, and F.O. is a dummy variable which is equal to one if the entrepreneur's father was <u>not</u> a farmer. Although the linear form of the equation had no more claim to validity than any other, it did provide a useful and convenient point from which to begin the analysis.

The result of the regression analysis of the equation, based on a sample of those seventy small-scale industrial firms that possessed the

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[1]This procedure was suggested by Harris [1971].

required profit and entrepreneurial characteristics data, was as follows:

$$\pi = \underset{(1,240)}{-1,057.0} - \underset{(467)}{593.9Ed} + \underset{(23.5)}{56.7Exp.} + \underset{(866.4)}{3,156.9Bk} + \underset{(.65)}{.371.C.}$$

$$+ \underset{(542.0)}{1,147.7R.P.} - \underset{(559.1)}{554.3F.O.} \qquad \bar{R}^2 = .59$$

Sig. $p < .01$

For a cross-section analysis, the results indicate that the equation has provided a reasonably good estimate of the underlying entrepreneurial characteristics that affect the economic returns to the entrepreneur. The individual characteristics must now be examined in turn.

The relationship between formal education and entrepreneurial success is surprisingly weak. Although only significant at the 20 percent level, the educational coefficient is negative, hinting perhaps that formal education and entrepreneurial performance may be inversely related. Similar results have been reported by Kilby [1965] for the Nigerian bread industry and Harris [1971] for a cross-section of Nigerian industries. There are, however, various explanations for this weak relationship between entrepreneurial success and formal education. Nonformal education is not only a substitute for formal education, but may, in some cases, provide a more superior form of training for the entrepreneur. In addition as Kilby [1965] has noted the more formally educated entrepreneurs may undertake several different business activities and thus their effectiveness in any one may be diminished. Finally, as Harris [1971] points out, formal education and basic ability may be inversely correlated in small-scale industry. This would occur if the good students with formal education were generally offered permanent jobs in government and large-scale industry, ". . .leaving only the bottom of the class to enter entrepreneurial careers, while the bright and energetic individuals without formal education turn to business as the best available alternative." [Harris, 1971]

The years of experience of the entrepreneur, on the other hand, do appear to have an important bearing on entrepreneurial success. The years in business coefficient is positive and significant at the 5 percent level. The "education" gained while operating the firm would thus appear to be a more important determinant of entrepreneurial success than the education gained in a more formal setting.

Entrepreneurs that keep even some rudimentary form of records or accounts also appear to be more successful than their counterparts who do not. The record keeping coefficient is not only positive but significant at the 1 percent level. This result indicates that technical training on how to keep and use financial records as a tool of management may be one effective method of assisting and increasing the economic viability of small-scale industrial enterprises in Sierra Leone.

The results of the analysis also reveal that those firms with access to larger amounts of initial capital were not necessarily any more successful than those commencing business with smaller amounts. Although the initial capital coefficient was positive, it was not significant at even the 30 percent level. The generally low initial capital requirements, simple technology and the general lack of economies of large scale production[1] involved in small-scale industry make it possible for a firm to enter on a rather small scale and compete quite successfully with the larger firms.

Moreover, the lack of access to external sources of capital for expansion also does not appear to have had an adverse effect on the economic profitability of the firms in the sample. The reinvested

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[1]See above.

profits coefficient was positive and significant at the 5 percent level, indicating that the entrepreneurs that expanded by using reinvested profits were generally even more successful than those enterpreneurs with access to external sources of capital. Although these results are certainly not conclusive,[1] they do cast some doubt on the contention that the lack of capital is the principal barrier to the success of small-scale industry in Sierra Leone.

The final result of the entrepreneurial analysis reveals that there was no apparent relationship between the occupation of the entrepreneur's father and the profitability of the establishment. The coefficient measuring the dummy variable for the nonfarming occupation of the father was negative and not statistically significant at the 30 percent level. Thus, the family background, at least in formulation used in this study, did not seem to have a major impact of the economic profitability of small-scale industrial establishments in Sierra Leone.

This initial formulation of the relationship between the entrepreneurial characteristics and the economic profitability of these firms has made it possible to isolate those entrepreneurial characteristics that seem to be associated with a high level of economic profits. Specifically, years of experience and the keeping of records are two characteristics that appear to be positively associated with economic profits. On the other hand, formal education, father's occupation, initial capital level and access to the capital market do not seem to be strongly associated with the level of economic profits and thus may

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[1]Indeed, the causation may be reversed, since more profitable firms have more funds to reinvest. A statistical association has been established but not necessarily a causation.

not be serious barriers to an expansion of entrepreneurship. These results, however, are dependent on the correctness of the underlying formulation of the analysis, and further analysis, particularly on a more disaggregated basis by locality and industry, are required before more definitive statements can be made. They do provide some initial guide to the kinds of policies that might be applied to encourage an expansion in both the supply of entrepreneurs and small-scale industries. The specific policy implications of this research must now be examined.

IV. MAJOR POLICY IMPLICATIONS

Several of these empirical and analytical results should prove to be of value to those charged with formulating policies with respect to small-scale industries. In this section, the overall policy implications of the study will be considered first, followed by an examination of those results that provide insights into the efficacy of the major policies that influence either directly or indirectly small-scale industries.

The key overall policy implication stemming from the study is the evidence that small-scale industry can contribute to meeting both the employment and output objectives of Sierra Leone. It has revealed that these industries generate not only more output, but also more employment per unit of capital than do the large-scale industries; thus, Sierra Leone does not have to sacrifice output to generate employment when small-scale industries are expanded. Moreover, those specific "processes" and small-scale industry groups that are more labor intensive also generate, on the average, more output per unit of capital. The underlying economic strength of small-scale industries is reinforced by the evidence that all the "traditional" small-scale industrial processes generate an "economic" profit when all factors are valued at their appropriate opportunity cost.

In view of the strong economic justification for such industries, it is important to examine the impact of various policies on small-scale industry. The two major policies designed to influence directly these industries, credit and training schemes, will be considered first, followed by an examination of several policies that indirectly affect small-scale industries.

Credit Policies

One of the most commonly articulated and utilized methods of directly affecting small-scale industries is through the provision of capital or more specifically credit. It is thus of importance to ascertain the need for such a policy measure and the form it might most effectively take. The findings of this research reveal that in Sierra Leone self-financing has been of overwhelming importance in this sector. Personal and family savings, for example, accounted for approximately 80 percent of the funds used to establish small-scale industries in Sierra Leone, while almost 90 percent of the funds used for expansion were reinvested profits.[1] The crucial question is whether the overwhelming use of self-financing reflects an underlying capital shortage and a corresponding need for improved access to credit through the formal financial system. The small-scale entrepreneurs themselves generally argue that the shortage of capital and credit is one of the primary constraints they face. Indeed, approximately two-thirds of the entrepreneurs interviewed in the Sierra Leone small-scale industry study felt that the shortage of capital or credit was the "greatest difficulty encountered in their business."[2] It is of importance to ascertain whether the perceived difficulty was real or whether it was simply an easy response to give the interviewer.

There is, for example, some force to the contention that capital and credit may not be a crucial constraint for small-scale industry. The initial capital requirements for the kinds of small-scale industries examined in Sierra Leone, for example, are relatively modest, generally

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[1] See above.

[2] Based on the survey data.

less than Le 100. Moreover, the results of the analysis of enterpreneurial characteristics indicated that firms with access to only small amounts of initial capital were as successful in generating economic profits as those with larger amounts of initial capital.[1] The same analysis also revealed that those firms that expanded with only reinvested profits were apparently more successful in generating high levels of economic profits than those that had access to outside funds. Finally, there is evidence that excess capacity exists in all of the major small-scale industries examined in Sierra Leone.[2] These findings, while not conclusive, provide some indication that capital may not necessarily be the overriding constraint facing small-scale industry.[3]

These considerations, however, do not necessarily obviate the need for policies designed to improve the small-scale industry's access to the formal credit market. The capital market in Sierra Leone, as in most other African countries, is highly "fragmented" with artificially low interest rates existing on credit from the commercial sources and unduly high rates existing on that credit available from sources in the noncommercial sector. Since the commercial banks charge a maximum interest rate of only 12 percent for their most risky loans, it is not surprising that they have limited their lending almost exclusively to their traditional customers in the trading sector and have made very few loans to

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[1] See above.

[2] See above.

[3] There was also no direct indication that working capital was a binding constraint. Working capital represented, for example, a relatively small percentage of the capital of even the most economically viable small-scale industries. See above.

manufacturing establishments.[1] The interest rate in the market thus does not serve as a rationing instrument. There are, however, virtually no formal institutional mechanisms outside the commercial banking system for making credit available to small-scale firms, particularly those located in rural areas.[2] It would thus appear to be important to develop improved institutional mechanisms to increase the access to and the availability of credit for small-scale industries.[3]

There is considerable force to the argument, however, that this credit to small-scale industries should be provided at higher rates of interest than are currently being charged by the commercial banking system. The present study, for example, has revealed not only that small-scale industries generate a high rate of "economic" profit, but also that "process choices" exist within the major small-scale industries. Thus, an unduly low or subsidized rate of interest may result in more capital intensive processes and industries being established than would be the case with interest rates that reflected more closely the opportunity cost of capital in Sierra Leone.[4]

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[1] In 1971/72, for example, the trading sector received 78 percent of the loans from commercial banks while manufacturing received only 5 percent [Bank of Sierra Leone, 1973].

[2] The Credit Guarantee Scheme, under which the Bank of Sierra Leone guarantees loans made by commercial banks and the National Development Bank to small private sector establishments, was launched in 1974. Once again, however, the vast majority of loans guaranteed (80 percent in 1974) were for trading activities, not manufacturing. See Chuta and Liedholm [1975] for more details of the scheme.

[3] Several useful suggestions with respect to the relevant institutional mechanisms are found in IBRD [1974].

[4] The initial results of the linear programming model indicate that changing the opportunity cost of capital does alter the intensities of the "processes" that would operate.

Technical and Managerial Assistance

The results of this study also provide some insights into the efficacy of policies designed to improve the technical and managerial skills within the small-scale industry sector of Sierra Leone. The apprenticeship system serves as the primary vehicle for providing technical training in small-scale industry; indeed, 90 percent of the proprietors had previously served as apprentices. None of the proprietors had received formal vocational training[1] and only one-quarter had received any formal education. The regression analysis revealed, however, that there was no correlation between the economic profitability of the firm and the level of formal education. Unfortunately, no information exists about the relative cost and benefits of alternative methods of providing technical training.[2] In view of the importance and ubiquity of the apprenticeship system, some attention should perhaps be paid to programs designed to upgrade and expand the existing apprenticeship system. In addition there is some evidence to indicate that policies designed to provide managerial training may be of some value. The small-scale industry study has revealed, for example, that only 17 percent of the proprietors keep a rudimentary set of books or accounts. Moreover, the regression analysis has indicated that a high positive correlation existed between those firms that keep books and the level of "economic" profits. Thus, policies designed to improve both technical and managerial skills may be of importance. The exact specifications of these as well as other policies, however, will

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[1]Indeed, only about 2 percent of the secondary school students are enrolled in a formal technical or vocation training institute.

[2]A thesis currently being undertaken in Nigeria by Mabawonku is attempting to quantify the costs and benefits of alternative methods of small-scale industry training.

require more detailed studies of the individual small-scale industries themselves.

In addition to these policies designed to directly influence small-scale industries, there are several policies that indirectly affect small-scale industries. Fiscal policies as well as policies designed to influence the infrastructure, large-scale industry, and agriculture influence, often in unintended ways, the small-scale industry sector.[1] Each of these policies must be briefly examined.

Fiscal Policy

Fiscal policies often have negative effects on small-scale enterprises. These negative effects are not necessarily the result of conscious design, but rather will arise from the indirect effects of policies designed to achieve other objectives, such as the encouragement of large-scale industry or the generation of governmental revenue. In Sierra Leone, two components of fiscal policy, the Development Ordinance of 1960 and the import duty structure, have had a particularly deleterious indirect effect on small-scale industry and must be examined in more detail.

The Development Ordinance of 1960 was a tax incentive ordinance, similar to those found widely in other African, Asian and Latin American countries, that was designed to encourage industrial investment in Sierra Leone. The firms qualifying for these incentives were eligible for: (1) exemption from income taxation during a tax holiday period that may extend from three to ten years; (2) deferral of depreciation allowances

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[1] There are several other policies that directly or indirectly affect small-scale industries, such as the provision of research on trading services, government procurement or export promotion or licensing schemes. They have not been explicitly dealt with at this time due either to a lack of data or uncompleted analyses.

until after the expiration of the tax holiday; (3) exemption from import duty on materials used in constructing the plant and on capital equipment; and (4) complete or partial exemption from import duties "on raw or semi-processed materials required" in production.[1] Since its introduction in 1960, thirty-three enterprises have been eligible for these tax incentives, and all were firms planning to invest in excess of Le 50,000 or $55,000.

By not permitting smaller firms to qualify for similar exemptions, however, smaller establishments were indirectly placed in a less advantageous position when compared with the larger establishments. The import duty exemption, in particular, would appear to have created large distortions and had a relatively large negative effect on small-scale industries.[2] The previous analysis has revealed, for example, that except for blacksmithing, imported, intermediate inputs represent from 10 to over 50 percent of the major small-scale industries' output value. Since substantial duties are generally levied on these intermediate inputs,[3] the smaller firms must pay a higher price for these materials and consequently face relatively higher costs than do their large-scale, tax-exempt counterparts. A similar argument holds with respect to the capital inputs imported by industrial establishments. The small-scale establishments are required to pay import duties on their capital goods while the larger establishments, which obtain capital at unduly low interest rates and are already often too capital intensive, are often able to

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[1]This provision appears to be without time limit.

[2]Since small firms generally are able to escape income taxation, the income tax exemption does not appear to cause undue distortion in the relative post-tax profitability of small and large firms.

[3]See below.

escape this duty entirely. Thus, the import duty exemption for both intermediate and capital goods inputs contained in the 1960 Development Ordinance would appear to have an adverse, indirect effect on small-scale industries.

The structure of import duties in Sierra Leone reinforces the adverse impact of the Development Ordinance on small-scale industries. Tariffs appear to have been established with revenue rather than resource allocation or overall development as the primary objective.[1] Consequently, many capital and intermediate goods required by industry are taxed at rates similar to those levied on "luxury" consumer goods. The most frequent rate of duty levied in Sierra Leone is 36.5 percent, a rate that applied to semi-luxury consumer goods such as toys and smoking pipes as well as to many capital and intermediate goods required by small-scale industry.[2] The imported dyes used as inputs by the gara dyeing industry, the buttons, needles, thread and scissors used by the tailoring industry, and the polishes used by the carpentry industry, for example, are taxed at the ad valorem rate of 36.5 percent. In addition, the grey and bleached white cloth used as intermediate inputs by the tailoring and gara dyeing industry is subject to an import tariff of approximately 22 percent.[3] Finally, the imported sewing machines, the basic capital input of the tailoring industry, are taxed at a 16.5 percent rate while imported carpentry, blacksmithing, and baking capital equipment is taxed at a 36.5

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[1]Revenue and development objectives, however, need not be in conflict with one another.

[2]The duty on some of the final goods potentially competing with the small-scale industry products, however, tends to be rather low. Small agricultural tools, for example, are taxed at only 2.75 percent.

[3]Cloth duties are specific rather than ad valorem. The 22 percent figure is based on the U.S. cloth prices in 1974/75.

percent rate. The relatively high tariff rates for these items when combined with duty exemption granted to most of the large-scale firms creates undesirable, and undoubtedly unplanned, allocative effects, particularly with respect to small-scale industries.

Infrastructure Programs

Programs designed to expand the infrastructure of a developing economy will also indirectly affect small-scale industries. The direction and magnitude of these indirect effects, however, cannot always be predicted with certainty. The provision of expansion of electricity, water, or roads, for example, would appear to benefit small-scale firms. These same amenities, however, also benefit the large-scale firms, which may now be able to enter markets previously dominated by small-scale establishments. Indeed, one differential advantage possessed by small- over large-scale industrial firms may be that they do not require large amounts of potentially costly infrastructure.[1]

The results of the Sierra Leone study, in fact, provide some indication that the lack of infrastructure may not be a critical constraint for the major small-scale industries in Sierra Leone. Electricity, for example, does not appear to be an essential prerequisite for any of these major small-scale industries. Alternative production processes, for example, were shown to exist within each industry and only those firms using the "modern" processes used electricity.[2] Yet, the profit analysis

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[1] If small-scale enterprises are used to construct these infrastructure components, however, the cost may be reduced at the same time that extra employment is generated.

[2] The "modern" tailors used sewing machines that could be operated either manually or with electricity; the "modern" bakers used electrical ovens, while the "modern" carpenters and blacksmiths used electrical machines.

revealed that the economic profit rate of the "modern" firms was generally lower than that of the more "traditional" firms, which used no electricity even when it was available. It should be stressed, however, that this result applies only to those small-scale industries currently existing in Sierra Leone and does not reflect the contribution the provision of electricity might make to the economic viability of other types of small industries either in Sierra Leone or elsewhere.

The lack of large quantities of water also does not appear to be an important constraint on the existing small-scale industries in Sierra Leone. The only establishments using water were bakeries and gara dyers, but the amounts needed by even these industries were not large.

These results would thus also cast some doubt on the effectiveness of industrial estates as a device for promoting small-scale industries of the type found in Sierra Leone. Since the provision of infrastructure, such as electricity and water, is one of the important objectives connected with the establishment of industrial estates, the indication that such services may not be critical for many small-scale firms makes the case for industrial estates less compelling.[1]

Finally, the results of the Sierra Leone study indicate that the improvement of roads might be expected to have a differential effect on the existing small-scale industries. The outcome depends importantly on the extent of the market, the relative input requirements and the potential large-scale competition of these small firms. Those industries, such as gara dyeing, that currently serve a relatively large market area, for example, might find their market positions somewhat enhanced by an

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[1]Moreover, most of the small-scale industries examined in the Sierra Leone study did not use elaborate buildings, but only simple workshops generally located close to their principal markets.

improved road network. The majority of small-scale industries in Sierra Leone, however, are primarily serving only the local market. Moreover, since the production analysis yielded no evidence of economies of large-scale production in these industries, a larger market area may not be crucial for them. An improved road network, on the other hand, may provide some added benefit to those industries, such as gara dyeing, that require large quantities of purchased inputs. These improved roads, however, may also open or expand the markets for large-scale firms. The degree to which the small-scale industries would be affected depends importantly on how substitutable the small- and large-scale products are for one another. Unfortunately, the component of the study analyzing product substitution has not yet been completed and thus the potential competition from large-scale firms cannot be assessed. It would appear, however, that small-scale industries serving relatively large market areas and with relatively large input requirements, such as gara dyeing, may tend to benefit from an improved road network, while those industries, such as tailoring, serving local markets with relatively modest input requirements, may not. Thus, the direction and magnitude of the indirect effects of programs designed to improve the infrastructure would appear to vary from one small-scale industry group to another.

Large-Scale Industrial Policies

Policies designed to encourage the development of large-scale industry also indirectly affect small-scale industry. The negative effects on small-scale industries stemming from the various fiscal incentives and credit subsidies accorded large-scale firms have been noted previously. In this section, however, the influence of the direct linkages between small- and large-scale industries must be considered.

Large- and small-scale industries are linked through both income and production relationships. In Sierra Leone, however, these linkages are rather minimal. Since large-scale industries are still such a relatively small component of the economy in Sierra Leone, for example, the increased income generated by an expansion of large firms would have relatively little effect on the demand for the products of small-scale industry. Moreover, the results of the study have revealed that the production linkages are also limited in Sierra Leone. There are virtually no forward linkages yet established from the small- to the large-scale sector and thus the large-scale provide few sources of intermediate demand for the products of small-scale industries.[1]

Moreover, there is some evidence that, through backward production linkages, the large-scale firms may have a negative impact on small-scale industry. Such negative effects could occur if a protected large-scale industry is providing large quantities of inputs to small-scale industries at an unduly high price. In Sierra Leone, the large-scale flour mill, which provides the major material input for the small-scale bakers, is protected by an exclusive import license and is thus in an insulated, monopolistic position. As a result, it has been able to sell its flour to small-scale bakers at prices over twice that of the potential import price.[2] Consequently, bakers have had their costs increased markedly and have been placed in a disadvantaged market position. Thus, even when linkages are considered, the policies designed to influence

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[1]The intermediate linkages are often much greater, however, in other countries with higher levels of industrialization. Small firms subcontracting to large firms are important in Japan and other Asian countries.

[2]In 1974/75, the price of domestically produced flour was Le 16 per cwt. while imported flour was approximately Le 6.3 per cwt.

large-scale industries would generally appear to exert indirectly a negative influence on the small-scale firms.

Agricultural Policies

The empirical and analytical results generated by this study also indicate that agricultural policies have an important indirect effect on small-scale industries, particularly those located in the rural areas. Such effects will occur because the agricultural and small-scale industrial sectors have been shown to be importantly linked to one another through both the income and production relationships. In particular, the Sierra Leone study has demonstrated not only that agricultural incomes provide one of the primary sources of demand for the products of small-scale industries, but also that agricultural incomes and the demand for the industrial products are strongly and positively related to one another. Indeed, a 10 percent increase in agricultural incomes is shown to generate a 16 percent increase in the demand for small-scale industry products in Sierra Leone. In addition, there are important forward production linkages between the sectors, since blacksmiths provide the vast majority of the tools required as inputs by the agricultural sector. There are also important backward production linkages that relate agricultural processing to the agricultural sector itself. Consequently, in view of the importance of these production and income linkages, general policies, for example, designed to increase agricultural output and incomes would, in general, appear to have an important positive, though indirect, influence on small-scale industrial output and employment, particularly in the rural areas. Moreover, as demonstrated in the migration component of the research project [Byerlee, Tommy, Fatoo, 1976] policies that expand rural small-scale industries will also have an

important impact on slowing the flow of uneducated migrants to urban areas.

These results point to the importance of incorporating these indirect effects into the evaluation of alternative policies or programs. Such indirect policy effects, however, can only be properly evaluated and assessed in an analysis that explicitly incorporates these intersectoral linkages.[1] When this integrated analysis as well as the more detailed examination of the individual policy requirements of each small-scale industry category have been completed, it will be possible to specify more detailed policy prescriptions.

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[1]Such an analysis is currently underway.

V. SUMMARY AND CONCLUSIONS

The evidence generated by this study has revealed that small-scale industries are a significant component of the industrial sector of Sierra Leone. Small-scale industries account for 95 percent of the employment and approximately 43 percent of the value added of the entire industrial sector. The vast majority of these industries are found to be located in rural areas. Indeed, 95 percent of the establishments, 86 percent of the employment, and 75 percent of the value added is generated by rural small-scale industries. In all locations, however, tailoring is the single most important activity; blacksmithing, carpentry, baking and gara dyeing follow tailoring in importance, but by quite a wide margin.

There are large differences in the annual mean output and value added generated by the various types of small-scale industry in Sierra Leone. In addition, the level of activity fluctuates widely over the year, although the seasonal patterns differ from industry to industry.

The magnitude of capital input used by the small-scale firms also varies by industry with the mean capital stock ranging from $89 in gara dyeing to $2,079 in blacksmithing. Comparative statistics indicate that these amounts of capital are small by international standards. The composition of this capital input also varies importantly by industry. In all the major industries, however, working capital constitutes a relatively small percentage of the total capital input.

There is also evidence, however, that this capital stock is not fully utilized. The amount of excess capacity differs from industry to industry, ranging from 25 percent in gara dyeing to 41 percent in blacksmithing. Moreover, the highest amount of excess capacity is found

to exist in the rural localities.

The initial capital requirements at the time these small industries were established, however, proved to be quite modest, generally less than Le 100. Approximately 80 percent of the funds used to establish these industries came from personal and family savings, while 90 percent of the funds required for expansion were reinvested profits. Self-financing has thus been of overwhelming importance in this sector.

The total labor input varies quite widely from industry to industry and by location, being significantly lower in the villages than in the larger urban locations. Apprentices and proprietors supply the vast majority of the small-scale industry labor.

The apprenticeship system is the primary vehicle for providing the technical training of small-scale industry. Apprentices serve the proprietors from one and one-half to five years, depending on the industry. The majority of the apprentices also are required to pay the proprietor a learning fee for the training received, a fee that is levied more often in rural than in urban areas.

Most of the proprietors, 90 percent, had themselves previously served as apprentices. None of the proprietors examined in the study received any formal vocational training and only one-quarter possessed any formal education. Moreover, only 17 percent of the proprietors kept even a rudimentary set of books or accounts.

In addition to these descriptive insights into the nature of small-scale industry, the Sierra Leone study also sheds light on the major determinants of the demand for and supply of small-scale industry products. With respect to demand, three principal sources of demand for the products of small-scale industry have been identified. The major source is that

demand generated from the incomes of rural and urban consumers. The analysis of demand elasticities undertaken in the study reveals that, counter to a key premise of the Hymer and Resnick model [1969], the rural income elasticity of demand for most small industry products is strongly positive; this result thus indicates that the demand for these products should be expected to increase strongly as rural incomes increase.

A second important source of demand arises from the backward and forward production linkages with the agricultural sector. The backward linkages from agricultural processing activities, particularly rice milling, to agricultural production are found to be important. In addition, strong forward linkages are shown to exist from the blacksmithing industry, which primarily produces and services small farm tools, to the agricultural sector; the agricultural sector thus provides an important source of intermediate demand for small-scale industrial products.

The third important source of demand for small-scale industry is that provided by the foreign or export sector. The study reveals that a strong international demand exists for the products of Sierra Leone's gara dyeing industry.

The analysis of the three major sources of demand for the small-scale industries thus indicates that the existing and potential market for the products of small-scale industry is strong and provides little support for the contention of Hymer and Resnick [1969] that the demand for and supply of these products will necessarily decline as rural income and output increase. Further support for this rather optimistic view of small-scale industry demand can be derived from the responses of Sierra Leone proprietors, the majority of whom stated that the number of small-scale firms had increased in Sierra Leone over the last five years.

On the supply side, several important characteristics of the small-scale industrial firms' production relationships are revealed by the various analyses undertaken. The results of the neoclassical production function analysis indicate, for example, that there is no evidence of increasing returns to large scale production in the various industrial categories examined; thus relatively large firms possess no apparent production advantage over the relatively small industrial firms. Moreover, the neoclassical production function analysis also reveals that the marginal productivities of all the labor groups, including apprentices, are positive. The marginal productivities of proprietors and hired workers, however, are significantly higher than that of the apprentices. Finally, the neoclassical analysis reveals that the opportunity for factor substitution between capital and labor exists within each industry.

The analysis of the alternative production processes available within each industry also indicates that at least two process choices or production techniques exist with each major small-scale industry in Sierra Leone. The factor or input proportions of these processes are found to differ significantly from one another. Moreover, the more "traditional" processes within each small-scale industry are not only more labor intensive (i.e., possess higher labor-capital ratios), but also possess higher output-capital ratios than do the more "modern" small-scale industrial processes. The more "traditional" processes thus generate both a higher output and a larger amount of employment per unit of the relatively scarce factor, capital. Consequently, there appears to be no conflict, at least in a static sense, between output and employment when choosing between industrial processes in Sierra Leone.

There are also important differences in the factor proportions between the small-scale industry groups. Among the "traditional" processes, for example, the gara dyeing, carpentry and baking industries possess the highest output-capital and labor-capital ratios, while tailoring and blacksmithing possess the lowest. Thus, the output-employment conflict also disappears even between the small-scale industry groups.

The study also reveals that the factor proportions vary significantly by location. The output-capital and labor-capital ratios increase as the size of localities declines and reach their maximum values in those localities with from 2,000 to 20,000 inhabitants. Both ratios are lower in the smaller villages, however, due importantly to the part-time nature of small-scale industrial activity in these locations. The importance of incorporating location in small-scale industry analyses is thus once again demonstrated.

Evidence is also presented to indicate that there are important differences in factor proportions related to firm size. The labor-intensity of small-scale industrial firms in Sierra Leone, for example, is found to be seventeen times greater than the labor-intensity of the large-scale firms. Moreover, the labor-intensity of Sierra Leone's small-scale industries appears relatively high even when compared internationally with the labor-intensity figures for small-scale industries located elsewhere in Africa. In addition, however, the output capital ratio for small-scale firms is over twice that of the large-scale industries in Sierra Leone. Thus, since the small-scale industries are shown to generate more employment and output per unit of capital than do their large-scale counterparts, it would appear that small-scale industries generate the maximum industrial output and employment per unit of scarce capital in Sierra Leone.

The profit analysis reinforces the findings derived from the factor proportion and production function analyses. The small-scale processes and industries possessing the highest labor-intensities and average capital productivity also tend to generate the highest rates of economic profit. Thus, these ratios may be useful substitutes when profit figures are not available.

A striking result derived from the profit analyses is the indication that, with the exception of "modern" blacksmithing, all the small-scale industries and processes in Sierra Leone generate a positive rate of economic profit; thus, except for the "modern" blacksmiths, all the major types of small-scale industries and processes in Sierra Leone must be considered to be economically viable. "Traditional" and "modern" gara dyers, "traditional" carpenters, and "traditional" bakers generate the highest rate of economic profit, exceeding 100 percent in each instance, and are thus deserving of particular attention within Sierra Leone.

In view of the strong economic justification for small-scale industries, the major policies that either directly or indirectly influence small-scale industry deserve attention. The provision of capital or credit is one of the most commonly utilized methods of directly affecting small-scale industries. The empirical and analytical findings of the study indicate, however, that capital may not necessarily be the overriding constraint facing small-scale industry in Sierra Leone. Improved institutional mechanisms to increase the access to and the availability of credit at somewhat higher interest rates charged by the commercial banks, however, would appear to be of value.

The results of the study also indicate that direct policies designed to improve both the technical and managerial skills within the small-scale

industry sector may be of importance. In view of the overwhelming importance and ubiquity of the apprenticeship system in providing technical training, some consideration might be given to upgrading and expanding the existing apprenticeship system. There is also evidence to indicate that improved managerial skills can enhance the economic viability of these firms.

In addition to these policies designed to influence directly small-scale industries, there are several policies that have important indirect effects on these industries. Fiscal policies, particularly as reflected in tax incentive ordinances and the import duty structure, for example, often tend to discriminate against small-scale firms. Morevoer, policies designed to expand the infrastructure may have a differential indirect effect on small-scale industries, providing a positive benefit to some small-scale industries and having a negative impact on others. In addition, policies designed to influence large-scale industries, even when the linkages effects are considered, generally appear to have a negative indirect impact on small-scale industries. Finally, the study indicates that policies designed to increase agricultural output and incomes generally have an important positive, though indirect, influence on small-scale industries.

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