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AN ECONOMIC ANALYSIS OF SMALL-SCALE INDUSTRIES  
IN RURAL AREAS OF SIERRA LEONE

by

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Type III Seminar Paper

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## INTRODUCTION

### Background Information

Sierra Leone is an English-speaking West African country. It borders on the Republic of Liberia on the South East and Guinea on the North. According to the 1963 Population Census, Sierra Leone has a total population of 2,180,355 people and occupies an estimated area of 27,699 square miles.<sup>1/</sup>

The rural economy of Sierra Leone has lagged behind the urban sector. Whereas agriculture grew at an annual rate of 2 percent between the period 1964/65 and 1970/71, construction sector and transportation/storage/communications sector grew at an annual rate of over 14 percent during the same period.<sup>2/</sup> Agriculture is the largest single sector in the economy, employing about 75 percent of the working population.<sup>3/</sup> Other production sectors of the economy such as manufacturing and handicrafts,<sup>4/</sup> mining and quarrying, wholesale/retail trades and restaurants and hotels grew at an annual rate of 2 percent, 4 percent and 5 percent respectively.<sup>5/</sup> The overall Gross Domestic Product at factor cost grew at an annual rate of 4 percent over the same period.<sup>6/</sup>

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<sup>1/</sup>Sierra Leone Government [1971].

<sup>2/</sup>Figures have been computed from Sierra Leone Government [1972, p. 10, table 8].

<sup>3/</sup>Spencer [1973, p. 1].

<sup>4/</sup>There is no information with respect to rural handicrafts.

<sup>5/</sup>Sierra Leone Government [1972, p. 10, table 8].

<sup>6/</sup>Ibid.

### The Problem Setting

The main focus of this study is the rural nonfarm small-scale industries and it is the first of its kind throughout Africa. Three major considerations account for the special emphasis of this study. First, the dichotomy of the economy into two sectors--agriculture and industry or traditional and modern--has not served a useful purpose in directing empirical research into relevant problem areas. It has indeed ignored the intersectoral and intrasectoral dynamics which constitute the key to the employment question. This research will depart from the conventional framework and focus attention on a third subsector--the rural non-farm subsector. Second, previous attempts to study small-scale industries have concentrated in the urban areas much to the neglect of rural areas.<sup>7/</sup> The lack of recognition and study of rural small industries means ignorance about the types and mode of operation of activities that exist in this subsector. This situation implies an inadequate treatment of the rural-urban migration issue and the question of unemployment in general. Third, detailed information in regard to rural small-scale industries does not exist, particularly for Africa. For example, there is no systematic study of factor proportions, output-factor ratios, types of processes and technologies existing for rural small-scale industries. There has been no consistent and conclusive evidence about the growth of rural small industries.<sup>8/</sup> What exists is evidence based

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<sup>7/</sup>Liedholm [1973] points out that in John de Wilde's [1971] survey of African private enterprise, for example, only a few brief references are made to the study of rural small industries. Also, see Liedholm [1973, p. 12, footnote] for a list of surveys of small industries in Africa.

<sup>8/</sup>See Liedholm [1973, pp. 6-13].

in comprehensive and fragmentary data generated from studies whose main focus was not the rural small industries. There is need not only to recognize the rural nonfarm sector; it is equally important to generate detailed information with respect to this sector and carry out a thorough analysis of the information obtained. Such an exercise will be carried out with respect to rural small industries in Sierra Leone.

#### Integrated Research

The study of rural small-scale industries in Sierra Leone will be carried out within the framework of an integrated rural development research project currently being undertaken under the leadership of Dr. Dunstan Spencer at Njala University College, Sierra Leone. The research project is integrated in that a team of researchers based at Njala University College will investigate different aspects of the rural sector, over the same time period and use almost the same sample units. For example, it is planned that the following components of the rural sector will be studied. These are:

- (1) Agricultural marketing and processing;
- (2) Agricultural production and onfarm marketing activities;
- (3) Rural nonfarm small-scale industries;
- (4) Household consumption;
- (5) Migration;
- (6) An integrated policy analysis.

There is no doubt that much efficiency is to be gained from such a team work in terms of cooperation and saving of financial costs.

### RESEARCH OBJECTIVES

1. The objectives that relate to the descriptive aspect of the study are the following:
  - a. To estimate the number, kinds and sizes of small-scale industries in rural areas of Sierra Leone;
  - b. To identify the present state of factor proportions, output-factor ratios and factor remunerations in major kinds of rural small-scale industries;
  - c. To identify what processes and technological alternatives exist and the source of such technologies; and
  - d. To examine the kinds of linkages which exist between rural small-scale industries and those in the urban areas.
2. There are also objectives which deal with the analytical aspect of the study. They are:
  - a. To analyse the range of choice between different techniques of production and capital-labor substitution possibilities;
  - b. To estimate what potential future demand exists for the products of rural small-scale industries;
  - c. To analyse the entrepreneurial and other supply constraints to an expansion of rural small-scale industries; and
  - d. To estimate the supply response and employment potential of small-scale industries.
3. On the basis of the above analysis, the present study will then:
  - a. Identify the problems of small-scale industries and
  - b. Recommend alternative policies to meet those problems.

EMPIRICAL EVIDENCE

Although comprehensive data do not exist with respect to rural small industries, available evidence indicate that rural households engage in diverse productive activities apart from agricultural production. A recent I.L.O. study indicates that in rural Western Nigeria, 27 percent of employed males had their primary occupation in the rural nonfarm sector and 14 percent of the employed males were secondarily engaged in nonfarm activities.<sup>9/</sup> Thus, 41 percent of employed males were engaged in rural nonfarm activities. Similarly, the data presented by H. A. Lunning [1967, p. 77] reveal that 48 percent of employed males had either primary or secondary occupation in rural small industries.<sup>10/</sup> In addition, David Norman's data, generated from a survey of three villages in Northern Nigeria, show that approximately 47 percent of the average male working time in the major village of Dan Mahawayi was spent on off-farm activities.<sup>11/</sup> Also, available fragmentary data reveal large seasonal variations in labor allocation between agricultural production and nonfarm activities. For example, Lunning's study [1967, p. 77] reveals that while 65 percent of males in rural Sokoto Province were primarily engaged in nonfarm occupations during the dry season, only 6 percent were primarily engaged in this sector during the wet season. The available evidence on rural small industries is fragmentary

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<sup>9/</sup>Liedholm [1973, pp. 3-4] computed these figures from a recent I.L.O. report [1972, p. 117].

<sup>10/</sup>See Liedholm [1973, p. 3].

<sup>11/</sup>See Norman [1973, p. 29]. Each family adult spent 122.6 days per annum on off-farm activities out of a total of 262.7 days worked per family adult.

because since these rural industries were not the primary focus of researchers, no detailed information on this subsector was generated. Nevertheless, the evidence we have, however rudimentary, points to the fact that the rural small industry subsector deserves a detailed study. This will enable the presentation of a more complete profile and analysis of rural industries.

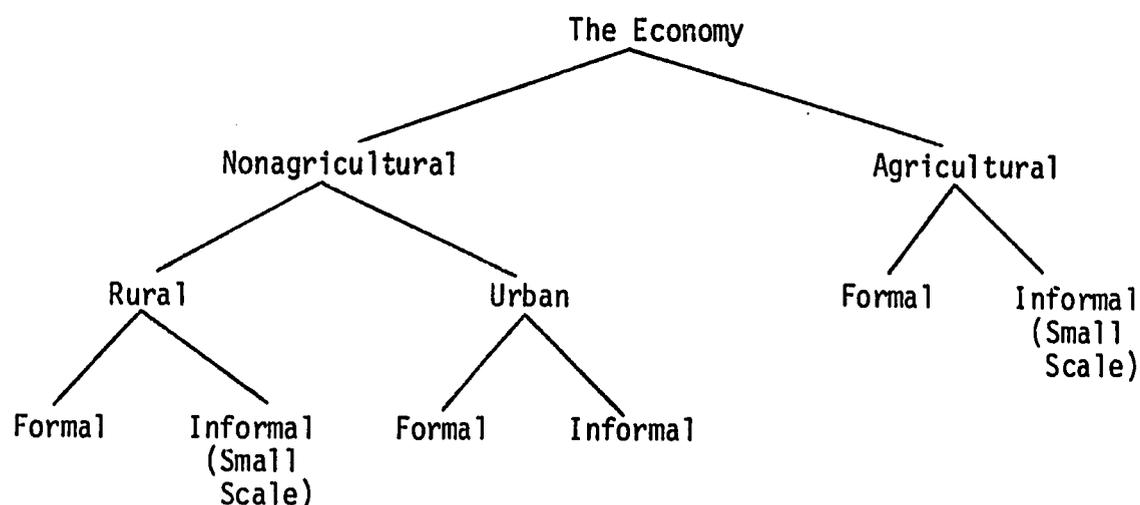
The question of growth of rural small-scale industries has been a controversial one. Liedholm [1973, pp. 12-13] has shown that evidence with respect to the growth of rural small industries is conflicting and inconclusive. Whereas the studies of Stephen Resnick [1970] and Montoya and Villalba [1969] indicate that these industries decline over time, those of Arthur Gibb [1972] in the Philippines, E. Gerken [1973] in Paktia, Afghanistan, and India National Surveys [1965] revealed an increased rate of labor absorption in these industries over time. Evidence exists for the linkages and employment potential for urban registered and unregistered small industries in India. Jan Herre van der Veen [1972], in his case study of Gujarat State, found that "unregistered" industries have a higher employment-output ratio than "registered" ones. His study, however, was limited to urban firms employing six or more persons. Thus, the rural and very small urban firms were not examined. One important contribution of this study will be to generate detailed information concerning the growth of rural small industries in Sierra Leone.

### THEORETICAL DEVELOPMENTS

Dual sector models as presented by scholars such as Lewis [1954], Fei and Ranis [1964], Harris and Todaro [1970] and Mellor and Lele [1972], focused attention on the traditional (agricultural) and modern (industrial) sectors. The modern sector is supposed to be the source of dynamism within the economy while the traditional sector slowly declines. So far this model has proved inconsistent with reality [ILO, 1972, p. 503]. In addition, the model did not explicitly recognize the small industries subsectors that exist either in the rural and urban areas. As a result, these models have not adequately handled questions of rural-urban migration and employment generation in the economy as a whole. Likewise, the existing national accounting framework includes agricultural and nonagricultural sectors (modern). The most that has been done was to split the sectors into large scale and small scale [Byerlee, 1971, pp. 45-58]. But, nowhere has the framework of national accounting and input-output models incorporated the rural nonfarm subsector. Yet there is neither a theoretical nor empirical justification for such an omission. However, the neglect of the small industries, especially those in the rural areas, meant an incomplete presentation of national income estimates. This situation implies a lack of adequate basis for planning to solve some important national economic problems. Due to such serious limitations of viewing the economy from a dual sector framework, economists began to produce a more rigorous and comprehensive theoretical model for sectoral analysis.

The first theoretical model that includes nonagricultural activities in an agrarian economy was produced by Stephen Hymer and Stephen

Resnick [1969]. In their model, rural households not only engage in agricultural production but also are involved in nonfarm, nonleisure type of productive activities called "Z-good" activities. But they have also postulated that the traded products of the "Z-good" activities are inferior goods so that as rural incomes increase, urban produced and foreign imported goods are substituted for the products of rural small industries. As a result, over time, such industries decline. Therefore, one hypothesis that will be tested in the study is that products of small-scale industries in the rural areas of Sierra Leone have positive income elasticities. More recent authors like Gerken [1973], Thirsk [1973] and Huddle and Ho [1972] have departed from the Hymer-Resnick definition of Z-good activities by restricting these to goods and services produced at home. Also, an I.L.O. publication [1972] has recognized the need to go beyond the two sector models. While still maintaining the agricultural and industrial (nonagricultural) sectors framework, the I.L.O. Kenya study introduced formal, government-related and informal nongovernment-related subsectors. Thus the study identified at least four sectors of the economy. Even though this framework did not explicitly recognize the rural and urban dichotomy, it is much better than the two sector models in showing intersectoral dynamics. There is no reason why the nonagricultural sector cannot be split into rural and urban sectors and within each sector; the formal and informal subsectors could be identified. Thus, it is possible to legitimately recognize six subsectors as shown on the following page:



Oshima [1971], recognizing the need to analyse employment creation and also identify forces and processes that make for accelerated growth, developed a tri-sector model in which the nonagricultural sector has been split into labor intensive and capital intensive subsectors with agriculture remaining as a labor intensive sector. It has to be remembered that he recognized a fourth sector, the government sector, even though he did not include this last sector in his theoretical analysis [p. 165]. Moreover, Oshima attaches considerable importance to the labor intensive small-scale industrial sector. Thus one hypothesis that will be tested in the research is that there is a direct relationship between the size of firm and the capital-labor ratio. Finally, Byerlee and Eicher [1972] developed a four sector model of the economy, made up of urban large-scale sector, urban small-scale sector, rural nonfarm sector and agricultural production sector. Again, this model can be expanded as in the case of the ILO model to recognize government and private participation in agricultural and industrial activities.

The Hymer-Resnick model lends itself to certain modifications which can render it more empirically operational. First, Liedholm [1973, pp. 23-26], has suggested that the Z-good concept is too general and needs disaggregation into three categories--nontraded home production for own use, traded production undertaken as a secondary occupation and traded production undertaken as a primary occupation. Second, he suggested that the model should be modified to take account of the potential urban or foreign based demand for rurally produced goods. Huddle and Ho [1972] have evidence of high income elasticities for rurally produced traditional and cultural goods. Third, Liedholm emphasized that the "Z-good" concept cannot be restricted only to consumer goods, but should be expanded to include intermediate goods. Bautista [1971] has developed a theoretical model in which "Z-goods" could be consumed or used as intermediate capital input for agricultural production. Finally, he pointed out that the Hymer-Resnick model could be modified to explicitly take account of the backward and forward linkages between the rural nonfarm activities and the agricultural sector. Apart from such linkages, Staley and Morse [1965, p. 46] point out a different kind of linkage that exists between rural artisal production and urban industries, especially where both perform complementary functions. They cited wholesale and retail shops, shoe production and shoe repairing as examples of such complementarity. Another hypothesis that will be tested in the Sierra Leone study is that there exists strong linkages between small-scale industrial production in the rural areas and urban industrial production.

### THE LINEAR PROGRAMMING MODEL

In order to examine the patterns of resource allocation among rural small-scale industries, estimate supply response and analyse how product response compares with demand requirements, a linear programming approach will be employed. Thus a one-year linear programming model will be applied to the different representative firm situations (discussed in the next section).

At the present moment, it is not clear which modeling procedure is to be used. At least three possibilities can be available. One possibility is to programme each representative firm for each industry on a regional basis and maximize profits to that firm as a single decision-making unit. The problem that might have to be faced here is that the representative firm could be restricted to just one process. In this case, it will be difficult to programme such representative firms on a regional basis. Another possibility will be to programme each representative firm type on a national basis. The advantage here is the possibility of identifying different processes for a representative firm situation. But there might be a risk of encountering a higher degree of aggregation error. A third alternative will be to programme all the representative firm situations on one regional or national model and maximise income to the region. An implicit assumption here is that each representative firm situation will maximise profits so that the sum of the individually maximised profits will equal profits or income maximised at the national level. This procedure assumes away the inherent aggregation problem (discussed in the next section). Secondly, the procedure of maximising regional or national income cannot focus on the individual firm as a

decision-making unit. Thus, the policy relevance of such a method is seriously limited.

Whichever model is adopted, the standard linear programming approach will be pursued. Each model will consist of three components--the objective function, the activity set and the constraint structure. In a compact form, each model will:

$$\text{Maximise } Z = \sum_{j=1}^n C_j X_j ; \quad j = 1, 2, \dots, n$$

$$\text{s.t.} \quad \sum_{j=1}^n A X_j \leq B$$

and  $X_j \geq 0$  where

$Z$  = profits or net cash returns

$C_j$  = vector of prices/costs/rate of interest, etc.

$X_j$  = vector of activities

$A$  =  $m \times n$  matrix of technical coefficients

$B$  =  $m \times 1$  vector of available resources (assuming  $m$  available resources)

### Basic Assumptions of the Model

#### 1. Additivity of Resources and Activities

The property of additivity means that the sum of resources used by different activities must equal the total quantity of resources used by each activity for all the resources, individually and collectively [Agrawal and Heady, 1972, p. 31]. This implies that no interaction

is possible in the amount of resources required per unit of output. In this study, this assumption can be accommodated by properly formulating activity levels to ensure clear distinctions among resource usage.

2. Linearity or Proportionality

The property of linearity implies constant returns to scale. So far, there is no empirical study of economies of scale among rural small industries in Sierra Leone. However, there is some evidence for size economies in rice production in Sierra Leone. Njoku [1971] and Spencer [1973, pp. 19-21] have empirical evidence of existence of size economies in the use of labor. It is envisaged that in the study of small-scale industries, data will be fitted into a regression model to determine the type of correlation that exists between the relevant variables. It is possible that with adequate structuring of representative firm situations, constant returns to scale will be a valid assumption. If indeed economies of size exist, then it would be necessary to further subdivide activities into small levels within which constant returns to scale will be assumed to exist.

3. Non-negativity of Decision Variables

The restriction of  $X_j \geq 0$  makes sense because firms cannot produce negative quantity of textiles or sell negative quantities of products.

#### 4. Divisibility of Activities and Resources

This property assumes that we can use factors and produce commodities in fractional quantities such as .5 machine-hours or .72 labor-hours and 46.3 yards of textiles respectively. It is also possible to round up figures without violating the restriction. Since the acquisition and salvage of resources like machinery will call for the use of integer programming (which is not contemplated in the present study), provision will be made for renting the services of such resources. In this way, the assumption of divisibility is maintained.

#### 5. Finiteness of the Activities and Resource Restriction

There will be a limited number of activities and restrictions in each model. Otherwise, the model cannot be programmed and optimal solutions cannot be obtained.

#### 6. Single-Valued Expectations

This property implies that resource supplies, input-output coefficients, prices of resources and activities are known with certainty. To a certain extent, this seems to be an unrealistic assumption. To ameliorate this apparent lack of realism, some sensitivity analysis will be performed while programming the data to test the stability of the optimal solutions.

### Activity Set

In specifying activity set for each enterprise, attempts will be made to identify and include different processes and technological alternatives. The following activities will be included:

1. Production activities, sales of output, purchase of variable inputs;
2. Labor hiring and selling valued at opportunity cost for unskilled labor and wage rate for skilled labor;
3. Renting of machinery at exogenously determined rates; and
4. Financial activities--made up of savings, borrowing and debt repayment.

### Constraint Structure

Resource restrictions for the representative firms would be the averages of the resources used by the firms that constitute a homogenous group from which the representative firm was constructed. For this reason, a thorough inventory of resources used by the firms will have to be taken.

The major resources will be labor, machinery and cash. There will also be regional demand restrictions on the major activities that will be programmed (see section on demand projections). With respect to cash, a distinction will be made between working capital and borrowings at various rates of interest. Working capital will be made up of cash generated from sales, savings, farm income less costs of inputs, consumption and debt repayment. The limits of borrowable funds could be determined by the amount of security the farmer has to offer and the extent of government guarantee on funds borrowable for investment.

### Results Expected from the LP Model

The LP model is expected to give information with respect to how the representative firms allocate resources to nonfarm activities. It will throw light on what factor remunerations are in different enterprises. Within the model, it will be possible to carry out some sensitivity analysis. For example, by altering product prices we could derive the ceteris paribus supply response; by varying input prices, we could obtain also the ceteris paribus derived demand for that input; we could vary labor and capital costs within a rural nonfarm enterprise to generate a short-term factor substitution possibility; finally by varying a set of prices relative to others, we could trace a production frontier. Finally, it is envisaged that the representative firm models will permit the development of a macro-model to trace interregional flow of resources in response to changes in certain policy variables.

### Supply and Demand Projections

This study will attempt to carry out supply and demand projections for the major rural nonfarm activities over the period 1974-1984. Therefore some specific assumptions will have to be made. On the supply side, projections will have to be based on the resource use coefficients (production costs) and prices determined during the survey, assuming that these will not change over a ten-year period. But it is hoped that interaction with entrepreneurs and officials of the industry will reveal the past trend of prices as an indication of what is to be expected in the future.

On the demand side, the independent variables to be considered are prices of products whose functional relationship is to be estimated, price of substitutes, per capita income and population. A procedure similar to that used by Spencer [1973, pp. 34-35] will be a guide as to what can be done. He estimated the domestic requirements in the rural and urban areas for rice in 1980. His equation is as follows:

$$\text{Demand (long tons)} = \frac{\text{Per capita consumption (lbs./day)} \times \text{Population} \times 365}{2240}$$

where per capita daily demand was projected using income growth rate of 3 percent and 4 percent in 1974-1975 and 1979-1980 respectively and an income elasticity of demand of 0.5.

In the study of rural small industries, it is possible that population projection will be based on the results of the forthcoming 1974 population census. Estimates of the rural income elasticities of demand for the different commodities will be obtained from the consumption study of the integrated research.

### THE REPRESENTATIVE FIRM SITUATION

From the data that would be generated in regard to rural small-scale industries in Sierra Leone, representative firm situations will be constructed. It is not clear, however, whether the representative firm or firms will be constructed on a regional or national basis. This might depend on whether the data that will be collected will reveal much regional variation. It is planned that representative firms will be constructed for the small industries that account for about 70 to 80 percent of the employment in the rural nonfarm sector.<sup>12/</sup>

The use of representative firm situations have some limitations with respect to estimating supply response. First, the representative firm approach is static whereas firms operate in a dynamic setting. Questions about differing internal management problems, and changes in institutions and technologies are not accounted for. In this regard, it is possible that analysis on a simulation framework will be very useful. But there is no contemplation to use a simulation framework for the present study. Second, some scholars maintain that the representative firm approach yields normative information and that the predictive power of the approach depends on whether entrepreneurial decision-making processes are incorporated into the analysis.<sup>13/</sup> Third, Harold O. Carter [1963, p. 1454] points out the practical problems of omitting some important variables like managerial ability or risk aversion which affect supply response just be-

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<sup>12/</sup>Liedholm [1973, p. 5] points out that the "sales workers" and "craftsmen and production process workers" account for over 70 percent of the employment in the rural nonfarm small-scale activities.

<sup>13/</sup>See Tweeten [1963, p. 1464].

cause such variables are difficult to quantify. However, whether these variables are to be used for stratification or not will depend on the nature of the data that will be generated. Fourth, the approach faces serious problems of aggregation bias. Thomas Miller [1966, p. 52] points out that aggregation bias exists, "when the sum of the solutions for each of the individual farms in the set does not equal the estimate obtained by determining the optimum solution to the entire set directly (or the total obtained by weighting the solution for the representative farm)."

While recognizing the first three limitations of the representative firm approach, more attention will be directed to the problem of aggregation bias. Richard Day [1963] has offered what he called sufficient conditions for exact aggregation. They are as follows:<sup>14/</sup>

1. That all firms must have identical matrices of input-output coefficients;
2. That firms have only proportional variation in net return expectations; and
3. That firms have only proportional variations in constraint vectors.

Day used the duality theorem of linear programming to prove the sufficiency of these conditions. Whether the sufficient conditions will be met is a purely empirical question. It is however not clear what can be done if those conditions are not satisfied in real life situations. Recently Paris and Rauser [1973, pp. 660-665] have pointed out that, "It is not possible to find empirical cases which fit Day's sufficient conditions." They, therefore, suggested the need to find less binding conditions that can be empirically useful. Their formulation of suffi-

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<sup>14/</sup>See Miller [1966, p. 54].

cient conditions do not require either equality or proportionality among the elements of the firms. They do however require equal dimensionality of all the firms' problems. Such equal dimensionality was achieved by introducing a set of diagonal matrices whose diagonal elements are strictly positive. Again, one wonders whether the equal dimensionality condition will directly fit into real life situations or will be achieved by design. While the aggregation problem seems quite insurmountable, an attempt will be made to ensure that homogenous groupings are provided for the representative firms. Adequate weighting systems will be used to take account of errors that tend to be compounded in the aggregation process.

Nevertheless, the representative firm approach has its advantages. Because the cost of programming each individual firm is prohibitive, the approach allows a reasonable degree of aggregation of results to enable estimation of aggregate supply responses. Of course how useful the approach is depends on how homogenous the firms are in terms of resources and market relations and the purpose of the research analysis. M. H. Becker [1963, p. 1456] emphasized that, "considerable use can be made of this approach to exemplify resource combinations necessary to attain given income levels and to provide guides for the best combination of resources."

It is envisaged that phase I of the survey (explained in the section for field work) will reveal the number, kinds and different characteristics of the firms and entrepreneurs and yield a clue as to the major variables that determine supply response. Such information is necessary to answer specific questions as to the number of representative firms and the

appropriate procedure for structuring these firms. For example, the age of the entrepreneur, education, achievement, initial capital, number of workers employed and rates of profit are factors to be considered to ensure that the representative firm typifies a set of homogeneous situations common to a given group of firms.

### ENTREPRENEURAL STUDY

The entrepreneur whether defined as innovator (Schumpeter), risk bearer (Frank Knight), a coordinator of factors of production (Marshall), has an important role to play with respect to economic development. He performs the constant function of perceiving productive opportunities, gaining control over factors of production, organizing productive resources, and managing the continued operation of the productive unit [Harris, 1967, pp. 2-4].

### Brief Review of Entrepreneurial Studies

Most previous entrepreneurial studies in India and Pakistan have adopted a single factor approach. Peter Kilby [1971, pp. 294-355] has an excellent review of such studies, some of which are purely sociological, others historical or anthropological, and the rest essentially economic in nature. These studies have two serious limitations. First, their narrow perspective impedes the changes of identifying the important variables that determine entrepreneurial success. Second, the fact that most

of these studies are urban-oriented does not tell us much about rural entrepreneurial supply.

In Africa, the major entrepreneurial surveys are those of Harris [1970] in Nigeria, Kilby [1962] in Eastern Nigeria, Callaway [1967] in Ibadan, Morris and Sommerset [1971] in Kenya, I.L.O. [1970] in rural Western Nigeria and Nafziger [1970].<sup>15/</sup> These studies have dealt extensively on the general characteristics of entrepreneurs. Such characteristics include age, education, previous occupation and inputs. But evidence on the characteristics of rural entrepreneurs is still very inadequate to enable a comparative analysis of rural and urban entrepreneurship. Apart from the I.L.O. study [1970] of rural Western Nigeria, the rest of the studies have concentrated attention on urban entrepreneurs. The Sierra Leone study will fill this gap by collecting detailed information with respect to rural entrepreneurs. The Sierra Leone study of entrepreneurship will adopt the multi-disciplinary approach as was done by Harris [1967] and attempt to identify determinants of entrepreneurial supply or success. Also a more systematic attempt will be made to identify markets for inputs and outputs of entrepreneurs and obtain more valid measures of output or value added [Kilby, p. 314]. Finally, it is hoped that a more rigorous analysis of data to be collected will be done to yield both descriptive and quantitative results for different kinds of entrepreneurs (trader or craftsman).

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<sup>15/</sup>Liedholm [1973, pp. 8-10] has an excellent review of these studies.

### Supply and Demand of Rural Entrepreneurship

The study of rural entrepreneurship will be carried out within the framework of demand and supply analysis. Nafziger has pointed out [Kilby, 1971, p. 314] that the demand for entrepreneurs is determined by a schedule of expected returns to entrepreneurship which is in turn dependent on the overall socio-political economic environment. In John Harris' terms [1970], demand is provided by potential opportunities in the economy. Variables that might be included in the economic environment will be rate of profitability which in turn will be a function of product and factor prices, development plans and policies as these affect industry, trade and commerce. Social environment will include education (literacy rate), family structure, population growth rate, inheritance regulations. Political environment will include political stability, party system and party affiliation.

On the supply side, John Harris [1967, pp. 2-38] has discussed three approaches to the study of supply of entrepreneurship: psychological, sociological and economic. Briefly, Nafziger [Kilby, 1971, p. 315] defines entrepreneurial supply to be a function of entrepreneurial capacity which in turn is a function of motivation, social community, family structure, time perspective, political milieu, education, training, work experience, market institutions, government policies and remunerations in competing occupations. It is obvious that some variables that account for the demand, also account for the supply. Some variables will be more important than others in accounting for the supply or demand. Some render themselves more to quantitative measurement than others. Yet there are others that can only be measured qualitatively. These situations will

no doubt determine the kind and quality of analysis that can be done. One hypothesis that will be tested in the entrepreneurial study is that some variables like education, managerial skill, technical abilities, initial capital outlay are important determinants of business success. It is important to remember that most surveys of African entrepreneurship concluded that there is virtually no correlation between education and business success.<sup>16/</sup>

### Data and Analysis

In view of the supply and demand variables listed out, data will be collected with respect to extent of mobility among entrepreneurs between place of birth and business location, ethnic group, religious affiliations, level of literacy, profits and general characteristics of entrepreneurs. Such characteristics will include number of employees by types (skilled or apprentice), form of business organization, asset structure, sources of financing, and types of problems that rural entrepreneurs face.

In view of the fact that this study will generate both qualitative and quantitative information, the analytical procedure that can be used poses a problem. At the minimum chi-squared tests will be used to estimate the dependence of entrepreneurial success (rate of profits) or supply on certain variables. Also, the analysis of covariance technique is contemplated for estimating the elasticities of supply of rural entrepreneurship. This means that all the qualitative data will be entered

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<sup>16/</sup> See Morris and Sommerset [1971, p. 215]; Nafziger [1970]; Kilby (1965, p. 92] and Harris [1970, p. 310]. Also, see de Wilde [1971, p. 12].

as binary variables in the regression model. The consequence of this will be that some degree of precision will be lost since the exact levels of the variables cannot be used.

In addition to the primary data that will be gathered, an attempt will be made to extract from official sources information regarding the impact of the Small Industries Division of the Ministry of Trade and Industry on rural small-scale industries. The role of public policies in regard to rural public works, industrialization, entrepreneurial training, village and community developments will also be examined.

#### GEOGRAPHICAL AREAS TO BE STUDIED

An understanding of the administrative setup in Sierra Leone is necessary in order to understand the procedure according to which the country has been stratified for the purpose of this study. The following schema presents the administrative machinery from the provincial to the local levels (see Figure 1).

The country has been split (following Nitra's stratification procedure [1969]), into nine regions to reflect homogeneous topographical environments which in turn determine the specific agricultural practices of each of the regions. The nine regions (shown in Figure II) fit into the physical map of Sierra Leone (Figure III) which is made up of the Freetown peninsula, the coastal swamp, interior plains and the interior plateau and hill regions. An important significance of the nine regions is that they have been constructed so as to follow chiefdom boundaries.

There are in all about 147 chiefdoms which fit into the 12 districts contained in the three major provinces in Sierra Leone.

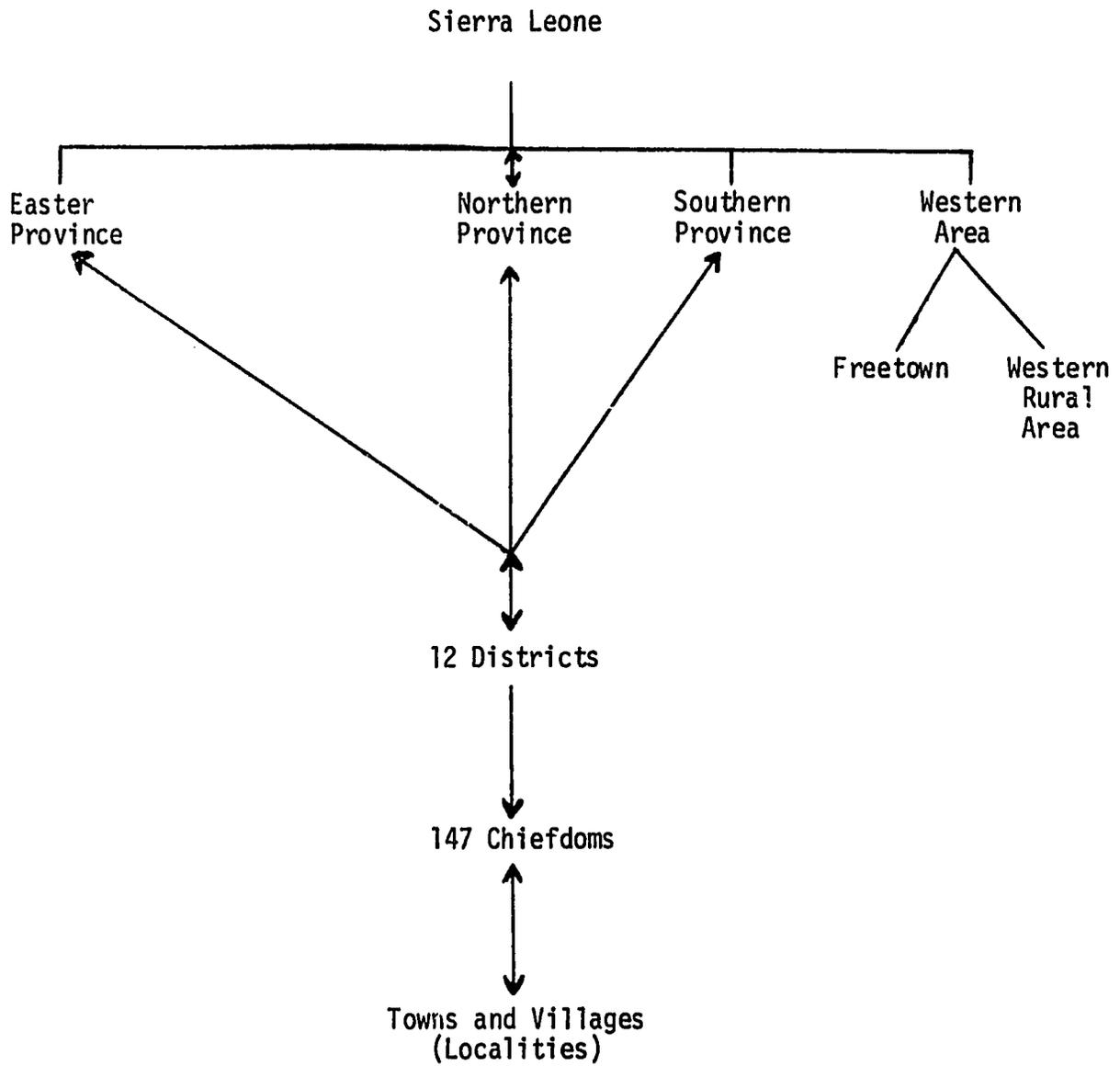


Figure I. Sierra Leone: Major Administrative Boundaries

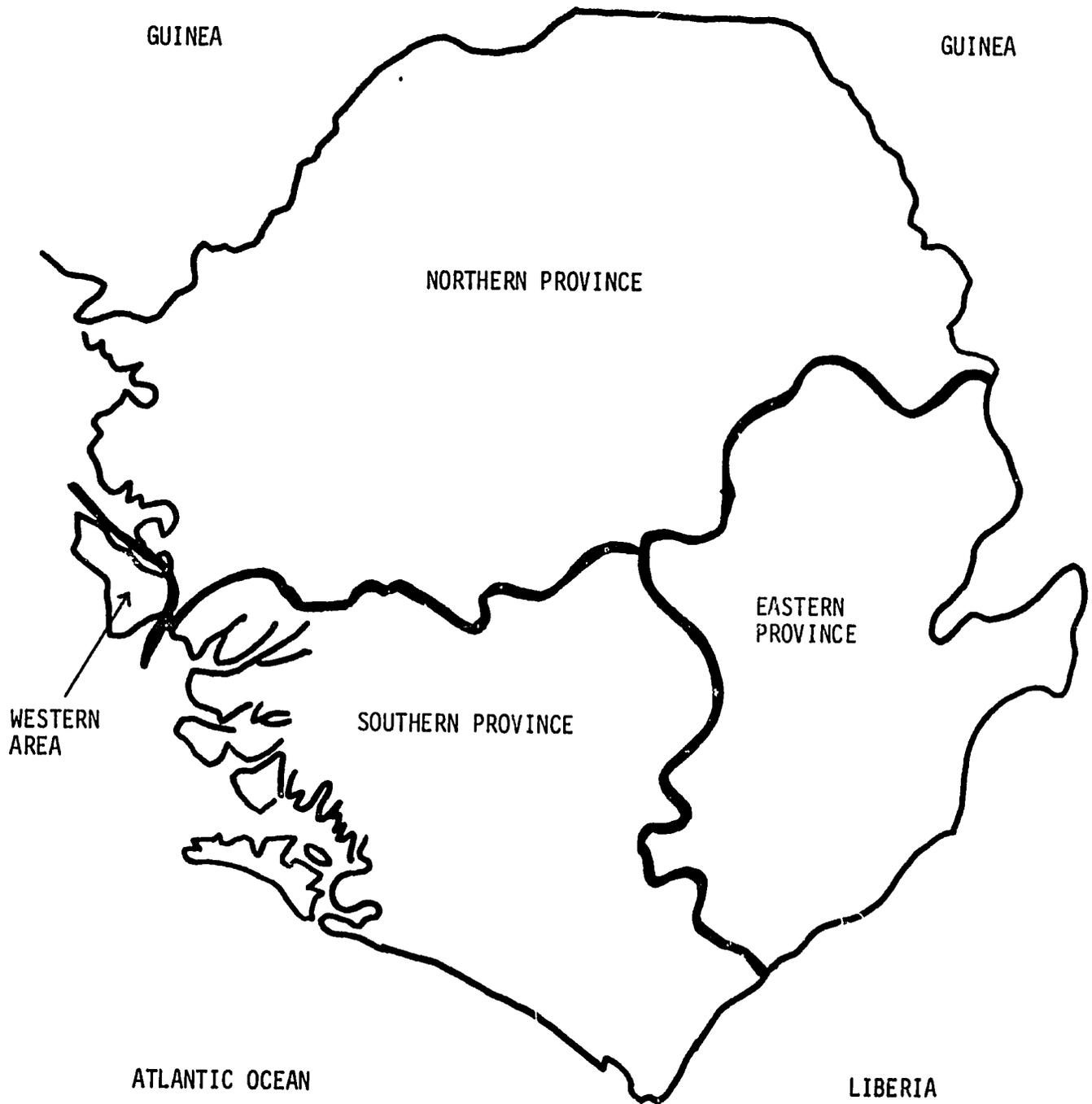


Figure II. Nine Regions for the Sierra Leone Study

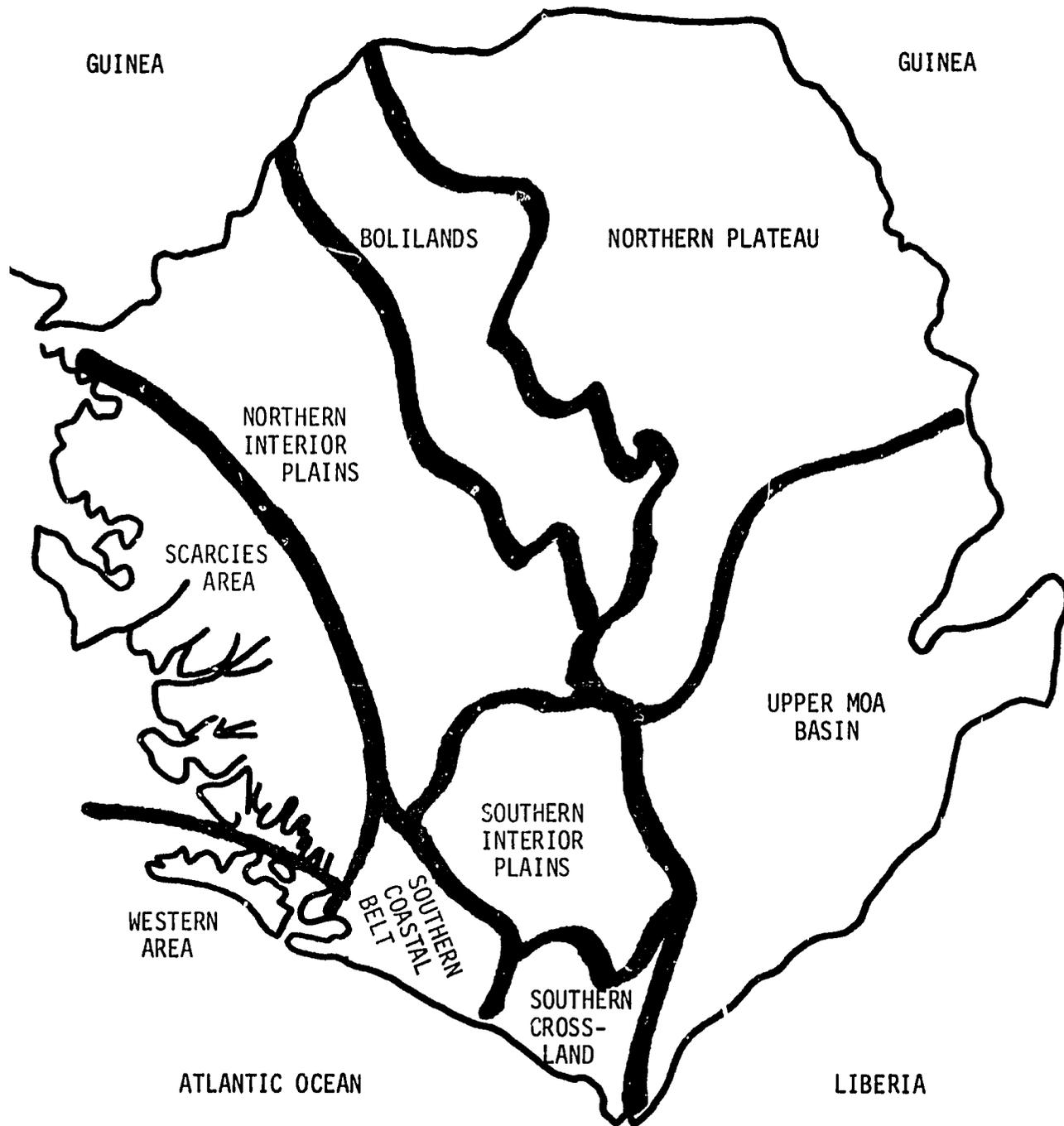
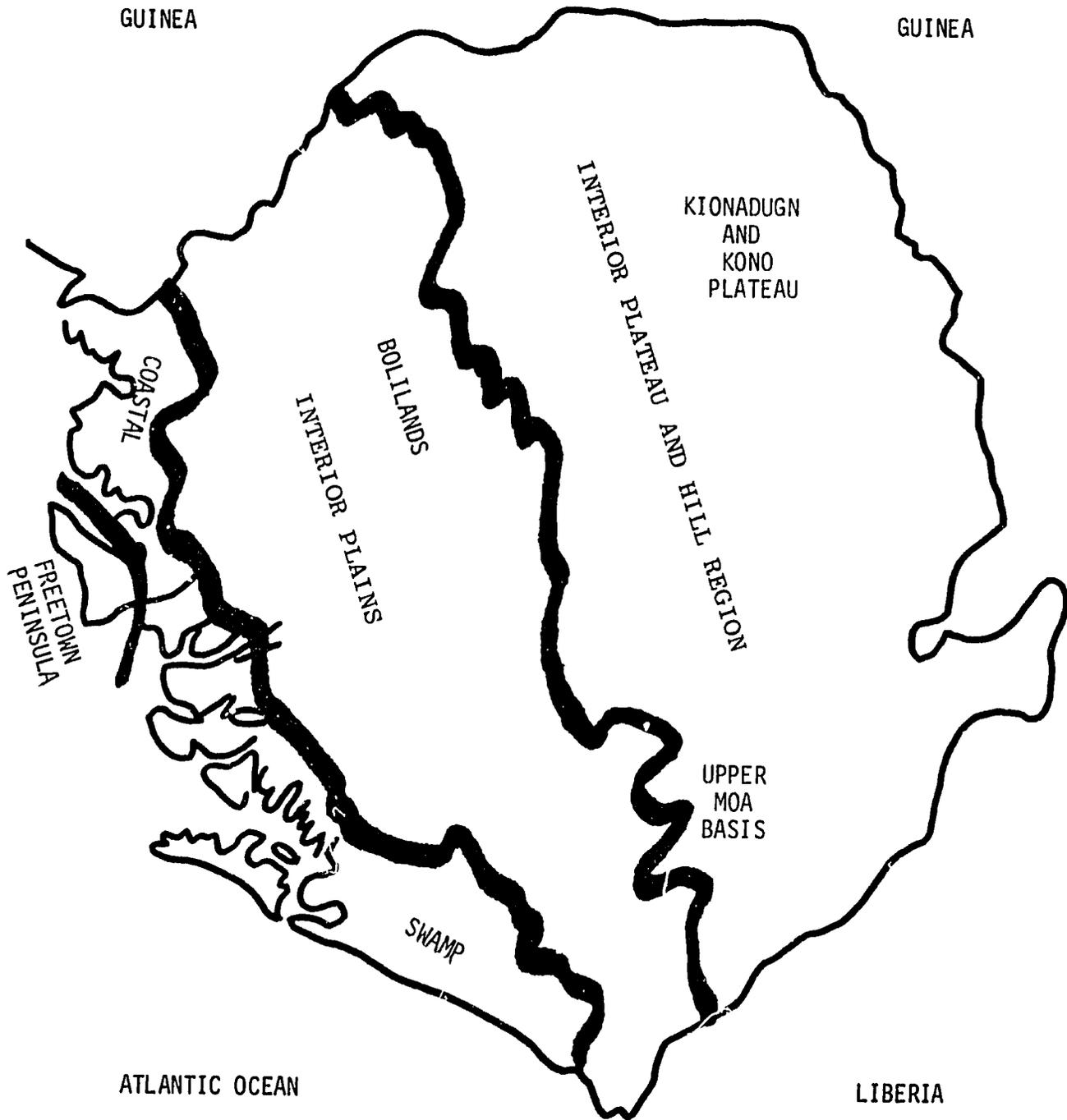


Figure III. Sierra Leone: Physical Map



## FIELD WORK

### Duration of Survey and Field Staff

The field work has been planned to last for about 15 months. For the successful implementation of this study four enumerators have been recruited for a period of 15 months. These are high school graduates whose score in the West African High School Certificate examination is grade 3. Each enumerator must be able to speak the language of the area he is working in but must not originate from that area. Since high school graduates with grades 1 or 2 have higher probability of getting into the university or being absorbed first in government jobs, recruitment of grade 3 graduates ensures continuity on the job. The enumerators will be provided with the necessary equipment including bicycles to facilitate their work. They would be trained for a period of two weeks at Njala University College before being sent to the field. Periodic retraining sessions will be arranged to suit the convenience of those involved. In addition to four field enumerators, a research assistant has been hired for this study for a period of two years. The research assistant is a college graduate in economics or agricultural economics. He will be paid the Njala College wage for research assistants and reasonable travel allowances. The research assistant will be involved in training sessions, supervising field work and preliminary processing of field data. Finally, there is also a field supervisor who has been hired for a period of 18 months. He will be entitled to a reasonable monthly wage and per diem. His duty will be mainly supervising field work and ensuring that the needs of field enumerators are taken care of.

### Sampling Procedure

Sampling will be carried out in two phases. The first phase will involve an estimate of the population of small-scale industries in rural areas of Sierra Leone. The smallest sampling units that will be studied are enumeration areas.<sup>17/</sup> All the 25 enumeration areas that will be sampled in the farm management study will be covered in the first phase of this study. One enumeration area will be randomly selected in Freetown peninsula. For the rest of the eight regions, three enumeration areas will be randomly selected. These enumeration areas will be essentially rural in the sense that their population will not exceed 2,000 people and agricultural production will account for not less than 75 percent of rural activity.<sup>18/</sup>

Apart from sampling the enumeration areas, larger rural localities will be sampled especially those that are serviced by the enumeration areas. A procedure of stratified sampling on the basis of size of localities will be followed. Empirical evidence shows that the amount of nonfarm activity tends to vary with the population size of rural settlements.<sup>19/</sup> Also, the I.L.O. survey [1970, p. 120] indicates that the occupational distribution of these localities is importantly influenced by their market or central place functions.<sup>20/</sup> The following table

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<sup>17/</sup> Each "enumeration area," which is a division constructed by the Central Office of Statistics for 1963 population census, contains an estimated number of 200 farm families [Spencer, 1972, p. 8].

<sup>18/</sup> 1963 Population Census of Sierra Leone has the relevant information.

<sup>19/</sup> See Liedholm [1973, p. 4].

<sup>20/</sup> Ibid.

shows the sampling units that will be covered.

Enumeration Areas	Larger Localities
25 enumeration areas to be covered in the farm management marketing and migration studies.	<ul style="list-style-type: none"> <li data-bbox="874 477 1507 576">i. 1 percent of the 413 localities with population ranging from 500-2,000 people.</li> <li data-bbox="874 610 1507 709">ii. 30 percent of the 43 localities with population ranging from 2,000-5,000 people.</li> <li data-bbox="874 743 1550 817">iii. 50 percent of the 16 localities with population ranging from 5,000-20,000.<sup>a/</sup></li> </ul>

<sup>a/</sup>United Nations [1969] defines as rural, places with population of less than 20,000. Also, see Liedholm [1973, p. 2]. The definitions of rural and urban vary from country to country.

The decision as to what percentage to use for each population category is purely arbitrary. However, decision was guided by the desire to strike a balance between the precision that can be gained from having a larger sample and the cost of sampling. At this stage of the survey, enumerators will be required to obtain information for each establishment identified on types of activity, number of works, type of workshop and number of machines used. This survey is envisaged to last for about one month.

In the second phase of the survey, a stratified sample survey will be drawn from the list of establishments. It is envisaged that the information obtained from Phase I of the survey will reveal the basis for stratification. Essentially input-output data will be collected. Information on the value and quantity of input and output, types of activities, sources of input, value and quantity of capital assets will be gathered. Generally, establishments will be visited once a week to collect infor-

mation. But labor inputs will be collected in hours and for this purpose, establishments will be visited twice a week. In collecting data, different classifications of rural industries will have to be borne in mind. Classification by market orientation or degree of specialization or capitalization will throw light on future prospects of survival of such industries. The types of information that will be collected with respect to entrepreneurship have already been mentioned in the section dealing with entrepreneurial study. Some of the information will be collected twice a year. Frequency of visiting establishments will depend on what kind of data there is to be collected.

#### POLICY RELEVANCE OF RESEARCH

The results of this research will be useful in development planning. First, this study will generate information that does not exist at the moment with respect to rural small-scale industries. Such information will spotlight the key structural parameters of the rural nonfarm sector and these can be related to the existing parameters of the farm subsector. A knowledge of such structural relationships is necessary in order that planners will be able to trace employment, output and income distribution effects of government policies.

An important developmental question in regard to rural small industries is what policies will seek to increase productive efficiency of these industries thus making them more viable.<sup>21/</sup> This question

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<sup>21/</sup>See Staley and Morse [1965, pp. 318-319].

seeks policies that will encourage the establishment and growth of most suitable types of industries and facilitate adaptive readjustments. On the contrary, Staley and Morse [1965, p. 58] gave evidence in Ceylon where the hand loom weaving industry survived only because of governmental patronage. They therefore emphasized the need for a more detailed survey of small industries in order to determine artisanal problems and their future needs. Some of the problems mentioned by Staley and Morse [pp. 88-89] include unprogressive technology, lack of qualified supervision, low productivity, resistance to change, poor bargaining position, lack of markets, high costs, poor management and high birth rates (especially among cottage or household industries). Policy measures are needed to enable present artisans to become aware of new opportunities, guide the training of youths to enter expanding trades and improve the managerial competence of rural artisans.

To answer the policy question also, there is need to identify rural industries that will grow and those that will become obsolete. In this regard, income elasticity coefficients that will be generated in the consumption study of the integrated research project will give an idea of the demand prospects facing the products of rural nonfarm activities. Moreover, among the ones that will grow, there is need to identify those that need immediate development and those that deserve later attention. Staley and Morse [p. 47] maintain that what is at times called a decline turns out to be a transformation of the functions and ways of operation of the small industries. Thus they have pointed out the pattern of complementarity that exists between modern factories and traditional small nonfactory types and have partially attributed the decline of

small industries to impacts of new products and new technologies where these are substitutes for those of the small-scale industries. It will not be possible to study the modern factories in detail and how the products of these relate to the products of rural small industries. However, some data exist and surveys will continue to be carried out in the Central Statistics Office in Freetown in regard to characteristics of businesses, types of activity, employment, value of sales and gross income of industrial establishments in the principal towns of Sierra Leone.

It is envisaged that the results of the analysis of this research will yield information that can be used by the relevant ministries in advising rural small-scale industry entrepreneurs on how best to allocate their resources and the most profitable lines of investment to undertake.

## BIBLIOGRAPHY

- Agrawal, R. C. and Earl O. Heady. 1972. Operations Research Methods for Agricultural Decisions. Ames: Iowa State University Press.
- Bautista, R. M. 1971. "Development and Trade in the Small, Open Economy: A Theoretical Treatment." Unpublished Ph.D. dissertation, Yale University.
- Becker, Manning H. 1963. "Discussion: Representative Farms--Guides for Decision Making?", Journal of Farm Economics, 45 (20): 1455-1457.
- Byerlee, Derek. 1971. "Agricultural Development and Urban Unemployment: A Simulation Analysis of the Nigerian Economy." Unpublished Ph.D. dissertation, Oregon State University.
- Byerlee, Derek and Carl K. Eicher. 1972. "Rural Employment, Migration and Economic Development: Theoretical Issues and Empirical Evidence from Africa." Rural Employment Paper No. 1, Department of Agricultural Economics, Michigan State University, East Lansing, Michigan.
- Callaway, A. 1967. "From Tradition Crafts to Modern Industries." The City of Ibadan: A Symposium on Its Structure and Development, edited by P. C. Lloyd, A. M. Mabogunje and B. Awe. Cambridge: Cambridge University Press in association with the Institute of African Studies, University of Ibadan.
- Carter, Harold O. 1963. "Representative Farms--Guides for Decision-Making?", Journal of Farm Economics, 45 (2): 1448-1455.
- Day, Richard H. 1963. "On Aggregating Linear Programming Models of Production," Journal of Farm Economics, 45: 797-813.
- de Wilde, John C. 1971. "The Development of African Private Enterprise," International Bank for Reconstruction and Development, Washington, D.C. (Mimeographed).
- Fei, J. C. H. and G. Ranis. 1964. Development of the Labor-Surplus Economy: Theory and Policy. Homewood, Illinois: Irwin, Inc.
- Gerken, Egbert. 1973. "Land Productivity and the Employment Problem of Rural Areas," Centre Discussion Paper No. 176, Economic Growth Center, Yale University, New Haven, Connecticut.
- Gibb, Jr., Arthur. 1971. "A Note: Defining the Nonfarm Employment Question," paper presented to Conference on Manpower Problems in East and Southeast Asia, Singapore.

- Harris, John R. 1967. "Industrial Entrepreneurship in Nigeria." Unpublished Ph.D. dissertation, Northwestern University.
- \_\_\_\_\_. 1970. "Nigerian Entrepreneurship in Industry," Growth and Development of the Nigerian Economy, edited by Carl K. Eicher and Carl Liedholm. East Lansing, Michigan: Michigan State University Press.
- \_\_\_\_\_ and Michael P. Todaro. 1970. "Migration, Unemployment and Development: A Two Sector Analysis," The American Economic Review, 60 (1): 126-142.
- Huddle, Donald L. and Thi-Min Ho. 1972. "The Contribution of Traditional and Small-Scale Culture Goods in International Trade and Employment," Paper No. 35, Program of Development Studies, Rice University, Houston, Texas.
- Hymer, Stephen and Stephen Resnick. 1969. "A Model of an Agrarian Economy with Nonagricultural Activities," The American Economic Review, 59 (4): 493-506.
- India, Government of. 1965. National Sample Survey #94. Calcutta, India: Cabinet Secretariate.
- International Labour Office. 1970. "Socio-Economic Conditions in the Ifo, Otta and Ilaro Districts of the Western State of Nigeria," Working Paper, ILO Fact-Finding Report for the Pilot Project for Rural Employment Promotion in the Western State, I.L.O., Geneva.
- \_\_\_\_\_. 1972. Employment, Incomes and Equity: A Strategy for Increasing Productive Employment in Kenya. Geneva: I.L.O.
- Kilby, Peter. 1965. African Enterprise: The Nigerian Bread Industry. Palo Alto, California, Hoover Institute Studies, Stanford University.
- \_\_\_\_\_. 1971. Entrepreneurship and Economic Development. New York: Free Press.
- Lewis, W. A. 1954. "Economic Development with Unlimited Supplies of Labor," Manchester School, 22: 139-191.
- Liedholm, Carl. 1973. "Research on Employment in the Rural Nonfarm Sector in Africa," African Rural Employment Paper No. 5, Department of Agricultural Economics, Michigan State University, East Lansing, Michigan.
- Luning, H. A. 1967. "Economic Aspects of Low Labor Income Farming," Agricultural Research Report No. 699, Centre for Agricultural Publications and Documentations, Wageningen, Netherlands.

- Mellor, John and Uma Lele. 1972. "Growth Linkages of the New Foodgrain Technologies," Occasional Paper No. 50, Department of Agricultural Economics, Cornell University, Ithaca, New York.
- Miller, Thomas A. 1966. "Sufficient Conditions for Exact Aggregation in Linear Programming Models," Agricultural Economics Research, XVIII (2): 52-57.
- Mitra, A. K. 1969. "Production, Production Requirements, Costs and Returns in Nine Resource Areas in Sierra Leone," Unpublished Report (9 volumes), UNDP (SF/FAO, Project IDAS, Freetown).
- Montoya, Miguel Urrutia and Clara Elsa Villalba. 1969. "El Sector Artesanal en el Desarrollo Colombiano," Revista de Planeacion y Desarrollo, 1 (3).
- Morris, Peter and Anthony Somerset. 1971. African Businessmen: A Study of Entrepreneurship and Development in Kenya. London: Routledge and Kegan Paul.
- Nafziger, E. Wayne. 1970. "The Relationship Between Education and Entrepreneurship in Nigeria," The Journal of Development Areas, 4 (3).
- Njoku, Athanasius O. 1971. "Labor Utilization in Traditional Agriculture: The Case of Sierra Leone Rice Farmers," Unpublished Ph.D. dissertation, University of Illinois.
- Norman, D. W. 1973. "Economic Analysis of Agricultural Production and Labor Utilization Among the Hausa in the North of Nigeria," African Rural Employment Paper No. 4, Department of Agricultural Economics, Michigan State University, East Lansing, Michigan.
- Oshima, Harry T. 1971. "Labor Force 'Explosion' and the Labor-Intensive Sector in Asian Growth," Economic Development and Cultural Change, 19 (1): 161-183.
- Paris, Quirino and Gordon C. Rausser. 1973. "Sufficient Conditions for Aggregation of Linear Programming Models," American Journal of Agricultural Economics, 55 (4, Pt. 1): 659-665.
- Resnick, Stephen A. 1970. "The Decline of Rural Industry Under Export Expansion: A Comparison Among Burm, Philippines and Thailand, 1870-1938," Journal of Economic History, 30 (1): 51-73.
- Sierra Leone, Government of. 1965. 1963 Population Census of Sierra Leone, Vol. 1-3. Freetown: Central Office of Statistics.
- \_\_\_\_\_. 1971. Annual Statistics Digest. Freetown: Central Office of Statistics.

\_\_\_\_\_. 1972. National Accounts of Sierra Leone, 1964/65 to 1970/71.  
Freetown: Central Office of Statistics.

Spencer, Dunstan S. C. 1972. "Micro-Level Farm Management and Production Economics Research Among Traditional African Farmers: Lessons from Sierra Leone," African Rural Employment Paper No. 3, Department of Agricultural Economics, Michigan State University, East Lansing, Michigan.

\_\_\_\_\_. 1973. "The Efficient Use of Resources in the Production of Rice in Sierra Leone: A Linear Programming Study," Unpublished Ph.D. dissertation, University of Illinois.

Staley, Eugene and Richard Morse. 1965. Modern Small Industry for Developing Countries. New York: McGraw-Hill Book Company.

Thirsk, Wayne R. 1973. "A Note on Z Goods, Marketed Surplus and the Labor Intensity of Small Farm Agriculture," Paper No. 40, Program of Development Studies, Rice University, Houston, Texas.

Tweeten, Luther G. and James S. Plaxico. 1963. "Representative Farms for Policy and Project Research," Journal of Farm Economics, 45 (2): 1458-1465.

Van der Veen, Jan H. 1972. "Small Industries in India: The Case of Gujarat State," Unpublished Ph.D. dissertation, Cornell University.