SPATIAL PATTERNS, LOCATION VARIABLES AND THE INDUSTRIAL STRUCTURE OF KISII DISTRICT'S AGRICULTURAL MANUFACTURING INDUSTRIES

BY

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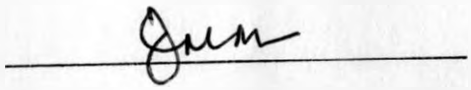
THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS, IN INDUSTRIAL GEOGRAPHY, IN THE FACULTY OF ARTS, UNIVERSITY OF NAIROBI.
1997

DECLARATION

This thesis is my original work and has not been presented for a degree in any other university.



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This thesis has been submitted with my approval as the University Supervisor

PROFESSOR R. B. OGENDO

DEDICATION

This work is dedicated to **One** who has not only loved me so much, but has also been a constant source of inspiration, comfort, joy and guidance throughout my life - **MY GOD.**

ABSTRACT

This study examines some aspects of agro-based industries in Kisii District. One of the aspects examined is that of the spatial patterns of the industries. The study also examines the variables that have influenced the location of these industries and which therefore are responsible for the prevailing spatial patterns. Finally, the study analyses industrial structural characteristics of the industries with a view to determining whether the characteristics contribute significantly to regional development. Literature has been reviewed on both the theoretical and empirical bases. A number of conceptual and theoretical frameworks/models are provided for the study.

Data analysis is based on primary data collected from a sample of industries where a recording schedule was utilized, and interviews conducted with industrialists in the study area. This analysis has utilized both descriptive and inferential statistics, as well as industrial location analytical tools. The descriptive statistics used include: means, percentages, frequencies and correlations. The inferential tools utilized are chi-square and factor analysis. The industrial location pattern is analyzed using the coefficient of localization and the location quotient as analytical tools.

Analysis of data relating to industrial spatial patterns indicates that there is a spatial concentration of agro-based industries in Kisii Municipality. Analysis of data on industrial location variables shows that the various variables influencing the location of agro-based industries can be summarised into mainly four factors, namely: personal preferences, market accessibility, industrial support infrastructure-cum-urban economies and government support-cum-labour-water supply. Analysis of industrial structural characteristics reveals the following: the technology utilized by industries is predominantly labour-intensive; the industries mainly

obtain their raw materials locally; the establishments manufacture primarily consumer goods; they produce goods largely for the local market; and the scale of production of industries is mainly very small and/or small.

Several conclusions have been drawn from the major findings of this study. It is apparent that a core- periphery type of development pattern exists in the study area with Kisii Municipality being the core and the rest of the study area being the periphery. Secondly, the industrial location variables influencing agro-based industries in Kisii District are mainly economic. Finally, the structure of Kisii District agro-based industries is largely centre-periphery orientated and hence inappropriate, and does not significantly contribute to regional development.

It is recommended that measures be taken by planners and policy makers to effectively deal with the apparently polarised space economy of Kisii District. It is also recommended that the identified industrial location variables be used as policy instruments to influence equitable industrial and overall regional development in the study area. In addition, there is need to closely study the industrial structural characteristics of the study area with a view to determining ways and means through which the industries could be more diversified so as to play a more significant role in regional development.

It is imperative to undertake further research in all manufacturing and allied service industries in both Kisii District and other parts of Kenya in order to achieve a nationally more comprehensive and well diversified and equitable pattern(s) of industrial development in Kenya.

ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to the following individuals and institutions for their support during the preparation of this thesis.

I wish to thank the University of Nairobi, through the Chairman of the Department of Geography, Dr. D.N. Mungai, for offering me a scholarship to enable me to undertake the masters degree programme. I am grateful to the Office of the President for granting me a research permit.

However, my deepest thanks and gratitude go to my supervisor, Professor R.B. Ogendo whose assistance, encouragement and supervision throughout the preparation of this thesis has been very valuable. He tirelessly pinpointed out mistakes and made constructive criticisms which have contributed to the successful completion of this work.

I am also indebted to the entire staff of Geography Department who have been, in one way or another, instrumental in my successfully undertaking this work. I am particularly grateful to the Chairman of the Department, Dr. D.N. Mungai, who has assisted and encouraged me throughout the postgraduate programme. His interest in my work has been a source of inspiration and stimulation. I am also very grateful to Dr. E.M. Irandu who has, not only taken keen interest in my progress, but has also made very valuable suggestions which I have incorporated in this work.

I wish to extend my thanks to Mr. F. Mwangi who assisted me in data analysis, Mr A. Nyaribo, Mr. J. Kirema and Mr. I. Ayuyo who assisted me in the cartographic work. Mr. V. Abuga, the departmental librarian, has been of great assistance to me.

I am grateful to the following for their assistance during the research period, namely: officials of the Districts Industrial Development Office (Kisii District); officials of the Districts Trade Office (Kisii District) and various industrialists who took time off their busy schedules to have discussions with me.

I am deeply indebted to my Dad, my late Mom, brothers and sisters and other relatives who have been a source of inspiration and support throughout my life. My deepest appreciation goes, particularly, to my elder brother, Mr. Johnson Nyabira Miyogo and his family, for their constant support, inspiration and encouragement without which I would not have gone this far.

My gratitude goes to Betty N. Ogugu and Esther N. Wanjoga, close friends, for their prayers and concern for my progress. Ken J. Omoke and John M. Omonywa have also been an inspiration to me.

The typing of this thesis has been a joint effort between Ms R. Njuguna and Mr. F. Mwangi and I am very grateful to them. However, I remain solely responsible for any shortcomings in this thesis.

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CHAPTER ONE

1.1 STATEMENT OF THE RESEARCH PROBLEM

This study examines certain aspects of agricultural manufacturing industries in Kisii District, namely: spatial industrial patterns, likely causal location variables and the associated industrial structure.

Location of economic activities (and more especially manufacturing), is an important aspect of development. This is because location of such activities in given places is usually accompanied by investment of resources in those places (Myrdal 1957). This enables locally available resources in those regions to be mobilized for purposes of regional development (Wegulo 1984). Pred (cited in Collins and Walker 1975), further notes that development of an industry in particular places leads to increased population and income in those places, which in turn stimulate further growth of service and commercial sectors to satisfy the increased demands of industrial workers.

Given the significance of location decisions, spatial industrial patterns are of paramount importance due to the fact that they have ramifications for intra-regional development. An equitable distribution of industries (and other economic activities), is likely to facilitate a broader spectrum of intra-regional development. On the other hand, inequitable spatial patterns of industries, (and other economic activities), are likely to lead to lopsided development. This is a situation whereby some areas tend to attract more development and/or are more developed than others. This phenomenon has been popularly referred to as 'polarization'. Polarization which has characterised Kenya's space economy is inappropriate for equitable regional development

because it is associated with many kinds of inequalities/disparities, nationally,regionally, locally, and even on individual bases (Ogendo 1988).

This study examines the industrial spatial patterns of agro-based industries in Kisii District, with a view to determining whether a polarized development pattern exists in the study area and consequently suggesting possible solutions to the problem if this is the case.

Whereas there is a general consensus among scholars, (for instance geographers, development planners and economists), on the significance of location decisions of industries (and other economic activities), one problem, however, remains fundamentally unresolved. This is associated with the determination of the "actual variables" which influence decisions to locate in certain places and not others (Wegulo 1984). A number of theories explaining industrial location variables have been advanced by mainly economists and geographers. The economists' contributions include the 'Least-Cost Theory' by Alfred Weber, and the 'Profit Maximisation Theory' by Fetter (1924), Hotelling (1929), Robinson (1934), Palander (1935), Hoover (1937) and Lösch (1954). The geographers have contributed the 'Spatial Margins to Profitability' approach by Rawstron (1958), the 'Behavioural Matrix' by Pred (1957), among other theories.

An examination of the contributions by both economists and geographers shows that they (the theories), suffer from certain limitations and cannot therefore adequately explain location decisions in certain places. For instance, the economists' contributions are viewed as inadequate from the geographical viewpoint because they preclude the spatial dimension (Chapman and Walker 1991).

Owing to the limitations of both the geographers' and economists' contributions, the location variables influencing location decisions in given places can only be determined on the

basis of empirical studies in those places. The desire to determine the 'actual variables' influencing agricultural manufacturing industries in Kisii District inspired this study.

Industrial structural characteristics can significantly influence regional development. For instance, if they, (the characteristics), are appropriate, they can contribute to equitable regional development. Thus, industrial structural studies are important because they (studies) can, help determine the appropriateness of given industrial structure(s). In this study, industrial structural characteristics are intended to give an indication of, *inter alia*, the agro-based manufacturing sector's scale of production, predominant types of technology utilized, raw material sources, major products manufactured and their markets.

In a nutshell, the thrust of this study can be summarized by the following questions, which essentially constitute the statement of the problem:

(1) What are the spatial patterns of agricultural manufacturing industries in Kisii District?, or Does polarization which has characterized Kenya's space economy also exist in the study area?

(2) Which variables account for the spatial patterns of agricultural manufacturing industries?

(3) Does the industrial structure of agro-based industries in Kisii District significantly contribute to equitable regional development?

1.2 REVIEW OF SELECTED LITERATURE

1.2.1 INTRODUCTION

This section reviews selected literature on both theoretical and empirical bases, regarding spatial industrial patterns, location variables and industrial structure. The rationale behind the selection of literature (and not a review of all available literature) lies in the availability and abundance of relevant literature. If a review of all available literature was undertaken, it would be, to say the least, almost unmanageable.

Review of literature is undertaken because of several reasons, namely:

(a) It helps to identify theoretical and/or empirical aspects that have been studied in the (planned) field of study along with their respective weakness(es) and/or gap(s). It is therefore the weakness(es) and/or gap(s) that the research undertaken should make an effort to remedy and/or fill in, respectively.

(b) It enables the researcher to determine the contribution(s) of past research(es) relevant to his/her research problem;

(c) It helps the researcher to identify what the past researchers have contributed, which he/she does not agree with, and therefore creates a possibility of his/her making a contribution to the relevant area of research.

(d) A literature review is imperative so as to identify topics (or sub-topics) already studied so as to avoid investigating the same, as this may lead to a waste of time, money as well as possible duplication of work.

Below is a review of literature on theoretical and empirical bases

1.2.2 THEORETICAL BASES

It is apt to start this section with the work of George Renner (1974, 1950). Renner is credited with being the first geographer to formulate a general principle of industrial location. He classified industry into extractive, reproductive, fabricative, and facilitative and stated that in order to be able to undertake any of these, six ingredients are required, namely: raw materials, market, labour (including management), power, capital, and transportation. In his general principle of industrial location, Renner (cited in Smith 1971:99) notes:

> An industry tends to locate at a point which provides maximum access to its ingredients or component elements. If all these component elements are juxtaposed, the location of the industry is predetermined. If, however, they occur widely separated, the industry is so located as to be most accessible to that element which would be the most expensive or difficult to transport and which, therefore becomes the location factor for the industry in question.

The above principle though generally applicable, operates in different ways with each of the four classes of industry. Renner also considers what he terms as industrial symbiosis. He introduces the terms "disjunctive symbiosis" where it is advantageous for unlike industries to exist together without any "organic" connection, and "conjunctive symbiosis" which occurs when different industries in an area have organic connection, such as one providing material for

another. This tendency for industry to develop symbiotically may ultimately lead to a big regional concentration of industry, to which Renner applies the expression, "coindustrialization".

Renner contributed immensely to the study of industrial location during his time by putting his ideas down in a formal way, particularly for the majority of geographers unaware of the more rigorous theoretical work of some economists available by his time. Renner's contribution is particularly useful due to the fact that many of his contemporaries were reticent about stating ideas concerning industrial location as formal laws or general principles.

Despite his contribution, Renner has, however, been criticized on several grounds. The major criticism is his failure to penetrate the economic forces behind his laws (Murata, cited in Smith 1971:99). For example he has not emphasized that an industry's "point of optimum access to its ingredient elements" is a product of spatial cost variation (Smith 1971:99). Renner has also been criticized on account of his industrial symbiosis and coindustrialization. It has been argued that these are merely elaborate expressions for externalities and agglomeration tendencies.

Smith (1971, 1981), an economic geographer, has contributed immensely to the whole problem of location of manufacturing industry. He has underscored the influence of a number of location determining variables among which he includes: labour, transportation, raw material availability and market. He has also incorporated personal considerations which, he argues, may combine with economic criteria to give an enterprise total satisfaction (Smith 1971: 32-92). He has observed that the variation of location variables (spatially) make certain places more favourable for location than others. Accordingly, this has led to spatial inequalities in Western Europe and North America. Smith has discussed three case studies, "Iron and Steel industry in

U.S.A.", "The location of Electrical Appliances Plant" and, "The location of a branch of Electronics Industry". He has identified the key variables in location in each of the case studies as well as the market requirements. In his illustrations of the industrial development strategy, the only centrally planned economy (communist) state he considers is Poland. Although Smith's work is useful, his views are confined exclusively to the developed capitalist economy. He has therefore been criticized on the ground that his work lacks much relevance to the practical problems of the developing countries (Wegulo, 1984).

Ogendo (1972:51-72) has observed that the location of any given industry is governed by physical and human variables. The physical variables noted include: the geological influence, the topographical effects, the significance of the distribution and reliability of rainfall, and the associated water resources for industry, and the ecological influence of vegetation and animal potential. Human factors include: (a) demographic and other socio-political and administrative factors, and; (b) economic factors. The economic factors cited include: (i) capital and managerial skill, (ii) industrial raw materials, (iii) industrial inter-dependence (or linkages), (iv) market attraction, (v) influence of infrastructure, (vii) industrial cost-structure and (vii) personal considerations. He has summarized the above factors as follows:

(i) historical, "topo-geolo-geographical" and ecological influences;

(ii) combined influence of transfer and processing costs with emphasis on availability and cost of capital, managerial and other skills and transport;

(iii) the influence of personal considerations with emphasis on personal cost-reducing and revenue-increasing factors and their interaction with government location directives;

(iv) the influence of the spatial pattern of infrastructural facilities and market; and,

(v) the influence of economies of agglomeration and/or industrial linkages.

Ogendo (1972:73-82), has broadly classified Kenya's manufacturing and allied service industries into:

(a) the agricultural processing and/or fabricating industries; and,

(b) the non-agricultural processing and/or fabricating and service industries.

These industries are further subdivided into:

(i) the agricultural food processing industries;

(ii) the agricultural non-food manufacturing industries;

(iii) the non-agricultural manufacturing industries; and,

(iv) the allied service industries.

Each of the above main sub-division falls into a number of individual or combined groups of industries according to the International Standard Industrial Classification (ISIC) of all economic activities. This study, identifies with Ogendo's work on two grounds: (i) the work

is closely related to this study and its frame of reference is a geographical region, namely, Kenya, and; (ii) the work lays special emphasis on agricultural manufacturing industries as this study does. The major difference lies in the fact that Ogendo's study is pitched on a national level. His observations and findings therefore relate to a much larger (geographical) framework. On the other hand, this study's frame of reference is limited to examining the location and structure of agro-based industries at a District level.

Norcliffe (cited in Walker and Collins 1975), has noted that three variables have a strong influence on the location of modern industry, namely: infrastructure, internal and external economies of scale, and linkage and contact fields. He views infrastructure in terms of availability of water, electricity, transport system and waste disposal. He has identified four types of economies of scale, namely: plant internal economies of scale; localization of-a-single industry economies, urbanization economies, and centralization economies (which are similar to urbanization economies but operate on a larger scale (regional level) than the latter (which operate on urban level). He further argues that linkage and contact patterns (especially that of face-to-face) are becoming increasingly important. Although useful, Norcliffe's observations are general and may not necessarily apply to the study area (that is, Kisii District).

Leong and Morgan (1982) have also observed the importance of various variables in influencing the location of industries. These include: raw materials, fuel and power, human resources, transport, markets, capital, government policies and industrial inertia. Other factors which are considered important include; availability of suitable sites, climate, water supply and historical accident. Whereas these variables are important, this work is general and lacks a specific frame of reference. Such a frame of reference is necessary because, the "actual

variables" that influence location of manufacturing establishments in a region are specific to that region. Explanations of such variables cannot, therefore, be couched in terms of the "general variables" presented by Norcliffe and Leong and Morgan.

Cannon (cited in Walker and Collins 1975:113), has noted that various incentives are used by governments to induce industrial location because of the varied nature of manufacturing activities. He has given the examples of pre-built rental factories and policies that subsidize a particular factor of production such as labour or capital, though he has argued that these (policies), tend to create biases in favour of industries and technologies which use relatively large amounts of the subsidized factors. Other incentives are: (a) those that have a direct pecuniary impact on the investment decision, (b) those that attempt to increase the absolute volume of manufacturing activity by extending credit to establishments that are unable to obtain investment through normal channels, and; (c) those that focus solely on improving the psychology of investment in target regions. This study has examined the role of the government policy as one of the variables influencing location of agricultural manufacturing industries in Kisii District.

Chapman and Walker (1987, 1991), have noted the influence of various variables in the choice of industrial location. They argue that "an understanding of the variables influencing the choice of location for a new factory has been the traditional focus of concern within industrial geography". The two writers have underscored the importance of various factors of production namely: land, labour, capital and enterprise in influencing plant (or factory/industry) location. Other factors which are considered of paramount importance include: transport costs, cost-structures, agglomeration economies and the distribution of customers, suppliers, as well as,

competition. According to the two writers, spatial distribution patterns of industries are influenced by locational requirements and they vary. These observations by Chapman and Walker are useful to this study but they are general as they do not relate to any geographic region.

1.2.3 EMPIRICAL BASES

In a survey carried out in Kenya during 1964/65, Ogendo (1972: 86-87) noted that Kenya had 2,747 factories each employing 5 or more operatives. These factories employed 95,692 operatives. There was a further 2,780 establishments with one to four operatives. The findings from the survey indicated that:

(1) In 1964, Kenya had few significant industrial establishments in comparison with the more industrialized countries of the modern world. These few factories (including those with only 1-4 operatives each) provided employment for about 1.1 per cent of Kenya's estimated population of 9 million in 1964. Many of the factories employing 1-4 persons were found insignificant in terms of "value-added" by manufacturing;

(2) Most of the operatives (58.4 per cent of the 92,692 national total manufacturing operatives), employed in 60.1 per cent of the 2,747 factories (each with 5-100+ operatives), were engaged in agricultural manufacturing industries.

(3) During 1964, most of Kenya's manufacturing industries consisted of small-sized mechanized factories (71.9 per cent of the 2,747 factories) though there were a

few which were larger and wholly mechanized (constituting 14.3 per cent of the 2,747 factories);

(4) Kenya's industries were found to be quantitatively fairly well diversified at the national level. In 1964 the national index of diversification was 54.4 per cent. The urban quantitative index of diversification was 46.3 per cent which compares favourably with the rural quantitative index of diversification of 35.7 per cent.

In a case study of location and structure of forest based industries, Ogendo (1966) notes that during a 1964/65 survey, the popular factory sizes in the saw-milling industry were those factories employing between 5-19 persons, 20-49 persons, and 50-99 persons, in that order. There were a few factories employing between 1-4 persons and 100 and over persons. Although only 15 in number, the factories employing 100 and or more persons accounted for 37.6 per cent of the 6,398 saw-milling employees and were followed by two medium sized factories which employed nearly equal number of persons. The two smaller types of factories, although accounting for 46.8 per cent of the establishments, only employed 11.9 per cent of the labour force in the industry. In 1964, Kenya had 14 pulp and paper establishments mainly concerned with the manufacture of paper products. Together, they employed 563 workers. There were 581 furniture and fixtures establishments in 1964 and these were mainly based in larger towns (74 per cent of the establishments) namely: Nairobi, Mombasa, Kisumu and Nakuru. Nairobi accounted for 45.5 per cent of the labour force and 40.8 per cent of the establishments in the industry. Mombasa's share was 20.6 per cent of the industry's establishments and 18.2 per cent of its labour force; Kisumu, 5.5 per cent of the establishments and 8.7 per cent of the labour

force; Nakuru, 6.7 per cent and 3.5 per cent, respectively. The furniture and fixtures industry was composed of small establishments employing 1-4 persons per establishment or 5-19 persons. These two groups accounted for 94 per cent of the establishments and 69 per cent of the employees. The last two size groups employing between 20-49 persons and 50-59 persons each, only made up 6 per cent of the establishments and provided work for only 31 per cent of the industry's labour force. The significant factory sizes in terms of employment were therefore those employing 5-19 persons and 20-49 persons each.

As far as miscellaneous wood products industry was concerned, Ogendo notes that there were 39 establishments in 1964. Nairobi had 13 establishments and accounted for 22.5 per cent of the labour force. Other important centres were Naivasha, Laikipia, Nakuru and Mombasa. The main products from the industry included matches, pencil slats, carvings, boxes and crates. In terms of employment, the industry was characterized by large establishments. The six largest establishments accounted for 71.3 per cent of the 1,123 employees. The two smaller sizes (those of 5-9, 20-49 employees categories) were also significant. They accounted for 51.7 per cent of establishments and 26.6 per cent of the entire labour force in the industry. The minimum-sized establishments (those employing 1-4 persons), though significant in terms of establishment numbers, were insignificant from the view point of employment.

From the foregoing review, it will be noted that Ogendo's findings are very useful for the current study because they emphasize agricultural manufacturing industries and also refer to a specified geographical region, that is, Kenya. However, the work needs to be updated since location and structure are dynamic aspects of industry. It is hoped that the current study will,

to some extent, serve to update some of Ogendo's findings and conclusions, especially for the specified current study area.

The McLaughlin-Robock study, (cited in Wheat 1973), has examined various aspects of industrial location in thirteen southern states stretching from Virginia to Oklahoma and Texas (in U.S.A.) after the 2nd world war. On the basis of this study, "market" has been found to be exerting an overriding importance in location decisions followed by access to raw materials. Other factors considered important by the study are: labour supply, agglomeration economies and resources. Though these findings are useful, they have a major limitation in that they are based on socio-economic backgrounds which are not similar to those in developing countries in general, and Kenya in particular. Moreover, the study was undertaken in the 1960's which for purposes of this study is a long time back. Changes in technology, consumers' demands and increase in market all combine to affect decisions on what are considered crucial factors in industrial location.

Nixson (1973, 47-73, 74-127) has carried out studies on industrial location in Kenya and Uganda. On the basis of these studies, he lists the following location variables as being important in location decision-making:

(a) transport and processing costs;

(b) the demand (market), and;

(c) personal considerations.

According to his findings, processing costs do not appear to be of much significance within Uganda, so are labour supply and costs. Similarly, most industrialists attach little significance to inter-industry linkages and only in a few cases was proximity to other firms considered important. Moreover, inter-industry transactions were manifested only in a small scale. Nixson made similar observations about industrial location in Kenya. He, however, observes that there are a lot of variations of locational requirements at industry level and also from one country to another (Kenya and Uganda). Nixson's work is useful because it is based on Kenya and Uganda and therefore, closer to what this writer is likely to find in the field. This study, on the other hand, seeks to narrow down the frame of reference from "country" (national) level to "District" level.

Obiero (1980) has noted several variables that influence the location of the sugar industry including: physical, social and economic factors. Among the social factors she examined included, population and the role of the government influencing the location of the sugar industry. The economic factors included, land, capital, managerial skills, industrial raw materials, transport, power, markets, industrial cost-structure and personal considerations. She has concluded from her findings that the Western Kenya sugar industry is apparently influenced by physical rather than economic factors. This, she argues, is due to certain anomalies in the economic operations of various established sugar factories. These anomalies relate to the fact that sugar companies do not meet their own production costs. Instead they are highly subsidized by farmers and especially the government in transportation. More specifically, the variables found to influence the location of the sugar industry included the government's role and personal considerations. Other factors such as land, capital, labour, transportation, tax and cost-

structure were found insignificant. Obiero's findings are definitely relevant to the current study because the sugar industry is one of the most important agricultural manufacturing industries in Kenya. However, the study will be concerned more with agricultural manufacturing industries including the sugar industry and its frame of reference will be Kisii District and not the whole of Western Kenya Region.

Wegulo (1984) has examined the location, structure and impact of manufacturing and supporting service industries in Nyanza Province. He has noted the following industrial location variables as being significant:

(a) the availability of local market,

(b) the availability of local support infrastructure, and ;

(c) government support-cum-labour-personal considerations.

In the light of the above findings, Wegulo has concluded that industrialists in Nyanza seek locations which guarantee them ready market for disposal of their goods. He further notes that sites that have been serviced,(provided with water, roads, railway lines (or sidings) and power installations), by the government or relevant municipalities, are advantaged, since they tend to attract industry better.

As far as spatial distribution of manufacturing establishments is concerned (in Nyanza Province), Wegulo used the total number of manufacturing operatives in each District, as an index of measurement. The findings show that in 1980, Kisumu District accounted for 76.75 per cent of the manufacturing operatives in Nyanza Province. South Nyanza accounted for

10.17 per cent, Kisii, 9.76 per cent and Siaya District, 3.31 per cent. Wegulo, therefore concluded, from his findings, that there was a spatial concentration of industries in Kisumu Town and District which tended to encourage polarized activities at the expense of the rest of Nyanza Province.

The industrial structural characteristics studied by Wegulo included: the predominantly prevailing technology and the type of goods produced. His findings show that capital-intensive technology accounted for 43 per cent of industries especially agricultural manufacturing. Only 19 per cent of all the manufacturing and supporting industries were "partially labour" intensive technologically. "Wholly labour-intensive" type of technology was not apparently reflected in any of the categories of manufacturing or supporting service industries. On the types of goods produced, export orientated manufacturing accounted for 54.5 per cent of the total operatives involved in the sample as compared to 20.8 per cent and 17.6 per cent, respectively, for consumer goods and intermediate/producer goods. However, on narrowing down the scope to consideration of consumer goods versus intermediate producer goods, Wegulo found an overwhelming preponderance of consumer goods which accounted for 75 per cent of the total number of operatives engaged, leaving only 25 per cent of the operatives engaged in the production of intermediate/producer goods. Most of the operatives in Nyanza were engaged in processing industries with negligible "value added" accruing to national economy. Wegulo therefore concluded that the structure of manufacturing and supporting service industries in Nyanza was weak and was unlikely to effect adequate regional development unless major structural modifications were implemented.

This work identifies very closely with Wegulo's study. Not only does it (Wegulo's work) deal with location and structure, but also its frame of reference is Nyanza Province within which the study area is found. This (current) study, however, differs from Wegulo's (work) since it is based on a District and not a province, that is, it has a narrower frame of reference to facilitate more detailed analysis. Moreover, it lays emphasis on agricultural manufacturing industries and not manufacturing industries in general (as Wegulo's work does).

Kinyanjui (1987) has investigated the factors that motivate entrepreneurs to establish industries in Thika. Her study reveals that government support to industry and accessibility to external business information are significant in the location decisions of large scale industries, whereas production cost-saving factors and accessibility to national markets are important for small-scale industries. The study also shows the factors that influence the general spatial patterns of industries. These include: the price of land, presence of a major highway, and presence of a major railway line. Kinyanjui has, however, limited her study of industrial structural features to spatial linkages. Other structural features, especially those given prominence by this study are not considered.

Opondo (1989) has studied the spatio-structural characteristics of small-scale industries in Kisumu Municipality. Her findings show that there are distinct structural characteristics between formal and informal enterprises in terms of: capital investment, ownership, technology utilized, and employment. Using factor analysis, specifically the principal components approach, she has identified the most significant factors that motivate entrepreneurs to establish industries in Kisumu. These include: agglomeration economies, industrial infrastructure, business information and personal considerations. She has also identified variables that strongly influence

intra-urban industrial spatial pattern(s). Using a simplified input-output system, she has established linkages between small-scale industries and Kisumu urban industrial economy. This study differs from Opondo's (study) in terms of: the frame of reference, types of industries given emphasis, and the variables given consideration (in terms of both industrial location and structure).

1.3 JUSTIFICATION OF THE STUDY

This study, can be justified on several grounds. It will be noted that although a number of studies relevant to the current one have been undertaken, the approach(es) and the scope(s) of such studies differ from those of this work.

Some of the studies undertaken have wide frame(s) of reference. They cover wider geographic regions as compared to the current research (Ogendo 1972, Obiero 1980, Wegulo 1984, Nixson 1973). This study is unique in that it covers a smaller geographic region, (a District), considered more appropriate for purposes of detailed analysis. It will also be noted that some of the studies and/or works related to this study lack a frame of reference (Chapman and Walker 1987, 1991, Leong and Morgan 1982, Bale 1981). Such studies and/or works are general and, therefore, their observations and hence their findings do not relate directly to those likely to be found in the study area.

Another justification for this study is that some of the studies undertaken and which are relevant to this study need to be updated. Some of these (studies) were undertaken in the 1960's and early 1970's [(Ogendo, 1966, 1972 Nixson (1973) McLaughlin-Robock study (cited in Wheat 1973)]. Since then, there have been many changes affecting location and structure of

industries. These include: changes in technology, changes in consumer demands and preferences, and scale(s) of operations as well as increased markets. Some of the work(s) of western writers (such as Smith 1971, 1981), which are related to this study, suffer(s) from the limitation of being irrelevant to the socio-econo-political background(s) of developing countries such as Kenya. Hence, findings and conclusion(s) arrived at, by these (western) writers, in connection with the current study are neither conclusive nor representative of the circumstances in developing countries, such as Kenya, and particularly Kisii District.

Furthermore, unlike this study, other relevant studies have tended to address themselves to general manufacturing and allied service industries (Nixson 1973, Wegulo 1984). Others are based on one specific industry (Obiero 1980). The present study is unique in that it is based on a specific composite type of manufacturing industry (that is, agricultural manufacturing) and considers several individual industries within agricultural manufacturing.

The study area chosen (Kisii District) is relevant in this study on account of its high agricultural potential. Out of 135,100 acres of land available for farming, 78 per cent is suitable for agriculture (District Development Plan, 1994-1996). The economy of the District is heavily agriculturally orientated. Thus, most of the industries located in the study area are agricultural processing and/or fabricating.

Implicit, from the available literature, is the fact that although such (literature) addresses itself to issues closely related to this study, the similarity ends there. Other writers' and/or researchers' frames of reference, scopes, as well as, approaches differ from those of the present study. Hence, this study curves out a "niche" for itself among other studies because it addresses

itself to issues relating to a specified spatial (or geographical) region and group of industries. This makes this study unique and hence its justification.

1.4 OBJECTIVES, THEIR SCOPES AND LIMITS

1.4.1 OBJECTIVES AND THEIR SCOPES

In the light of the statement of the problem, the objectives of this study and their scope(s) are outlined below as follows:

(1) To describe and portray the spatial industrial patterns of agro-based industries in Kisii District.

(i) The emerging the industrial spatial patterns have been described. These patterns have been portrayed using cartographic techniques.

(ii) The manufacturing employees in both agro-based and non-agro-based industries have been utilized to compute percentages, the coefficient of localisation and the location quotient on the bases of which the spatial industrial patterns have been described.

(iii) The numbers of agro-based establishments in 1994 in the various divisions of the study area have been used to determine the industrial spatial patterns.

(2) To evaluate the nature of the variables that have influenced the location of agricultural manufacturing industries in both Kisii District.

The following variables have been examined in this study:

(i) Physical variables;

(ii) Economic variables; and,

(iii) Demographic, socio-political and administrative variables.

(3) To determine whether the industrial structure of agro-based industries in the study area contributes significantly to its (the study area's) development.

The significance of selected aspects of industrial structure has been analyzed. These aspects include:

(i) Predominant type of technology utilized;

(ii) Source(s) of the raw materials used;

(iii) Types of commodities manufactured;

(iv) Markets for the manufactured commodities, and;

(v) Scales of production.

1.4.2 LIMITS OF THE STUDY

This study's limits are as follows:

(i) This study addresses itself to the spatial patterns, location variables and the industrial structure of agricultural manufacturing industries in Kisii District. No other aspects of the agro-based industries are examined.

(ii) Owing to data limitations, the study has only given consideration to a few industrial structural characteristics. These are: technological orientation; scale of production;

source(s) of raw materials; types of commodities manufactured, and; the markets for the manufactured commodities. Other industrial structural attributes are not given consideration.

(iii) It is noted that equitable regional development is a function of many variables, some of which include: people's culture, prevalence of skilled labour, resource endowment, people's drive towards improvement of quality of life, and so on. However, this study does not concern itself with these but specifically examines the influence of some aspects of agricultural industries on the equitable development of Kisii District.

(iv) The study limits itself to agro-based industries in Kisii District. However, to facilitate the computation of the coefficient of localisation, employment figures for non-agro-based manufacturing and allied service sector are utilized. No consideration is given to industries outside the study area.

1.5 HYPOTHESES

The above objectives need to be recast into hypotheses. Given below are the relevant hypotheses. Hypotheses 1 and 2 relate to the industrial spatial patterns and the industrial location variables, respectively. The rest of the hypotheses are concerned with the selected industrial structural variables.

(1) H_0: There is no significant industrial localization in Kisii District.

H_1: There is significant industrial localization in Kisii District.

(2) H_0: Economic variables are not the main determinants of the location of agro-based manufacturing industries in Kisii District.

H_1: Economic variables are the main determinants of the location of agro-based manufacturing industries in Kisii District.

(3) H_0: The differences between agro-based food and agro-based non-food establishments, in terms of technological orientation, are not significant.

H_1: The differences between agro-based food and agro-based non-food establishments, in terms of technological orientation, are significant.

4. H_0 The sources of raw materials for both agro-based food and agro-based non-food manufacturing industries are not significantly different.

H_1 The sources of raw materials for both agro-based food and agro-based non-food manufacturing industries are significantly different.

5. H_0 There is no significant difference in the types of commodities, manufactured by agro-based food and agro-based non-food industries.

H_1 There is a significant difference in the types of commodities, manufactured by agro-based food and agro-based non-food industries.

6. H_0 There is no significant difference between agro-based food and agro-based non-food industries in terms of market for manufactured products.

   H_1 There is a significant difference between agro-based food and agro-based non-food industries in terms of market for manufactured products.

7. H_0 The scale of production of agro-based food and agro-based non-food industries is not significantly different.

   H_1 The scale of production of agro-based food and agro-based non-food industries is significantly different.

1.6 CONCEPTUAL AND THEORETICAL FRAMEWORKS/MODELS

This section deals with the study's operational definitions and concepts as well as the conceptual and theoretical frameworks. The operational definitions and concepts are presented first followed by a discussion of the conceptual and theoretical frameworks.

1.6.1 OPERATIONAL DEFINITIONS AND CONCEPTS

Definitions are, broadly speaking, procedures for specifying meaning. They are vital for the development of understanding and communication of information (Harvey 1969). A concept refers to a mental construct, image, thought or idea, especially one that is constructed by generalization from particular examples (Harvey 1969, Clark 1987). A number of concepts and definitions have been used in this study. These need to be explained in the context in which they have been used so as to make them clear to the readers.

1.6.1.1 OPERATIONAL DEFINITIONS

The operational definitions are provided below as follows:

Establishment - this is an individual plant in which goods are manufactured, usually in an enclosed shed.

Industry - refers to any productive enterprise, (especially manufacturing and certain service industries, such as, transportation and communications) which employs relatively large amounts of capital and labour.

Industrialist - refers to a business person involved in manufacturing in a factory and/or in the provision of services. This could be the owner, or the one in charge (for example the manager). Other terms used in this study to refer to same individual are entrepreneur and manufacturer.

Location Variables - these refer to the phenomena which influence the choice of location of an industry. In this study, various variables which influence location of agricultural manufacturing industries in Kisii District are examined, namely: physical, economic, demographic and socio-political variables.

Operatives - these are the assembly-line workers who assist in manufacturing materials in factories or establishments. They can be classified as skilled, semi-skilled and unskilled. Skilled operatives are those who have acquired competence in their work by knowledge attained through training and/or experience. Semi-skilled operatives are those who have gained some experience

in their work but have not reached the level of a skilled worker. Unskilled operatives are those who are inexperienced and/or untrained and have no recognizable competence in their work.

Employees - this term refers to both the assembly-line workers (operatives) as well as others employed in the management (the industrialist(s) and/or the assistants).

Development-inducing industries - these are those industries which are either located in the urban or rural areas, but which, by virtue of their clear profitability, are capable of ploughing back a substantial portion of their financial proceeds into the rural areas. Good examples include: tea, coffee and sugar industries.

Development-supporting industries - these are industries, (largely of the service type), which can only plough back money into the rural areas if they are owned and located there. Otherwise for similar industries whose owners live in the urban areas, they, (the industries), merely act largely as sources of leakages of rural development funds, except in instances where the wages they pay their workers is ploughed back to the rural areas by the workers. Good examples include: printing and publishing, motor vehicle repair, a number of other service industries, metal furniture and fixture fabrication.

Processing - refers to an early stage of the conversion of primary agricultural raw materials, for example, the conversion of sugarcane into milled sugar; raw hide from animals into leather;

separation of cotton lint from cotton seed, and so on. In this case, milled sugar, cotton lint, and leather are products of the processing stage of manufacturing.

Fabrication - refers to the later stage of manufacturing, whereby the processed products are made relatively directly useful to the users. For example, the conversion of leather into shoes, bags; fabrication of sisal fibre into carpets, and so on.

Agglomeration economies - these are economies emerging from "the association of productive activities in close proximity to one another", as in a major specialised industrial region or in a large town or city. Agglomeration typically gives rise to external economies of scale.

Jua Kali activities - these are activities conducted in the open and other unplanned working sites in which people work while exposed to harsh environmental conditions like heat from the sun, rain and dust.

Eigenvalue - this refers to the total variance in the entire set of original variables that is accounted for by each factor or component in the factor analysis or principal component analysis procedures, respectively.

Communality - this is the proportion of variance for each variable accounted for by all the factors or components.

Factor Loadings - these are correlations between variables and factors. The higher the correlation between a variable and a factor, the higher the loading of the variable on the factor.

1.6.1.2 OPERATIONAL CONCEPTS

The concepts used in the study are explained as follows:

Development - this is a process that includes economic growth as one of its essential aspects, but goes beyond this to encompass the complex of interdependent changes in society as a whole which carry society forward according to prevailing value judgements (Hermansen, 1972). This process raises the standards of living of people through increasing incomes and consumption levels, creation of conditions conducive for self esteem through socio-cultural and political as well as economic systems. It also deals with increasing people's freedom of choice and enlarging the range of choices in terms of consumer goods and services.

Equitable regional development - this is comparatively equated, (not necessarily equal), development that takes into account the differences in regions, in terms of, particularly, their resource endowment(s). It should be noted that the value of a resource is not intrinsic in the material itself but depends on the structure of demand, the state of technology, the cost of transportation, the social and political organization for transforming the raw material into marketable commodities. Thus, to make resources in an area available for development, considerable investment may be required.

Intra-regional development - this is development within all parts of a given region. This concept takes into account the fact that within a region, different parts are likely to have distinct endowments which should be exploited for purposes of the region's development. Although physical resources may have dwindling importance, as inputs of production, the start of development in a locality will frequently result from a unique resource advantage which attracts capital and other factors of production.

Industrial structure - this refers to the aggregate of individual industries in a region, that account for all the manufacturing ranked according to magnitude which can be measured proportionately using given criteria (or a criterion). It also refers to certain aspects of industry herein referred as 'structural aspects'. Examples of such aspects include: technology utilization, scale of production, location of industry, ownership pattern(s), types of goods produced, and raw materials used.

Spatial distribution/pattern - this concept refers to the areal spread of phenomena (or phenomenon). In this study, it refers to the areal 'spread' of agricultural manufacturing industries in Kisii District.

Polarization effects - These are effects which result in the decrease of absolute level of development of a peripheral area relative to a core area (Obiero, 1980). For instance, migration from a peripheral area to a core area (such as a town) may remove productive population from the former to the latter.

Location - This refers to the actual area where industrial activity takes place or spatial/areal spread of given industrial activity in relation to other industries and/or economic activities.

Infrastructure - this is the underlying super-structure of services and amenities needed to facilitate industrial, agricultural and other economic development(s). Infrastructure, therefore, includes the provision of transport, communications, education facilities, power supplies, water, health facilities, etc.

Manufacturing - This is a process by which any of the raw materials (primary or secondary, of vegetable or animal origin), are converted into more useful forms (Ogendo 1972:2). This process takes place in a factory (or establishment). The raw materials are converted into valuable commodities, ready for consumption. Manufacturing often consists of two stages, namely : processing and fabricating.

Development centres (DCs) - These are planned and graded relatively larger industrial towns which meet particular centrifugally-based rural development threshold size(s) in terms of the number and size(s) of manufacturing establishments, their operatives and the graded resident population(s) but with their planned symbiotic rural counterparts in mind. The manufacturing operatives and resident populations, respectively, vary from 10,000 and 200,000 in DC1; 4,500 and 50,000 in DC2; 4,000 and 30,000 in DC3; 1,500 and 18,000 in DC4, to 1,000 and 18,000 in DC5.

Development points (DPs) - These are points (usually planned and graded smaller urban centres), by virtue of directed planning, from which economic growth and/or economic development is purposely intended to originate and operate most efficiently with a view to radiating or diffusing to the surrounding rural areas. The manufacturing operatives and resident populations, respectively, range from 700 and 10,000 in DP1; 600 and 5,000 in DP2; 500 and 4,000 in DP3; 350 and 3,500 in DP4, to 200 and 2,000 in DP5.

Potential development points (PDPs) - these are planned and graded small towns that are, centrifugally, largely local in function, but with intended characteristics of the development centres and development points, though at the basic level(s). They have manufacturing operatives varying from 1500 in a PDP1; 1000 in PDP2; 500 in PDP3; to 50 or more in PDP5.

Service centres (SCs) - these are planned, up-and-coming, relatively smaller towns (than potential development points), and less important in function. They are more ubiquitous and often denser than the potential development points, hence, more numerous and play the basic roles in the Central Place Theory service hierarchy. Some may even have significant industrial cores.

1.6.2 CONCEPTUAL FRAMEWORK/MODEL

This section attempts to provide a conceptual model for this study. The model is based on the normative theories of location formulated by the classical and the neo-classical economists. The theories include: the "least cost" or "cost-minimisation" approach, usually

associated with Alfred Weber, and the "market- area"/"locational interdependence"/"profit maximization" approach(es). The classical and neo-classical approaches have been contributed mainly by economists with the intention of integrating industrial location into the main body of economic theory and, in particular, the "theory of the firm", so as to come up with "pure rules" of location which lead to optimal location of the individual firm (Nixson, 1973:5,6). Such theories (or approaches) are based on the response of the individual firm to such economic factors as: (a) transport; (b) labour; and, (c) access to market.

The birth of modern industrial location theory is generally dated as 1909 and is associated with Alfred Weber's seminal work (namely: '*Uber den standort der Industrien*'- translated as, **Theory of the Location of Industries**). However, before this work, other Germans, such as J. H. Von Thünen and Wilhelm Launhardt had written on this (or somewhat related) subjects.

To come up with his theory, Weber made certain assumptions for the purpose of eliminating complexities of the real world, namely:

(a) Raw materials are found in certain localities only, that is, they are not ubiquitous;

(b) There is perfect competition with each producer having unlimited market, and, finally;

(c) There are several labour locations which are fixed with labour being immobile and in unlimited supply at a given wage rate.

Given the above assumptions, Weber argued that, the primary factor influencing industrial location is transport cost. Other factors Weber considered important were labour costs

and agglomerative and deglomerative forces. He has referred to the first two (that is, transport and labour costs) as "general regional factors" while the third one as a "local factor".

Costs are not considered directly but rather as a function of weight to be carried and distance to be covered (Smith, 1971). Weber's theory of location begins by identifying a minimum cost location using Launhardt's locational triangle (Smith, 1971:114). By using isodapanes (lines drawn around the least-transport cost location joining places of equal additional transport costs), Weber's theory seeks a better location either through savings in labour costs and/or agglomeration economies. Where savings in labour and/or agglomeration economies exceed additional transport costs, a critical isodapane is defined and a new optimum location is identified (Norcliffe, cited in Walker and Collins 1975:21) . According to Weber's theory, the locational objective of the businessman is to substitute between the three factors (that is, transport, labour and agglomerating economies), and in so doing select a site which minimizes total costs (least-cost). Such a location is known as the optimum location.

Although Weber's work provides a valuable basis for development of the theory of location, he (Weber) has been criticized for his unrealistic assumptions. His assumption of fixed labour location is unrealistic taking into account the great labour mobility, especially in Kenya. He has also assumed constant demand and has altogether omitted institutional factors (Nixson, 1973:8,9). Furthermore, Weber has been criticized on account of the fact that his analysis does not give adequate explanation of locational factors or variables. He does not give reasons for selecting and designating three factors as important as opposed to those he rejected (or did not consider), [Obiero 1980]. It has been noted that several developments, since Weber's time, have downgraded the importance of his three location factors (or variables) (Norcliffe, cited in Walker

and Collins, 1975:22, 23, 24). For instance, Smith (1971) has noted the decline in the importance of transport when he states:

> Transportation is often considered to be the most important single determinant of plant location. This is less true than it has been historically, but transportation is still a major factor in the location of many industries (Smith 1971:69).

Despite these criticisms however, Weber's theory should not be downplayed. At the turn of the century, his theory had relevance but subsequent developments call for revision of the theory.

Hoover (1948) attempted to respond to the criticisms raised about Weber's ideas by trying to make more realistic his (Weber's) weak sounding assumptions. Unlike Weber, who assumed that transport costs are directly proportional to distance moved and weight carried, Hoover varied the costs to reflect length, direction of the haul and the composition of the goods involved. He also incorporated institutional factors (Wegulo, 1984).

Despite Hoover's attempts to reformulate and make Weber's original ideas more realistic, the least-cost approach is still criticized for over-emphasizing the supply component in the production process and neglecting demand. Smith (1971) notes:

> The weakness of the approach is that as soon as demand is allowed to vary in space, the least (average) cost location does not necessarily yield maximum profits, since it may be preferable to move to a new location with higher unit costs

> but where greater sales will increase
> total profits (Smith, 1971:137).

To overcome the weaknesses of the "least cost" or "cost-minimisation" approaches, the "market area" or locational interdependence school of thought was developed by among others, Fetter (1924) and Hotelling (1929). This approach assumes that all firms have identical production costs and sell to a spatially distributed market. The price of products to consumers varies with transportation costs from the factory. In choosing his location, each seller seeks to control the largest possible area which is determined by consumer behaviour and location decisions of other firms. Thus, the manufacturer exercises monopoly control over that section of the market which he can supply at a lower price than his rivals (Smith, 1971:138).

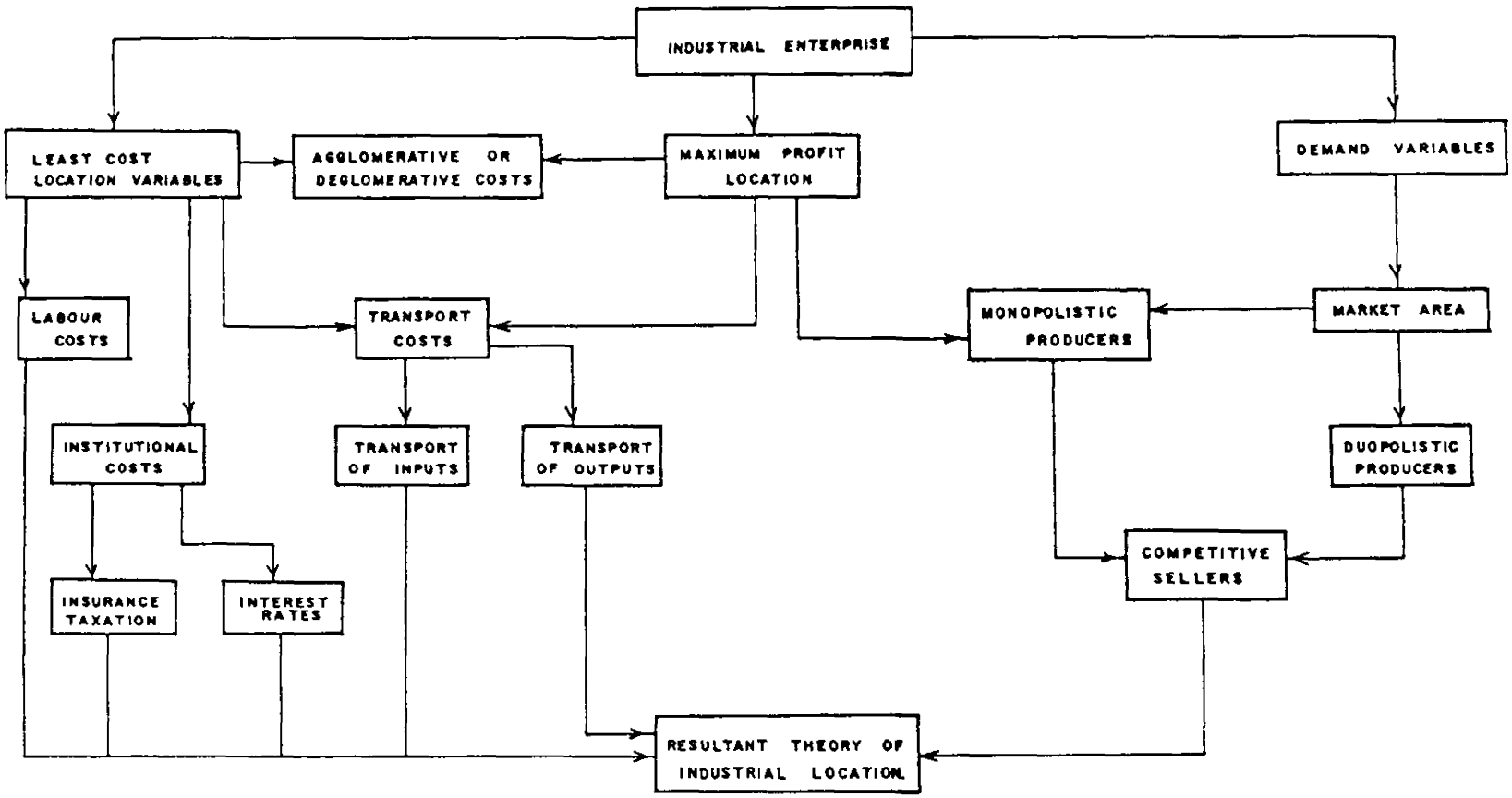
This school of thought has been criticized just as its predecessor (the least-cost school of thought) for being unrealistic in that it over-emphasizes the demand aspect at the expense of other considerations which are likely to influence the entrepreneurs decisions in location of enterprises (Wegulo, 1984).

Lösch (1954) has incorporated both demand and supply aspects into the notion of location of production. Lösch's main contribution is not in helping to explain the location which he takes as given, but in trying to formulate the optimum market areas (where profit is maximized), for firms in competing industries in a given area (Bale, 1981:63). Lösch, like his predecessors (Fetter and Hotelling 1929, among others), notes that every firm (or production unit) has an element of spatial monopoly in which it can best serve itself. The incorporation of transport costs to more distant markets increases the prices of goods produced by the firm and quantity demanded gradually declines until it is zero. Given a homogeneous plain, evenly populated with

homogeneous people, a demand cone may be constructed around a firm defining the market area and the quantity sold (Chapman and Walker 1987:40, Lloy and Dicken [cited in Chapman and Walker 1991], have shown that competition will finally turn the circle (formed by the demand cone) into a hexagon (hence hexagonal market areas) which are part of a series serving a region more efficiently. Lösch's work is actually an extension of the earlier schools of thought such as the "least cost" and the "market area" approaches, though it differs from them in the sense that he does not hold demand and/or supply constant. He (Lösch) argues that the goal of a rational production unit is to select a location at which profits are maximized.

The various ideas advanced by the classicists and neo-classicists are incorporated in the conceptual model shown in figure 1. Accordingly, the main variables influencing industrial location include: transport costs associated with the transportation of inputs and outputs; demand variables which are associated with the market areas of industrialists; agglomeration costs; labour costs; and, institutional costs such as insurance, taxation, interest rates, and so on. The classical and neo-classical approaches find some expression in the location of various types of industries both in the 'developed' and 'developing' worlds. However, such expression is limited - due to the limitation(s) of the approaches and the fact that it is rare that industrialists are given a free hand to determine the location of industry. It is general consensus, therefore, that the classical and neo-classical theories, which oscillate around the notion of "optimum location", are far from being accepted as capable of guiding the location (more especially in the contemporary world), of manufacturing industries.

FIG. 1 : A MODEL ILLUSTRATING THE MAIN VARIABLES OF INDUSTRIAL LOCATION AS FORMULATED BY THE CLASSICISTS AND NEO-CLASSICISTS



Source : Obiero, J. C. A. (1980.29)

1.6.4 THEORETICAL FRAMEWORKS/MODELS

As already noted, the classical and neo-classical theories (or approaches) of plant location are not very significant in the contemporary world due to a number of changes that have occurred since the theories were first formulated. Moreover, central in these theories are certain assumptions regarding the characteristics of those responsible for the selection of the best (or optimum) plant location. These characteristics are embraced in the concept of "economic man" (Chapman and Walker, 1991). Such an individual is considered rational and is in command of perfect knowledge of all the relevant economic information including the ability to predict the actions of competitors and future events (Bale 1981, Chapman and Walker 1991, Wegulo 1984). However in reality, no individual can possess such "omniscient" powers. These, and other weaknesses of the 'normative' industrial location theories (or classical and neo-classical theories) have led to the emergence of other schools of thought whose approaches "are sub-optimal" in nature. These (schools of thought) are more realistic in that they have attempted to moderate the superhuman attributes of the 'economic man' alluded to in the classical and neo-classical theories.

Since 1950's, writers have recognized the need to consider both demand and supply (cost) as independent variables of location. One of the best attempts made towards this direction is that of Greenhut (1956) who has both developed a theory and conducted empirical research. Greenhut (1956:279-80) identifies three classes of location factors (variables). These include: demand factors, cost factors and purely personal factors. Demand factors include those factors that influence the character of demand, that is, not only where potential buyers are located, but also the nature of demand for products and the way it relates to cost, the impact of competitors

and the need for personal contact or particular services required by customers (Greenhut, 1956:279). Cost factors can be divided into several subgroups. The first subgroup covers the cost of buying and running the factory itself including capital costs. The second subgroup includes the costs of personnel, and the living and community conditions, which affect the availability, happiness and productivity of the work force. The last two groups of cost factors (or variables) are material costs and transport costs. Purely personal factors (variables) include the importance of psychic income (non-monetary satisfaction), environmental preferences and the security motive. Empirical research led by Greenhut, however, showed that location variables did not fit conveniently into his (economic) categories (Greenhut 1956, Greenhut and Colberg 1962).

Other emerging schools of thought (or approaches) include: the "behavioural approach"; the "spatial margins to profitability approach" and the "structural approaches."

The idea of "spatial margins to profitability" was developed by two British geographers, E.M. Rawstron (1958) and D. M. Smith (1971, 1981). The idea arose out of the need to refine the concept of optimum point location and make allowance for sub-optimal behaviour (Wegulo, 1984). The possibility of sub-optimal behaviour in the choice of factory location was seemingly being confirmed by empirical studies of industrial location, as answers to questionnaire surveys of industrialists stressed the importance of "personal considerations" over the more obvious conventional variables such as proximity to raw materials and market (Chapman and Walker 1991). In some cases, a businessman or entrepreneur may feel that benefits (e.g. social amenities) that would be gained by sub-optimal locations compensate for extra profits found at the would be optimal location(s), in which case the location chosen will be sub-optimal in the

sense that it increases his general level of satisfaction without necessarily maximizing profit (Bale, 1981:78). Such entrepreneurs are thus "satisficers" and not "optimizers".

Bale (1981:80) has listed the following as other variables which might make an industrialist locate away from the optimum location. They include:

(i) the residence or birthplace of the founder of the industry;

(ii) the availability of a vacant factory or plot of land at the right time;

(iii) imitation or gregariousness on the part of the consumer;

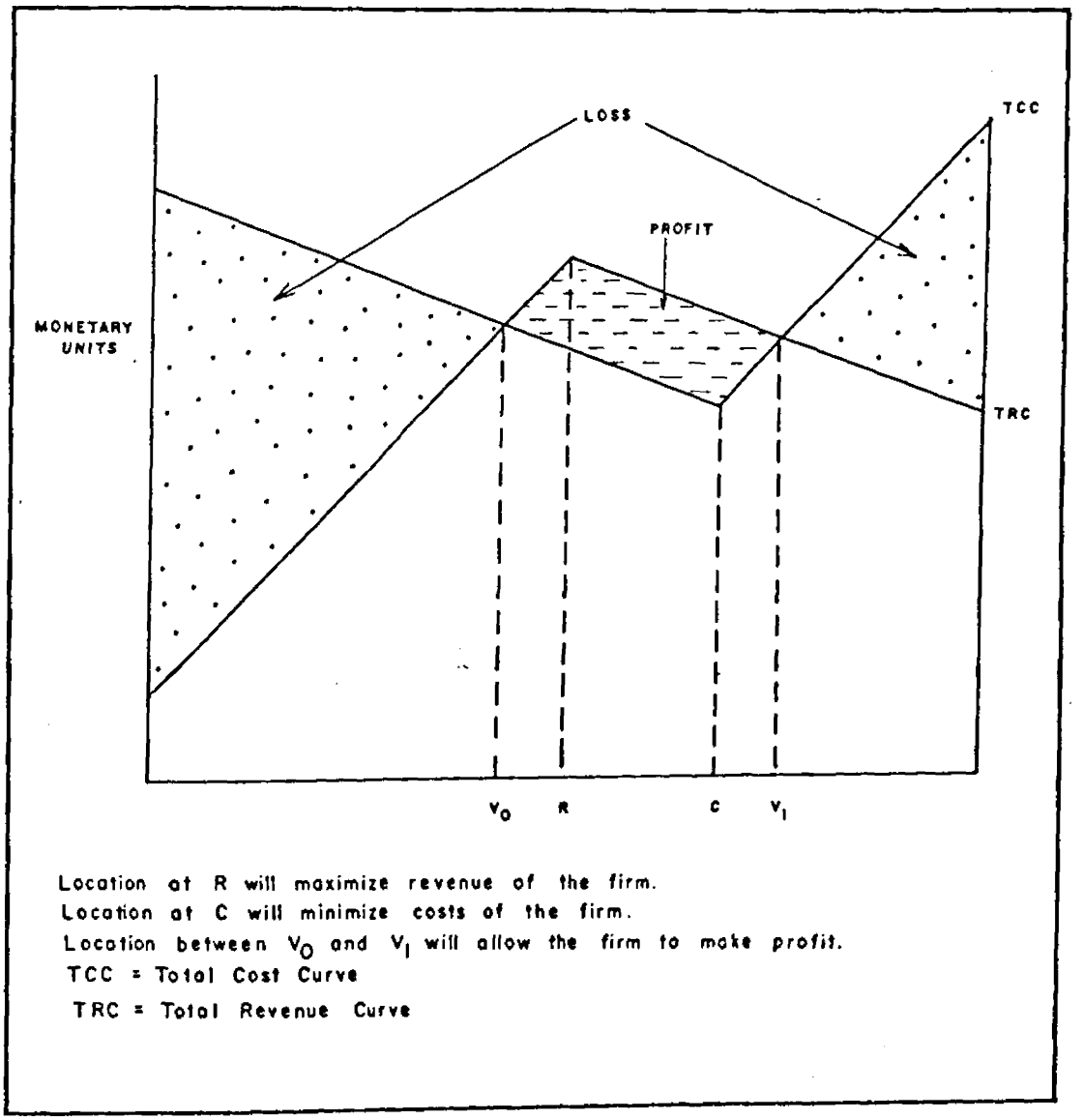
(iv) parental backing of the development of the enterprise, and;

(v) the support of local authority or the central government.

An industry's "spatial margins to profitability" can be defined by the total cost and total revenue curves as illustrated in figure 2. Within the spatial margins (V_0 and V_1 in Figure 2), an industrialist can make profit which may not be maximum (depending on how far he locates from the optimum point or point of highest profit), but, which is nevertheless satisfying to him.

The "spatial margins to profitability" approach has, however, been criticized for assuming an irrational and non-economic "entity" in location decision-making. The case for economic decision-making is stronger now in the developed and developing worlds given the current decline in resources. Profit maximization seems to be a major consideration still if judgement were to be made from the ever expanding business techniques such as market research and advertising. It has also been argued that the "spatial margins to profitability" approach simply represents a shift of scale-replacing a point (as in Weber's model) with an area. Within

the 'area' the sub-optimal man is allowed to locate where he likes but the locational boundaries are still determined by objective economic factors (Stafford, cited in Bale 1981:82). Furthermore, for margins (or boundaries) to be drawn (or determined), an entrepreneur would need an abundance of information regarding market conditions, cost inputs, transport costs and technological costs and any other costs. Hence, the delimitation (or demarcation) of the spatial margins would present difficulties, especially, in less developed countries such as Kenya, where such information is often lacking. Despite these criticisms, however, Smith and Rawstron's "spatial margins to profitability" approach is very useful in explaining location decisions.



Location at R will maximize revenue of the firm.
Location at C will minimize costs of the firm.
Location between V_0 and V_1 will allow the firm to make profit.
TCC = Total Cost Curve
TRC = Total Revenue Curve

FIG. 2 : OPTIMUM LOCATION AND THE CONCEPT OF SPATIAL MARGINS TO PROFITABI
Source : D. M. Smith (1966, 1971 and 1981)

The other approach that has gained popularity in explaining plant location decisions is the "behavioural approach". It is actually closely related to the spatial margins to profitability approach as it explains where, within the spatial margins, industrialists are likely to locate their establishments depending on the information available to them and their ability to use it (Bale 1981). The "behavioural approach" derived its inspiration from the work of Simon (1957b) and March and Simon (1958) (cited in Chapman and Walker, 1991). Simon observed, that whereas the 'economic man' is an "optimizer" his real world equivalent is a "satisficer".

Pred (1967) incorporated these ideas within his concept of the "behavioural matrix", which he applied to a variety of decision-making situations including the selection of a new factory location. The matrix explains theoretically where within the spatial margins (assuming these have been determined) industrialists actually locate their industries. Pred (1967, 1969) suggests that this location (that is, within the spatial margins) will depend on two factors, namely:

(a) the amount of information available to the industrialist (or decision-maker), and;

(b) the industrialist's ability to utilize the information.

Thus, Pred's behavioural matrix consists of axes which measure the quality of information available to the industrialist (or decision-maker) and his ability to use the information. Depending on these two factors, firms have different positions in the behaviourial matrix. Consequently, an industrialist's success in selecting a viable location will depend on his position in the matrix. Those industrialists with a high level of information at their disposal and

with a well developed ability to use the information are likely to select well and will thus locate towards the bottom right hand corner (see Figure 3). On the other hand, those industrialists that have little information, and are generally incompetent and ignorant in economic terms, are likely to locate towards the top left hand corner of the behavioural matrix (Smith 1971, Bale 1981, Chapman and Walker, 1991). Figure 3 shows Pred's behavioural matrix. Three areas have been identified, within which hypothetical industrial activity may be profitably undertaken. Within each of the three areas, an optimal location is identified. The geographical position of a number of establishments is linked to their position in the behavioural matrix. Generally, establishments in the bottom right of the matrix have chosen locations near, at least, one optima. Most of the establishments chara erized by positions in the top left of the matrix, have selected unprofitable locations.

Pred's behavioural matrix has been criticized on several grounds. Smith (1971:107) has noted that, the ability of industrialists (or firms) to choose satisfactory locations (where profit is made) and yet these, (firms) have handicaps of information as well as ability to use it, emphasizes the failure of the matrix position to predict how good a choice will be made. The attribution of the satisfactory locations of such firms, to such factors as "chance" or "good luck" (Bale 1981:84) is not satisfactory. The behavioural approach has also been criticized on account of the fact that it overemphasizes availability of information. There are many variables involved in location decision-making. Moreover, even if the information necessary was available, the individual industrialists may not be able to manipulate it to the industrialists desirable ends.

To complicate the situation further, in many developing countries, Kenya included, the industrialists or entrepreneurs are often not allowed a wide and free choice in location decisions.

Despite these criticisms, the behavioural approach helps in explaining location-behaviour-influencing variables. Its applicability, however, lies in its being blended with other valid contribution(s) by other theorists.

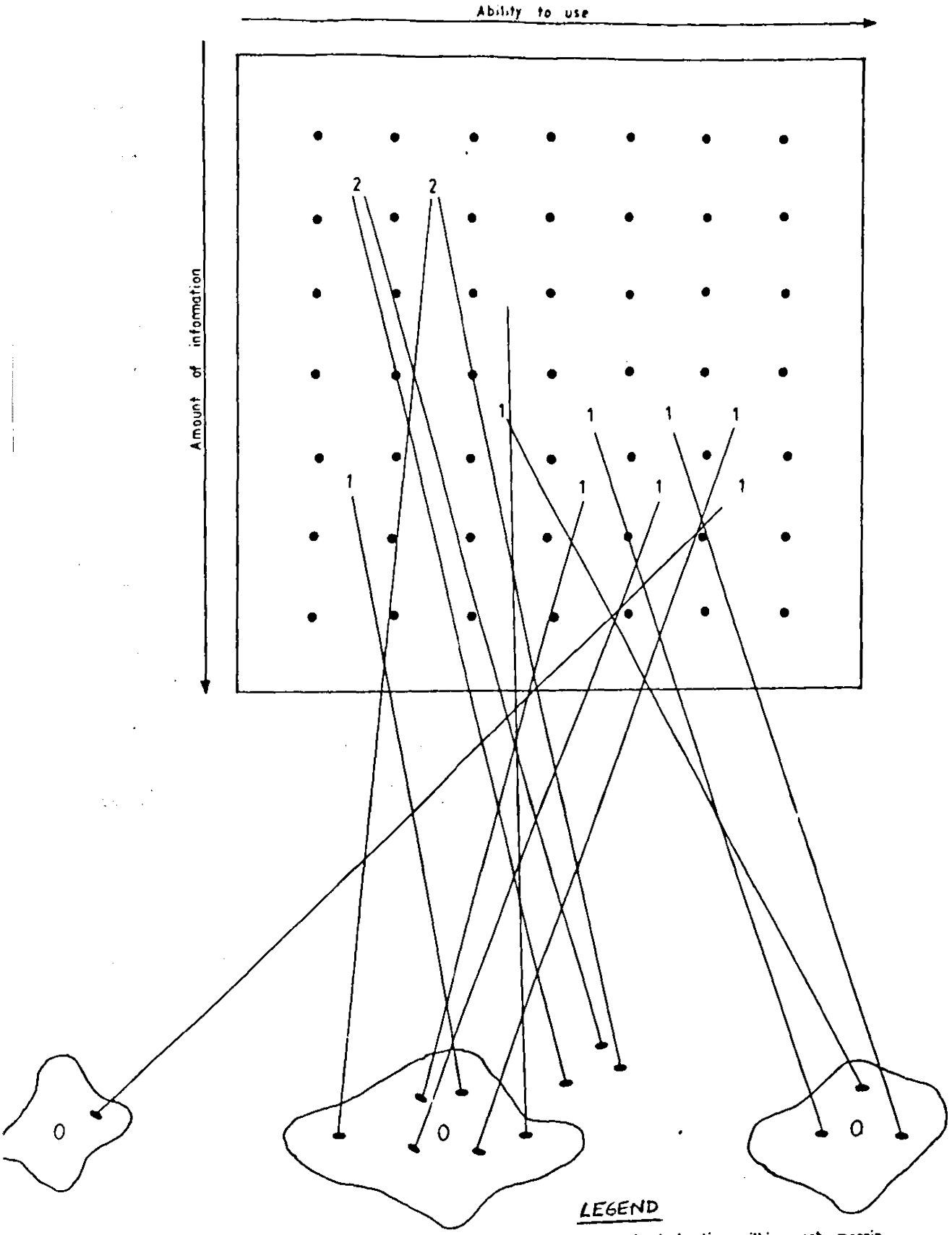


Fig. 3 The behavioural matrix and industrial location decisions

Source Chapman K. and Walker D. F. (1991)

Another explanation that has emerged is the structural school(s) of thought. Apparently, these consist of several rather than a single approach. The approaches' attention focuses on how a firm's use of space is determined in the wider economic and social structure(s) inside which it operates. These schools of thought are founded on Marxist analysis because of their emphasis on the development of "production under capitalism." The structural schools of thought provide an important link between spatial and non-spatial behaviour by locational trends and behaviour of individual firms to changes within the system as a whole.

Smith (1981:142) has observed that the chief merit of the Marxian (or structural) approach(es) "is its breadth which permits industrial location to be analyzed as an integral part of the totality of economic, social and political processes." This view has become strongly entrenched in the analysis of international development and underdevelopment, (Chapman and Walker 1991).

However, "applications of the structural approach(es) are less common than general assertions of its superiority as a mode of explanation possibly due to the intellectual demands imposed by such a holistic view of society" (Chapman and Walker 1991).

Hamilton (cited in Chorley and Haggett 1967) has incorporated many of the location variables (of industry) that have been advanced by the various schools of thought (or approaches) to produce a model of industrial location (see Figure 4).

Accordingly, there are three kinds of entrepreneurs that decide location in the real world, namely: private capitalist, corporate capitalist and state administration. The model (Figure 4) clearly distinguishes three different approaches to the location problem. Location decisions in

the capitalist sector are influenced by profit motives while state location choices are influenced by less easily quantified motives such as 'national interest(s), social cost(s) or social benefit(s)'.

Circumstances that are peculiar to each kind of entrepreneur also influence their choice of location. For instance, the private entrepreneur is influenced by personal considerations, which could be economic in nature (such as personal cost-reducing and personal revenue-increasing factors) or social (such as climate, hobby possibilities, etc.) than the corporate capitalist or state. When a firm grows under a corporation, personal factors (or considerations) are subordinated to the interests of shareholders and the efficiency of the plant in a highly competitive world. Location decisions are influenced by corporate interests which include the efficient capital, technical and economic relationships of new plants to existing plants, and division of the market to ensure adequate supplies of products to existing or potential market areas.

As the model shows, the state can bring its social and planning policies to bear upon decisions in the capitalist sector of a mixed economy. At the same time, state production or strategic needs influence location decisions.

Extraneous elements are introduced in the next stage of the model. These include, demand (which is influenced by population size, distribution and occupation), techniques and plant economies. These elements condition the line or range of production, establish how many plants of optimum scale are required to serve the market, and indicate how far the production process is technically divisible or indivisible and thus amenable to spatial dispersal or concentration. The scale of operation chosen is an important consideration in examining the

accessibility that the various locations offer in terms of economic costs regarding supplies of materials, labour, markets and energy, (see economic costs in Figure 4).

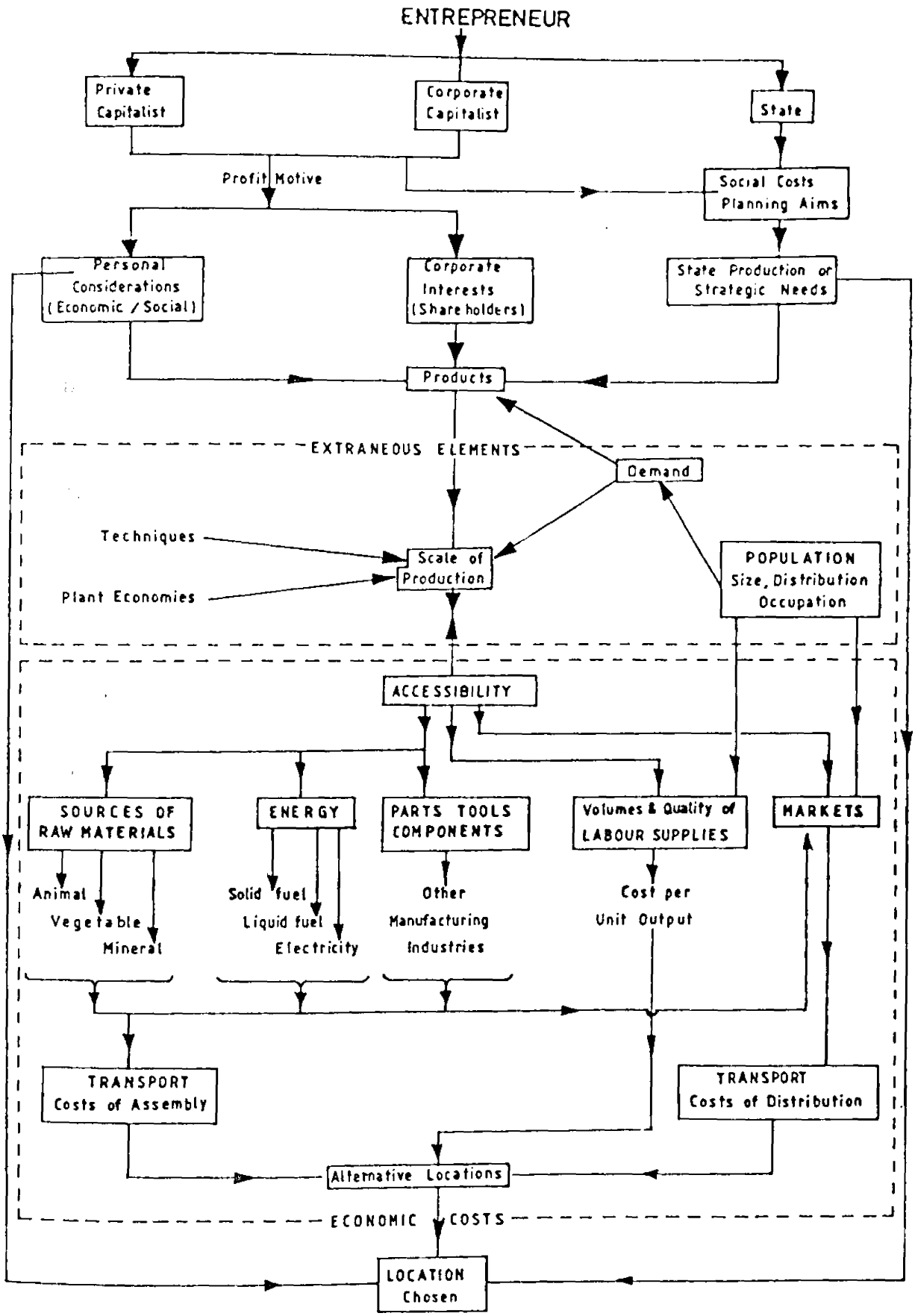


Fig. 4 A BASIC MODEL OF FACTORS INFLUENCING INDUSTRIAL LOCATION

Source: Modified from Hamilton F.E.I's Industrial Location Model (in Chorley R.J. and Haggett P.(eds) (1967), 'Models in Geography': Methuen, London)

The model shows that in deciding where to locate industry, entrepreneurs take into account the summed totals of production and transport costs of raw materials, fuel (or power) and components, the cost of labour inputs and the cost of distributing the product(s) to the market from alternative locations.

Hamilton's model is comprehensive and gives a general view of location variables taken into account by different entrepreneurs, though it (model) does not indicate the relative importance of each location variable.

It has already been noted that the location of economic activities, especially manufacturing industries plays a great role in regional and national development. A number of models have been put forward to explain regional development. These models are based on the works of, *inter alia*, Perroux (1955), Myrdal (1957), Hirschman (1958), Boudeville (1966), Friedmann (1966) and Ogendo (1980, 1988).

Perroux's work was centred around the concept of "growth pole" which he defined in relation to economic space. François Perroux believed that "the basic fact of spatial and industrial development is that growth does not appear everywhere all at once but rather that it appears in points, or development poles with variable intensities, spreading along diverse channels and with varying terminal effects to the whole of the economy". Perroux described economic space as comprising poles or foci, and defines poles as "centres" from which centrifugal forces emanate and to which centripetal forces are attracted. He argued that each centre has an attraction and repulsion and has its proper field, which is set in the field of other centres (Perroux 1954). The forces which Perroux conceives are essentially economic and the

poles which generate such forces are, basically, firms or industries, or groups of firms or industries.

Perroux was largely concerned with growth rates among sectors of the economy or, more specifically, with firms and industries and their interrelationships. Such sectors (or firms and industries or poles) are represented by an input-output matrix in which growth effects can be transmitted across rows and columns. In this matrix, growth is directly related to the activity of the poles themselves, and also the degree of inter-connection amongst them.

An important feature of Perroux's notion of growth pole(s) is 'dominance' of many firms by one firm. This is said to occur when the flow of goods and services from industry X to industry Y is a greater proportion of X's output than the flow from Y to X of Y's output. In such a case, Y is said to be dominant, while firm X is dependent.

Another feature of the growth pole(s) concept is the emphasis placed on the size of the pole (or firm or industry). The rate of growth or change is assumed to be directly related to the size of the pole (or industry). The bigger it is, the larger will be its field of dominance over other firms (or industries) which sell to it or buy from it.

Perroux's growth pole(s) incorporates the notions of leading industries (*industrie motrice*) and propulsive firms. Accordingly, at the core of growth poles are propulsive firms which belong to leading industries. These firms dominate other economic units. There may be just one dominant propulsive firm, or a core of them forming an industrial complex. The salient features of a leading industry are that it should be relatively new and dynamic with an advanced level of technology. It should have a high income elasticity of demand for its products which are usually sold to national markets. Moreover, it should have strong inter-industry linkages and,

hence, assert considerable influence in its environment. The major characteristics of propulsive firms are that they should be relatively large; have a high integration capacity with other firms; have a high degree of dominance; have a high ability to innovate; belong to a fast growing industry; and they should be capable of generating significant growth impulses.

Perroux's ideas have been criticized by a number of scholars from different viewpoints. Darwent (cited in Friedmann and Alonso 1966), has argued that the growth poles(s) concept "has become associated with an enormous variety of ideas and ill-defined concepts and notions". Alonso (1964) has taken Perroux to task over his ideas on advanced technology (associated with the leading industry) as a pre-requisite for the functioning of a growth pole. Alonso has observed that this type of technology (as advanced by Perroux) is out of reach of the developing countries. Furthermore such technology may be inappropriate in terms of factor inputs, such as a capital-intensive technology associated with possible employment reducing tendencies.

Perroux's notion of "leading industry with strong inter-industry linkages" has been criticized. Perroux does not explain how such an industry finds location to serve as a nucleus around which other industries cluster. This is especially so when it is considered that Perroux concludes that "such clusters will become growth poles, if served by leading propulsive industries which are localized to form an industrial complex large enough to exert a determining influence over its industrial environment" (Misra et al. 1974:183). What criteria ought be satisfied prior to the establishment of these (leading industries) type of industries? Perroux's model does not answer this and other questions.

Perroux has also been criticized on his focus on the economic space structural characteristics of the growth pole and inter- relations between industries. He has excluded the

spatial (or geographical) dimension of development. It goes without saying that growth occurs in geographic space and is inevitably influenced by spatial organization. Moreover, it (growth) has an effect upon the spatial structure of the economy and hence the existence of poles (as introduced by Perroux), though attractive, presents unsolved questions of the so-called development poles.

Thus, a number of theorists have attempted to reorientate the scope of the original growth pole(s) idea to include the spatial perspective, which is lacking. Myrdal and Hirschman have attempted to integrate a theory of "geographical incidence of growth" with a hypothesis of "the mechanism of the geographical transmission of development impulses". Both start with the premise that development is necessarily geographically imbalanced. For instance, Hirschman (1958:83,84) argues that it must be taken for granted that economic progress does not appear everywhere at the same time and that once it has appeared, powerful forces make for spatial concentration of economic growth. Myrdal has also noted that growth is initiated in certain places because of initial advantages they may have had.

Myrdal observes that once growth has been initiated or once regional inequalities have emerged because of some initial advantages some regions may have had, the interplay of market forces tends to increase rather than decrease regional inequalities. This takes place through a process Myrdal has called "circular and cumulative causation" (see Figure 5). According to this process, development makes an area attractive for further development. Thus, there are growing regions (where development has been initiated) and stagnating regions. Development impulses are transmitted by means of 'backwash effects' and 'spread effects'. Backwash effects are centripetal forces whose effects are to increase regional inequalities by enabling the growing

areas to exploit the stagnating areas. This is through the flow of capital, commodities and labour to the growing regions. Keeble (cited in Chorley and Haggett, 1967:259) notes:

> Since faced with the higher returns
> obtainable in growth areas those other regions
> tend to lose not only their more skilled
> and enterprising workers, but also much
> of their locally generated capital.

However, the backwash effects are not the only means of transmitting development impulses. Also of significance are 'certain centrifugal "spread effects" of expansionary momentum from the centres of economic expansion (that is, growing areas) to other regions' (Myrdal cited in Chorley and Haggett, 1967:259). The growing regions may stimulate demand for, for example, agricultural and mineral products of other regions. This may initiate economic growth in those areas. Myrdal has insisted that the mechanism of regional growth occurs in such a way that centripetal forces become stronger than centrifugal spread effects. However, if the impact of centrifugal forces is stronger than centripetal forces, the process of cumulative causation may well begin in the stagnating areas.

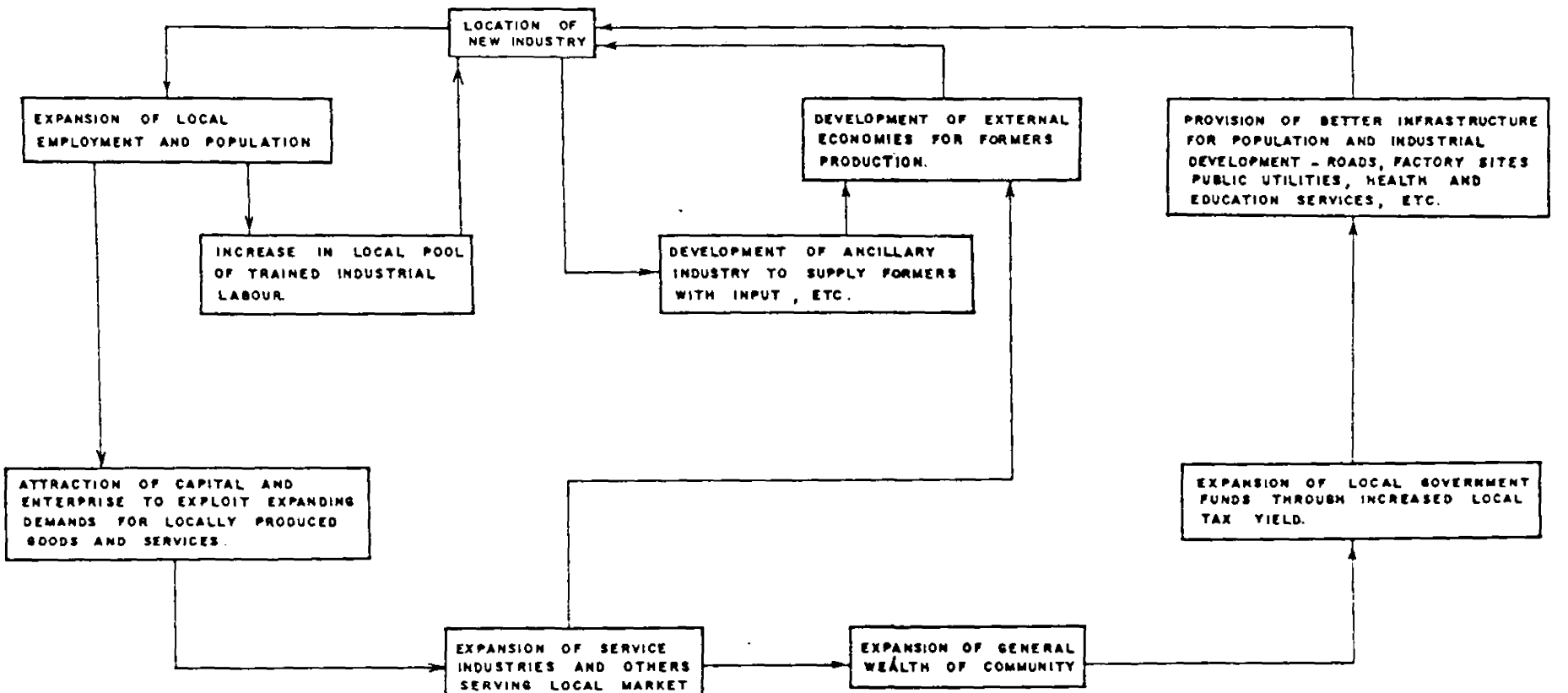


FIG. 5 : INDUSTRY AND REGIONAL DEVELOPMENT- MYRDAL'S PROCESS OF CUMULATIVE CAUSATION

Source : Keeble, D. I - Models of Economic [illegible]opment, in 'Models in Geography', Chorley, R. J. and [illegible] (eds) (1967)

Whereas, he does not subscribe to the process of circular and cumulative causation, Hirschman has noted the role of backwash effects (which he calls "polarization effects") in inducing regional disparities in economic growth and "trickling down effects" (equivalent of Myrdal's "spread effects") whereby growth is extended outwards from the core to the less favoured regions. Hirschman argues that if an imbalance between regions resulting from the dominance of polarization effects develops during the early stages of growth, counter-balancing forces will come in operation to restore the situation to an equilibrium position. Chief among these forces is government economic policy. Their (forces) inclusions, together with the exclusion of any cumulative mechanism (Hirschman, 1958;187) represents the chief structural difference of Hirschman's model from that of Myrdal.

Myrdal and Hirschman are credited with having identified the basic reason(s) why development is localized in space, and exposing the nature and mechanism through which development impulses are propagated from a limited set of urbanized regions to the rest of the country. However, it has been argued that the theory which Myrdal and Hirschman have proposed is essentially non-geographical, since they hardly say anything about the geographical location of development centres and the geographical manifestation of the development impulses propagated from such centres (Hermansen, 1972:44).

Due to the weakness observed in Perroux's abstract conception of space and Hirschman's and Myrdal's theories of unbalanced growth, Boudeville has come up with a modified model that lays emphasis on the regional character of economic space. His model centres around a "growth centre" in which economic and social development may be initiated and transmitted to the area around it. This model (of growth centre) gives some clearer direction to the most important

'normative questions' of regional economic development, namely, those concerned with the regional allocation of investments in both time and space.

Boudeville maintains that economic space is "tied" to geographical space through a functional transformation which describes the relevant properties of economic spaces (Hermansen, 1972:197).

Much of Boudeville's work in this general direction, especially from development viewpoint, is based on his conception of three types of (geographic regions, or) space namely: homogeneous space, polarized space, and planning/programming space.

Boudeville's model is thus modified from Perroux's. In this modified model, he (Boudeville) has changed the definition of 'economic space' so that it becomes the application of economic variables in or on geographic space. In other words, the (growth) pole in Perroux's abstract economic space becomes an 'urban centre' in geographic space with its associated periphery or hinterland. Boudeville has thus defined a growth pole as "a set of propulsive industries (that is, large-scale industrial complexes) located in an urban area and capable of inducing increased development throughout their zones of influence".

Boudeville is credited for his attempt to give a geographical orientation to the growth pole theory treating poles as "geographical agglomeration of activities rather than a complex of sectors different from the national matrix". Boudeville has also observed that "growth poles will appear as towns possessing a complex of propulsive industries" (Boudeville, 1966:112,113). Despite these contributions, however, Boudeville has been criticized for his inability to rid his theory of non-spatial implications of the growth poles (Misra et al. 1974:137).

Friedmann has also attempted to address the problem of regional development in a geographical framework. In a case study of Venezuelan regional development, Friedmann (1966) used the centre (or core) periphery model in which he argued that development originates in a number of small urban centres termed as "cores". Such cores are surrounded by areas lagging behind in economic activity and development. Such lagging areas are known as the 'periphery'. The process of development is said to involve the economic and social integration of the core and the periphery. The periphery is dependent on the core and its development is largely determined by institutions in the core.

Friedmann's centre (or core) periphery model is of two types, namely, the 'local case' and the 'international case'. In the local case, Friedmann's centre-periphery model involves a policy of encouraging spatial integration between the core and periphery at the intra-regional scale (namely, the level of a polarized region), while correcting the imbalance evident between the main national core (or pole - as in the case of Nairobi in Kenya, Paris in France, etc) and the rest of the (relevant) nation, (namely, the periphery, for example, the rest of Kenya, France etc, as in the quoted example above).

Friedmann's centre-periphery model can also be applied internationally, as already noted. For instance, Myrdal (1957) and Hirschman (1958), independently introduced the idea of a process whereby one region (or country) (called North, by Hirschman) is the growth centre (or core)-(being more advanced and developed)- and is seen as influencing or controlling the rest of the nation (or another country or other countries, called South by Hirschman) by the processes of "polarization/backwash effects" (of Hirschman and Myrdal, respectively) and "trickling-down/spread-effects" (also of Hirschman and Myrdal, respectively). Consequently,

polarization effects on the South, by the North, tend to be at the South's disadvantage and are due to the North's stronger economic position. The polarization effects include severe competition against the South's relatively inefficient industries and a tendency towards selective migration of the young, more educated and skilled people from South to the North in search of greater opportunities and, apparently, higher salaries available in the North.

Moreover, since the North's industrial enterprises are relatively more productive than those of the South, whatever little capital the South has is also likely to migrate to the North, where interest rates are higher and the security (and, perhaps currency strength) of such capital is guaranteed. However, the "trickling down effects"/"spread effects" from the North to the South are (i) the increased North's purchases and investments in the South and, (ii) the absorption, by the North, of some of the South's under- or unemployed, thereby raising per capita incomes in the South.

Nonetheless, it is apparent that the spread-effects are most likely to be balanced in favour of the North (the growth centre) and against the South (the periphery), and that such an imbalanced situation will tend to persist up to the point where, either:

(a) the lagging of the South begins to affect the North's growth, or:

(b) the South will seek to redress/redeem the balance by political action or revolution.

John Friedmann's model therefore borrows and expands Hirschman's notion of "unbalanced growth".

The centre (or core)-periphery model seems to take for granted that development will always originate from some urban centre and should the centre be integrated (it is not stated how) with the periphery, then innovations are likely to diffuse towards the relatively poor areas. It may be argued that the mere presence of urban system (centre) even when it occurs in a spatial system of other centres does not constitute a *raison d'etre* for development of its hinterland (periphery) (Wegulo 1984). Not unless the activities within urban centres (eg. manufacturing) are intimately linked to the activities of the rural (peripheral) areas. Only in this way might it be possible to discourage parasitic relationship(s) between the core and the periphery that are (is) likely to emerge.

This line of thought has been extensively explored by Ogendo (1988, 1989). He has developed the centrifugal model, to reinforce the District Focus for Rural Development (DFRD) strategy in Kenya's regional development planning.

The District Focus strategy, was launched in July, 1983 and adopted, for the first time, in the 1984-1988 National Development Plan. The introduction of the strategy was due to disabling problems that faced other approaches that had been adopted for regional development planning of, especially, the rural areas. Such approaches included:

(a) Disaggregated style of national and/or regional development policies and plans, largely based on models such as: Perroux's growth pole(s) model, Boudeville's growth centre model, and especially Friedmann's growth centre/ centre-periphery (local and international) model(s). The above models tended to create polarized,

hence, inequitable national and/or regional development. Hence, they were later dropped by the government for other proposals such as:

(b) President Kenyatta's slogan of, 'back to the land' which was reinforced by a series of small settlement schemes in many parts of Kenya. This approach later developed teething troubles and could not solve accumulated problems, especially the rapidly growing population; and,

(c) Special Rural Development Programme (SRDP), which was apparently abandoned halfway through its implementation, and;

(d) Integrated Rural Development Programme (IRDP), which never took off.

The main objectives of the District Focus strategy for rural development included:

(i) Mobilizing the domestic resources of each District for equitable development, especially between the urban and rural areas.

(ii) Encouraging cost-sharing between the government and the local population,

(iii) Allowing for popular participation by involving local people in planning and in the implementation of local projects,

(iv) Reducing the polarization of the space economy,

(v) Discouraging the existing adverse rural-urban migration,

(vi) Promoting rapid growth of medium-sized and small-sized towns, and;

(vii) Encouraging productive linkages between the agricultural and others sectors of the national economy, and between the rural areas and the local service centres, market centres, gateway towns and intermediate large urban centres.

The District Focus for Rural Development (DFRD) strategy aims at development from below. The model puts great emphasis on the motivation and popular participation of the rural population in rural development. In a nutshell, the model aims at inducing, supporting and sustaining rural development. However, the DFRD strategy has not achieved most of its objectives due to problems facing its implementation. These are outlined below:

(a) Conflicts arising due to lack of clear operational definition as to the role(s) and function(s) of its various organs, for example, the District Monitoring and Evaluation Committee(s) and the Provincial Monitoring and Evaluation Committee(s).

(b) Problems related to information that is either inaccurate, irrelevant, untimely, aggravated by shortness of programming time and lack of both development funds and skilled personnel.

(c) Delays in the release of funds from the Ministries concerned.

(d) In some cases, not all the projects forwarded by the District Development Committee(s) are approved for funding by the Ministry of Finance.

(e) Poor, or even, lack of rural population participation (in the identification, prioritisation and the implementation of the District development projects) remains a disturbing problem.

(f) Other problems that impede proper functioning of the District Focus strategy, include: lack of commitment; lack of (senior) skilled personnel; low level of integration in the decision making processes; mistrust; low wages; politicised civil

service; genuine dearth/scarcity of known mobilizable development resources; personalisation of the public offices; unnecessary transfers, or early retirement (s) of experienced personnel; intensified primacy which tends to accelerate rural-urban migration; education that orientates graduates for urban employment opportunities; rapid population growth rate; socio-cultural drawbacks and red tape; level and distribution of foreign investments and aid; high proportion of young children; youth and women who are predominantly illiterate; partial decentralisation of planning; inadequacy of data at District level; vulnerability of projects to political issues; and, the problematic complex organisation at the provincial and District levels.

To improve the District Focus strategy, the following should be considered:

(i) There is need for genuine and practical development from below, not disaggregated and imposed from above. This will ensure popular participation of the rural population, which is vital for the success of the DFRD strategy.

(ii) Districts that are specifically disadvantaged should be exposed to development policies and plans directed at solving problems of poverty.

(iii) There is need for greater use of appropriate technology rather than borrowed unfamiliar technology.

(iv) Objectives that are more likely to foster popular participation and which could, finally, solve rural development problems should be encouraged.

(v) Deliberate policies and plans are to be adopted to facilitate comprehensive development planning.

(vi) Rural development planners should consider, as basic, the ecological-cum-overall-environmental conserving strategies.

Ogendo's centrifugal model[1] (Ogendo 1988,1989) has the following principal objectives:

1. Development resource bases assessment

The model aims at using a comprehensive assessment of all known development resource bases in each District, while toning down/eliminating identified variables that are negative.

2. Industrial structural studies

The centrifugal model relies on applied industrial structural studies so as to discourage largely parasitic type of both local and international core-periphery exploitative regional development structure. Hence the right industrial structure requires a critical assessment of the following:

2.1 a) Formal sector industries.

b) Informal sector industries.

2.2 a) Agro-based (food and non-food) industries.

b) Non-agro-based industries.

c) Non-agro-based allied service industries.

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[1]*For a detailed study of the model the reader should consult Ogendo (1988, 1989).*

b) Low quality goods industries.

c) Dangerous component(s) goods and low-quality pharmaceutical and related goods local industries.

2.11 a) Industries using local raw materials.

b) Industries using imported raw materials.

2.12 a) Capital goods industries

b) Intermediate/producer goods industries.

2.13 a) Capital-intensive industries.

b) Labour-intensive industries.

2.14 a) Public (mainly Parastatal or Government) owned industries.

b) Privately owned local or foreign (multinational or transnational) industries.

c) Public (non-government) cooperatively owned industries.

2.15 a)Industries capable of establishing extensive (forward or backward) linkages.

b) Industries with little or very limited (forward and backward) linkages.

c) Leading and/or key industries.

2.16 a) Primary/extractive industries.

b) Secondary/manufacturing industries.

c) Service industries: i) Standard tertiary industries

ii) Technocratic (or quarternary) industries.

3. Development-inducing and development-supporting industries

The model gives priority to development-inducing and development-supporting industries. It is these industries which are principally capable of ploughing development finance into the rural areas.

4. Location patterning of industries

The centrifugal model advocates for deliberate location patterning of (especially development-inducing) industries such that: a) some have national activity radii such as the final stages coffee industry centred in Nairobi, but ploughing back development funds into the rural areas (almost nationwide); b) others have intermediate activity radii (for instance, flour milling, brewing, etc); c) while others (such as sugarcane processing, tea processing, etc.) have short activity radii. The diversification of activity radii ensures that the rural areas are appropriately radially catered for in national, regional and local aspects of development.

5. Replanning of present urban system

The model takes the present Kenyan urban system as given but proceeds to plan for their conversion into development centres (DCs), development points (DPs), potential development points (PDPs) and service centres (SCs). Development points are of national and/or regional calibre. They serve their respective macro econo-geographic regions, as well as, their micro areal units. Development points are intermediate in size and function and mainly serve the macro-economic regions and the local District(s) in which they are located. Potential development points are largely local in function, although they are larger and more important than either service centre(s) type 1 and type 2.

6. Infrastructural networks and media

The centrifugal model encourages full development of various local, regional, national and international infrastructural networks and media.

7. Leakage of development funds

The model attempts to discourage leakages of development funds from any given District or region by introducing semi-closed system(s). This is particularly the case with regard to the development items most affected by such development capital leakages to other and/or international centres of greater attraction.

8. Replanning of areal units

The model demarcates the supermacro and macro regional economic development areal units to coincide with the zoned supermacro and macro geographic units, hence, forming supermacro and macro econo-geographic regions.

9. Identification of development aspects by which Districts have affinity

The model identifies development aspects by which Districts have affinity (in terms of physical, environmental, economic, political, social and cultural aspects). The model also identifies the 'development triggering District.' This is the District likely to give a lead to other associated District(s) somewhat lagging behind in any given macro-econo-geographic region.

10. Investment of development capital

The model suggests short-term investment of idle development capital, in proven profitable large economic enterprises in local, or neighbouring, or any other approved micro, macro or core-macro areal units, for a specified period of time. Profits from such investment could be used for that District's development either in short- or long-term planning process.

11. Agglomeration economies

The model takes advantage of agglomeration economies. Examples include: a) internal economies of scale due to any large scale industry in the District; b) external economies of scale within thriving large scale industries in the District; and c) any urbanization economies.

12 Cumulative Causation (model) designed to be non-polarizing as regards the selected industries

The model advocates for designed non-polarized cumulative causation (model) type of development-inducing industrial enterprises, with strong forward and backward linkages especially in the agro-based industrial sector.

13 Elements of sound industrial strategy

According to the model, elements of sound industrial strategy should include the following:

i) Industrial development must be approached actively and aggressively.

ii) Industrial development should be broadly supported countrywide and should be turned into a virtual crusade.

iii) Industrial development approach, since it is largely experimental, should be seen to be as free as possible from prejudices and should be reasonably flexible.

iv) The government should generate initiative and the drive to industrial development.

v) There is need to create a favourable industrial development climate.

vi) Government bureaucratic requirements need to be streamlined.

vii) There should be justified protection of new industries; attraction of foreign capital, and; "guarded" international open-door outlook.

viii) Training and development of personnel (both managerial and technical) should be emphasized.

ix) Industrial development should be placed in proper perspective in relation to other sectors of the economy.

14 Procedures for depolarization of Kenya's polarized space economy

The centrifugal model examines Kenya's current polarized space economy and proceeds to suggest remedial measures.

Accordingly, the Kenyan present polarized space economy falls into various types of polarized economic surfaces/zones (Figure 6) as follows:

1. The Nairobi core zone (1.0);
2. Active periphery (1.1 - 2.4);
3. Downward transitional zones (3.1 - 3.5); and,
4. Negative-cum-problem zones (4.3 - 4.5).

14.1 Nairobi Core Zone (1.0)

The Nairobi core zone (1.0) lacks in natural resources of its own, although it can attract these [from its neighbouring resource frontier(s)] due to its relatively high internal efficiency. The zone is virtually endowed with all the necessary development components such as: capital, technology, societal or institutional innovation, all types of labour, manufacturing industries, external economies of inter-industry linkages, urbanization economies, favourable terms of trade, high intra-regional demand,including full national power to withdraw decision-making from any of the local/national peripheral zones. It is apparent that the core zone is congested. In order to

lessen this congestion and create greater efficiency in the core zone, the inflow of development factors/determinants, (particularly societal innovation and decision-making) should be diverted to other less favoured zones/surfaces, such as: upward transitional zone(s), depressed zone(s), stagnating zone(s), and negative zone(s). Such a procedure should reduce the existing regional inequalities, thereby facilitating the reorganization of the Nairobi core zone to eliminate congestion and allow for greater efficiency.

14.2 Active Periphery (1.1-2.4)

The active periphery (1.1-2.4) is part of the resource frontier for the Nairobi core zone. The active periphery consists, on the ground, of the various secondary core zones, such as, Malindi-Kilifi-Mombasa-Ramisi secondary core zone; Kiambu-Murang'a-Nyeri-Meru secondary core zone;Lake Basin's Kisii-Kisumu-Kakamega-Bungoma secondary core zone; Nakuru-Njoro-Elburgon-Molo secondary core zone, and; Eldoret-Kapsabet-Kakamega secondary core zone. Structurally, the active periphery comprises:

1.1-1.3: a) Upward transitional zone(s) - which are partly resource frontier, although actively competitive in relation to the Nairobi core zone.

2.1-2.2: b)i) The rest of the active periphery - this is largely a resource frontier for zones 1.0 and 1.1-1.3 above. Zones 2.1-2.2 are far less competitive in relation to the Nairobi core zone as compared to zones 1.1-1.3.

2.3-2.4 b)ii): Less active parts of the Inner Fringe Zones - although 2.3-2.4 are incorporated in the active periphery, they do not, in practice, belong here, so that they are, for practical

purposes, not included in the active periphery. 2.3-2.4 zones are mainly resource frontiers for zones 1.0, 1.1-1.3 and even zones 2.1-2.2.

To maintain sustained development, the secondary core and related active periphery zones should retain enough factor returns, (through wages, etc.) in order to create adequate internal demand to provide the basis for regional service and manufacturing industries, and to mobilize development determinants from outside. The creation of urbanization economies and their inter-industry linkages within the active periphery should facilitate comprehensive development, especially when the natural resources complexes are utilized by the relevant processing industries to enhance the value of such natural resources, thus availing more development funds. In summary, the central requirements for development in the active periphery zone include:

a) Building of an effective internal demand - in order to maintain sustained development, the active periphery have to be able to retain enough factor returns (through wages, etc.), in order to create adequate internal demand to provide the basis for regional service and manufacturing industries, and to mobilize from outside.

b) The creation of urbanization economies and their inter-industry linkages within the active periphery should effect comprehensive development, especially when the natural resource complexes are utilized by the relevant processing industries to enhance the value of such natural resources, thereby availing more development funds.

c) Creational of dynamic institutional/societal structures -these determine the value of the resource frontier zone's natural (and human) resources and such zones' ability to retain factor returns on the development of such secondary zones.

c) Granting of decision-making power by the Nairobi core zone. It is apparent that the cumulative effect is almost always favourable to the core zone, which keeps on increasing its relative advantage until such a time as the active periphery zones are able to exert effective pressure, (political or otherwise), for more or most decision-making powers, thereby weakening the core zone's self-perpetuating tendencies and/or trends.

14.3 Downward Transitional Zones (3.1-3.5)

The downward transitional zones (3.1-3.5) experience an inverted economic development situation, and seem to suffer more from backwash-effects. Thus, these zones benefit far less from spread-effects.

The downward transitional zones constitute the Outer Fringe Zones, namely: **3.1-3.30 - Depressed "passive" periphery "problem" zones**, and; **3.31-3.5 Slowly developing or stagnating "neutral" periphery "problem" zones**. As regards the downward transitional zones, the possible remedial measures may be outlined as follows:

i) The stimulation of internal development factors through the expansion of internal demand (this is usually through public income transfers to the relevant zones in each case) and through the specialization of the regional economic structure.

ii) The mobilization of the development process from inside:

(a) **In theory:** The depressed zones/surfaces are regarded as a closed system.

(b) **In practice:** However, in practice, the development process from inside is superseded and, usually, guided by government impulses from outside such depressed regions. The

major factors which stimulate a depressed region's development from outside, include: the world's demand for various types of their resources; the depressed region's links with outside in terms of access to outside information, resources and markets, and; the zone's capacity to internalize outside developmental factors through building up of its internal economic demand from savings derived from export-based activities. This facilitates self-sustained development.

iii) Formation of groups within the depressed zone which (groups) have the capacity for mobilizing and utilizing resources in the service of self-defined objectives. These groups involve the services of regional businessmen, intellectuals and politicians. All the above groups have to identify themselves with the depressed region's interests and should be capable of pressing for the zone's interest with outside decision-makers.

iv) Increasing the competitive capacity of the downward transitional zones towards the outside by rationalizing existing production processes, or by identifying new potential products, or high value resources (such as precious minerals, etc.). The transport and other means of communication should be improved in the zones to facilitate easy access to the external market.

14.4 Negative-cum-problem Zones (4.3-4.5)

The negative-cum-problem zones, like the downward transitional zones, experience an inverted economic de situation and fall into four sub-zone areal units, namely:

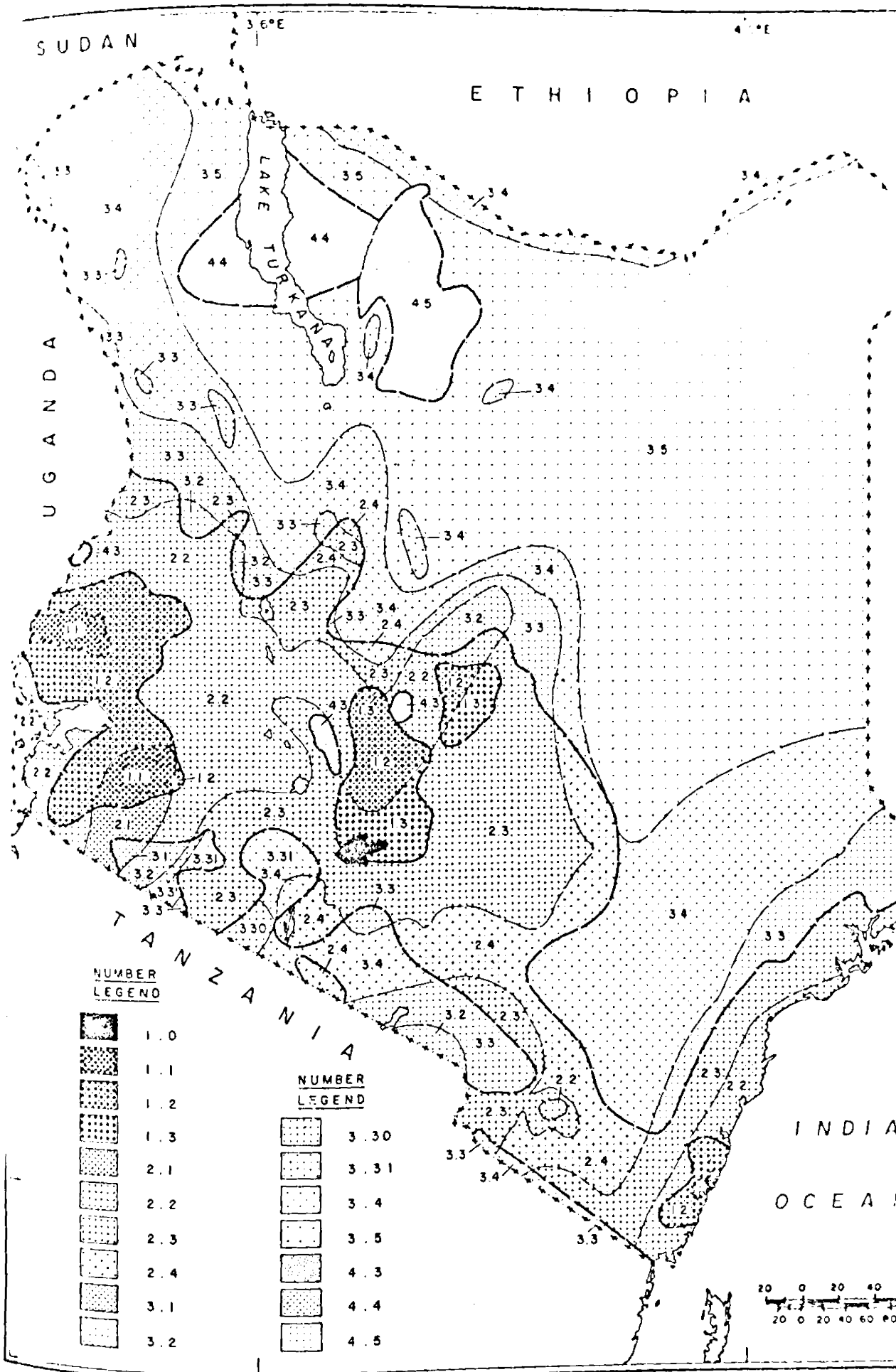
4.3: Cold (Afro-Alpine - 4.3.1) semi-desert and Cold (mountain summit - 4.3.2) ice-capped or barren (stony) desert are not, however, differentiated and are shown combined as 4.3;

4.4 Hot, low-lying, standard Kenyan desert (4.4), and;

4.5 Hot, low-lying, barren stony desert.

As for the negative-cum-problem zones (4.3-4.5), the future will much depend on advanced technology, unless high–value minerals or mineral oil could be found with the zones. Such positively substantial development resources could trigger large-scale development which could serve as bases of large capital investments necessary for developing these currently, otherwise, inhospitable zones, such as parts of Turkana and Samburu found within West Pokot's macro-economic development planning region forming a portion of the Greater Eldoret Region.

Generally speaking, comprehensive development will require the adoption of deliberate policies and plans. These include: (a) i) goal setting for regional development plans; ii) objectives in the inter-regional and inter-local planning; iii) principal problems in designing regional policies and plans; iv) Major problems in implementing regional policies and plans; b) some basic weaknesses of regional development planning: i) regional development priorities, and; ii) role of regional development research.



GURE 6 : THE POLARISED SPACE ECONOMY OF KENYA

SOURCE: OGEN

15 Role of the urban system in centrifugal model

The role of the urban system in the development of Kenyan Districts would appear to fall in following functions:

a) to transmit technological and societal innovation, control and decision-making functions from the Central Government core region, centrifugally downwards through regional urban centres to their respective metropolitan areas or hinterlands;

b) to transmit production factors and commodities between the regional urban centres and their metropolitan hinterlands, as well as both the national urban and regional hierarchies;

c) to facilitate the interaction between economic, societal and political development determinants at both local and regional levels;

d) to interrelate development determinants from outside with those from inside the region, at both local and regional levels;

e) to accelerate metropolitan areas development by encouraging more of the urban-located businessmen to establish rural-linked development-inducing and/ or development-supporting industries with the specific aim of ploughing back, into the relevant metropolitan areas, profits, development finance, and allied production factors, and;

f) to facilitate the spreading out into the rural hinterlands and beyond, those urbanization economies which make for lower cost and higher efficiency of the regional activities.

The principal components of Ogendo's centrifugal model are shown in figure 7. Ogendo model is very useful for comprehensive equitable regional development planning.

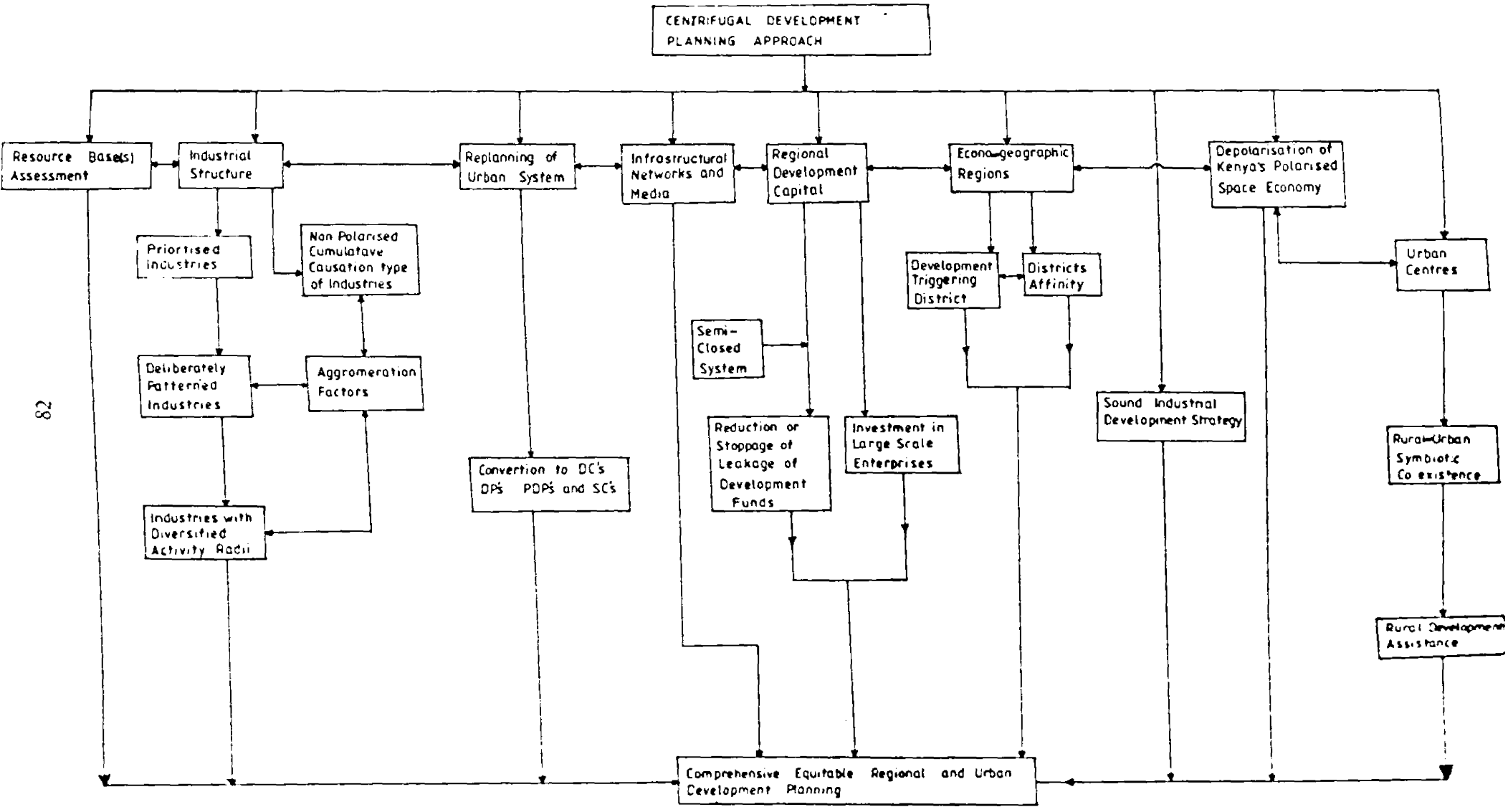


FIG. 7 THE CENTRIFUGAL MODEL FOR COMPREHENSIVE EQUITABLE REGIONAL AND URBAN PLANNING.

Source: Modelled from Ogendo's original perception (1988, 1989)

It has been established that the activities of multinational corporations (hereafter referred to as MNCs[1]), play a role in regional and/or national development (Kaplinsky 1978, Coughlin 1988, Jhingan 1989, Langdon 1975). The role of MNCs is important because in less developed countries (LDCs), such as Kenya, direct foreign investment accounts for a substantial share of value-added. Moreover, it (the investment) is concentrated in the leading sectors, such as the manufacturing and agricultural sectors (Kaplinsky 1978).

In Kenya, Nairobi serves as the local and regional headquarters of a number of MNCs. Prior to 1945, MNCs activities in Kenya were concentrated in the agricultural and trade sectors (Swainson 1976). However, in the contemporary situation substantial changes have occurred. There has been a shift in the orientation of foreign investment. MNCs investments are now concentrated in the manufacturing sector, dominantly in the petroleum products, industrial chemicals, pharmaceutical products, footwear, paints, soaps, metal products sector and soft drinks. There is relatively little investment in primary production but a great deal relatively in the manufacturing and service sectors.

Jhingan (1989) has noted the following as the merits of MNCs:

(i) They lead to a net increase in capital formation since they provide large and cheap capital to LDCs by way of direct investment.

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[1]*A multinational corporation is a company or enterprise with its headquarters in a developed country such as the United States, Britain, West Germany, Japan, etc., and also operates in other countries, both the developed and the developing (Jhingan 1989).*

(ii) They start new ventures following which the advantages of superior management, training, education and entrepreneurial ability are bestowed on these ventures.

(iii) They transfer superior technology to LDCs which is usually based on research and development in the parent concerns. This leads to the discovery and introduction of new processes and differentiated products in LDCs. These products tend to raise the standard of living of the people.

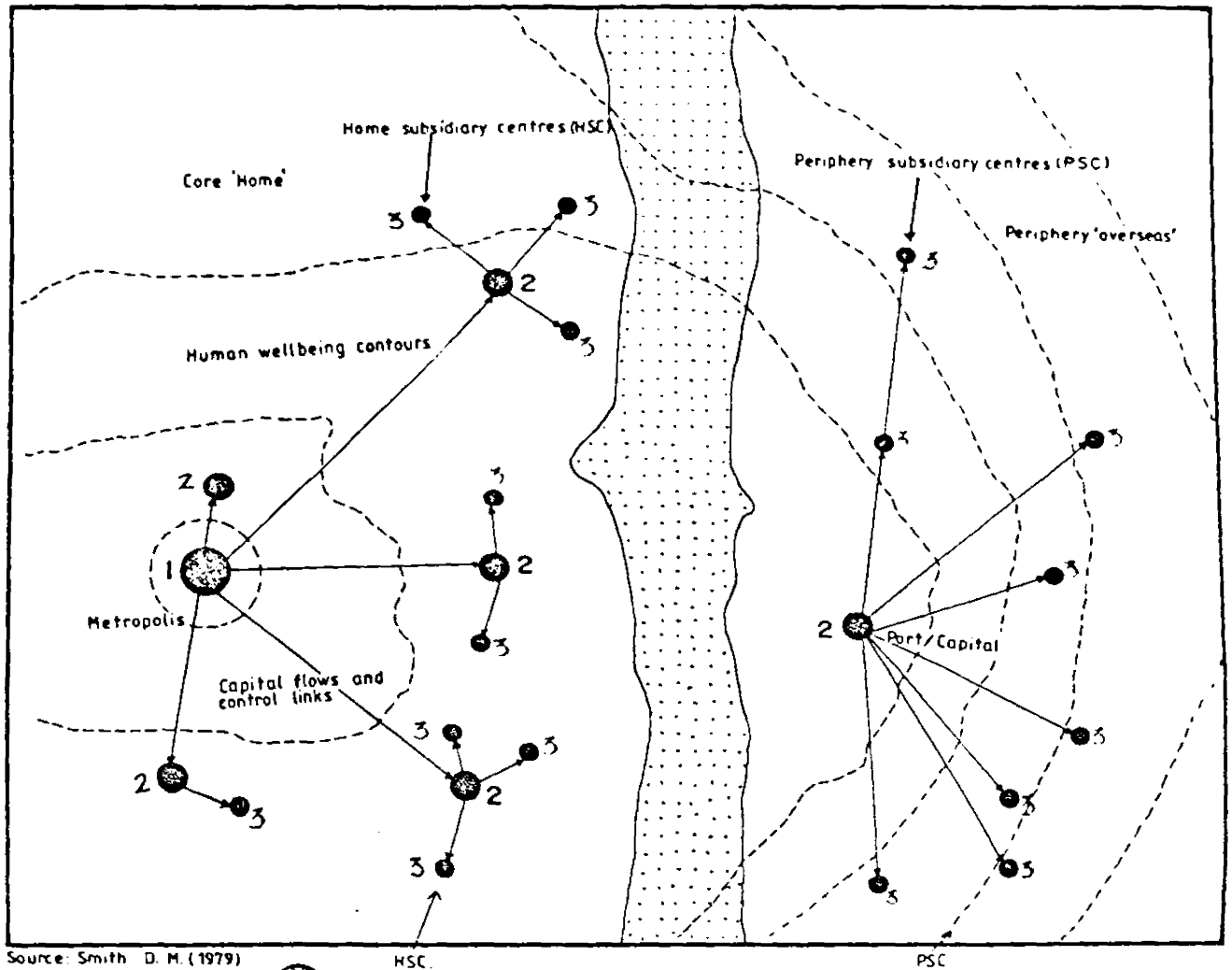
(iv) MNCs introduce new methods of marketing in LDCs through market research in their headquarters. They adopt new and better advertising and promotional methods which impart information to buyers and create demand for products. This encourages competition.

Despite these (apparent) advantages, MNCs have been accused of doing more harm than good, especially as far as the development of LDCs is concerned.

It has been noted that there is excessive head office (headquarters of given MNC) control over the activities of subsidiary establishments (Langdon 1975, Smith 1979, Kaplinsky 1978). The head office controls annual budgets, capital expenditure, sources of material inputs, choice of production techniques, marketing policies, personnel policies and the profitability targets, of subsidiaries. This control does not, in most cases, take into account the local conditions in which any given MNC subsidiary is operating. This leads to conflicts of interest between MNC activities and the state (national) activities of the country where the MNC is operating. Scholars have argued that multinationals are an extension of core-periphery relationships that exist in LDCs. Such relationships are associated with the exploitation of the periphery by the

core. Smith (1979) notes that the control, top level management planning and decision making in MNCs subsidiaries is exercised from the 'home territory' (the headquarters), which constitutes the core. The periphery is the overseas countries where MNCs operate. Hymer (cited in Smith 1979) argues that MNCs are hierarchical in their organisation. They consist of 'top level hierarchy' and 'bottom level hierarchy'. The 'top level hierarchy' comprises senior management with functions of goal determination and planning. The 'bottom level hierarchy' comprises day to day management of operations, performed by people with relatively low pay and status as compared to top level management. Hymer's model is illustrated in figure 8. The 'home territory' is representative of North America or Europe, with a metropolis of top level control and subsidiary centres. 'Overseas' represents the periphery, usually the developing countries 'where control is exercised from the capital or major port, itself a subsidiary of the home (core) metropolis. Figure 8 is shown below.

FIG. 8 THE MNCS' SPATIAL CONTROL HIERARCHY AND PATTERNS OF WELLBEING AS FORMULATED BY HYMER



Three levels of management are highlighted by the model. Level one consists of top level management holding well paying and high status jobs. Level two consists of medium level management. The employees earn medium pay and hold medium status jobs. Level three consists of day to day management with little local control, and relatively low pay and low status jobs. In a study of seven British MNCs in Kenya, Kaplinsky (1978) observed that parent establishments 'are anxious to control the generation of new technology in their subsidiaries and that, particularly in the consumer and intermediate goods sectors, subsidiaries are dependent upon parent companies for generation (and choice) of new technology'. Jhingan (1989) also observes that MNCs transfer second rate and overpriced technology to LDCs. Moreover, the technology transferred to LDCs is capital-intensive hence inappropriate to the 'capital-scarce and hence labour-surplus economies'.

MNCs have also been accused of accentuating regional and/or sectoral inequalities especially in LDCs. This is because they establish their plants in big towns and cities (for instance, Nairobi, Mombasa, Nakuru, Kisumu, etc., in Kenya) where infrastructural facilities are well developed. Other parts of the countries involved are often neglected. Furthermore, MNCs concentrate mainly in certain (leading) sectors of the economies of LDCs.

MNCs are associated with transfer-pricing practices. Research in parts of the world has shown that there is a very large difference between the profits declared and the effective profits (Robbins and Stoubaugh 1975). It has been noted that MNCs overprice their imports and

underprice the exports of LDCs. The effect of this is that there is little capital formation in LDCs since net capital inflow is very small.

There is need for developing countries to control and curtail the damaging effects of MNCs and utilize them for their maximum benefit. Some suggestions of achieving this include:

(i) LDCs should enter into 'turnkey agreements' whereby MNCs will undertake projects and once these (the projects) are fully operational, they (MNCs) entrust them to a local firm. In lieu of these services, the MNCs should be paid either a fixed or cost-plus fee.

(ii) Joint-venture agreements, between local firms and/or government with MNCs, should be entered into. These agreements should be specific, for instance, to manufacture product(s) within the country with locally available raw materials, train and employ manpower, carry out research and development in the host country, as well as, invest a certain percentage of profits in it.

(iii) LDCs should establish independent agencies to report on the workings and activities of MNCs from time to time and action should be taken, against MNCs involved in activities regarded as offensive.

(iv) Before contracts are entered into, between states and MNCs, there should be active bargaining, to procure agreements. Baily (1976) has noted that more often than not Kenya does not actively bargain with foreign companies. Even where such bargaining does take place, the criteria used by the state are often narrow and misguided leading to sub-optimal decisions.

CHAPTER TWO

THE STUDY AREA

2.1 INTRODUCTION

This chapter examines various relevant aspects of Kisii District. These aspects include the physical, economic and population characteristics of the study area. An examination of these characteristics is important because of their influence on this study.

2.2 LOCATION AND SIZE

Kisii District is one of the Districts making up Nyanza Province. The District shares common borders with Nyamira District to the north and east, Narok District to the south and Homa Bay and Migori Districts to the west. Figure 9 shows the position of Kisii District in Kenya. Figure 10 shows the divisional administrative boundaries of the study area. The study area lies between latitude 0° 30' and 1° south and longitude 34° 38' and 35° east. It is the second smallest District in Nyanza Province after Nyamira District.

Kisii District covers an area of about 1302.1 km² and is subdivided into a number of administrative divisions (Figure 10). Nyamarambe is the largest division occupying 208.2 km², followed by Masaba and Keumbu which occupy 160 km², and 149 km², respectively. The smallest divisions are Sameta and Nyamache which occupy areas of 81 km² and 78 km², respectively. The three largest divisions occupy an area of about 40 per cent of the study area's total land area.

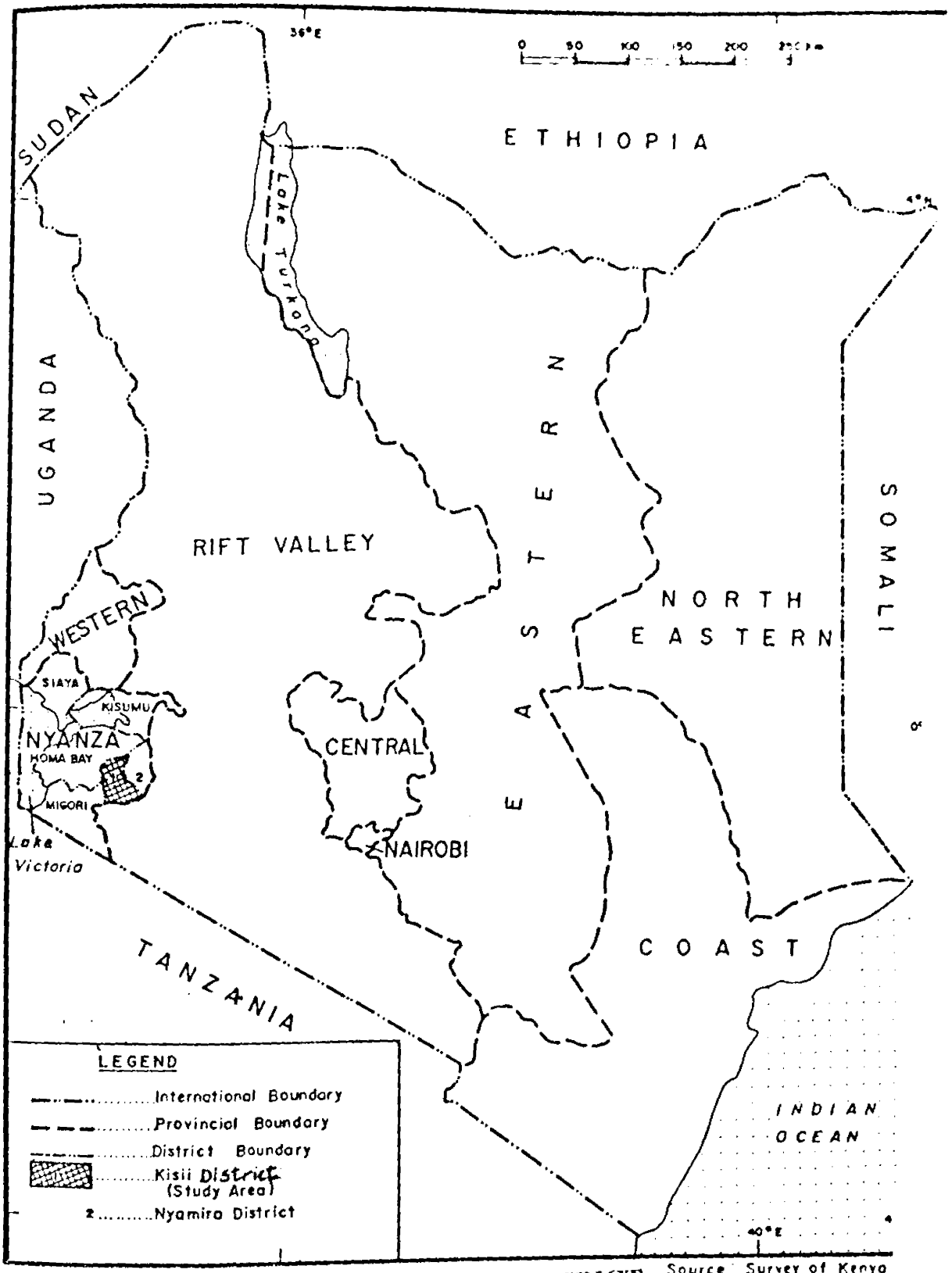
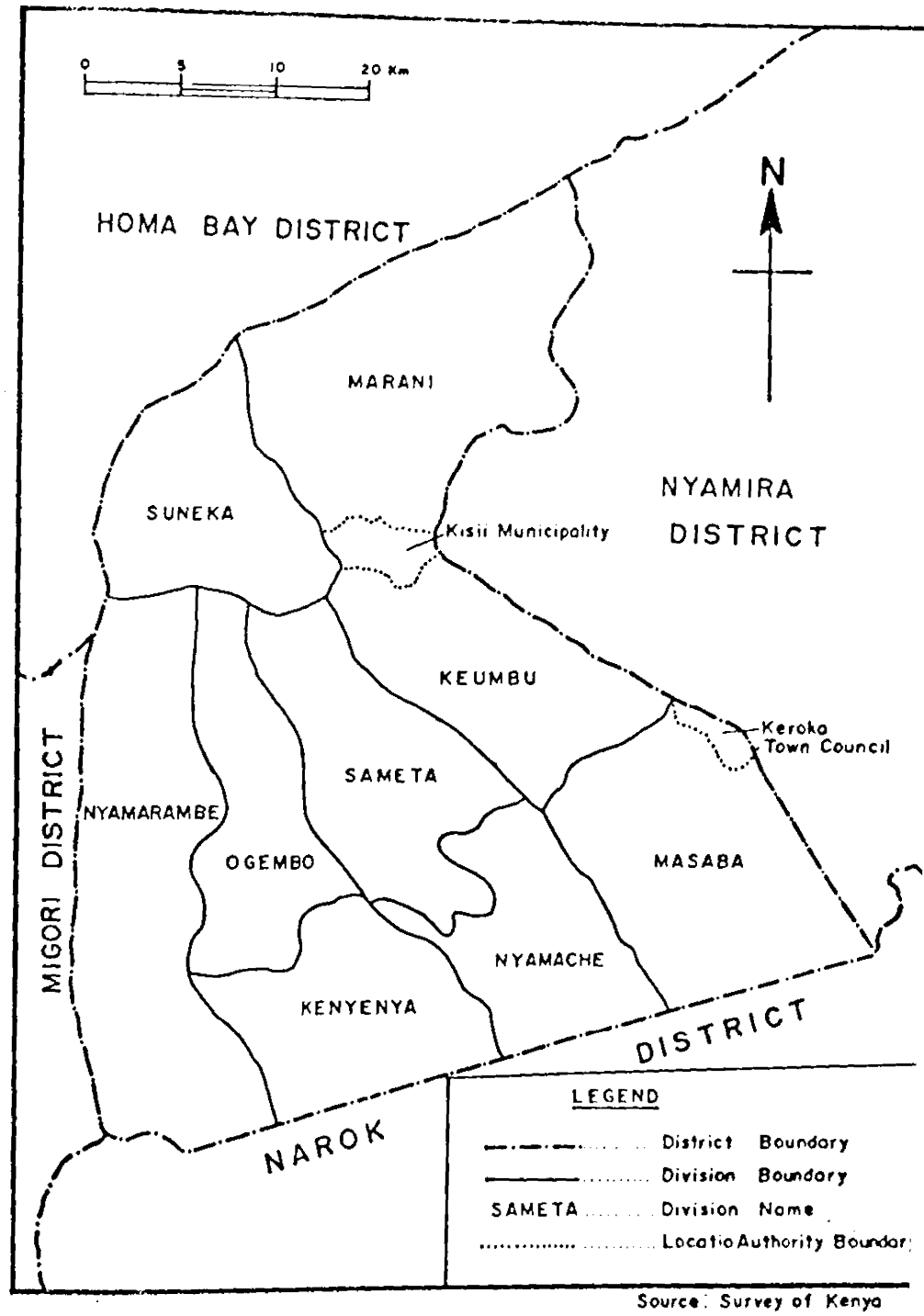


FIGURE 9: KENYA: POSITION OF KISII DISTRICT

FIGURE 10: KISII DISTRICT: ADMINISTRATIVE UNITS AND BOUNDARIES



2.3 SURFACE CONFIGURATION IN RELATION TO INDUSTRIAL LOCATION AND STRUCTURE

A study of surface configuration of an area (in this case, Kisii District) is of paramount importance in the study of industrial location and structure. This is because, among other things, surface configuration influences ecological zones and agricultural production, hence, agro-based industrial raw materials. It also influences transport network.

Kisii District, like much of western Kenya, have been influenced by successive phases of prolonged sub-aerial denudation and large scale tectonic disturbances. Earth movements including uplifts, tilting, faulting and volcanicity took place in the region giving rise to an upland environment as exemplified by Kisii Highlands.

Structurally, the study area consists of three major topographical zones. These zones are closely related to altitude. The first topographical zone consists of areas with an altitude of less than 1500 metres above sea level. It is found along the western boundary of the District and is considered part of the Lake Victoria Basin. This zone includes parts of Suneka, Marani and Nyamarambe. The crops that can be grown in this zone are coffee, sugarcane, groundnuts, soyabeans and bananas.

The second topographical zone consists of those areas with an altitude of between 1500 and 1800 metres above sea level. This includes parts of: River Gucha basin, western parts of Keumbu Division, eastern Marani and Sameta. This zone is associated with the cultivation of tea, coffee, vegetables (such as cabbages, peas, beans, spinach etc), maize and dairying.

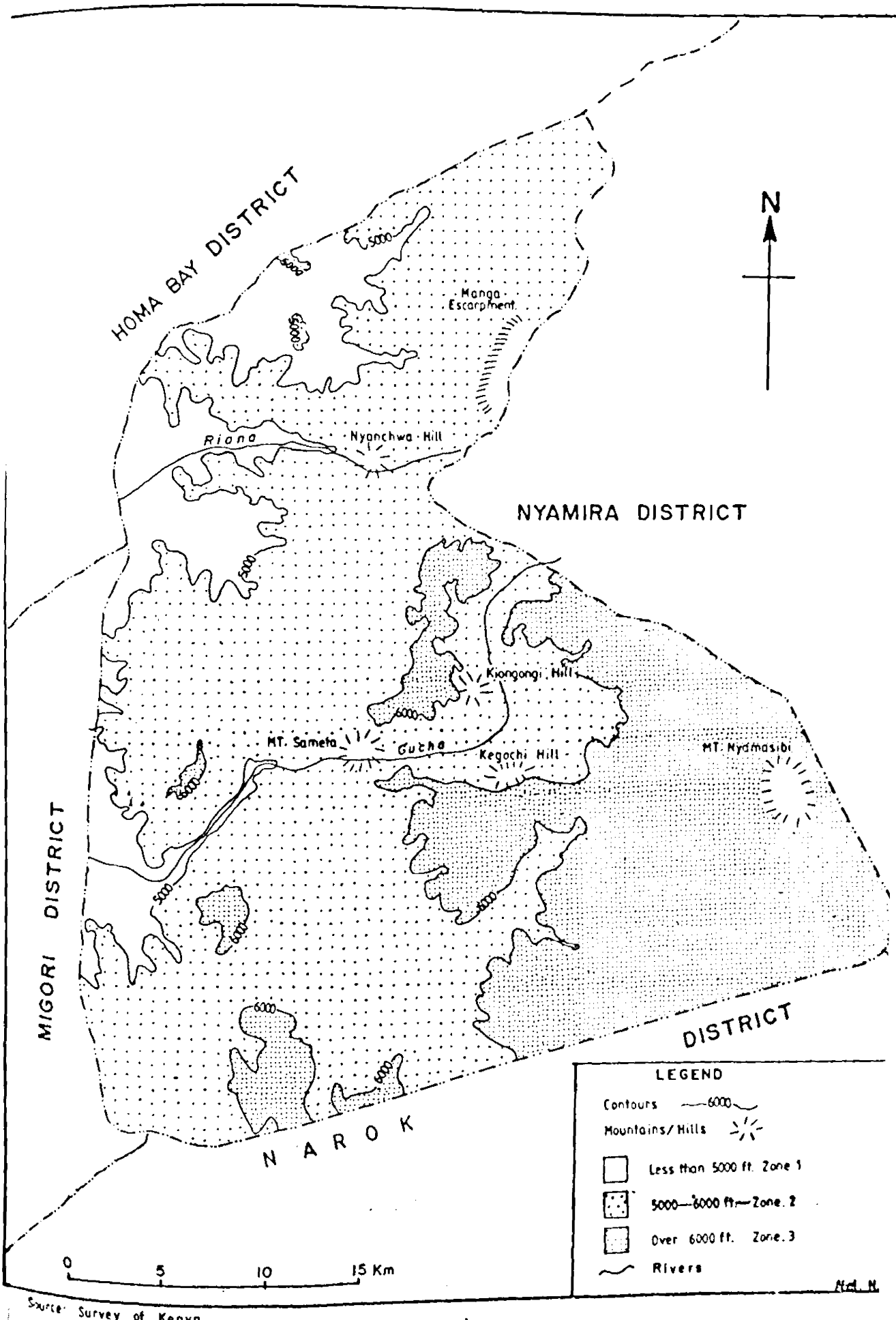
The third topographical zone consists of areas whose height above sea level is 1800 metres and above. This zone covers parts of Eastern and southern Keumbu, Masaba and

southern parts of Marani. Tea and pyrethrum are widely grown in this zone. Other crops grown in this zone include maize, wheat (on small scale), vegetables and fruits.

The study area is mainly hilly, with steep slopes and several ridges. There are several prominent topographical features including Mts. Nyamasibi and Sameta; Nyanchwa, Kiongongi, Kegochi hills, and Manga Escarpment (Figure 11). This type of landscape, characterised by steep slopes, poses challenges to agriculture and transport network. Steep slopes are unsuitable for cultivation due to thin soils along the slopes which are deficient in nutrients. Furthermore there is the danger of soil erosion. However, due to population pressure on the available land in the study area, steep slopes have been brought under cultivation of maize, tea, fruits (such as passion fruit), and vegetables. The slopes have also been an obstacle to the transport network in the study area. Moreover, during the rainy season roads along the hilly terrain become impassable.

Kisii District has a number of marshy areas. These are very common especially along valley bottoms. Marshy areas reduce the total land area available for cultivation. This realization led to the inception of the 'Valley Bottom Drainage Project' which is helping to reclaim the many swamps in the study area and, hence, increase in the total land available to cultivators.

FIGURE 11: KISII DISTRICT: SURFACE CONFIGURATION



2.4 CLIMATE (AND DRAINAGE) IN RELATION TO INDUSTRIAL LOCATION AND STRUCTURE

Rainfall amounts, its reliability and effectiveness influence agricultural production and the amount of water available for industry, thereby, influencing industrial location and structure.

The climate of the study area is one of the wettest in Kenya. This is because the area is the centre of convergence of daily convectional-cum-orographic lake winds with the 750mb easterlies.

A combined 762mm rainfall reliability and mean annual rainfall map (Figure 12) shows that the study area generally receives reliable rainfall. The chance of receiving 762mm of rain in a year is good with a probability of failure of 0 to 5 per cent in almost the entire District, except for a small portion to the western part, where probability of failure is 5 to 15 per cent per annum.

The combined rainfall reliability and precipitation effectiveness index map[1](Figure 12) shows that, at 762mm (30 inches) rainfall reliability, Kisii District receives reliable rainfall. The chance of receiving 762mm[2] (30 inches) of rainfall in a year is good with a probability of failure of 0 to 5 per cent throughout the study area. However, despite the uniformity of rainfall

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[1]*The combination, in a single map, of rainfall reliability isolines and precipitation effectiveness (or moisture) index is useful for planning purposes. This is due to the fact that rainfall may be reliable but not effective. Rainfall reliability does not take into account the amount of rain water which is absorbed into the ground to be utilized by crops and hence the need to combine it with precipitation effectiveness.*

[2]*762mm (30 inches) of rainfall is regarded as the minimum amount of rainfall required to facilitate the cultivation of crops, but with particular emphasis on maize, an all-important staple food crop.*

reliability throughout the study area, the precipitation effectiveness (or moisture) index varies. Thus, Kisii District falls into three moisture index categories, namely:

(i) **Moisture index range from +20 to +10**: This range has a drought limit designation, moist sub-humid. Evapotranspiration values vary from $0.8E_o$ to $0.6E_o$. The south-eastern tip of the study area experiences this moisture index range.

(ii) **Moisture index range from +10 to 0**: The drought limit designation for this range is also moist sub-humid and is demarcated by evapotranspiration ranging from $0.8E_o$ to $0.6E_o$. The central, eastern and southern parts of the study area fall under the moisture range.

(iii) **Moisture index range from 0 to -10**: This is classified as dry sub-humid. The area covered include the western and northern parts of the study area and evapotranspiration varies from $0.6E_o$ to $0.4E_o$. Unlike the case in the first two moisture index categories, the area covered by this category is, generally speaking, a dry zone.

The combined rainfall reliability and precipitation effectiveness index map (Figure 13) shows that almost the entire study area has one drought designation limit, namely, moist sub-humid, with precipitation effectiveness tending to improve towards the central, eastern and south-eastern parts of the study area.

The type and variety of industrial crops that can be grown in the study area is likely to vary according to precipitation effectiveness. Crops that do not require a lot of rainfall such as cassava, millet and sorghum can be grown to the western part of the District. The central and

eastern parts are likely to support such crops as maize, coffee and marginal tea. The south-eastern part can support tea, coffee, pyrethrum, and fruits.

According to the mean monthly rainfall periodicity map at 50mm (Figure 14), much of the study area is wet throughout the year (0D,3). However, a portion to the north and north-east has one dry month (i.e. 1D,1), namely, January. Thus, crops which do not require a lot of rainfall, for example sorghum, millet, and cassava, can be widely cultivated throughout the District.

At 75mm level (Figure 15), the relevant parts of the study area occupy much less ground as compared with the 50mm level. As a result, at the 75mm level, Kisii District falls into six sections, namely: the northern, the north-eastern, the western, the central, the southern and the south-eastern (Figure 15). To the north, the areal unit has only two dry months, (2D,1,2,), namely, January and February. To the north-east, the unit has only one dry month (1D,1), in January. To the west, like the north-east unit, there is also one dry month, (1D,1), in January, while in the central unit, there is no dry month, (0D,3). In the southern unit, there are two groups of dry months, namely, the first (2D,1,7), in January and July, and the second, (1D,7), in July. The south-eastern unit experiences two dry months, (2D,7,10), in July and October.

Each of the above areal units can support a variety of crops, some of which are important industrial raw materials including: maize, marginal coffee, wheat, fruits (such as bananas, papaws, guavas, etc.), potatoes, beans, peas and vegetables.

According to the mean monthly rainfall periodicity at 100mm level (Figure 16) the study area can be divided into five parts: the northern, the western, the central, the eastern and the southern parts. The northern part has two dry months, (2D1,2), in January and February and

hence it can support the cultivation of maize, coffee, pyrethrum and marginal tea. To the west, there are three dry months (3D,1,2,7), namely: January, February and July. This part is suitable for maize and fruits. The central part experiences two groups of dry months, the first (2D,1,2), in January and February, while the other, (2D1,7) in January and July. This part, like the northern part, is suitable for maize, coffee, pyrethrum and marginal tea. The eastern part experiences one dry month, (1D,1), in January and is very suitable for maize, pyrethrum, various fruits and marginal tea. The southern part has two categories of dry months. The first category consists of two dry months (2D1,7), in January and July while the second category, five dry months in January, February, July, August and October.

At the highest 150mm mean monthly level of rainfall periodicity, (Figure 17), there are six groups of areal units. Some of them are more complex than others. The simpler units are the northern, the southern, the south-eastern and the north-eastern units. The more complex units are the western unit, (partitioned into nine sub-units) and the central unit (partitioned into twenty sub-units). The northern unit experiences three groups of dry months. The first group, (9W,4,5,9), has nine dry months with wet months in April, May, and September; the second group, (8W,3-5,9), consists of eight dry months with wet months in March, April, May and September, while the last group, (7W,3-5,9,11), experiences seven dry months with wet months in March, April, May, September and November. The western areal unit is complex and can be partitioned into nine sub-units, as outlined below:

(i) 8W,3-5,8 - Eight dry months, with wet months from March to May and in August.

(ii) 7W,3-5,8,9 - Seven dry months, with wet months from March to May , August and September.

(iii) 6D,1,2,6,7,10,12 - Six dry months in January, February, June, July, October and December.

(iv) 8W,4,5,9,11 - Eight dry months with wet months in April, May, September and November.

(v) 8W,3-5,11 - Eight dry months with wet months from March to May and in November.

(vi) 7W,3-5,8,11 - Seven dry months with wet months from March to May and in August and November.

(vii) 9W,4,5,11 - Nine dry months with wet months in April, May and November.

(viii) 7W,4,5,9,11,12 - Seven dry months with wet months in April, May, September, November and December.

(ix) 6D,1,2,6-8,10 - Six dry months in January, February, from June to August and October.

The southern unit experiences four groups of dry months. The first group, (9W,4,5,12), consists of nine dry months with wet months in April, May and December. The second group, (8W,4,5,11,12), has eight dry months with wet months falling in April, May, November and December, while the third group, (9W,4-6), is composed of nine dry months with wet months from April to June. The last group, (10W,4,5), consists of ten dry months with wet months in April and May. The south-eastern areal unit experiences nine dry months, (9W,3-5), with wet months from March to May. The north-eastern unit has six dry months, (6D,1,2,7,10-12), with

wet months in January, February, July and from October to December. The central unit is the most complex and is partioned into twenty units, outlined as follows:

(i) 6D,1,2,7,8,10,12 - six dry months in January, February, July, August, October and December.

(ii) 5D,1,2,7,8,10 - five dry months in January, February, July, August and October.

(iii) 6D,1-3,7,8,10 - six dry months from January to March, July, August and October.

(iv) 6D,1,2,7,8,10,11 - Six dry months from January, February, July, August, October and November.

(v) 8W,4-6,12 - Eight dry months with wet months from April to June and in December.

(vi) 4D,1,2,7,11 - Four dry months in January, February, July and November.

(vii) 4D,1,2,7,10 - Four dry months in January, February, July and October.

(viii) 3D,1,2,7 - Three dry months in January, February and July.

(ix) 5D,1,2,7,10,12 - Five dry months in January, February, July, October and December.

(x) 8W,3-5,9 - Eight dry months with wet months from March to May and in September.

(xi) 8W,3-6 - Eight dry months with wet months from March to June.

(xii) 6D,1,2,6,7,11,12 - Six dry months in January, February, June, July, November and December.

(xiii) 7W,3-5,8,9 - Seven dry months from March to May and in August and September.

(xiv) 5D,1,2,7,11,12 - Five dry months in January, February, July, November and December.

(xv) 7W,3-6,9 - Seven dry months from March to June and in September.

(xvi) 7W,3-5,9,11 - Seven dry months from March to May and in September and November.

(xvii) 6D,1,2,7,8,10,12 - Six dry months in January, February, July, August, October and December.

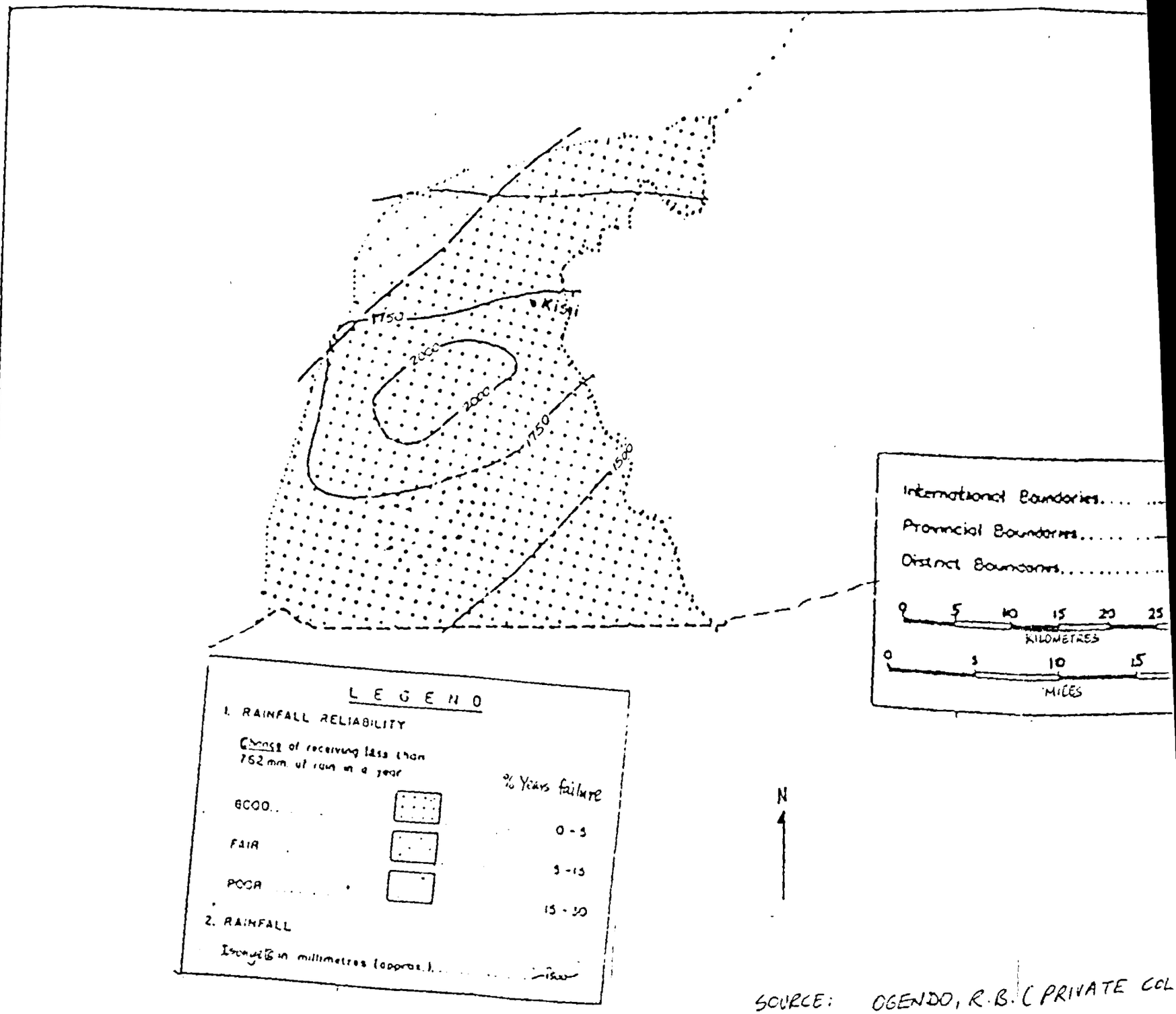
(xviii) 5D,1,2,7,10,12 - Five dry months in January, February, July, October and December.

(xix) 4D,1,2,7,12 - Four dry months in January, February, July, December.

(xx) 5D,1,2,6,7,12 - Five dry months in January, February, June, July and December.

Since all these areas are at the highest mean monthly level of rainfall periodicity, each of the above areal units can support a variety of crops, some of which are important industrial raw materials including: tea, coffee, pyrethrum, maize, wheat, fruits(such as bananas, papaws, guavas, etc.), potatoes, beans, peas and vegetables.

FIGURE 12: KISII DISTRICT: COMBINED 762MM RAINFALL RELIABILITY AND MEAN ANNUAL RAINFALL



SOURCE: OGENDO, R.B. (PRIVATE COL

FIGURE 13: KISII DISTRICT: COMBINED 762MM RAINFALL RELIABILITY AND PRECIPITATION EFFECTIVENESS INDEX

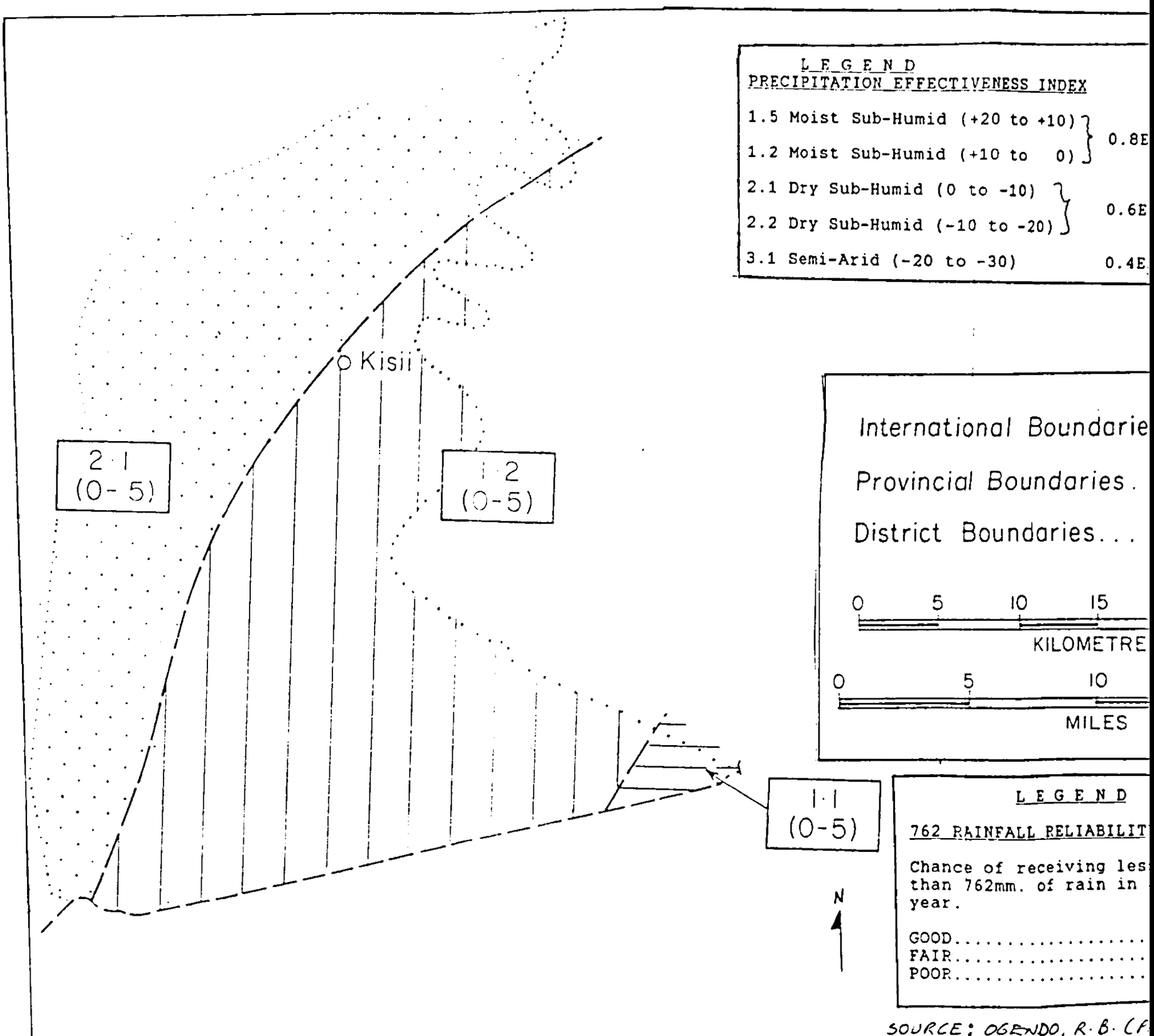
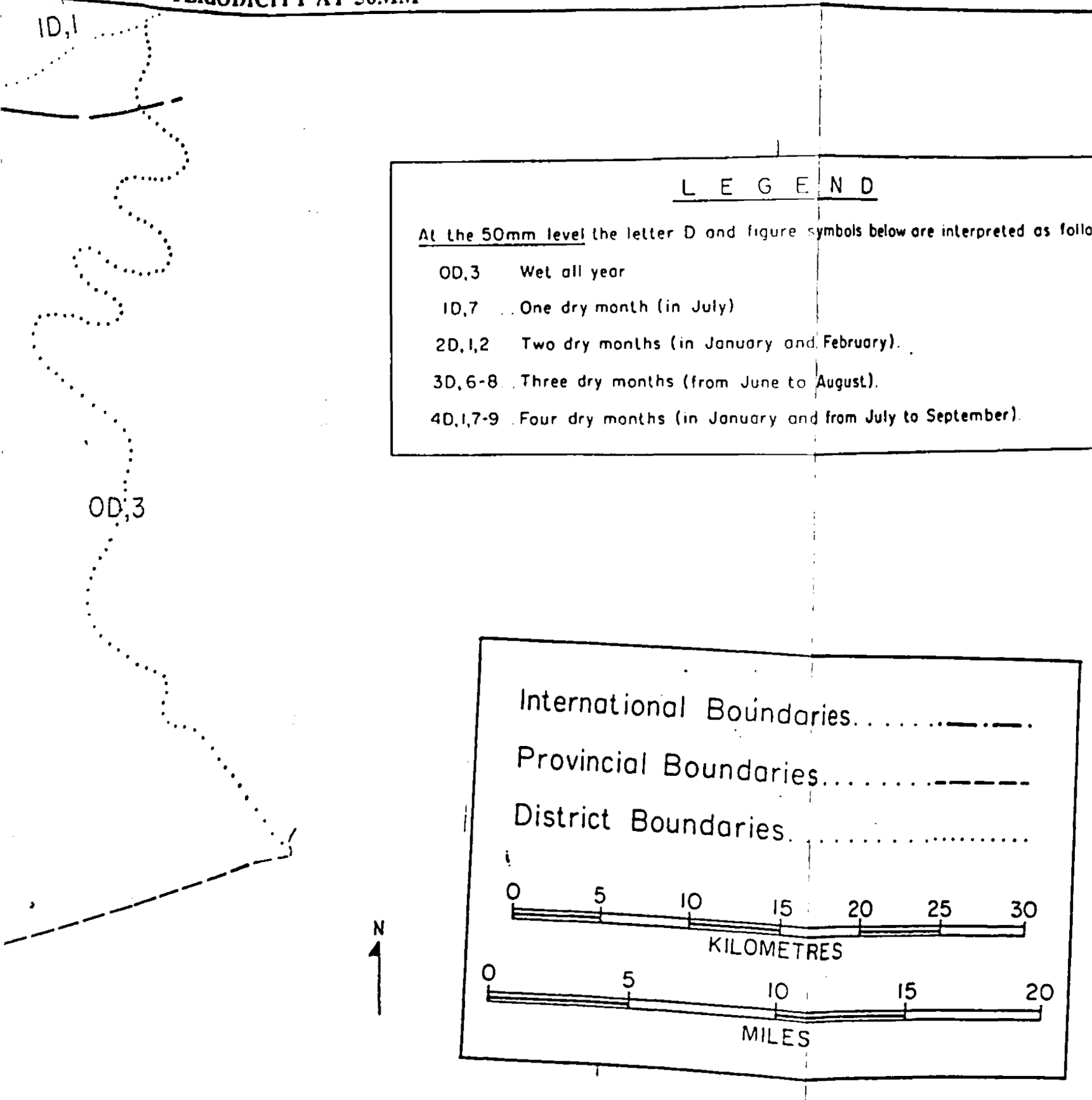


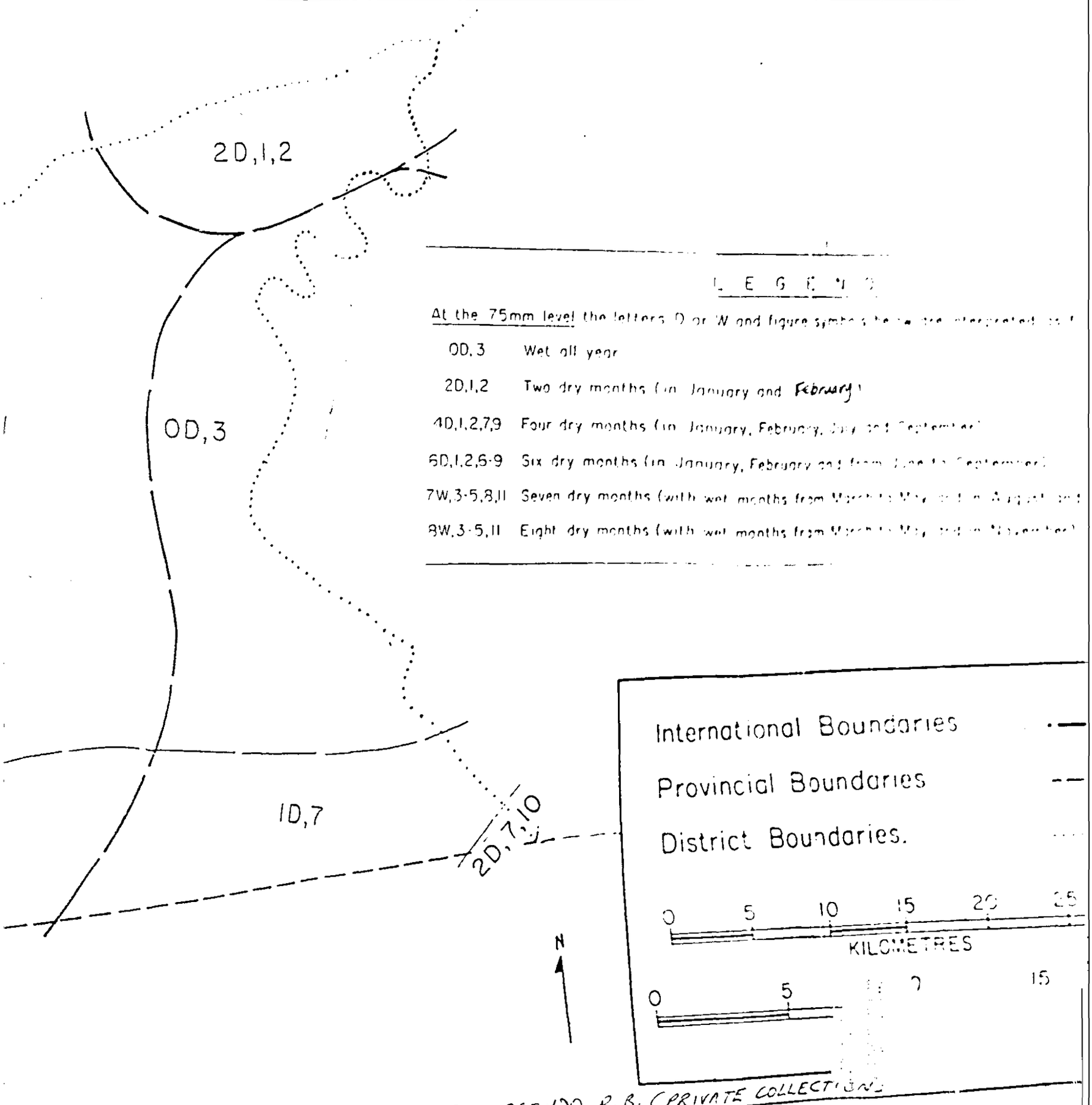
FIGURE 14:KISII DISTRICT: MEAN MONTHLY RAINFALL PERIODICITY AT 50MM



SOURCE: OGENDO R.B. (PRIVATE COLLECTION)

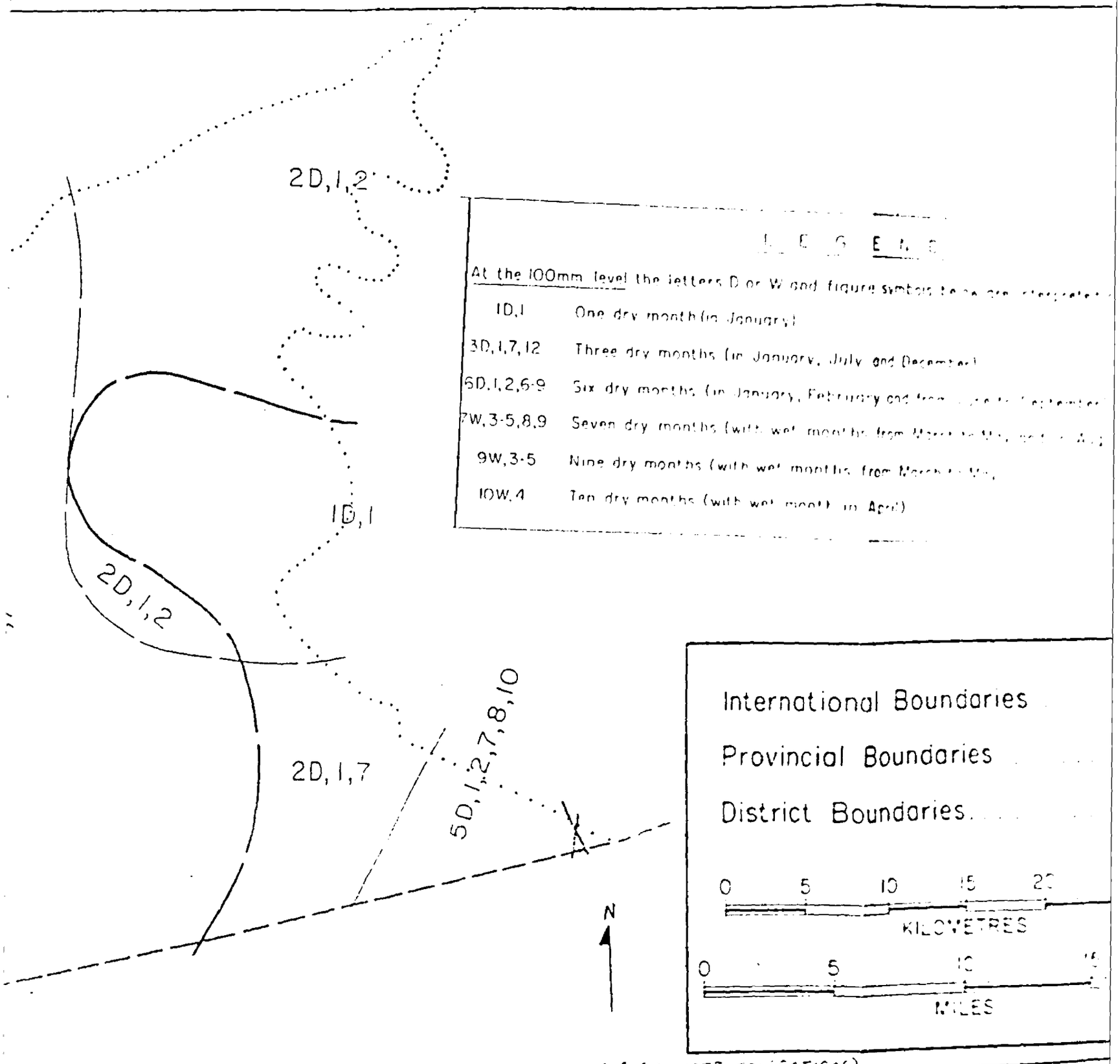
URE 15: KISII DISTRICT: MEAN MONTHLY RAINFALL

IODICITY AT 75MM



SOURCE: OGENDO, R.B. (PRIVATE COLLECTION)

FIGURE 16: KISII DISTRICT: MEAN MONTHLY RAINFALL PERIODICITY AT 100MM



SOURCE: OGENDO, R.B (PRIVATE COLLECTION)

Due to its high altitude, the study area does not experience excessive temperatures despite its proximity to the equator. The mean annual minimum temperature ranges from 14°C to 18°C to the north while in the rest of the two Districts temperatures range from 10°C to 20°C. Mean maximum temperatures range from 26°C to 30°C in the North and 22°C to 26°C in the rest of the area of study. Thus crops which do not require excessive temperatures such as coffee, tea, pyrethrum, bananas and others can be easily cultivated in the study area.

As far as drainage is concerned, the study area has no natural or artificial lakes. However, it has a number of permanent rivers and intermittent streams. The main river is River Gucha which rises from Mt. Kiabonyoru in Nyamira District, The river has adequate water for the development of a small hydro-electric station to supply electricity to industries in the study area. Another prominent river in Kisii District is Riana. Other rivers include: Mogusii, Iyabe and Mogonga. These rivers are supplemented by other water sources in the study area including springs, streams, boreholes and roof catchments.

Thus, the study area is well endowed with water supply which supports agricultural production and hence industrial raw materials. Moreover, there is plenty of water for industrial use. Temperatures are also not excessively high and this has further encouraged agricultural production.

2.5 THE GEOLOGICAL BASE AND RELATED SOILS FROM THE VIEWPOINT OF INDUSTRIAL LOCATION

The underlying rock structure is an important variable in the location of some industries. Furthermore, the rock structure influences the characteristics of soils formed and, hence, resultant agricultural production, and industrial raw materials.

The geological structure of Kisii District consists of Bukoban, Nyanzian and Kavirondian rock systems. The dominant system is the Bukoban system represented in the study area by the Kisii series. They are estimated to be 670 million years old. The Kisii series were formed during the Precambrian era but are much younger than the Nyanzian and Kavirondian systems. The Nyanzian system consists of rocks of great thickness of various types of ancient volcanic materials associated with some pyroclastic rocks and lenses of conglomerate. The Kavirondian system consists of alternating bands of grit, sandstones, mudstones and conglomerates especially along the banks of rivers.

The geological structure of the study area has influenced soil characteristics. These (soil characteristics), in turn, have influenced agricultural production and, hence, industrial raw materials. The dominant soil type in the District is nitosols. These soils are well drained, deep and with thick humic topsoil. The soils are associated with the Kisii series rock type. They (soils) support a wide variety of crops which are important industrial raw materials, namely, tea, coffee, pyrethrum and others, such as; bananas, groundnuts, beans, maize, Irish and sweet potatoes. Nitosols are thus dominant in those agro-ecological zones such as; coffee-tea zone, the tea-dairy zone and the wheat-maize-pyrethrum zone. Other soil types in the study area include phaeozems, ferralsols, acrisols, and vertisols. Phaeozems are clays that are in some

places poorly or excessively drained. In places where phaeozems are well drained, they support a number of industrial raw materials for example, tea, sugarcane and coffee. Other soils such as ferralsols and acrisols are not fertile, while vertisols are poorly drained and cannot therefore support agriculture.

2.6 AGRICULTURAL BASES FOR INDUSTRIAL LOCATION AND STRUCTURE.

Kisii District can be divided into three main ecological zones[1] comprising upper midland (UM) which covers 75 per cent, lower highland (LH) covering 20 per cent, and; lower midland (LM) covering 5 per cent (Figure 18). These zones support various agricultural activities, hence influencing the industrial raw materials available in different parts of the study area. The industrial raw materials constitute the agricultural bases for industrial location and structure. There are two lower highland zones, each with distinct characteristics. The first zone (LH1) is most suitable for growing tea and for dairy farming. Hence, it is known as the tea-dairy zone. This zone is moderately cool and humid with good climatic conditions for pastures. The temperatures are suitable for high quality tea but too cold for other crops such as pyrethrum. The zone has an altitude ranging from 1890 m to 2180 m. The soils found in this zone consist of nitosols and phaeozems. The zone receives a mean annual rainfall ranging from 1400 mm to 2100 mm. It covers Masaba division. The second lower highland zone (LH2) is a wheat-maize- pyrethrum zone. Climatic conditions in this zone are good for pyrethrum and wheat (especially late maturing wheat like Kenya Bongo); and fair for maize. The soils found in this

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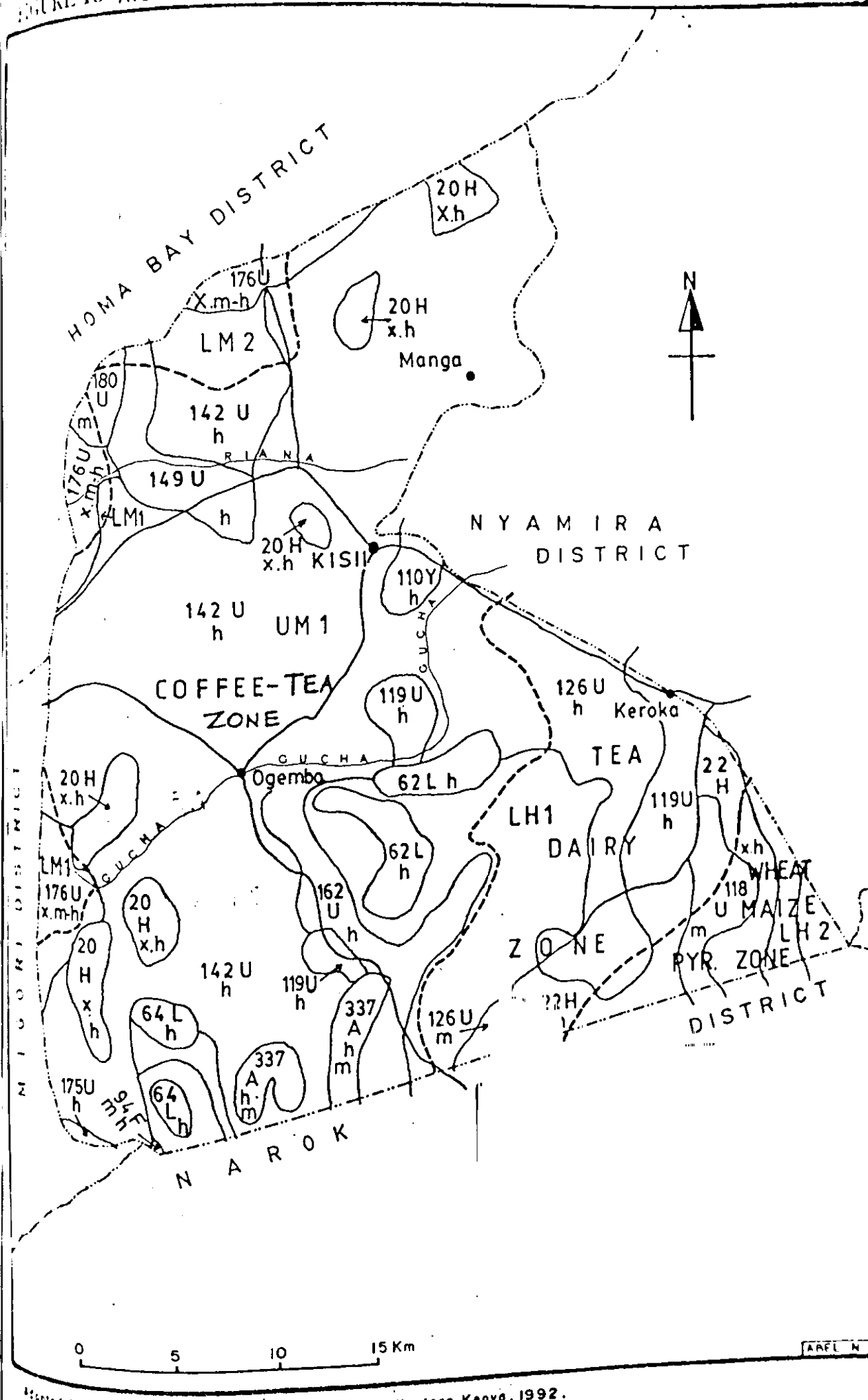
[1] *Agro-ecological zones are zones of potential land-use delimited on the basis of natural (or environmental) factors*

zone are nitosols and phaeozems and the altitude of the zone ranges from 1675 m to 2180 m. The zone covers parts of Keumbu and Masaba Divisions. Mean annual rainfall in the zone ranges between 1300 mm to 1600 mm. Upper midland zone (UM1) which is the largest agro-ecological zone in the study area, is most suitable for the cultivation of tea and coffee. Climatic conditions in this zone are temperate and humid and can support arabica coffee and tea. Mean annual rainfall ranges from 1400 mm to 2100 mm. Annual mean temperatures range from 18°C to 21°C. This zone is found within altitudes 1420 m to 2060 m and covers the divisions of Suneka, Marani, Ogembo, Kenyenya, Sameta, Nyamache, Nyamarambe and Keumbu. The soils found in this zone include nitosols, phaeozems, feralsols, luvisols and camposals. Other crops that can be grown in this zone include fruits such as guavas, papaws and vegetables. The lower midland zones (LM1 and LM2) cover the smallest area in the District. The first zone (LM1) is most suitable for the cultivation of sugarcane. However, the yield is low and this zone is best developed in Homa Bay District. The second zone (LM2) is suitable for maize, coffee and marginal sugarcane. The zone receives rainfall ranging from 1400 mm to 1600 mm. Mean annual temperatures range between 20.5°C and 21.0°C. Other crops that can be grown in this zone include groundnuts and soyabeans. The lower midland zones cover parts of Suneka, and Nyamarambe Divisions.

Dairying is carried out mainly in the second lower highland (LH2) zone where various breeds of cattle are kept, both local and exotic. Crossbreeds are also common. Other animals kept in the study area include sheep, goats and poultry. However, it should be noted that in the study area, livestock farming is mainly undertaken on a small scale and, hence, cannot support agro-based processing industry.

There are no gazetted forests in Kisii District. However, efforts of church organizations, government and non-governmental organisations efforts have encouraged the afforestation of numerous hilltops and swamps. The efforts of these organizations have resulted in the afforestation of 103 ha. and 32 ha. of Nyangwata and Kiabigori hilltops, respectively. A total of 18.5 ha. of swamp in Keumbu have also been afforested. Due to high rainfall, tree survival rate is very high. Despite this, much of the timber consumed in the District is imported from other Districts.

FIGURE 18 KISII DISTRICT: AGRO-ECOLOGICAL ZONES



Adapted from Farm Management Handbook Vol. II Western Kenya, 1992.

2.7 POPULATION CHARACTERISTICS

In 1979, the former Kisii District had a population of 568,556 people. The population had been projected to increase to 1,137,054 in 1989 (Kenya, Republic of, 1989). This represents an increase of almost 100 per cent. Actual population figures for the study are not available, however.

Nevertheless, the study area's population structure is made up of mainly young people. The population proportion of children aged between 0-14 years is approximately 54 per cent of the total population. The observed high population growth is accounted for by high fertility levels. The average number of children per family ranges between 4-6 children. Ominde (1975) has noted that the study area lies within the high fertility belt. Maximum fertility occurs between cohorts 15-34 years, which account for 73-77 per cent of total fertility levels (District Socio-cultural Profiles Report, 1984). Table 2.1 below shows population projections of selected age-groups between 1979 and 1996.

TABLE 2.1: POPULATION PROJECTIONS OF SELECTED AGE- GROUPS 1979-1996

AGE	1979	1993	1994	1996
6-13 (PRIMARY)	13800	227,614	235,808	253,092
14-17 (SECONDARY)	36,388	59,702	61,851	66,385
15-59 (LABOUR FORCE)	245,048	402,057	416,530	447,060
60 +	13,077	21,455	22,223	23,857
15-49 (FEMALES)	119,441	195,971	203,026	217,909

Source: District Development Plan, 1994 - 1996

From the foregoing remarks, it will be noted that the study area has a high population growth rate and therefore more than enough labour for her industries. However, the rapidly growing population is a major constraint on the resources and the economic productivity of the entire District and will continue to do so unless sources of gainful employment are increased to absorb the increasing number of youths or until effective family planning strategies are put in place.

2.8 INFRASTRUCTURAL BASES FOR INDUSTRIAL LOCATION AND STRUCTURE

Infrastructure plays a big role in influencing industrial location and structure. For instance, the road network of a region influences the region's industries' access to both raw materials and markets, and power line distribution influences the amount of electricity supplied to the region and the specific areas it is supplied to in the region.

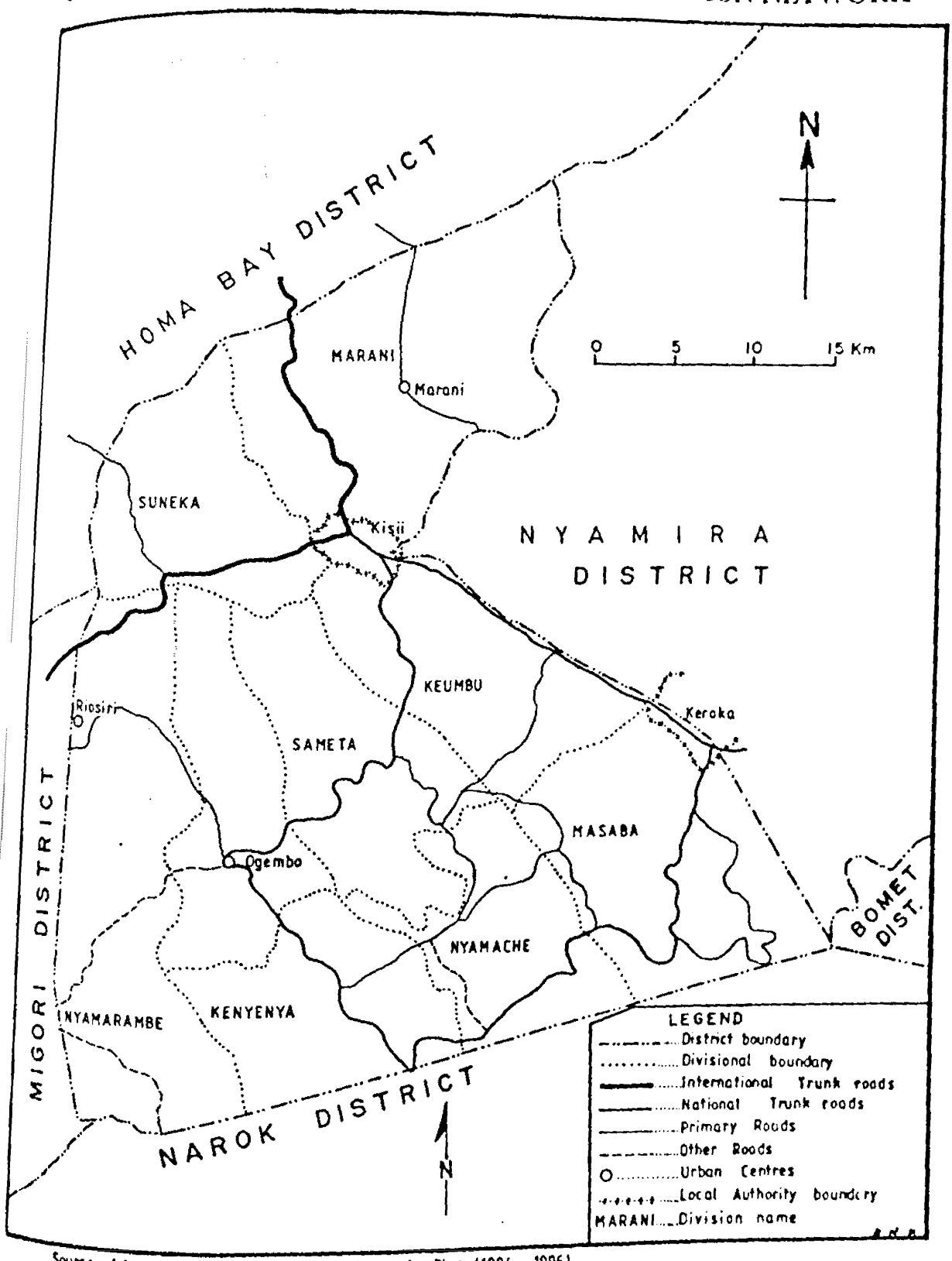
2.8.1 STANDARD INFRASTRUCTURE

The District has a road network of 1,079.9 kilometres of classified roads and 435 kilometres of rural access roads. About 103.1 kilometres are tarmacked; 411.9 kilometres gravelled while 565.8 kilometres are earth roads, (District Development Plan, 1994-96).

An international trunk road passes through the study area, thereby benefiting Marani, Suneka and Nyamarambe Divisions, besides Kisii Municipality. There are several national trunk roads, primary roads and other roads within at least each division of the study area (Figure 19).

The utilization of roads is very intensive, because they serve high agricultural po areas (to procure industrial raw materials) as well as urban centres (markets) of the study Though roads are fairly well distributed, poor maintenance and hilly terrain of the District them impassable during the rainy seasons. The tarmacked road network passes through urban centres. Figure 19 shows road classification in Kisii District.

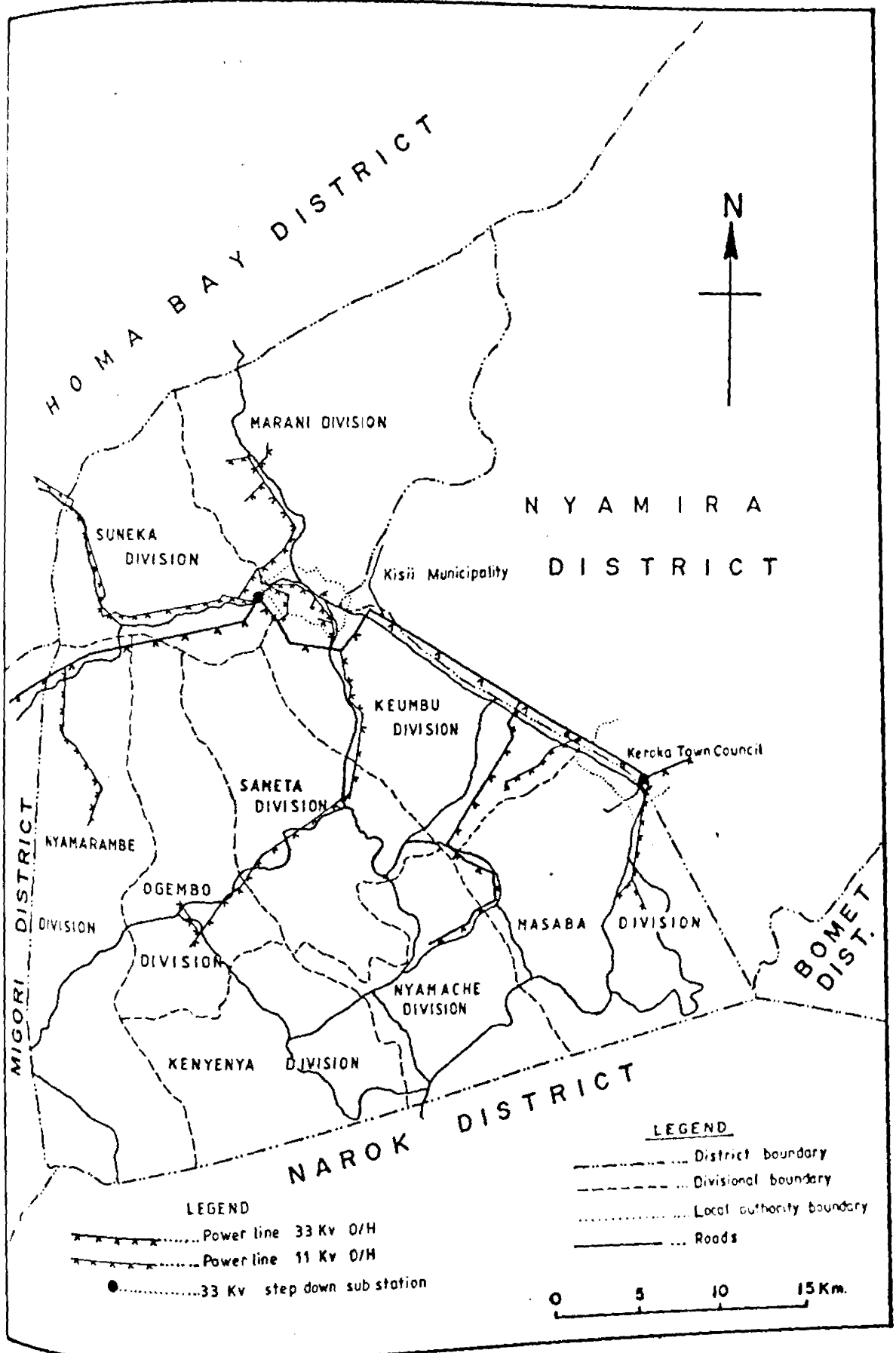
FIGURE 19: KISII DISTRICT: ROAD CLASSIFICATION NETWORK



Source: Adopted from District Development Plan (1994—1996)

The rural electrification programme has been implemented in the study area. Almost all divisions have a power line. However, even the divisions with power lines have only been covered to a small extent. The industrial development potential of the study area has thus not been fully mobilized. Tea growing areas have electricity for processing tea in the factories. In areas served, the utilization rates are very high and the demand for the services is high. However there are a number of market centres and numerous coffee factories that badly need electricity but are yet to receive it. Major urban areas such as Kisii Municipality which are well supplied with electricity have attracted more industries than areas with little or no electricity supply. The slow pace of electrification has been blamed on the high cost of electrical installations like transformers. However, plans are underway to supply electricity to all factories and mills that require it (District Development Plan, 1994-1996). Figure 20 shows the study area's power line distribution.

FIGURE 20: KISII DISTRICT: POWERLINE DISTRIBUTION



Source: Kisii District Development Plan, 1994-96

2.8.2 HUMAN INFRASTRUCTURE

Kisii District has some of the highest population growth rates and densities in Kenya. Over 50 per cent of the total population is composed of children and young people (District Development Plan, 1994-1996). For 1994, it was projected that the population of Kisii District would be 966,428 rising to 1,037,263 by 1996. Out of this total population, the age group comprising the labour force would be 416,530 in 1994 rising to 447,060 people by 1996. Thus the study area can boast of a high potential in industrial (although largely unskilled) manpower during the present and coming years.

However, a significant number of this labour force is employed in the agricultural sector(s) which can no longer support them, due to decline in land size as a result of population increase. Furthermore, much of the labour force lacks skills essential for employment in industry. This is associated with low education levels in the study area. However, more and more people are recognizing the significance of education and job skills. It is projected that by 1996, there will be 253,092 primary school-going children and 66,385 secondary school-going children (District Development Plan, 1994-96). There is need for increasing gainful employment sources so as to absorb the increasing labour force.

CHAPTER THREE

METHODOLOGY

3.1 INTRODUCTION

This chapter deals with this study's methodology. Various methodological aspects are examined, namely: experimental design, data requirements for the study, and data collection and analysis techniques.

Research methodology is very essential in any research undertaking because it answers the fundamental question, "how does one conduct the research?". As Prewitt (1974) noted, methodology helps the researcher to avoid self deception.

3.2 EXPERIMENTAL DESIGN

3.2.1 UNIVERSE

The universe can be defined as the aggregate of all individual objects related to a given problem (Gregory 1978). Thus, a universe of all industries in a given place would consist of all the industries that exist or have existed in that place. For the purpose of this study, the universe consisted of all manufacturing and allied service industries in Kisii District totalling 280[1] at the time the research was undertaken (1994).

[1] *This figure is based on records provided by the District Trade Office*

3.2.2 SAMPLE FRAME

A sample frame is an important part of the universe called the working population[1]. A sample frame or working population contains the ideal representative sample of all types of individuals of the population (i.e. there is nothing else in the universe which is not represented in the working population or sample frame but the sample frame is always much smaller than the universe). A list of agricultural manufacturing industries in the study area was obtained from the District Trade Office, which is charged with the responsibility of licensing trade activities in the District, including industries. This constituted the sample frame and consisted of 200[2] establishments. The utilization of a sample as opposed to a study of all manufacturing industries in Kisii District was necessitated by the insufficiency of financial resources and the time at the disposal of the researcher. Furthermore it has been noted that sample coverage often permits a higher level of accuracy as opposed to full enumeration (Moser and Kalton 1971) although this depends on the sophistication of the analytical tools.

3.2.3 SAMPLING PROCEDURE

To facilitate the selection of a sample from the sample frame one of the basic principles of experimental design was utilized, namely, the principle of randomization. It has been argued that randomizing helps to 'average out' the effects of extraneous factors that may be present in the sample frame (Hosking and Clark 1986). To obtain a sample of the industries from all the

---

[1] *A working population has been defined as a complete set of counts or measurements derived from all objects possessing one or common characteristics (Hammond and McCullagh 1978)*

[2] *This figure is based on records provided by the District Trade Office*

divisions including Kisii Municipality and Keroka Town Council, stratified random sampling procedure was utilized. The industries were stratified as agro-based food processing industries and agro-based non-food manufacturing industries as well as according to the administrative units in which they were located. Each of the industries was allotted a number. Using a table of random numbers (Appendix 5) a sample of 65 industries was selected (Appendix 3). This sample size was deemed adequate given the limitations of financial resources and time. Moreover, it accounted for over 30% of the population of industries. A pilot survey was carried out to determine the existence and actual location of the establishments to be visited. Afterwards, the researcher and his assistants visited the various industrial establishments to administer recording schedules and conduct interviews.

3.2.4DATA REQUIREMENTS

Data is very essential for any research undertaking. This is because any conclusions arrived at, at the end of the research, will depend on the analysis of data collected in the initial stages. Therefore, the availability and quality of data play an important role in research. There are two types of data, namely: primary data and secondary data. Primary data is usually collected from the field by the researcher himself, and hence it is known as raw data. Secondary data on the other hand, is collected from published and unpublished sources. Such data is, therefore, derived from other peoples' effort(s) at an earlier date.

To meet the objectives set out for this study, it (study) has relied on both primary and secondary data. The data collected for this study includes the following:

(i) Data on spatial industrial patterns of Kisii District agricultural manufacturing industries. The number of operatives employed in the relevant industries in each division of the study area was determined.

(ii) Data on the variables influencing industrial location within Kisii District.

(iii) Data on the structure of agricultural manufacturing industries in Kisii District.

3.2. 5METHODS OF DATA COLLECTION

To obtain the relevant data, both primary and secondary data sources were used.

3.2. 6PRIMARY DATA SOURCES

Primary data was obtained from the field. To obtain the data from the field, recording schedules (Appendix 1 and 2) were utilized and interviews conducted. Recording schedules were administered on industrialists (or their assistants) by the researcher with the help of research assistants. The rationale behind the use of recording schedules is that they facilitate personal contact with the interviewee, and hence better communication and probing of issues likely to cause confusion. Moreover, they can facilitate better answers especially if the interviewer can create an "atmosphere of ease" (i.e., allay fears of the respondent). Furthermore, recording schedules can, to a large extent, eliminate the problem of low response rate which is characteristic of postal questionnaires.

As already noted, personal interviews was another method of data collection from the field. The interviews were conducted in order to elaborate and expound on the relevant issues which the recording schedule did not handle. Interviews were conducted with various

personalities although restricted to individuals whom it was thought had certain special information. Among those interviewed included: District Industrial Development Officer, District Trade Officer, officials of the Kenya Industrial Estates, planning officers and industrialists. These interviews took the form of discussion of topics relevant to industrial development in general and agricultural manufacturing industries in particular. No recording schedules were used during such interview sessions although short notes were taken whenever it was considered appropriate. The chief advantage of this technique was that respondents had the freedom to volunteer information that may have inadvertedly been ignored by the researcher so long as care was taken to keep the discussion within relevant grounds. However, information acquired from this source had to be treated with caution given the fact that it tended to reflect individual biases as defined by the respondent's official position.

3.2.7 SECONDARY DATA SOURCES

For purposes of this study, the relevant secondary data sources included:

(1) **'Industrial census'** - This is published annually and provides information relating to, among other things, the number of operatives employed in manufacturing establishments, each with at least five or more operatives.

(2) **'Directory of industries'** - This data source gives information on employment, it also gives names of establishments, when they were established, their postal and locational contacts and the type of commodities produced by the establishments.

(3) **'Statistical abstract'** - This is published annually and contains information on nearly all aspects of the economy. It is anticipated that the current statistical abstract will provide information for this study.

(4) **'Development Plans'** - National development plans and District development plans provide useful information related to planning aspects during the period covered by the plans.

(5) **'Other sources'** - These include economic surveys, District socio-cultural profiles reports and any other appropriate sources such as annual reports and statements of accounts of companies.

3.28 DATA ANALYSIS

To analyze the data obtained from the field, several statistical analytical tools have been used. At the initial stages data was summarised into tables, which proved useful in preliminary investigations and conclusions, as well as forming a basis for statistical analyses of the relevant aspects of agro-based manufacturing industries in Kisii District. This study has utilized both descriptive and inferential statistical analytical tools in data analysis.

Among the descriptive statistical tools utilized include: means, frequencies, percentages and correlations. The justification for the utilization of descriptive statistics can be summarised as follows:

(a) they facilitate easy assimilation of data;

(b) they help in comparison between different sets of raw data; and,

(c) they assist the researcher in the presentation of data in a summarised form and hence such data can be easily communicated to other people.

The chi-square non-parametric test and factor analysis are the inferential statistical analytical tools that have been used. Inferential statistics provide a means of measuring the uncertainty associated with sampling from populations and a precise measure of confidence that can be placed on the results based on representative samples (Mathews, 1981).

The industrial location analysis tools used include, the coefficient of localisation and the location quotient.

3.2.3.1 ANALYSIS OF DATA RELATING TO INDUSTRIAL SPATIAL PATTERNS

In analyzing the spatial patterns of Kisii District agricultural manufacturing industries, the techniques of coefficient of localisation and location quotient have been used. The coefficient of localisation measures the degree of localisation/concentration of a given industry or other economic activity(ies) distributed over a set of areal units/regions. The criteria used for measurement include: population, land area, manufacturing employment, or income (Isard 1960). In this study, the criterion used is manufacturing employment.

The values of the coefficient range between 0 and 1. The value 0 indicates even distribution of the given industry in the areal units/regions considered. A value such as 1 (or close to 1) indicates concentration of industry in a given areal unit. The coefficient has certain limitations. These include:

(i) On its own, the coefficient of localisation is a rather crude index. Hence, it has little value unless combined with other techniques.

(ii) The index can only be computed in terms of its two extreme values.

However, the coefficient is a useful preliminary technique for regional comparison of economic activities and for showing change in the distribution of criteria (for instance, employment), over a period of time. The formula for computing the coefficient of localisation is given below:

$$L = \frac{X}{100}$$

where L = coefficient of localisation
X = Regional percentage differences of employment

The technique of location quotient seeks to identify "spatial agglomeration" or localization of industries (Bale 1981:126). The location quotient indicates the degree to which a region's industries are in balance, or otherwise.

In this study, the number of operatives employed in each category of agricultural manufacturing industries (namely, agricultural food and non-food industries) in each division of the study area and Kisii Municipality has been determined. The location quotient for each industrial group (namely, agricultural food manufacturing and agricultural non-food manufacturing) has been computed using the formula below:

$$LQ = \frac{S_D / S_N}{M_D / M_N}$$

Where

LQ = Location quotient of agricultural manufacturing industries in any given division or Kisii Municipality

S_D = Number of employees in each category of agricultural manufacturing in any given division or Kisii Municipality

S_N = Total number of agricultural manufacturing employees in Kisii District

M_D = Divisional total manufacturing employees

M_N = Total manufacturing employees in Kisii District

A location quotient of more than 1.0 means that the respective division or Kisii Municipality has more than its fair share of industries (that is, there is localization). A location quotient of less than 1.0 means that the division (or Kisii Municipality has less than its fair share of industry)

The location quotient is a useful technique that is widely applied because of its simplicity and the fact that it can be based on readily available data.

However the technique has its own limitations, namely: its simplicity and the fact that it does not give much information beyond the fact that a region has more or less than its "proportional" share of industries.

3.2.3.2 ANALYSIS OF DATA RELATING TO INDUSTRIAL LOCATION VARIABLES

Most of the variables known to influence the location of agro-based industries were initially identified (before the field research was undertaken). Sixteen major variables were isolated and included:

V01 Local availability of raw materials

V02 Availability of local capital for investment

V03 Proximity to other local establishments

V04 Presence of urban economies

V05 Availability of local market

V06 Transport costs

V07 Nearness to home

V08 Access to power supply

V09 Suitable underlying rock structure

V10 Suitable surface configuration

V11 Availability of cheap land for expansion

V12 Influence of government

V13 Influence of local politics

V14 Adequate water supply

V15 Labour supply

V16 Influence of personal considerations

Industrialists and/or their assistants were asked to rank these variables in order of importance, using a scale ranging from 1 to 10 (Appendix 1).

Using a computer package, SPSS (Statistical Package for Social Scientists) field results were analyzed to derive means, percentages, frequencies and correlations. Some of the results are shown in appendix 7. Further detailed analysis of the field results was undertaken using the factor analysis procedure.

Factor analysis is a data analytical tool originally used by psychologists (Taylor 1977). It has been used in a number of research strategies to:

(1) Evaluate/test hypotheses deduced from theory;

(2) Transform a set of variables into a new set or orthogonal factors for input into a regression model;

(3) Explore the underlying structure of a data matrix; and

(4) Achieve parsimony in data description.

The technique is used to reduce data in such a way that new and fewer derived variables from the original data set are obtained.

The application of factor analysis in geographical research is well-documented (Johnston 1978, Obara 1983, Wegulo 1984). In this study the technique of factor analysis has been employed in establishing the principal variables that influence industrial location in the study area. Although the application of factor analysis is widespread in geographical research, the technique is faced with a number of limitations. In the first instance, factor analysis consists of

many alternative approaches which normally give different results. The choice of these approaches during data analysis is often subjective limiting the comparability of factor results. A further limitation of factor analysis often cited is that the technique is mainly a descriptive tool and offers very little explanation especially when applied to problems with nonexisting theories (Obara, 1983).

3.2.8.3ANALYSIS OF DATA RELATING TO INDUSTRIAL STRUCTURE

This study examines various industrial structural characteristics of agricultural manufacturing industries. These include, among others, the type of technology utilized, types of commodities produced and their markets, raw materials used and their sources, and the scale of production. In all the structural aspects, the chi-square non-parametric test has been utilized to determine whether the differences between agro-based and non-agro-based industries are significant.

Chi-square measures the discrepancy between observed and expected frequencies. It involves a comparison of observed and expected frequencies.

$$X^2 = \sum \frac{F_o - F_e}{F_e}$$

where X^2 = Chi-square Σ = Summation

F_o = Observed frequencies F_e = Expected frequencies

If the calculated chi-square statistic is greater than or equal to the tabulated value at a given significance level, the null hypothesis is rejected, and vice versa. However the chi-square test is sensitive to sample size. Moreover it does not show the strength of a relationship.

This study has adopted the market for manufactured commodities criterion in analyzing the predominant types of technology (Pearson 1969). Labour-intensive industries are identified with the domestic (local) market production and capital-intensive industries with export market production.

The scale of production of the various agricultural manufacturing industries was analyzed on the basis of the number of operatives employed by the establishments. Depending on the number of operatives employed, industries were categorized as follows:

(i)	1 - 4	Very small
(ii)	5 - 19	Small scale
(iii)	20 - 49	
(iv)	50 - 99	
(v)	100 - 199	Medium scale
(vi)	200 - 499	

To analyze the types of goods produced, agro-based manufacturing industries were stratified according to various categories as: (a) consumer goods; (b) export goods; and, (c)intermediate goods.

The market for goods produced was categorized into: local market, (that is, within the District), and external market (other parts of Kenya and outside Kenya). Manufacturers were asked to state where their products are sold in order of volume of sales. On the basis of the results, the predominant market for goods produced was determined.

3.2.9 METHODS OF DATA PRESENTATION

Data in this study has been presented using various methods. These include maps, diagrams (pie charts and bar graphs) and tables. These methods are useful in providing a quick visual impression of the different types of data, as well as, for summarising the data.

3.2.9.1 Maps

This study has utilised quantitative maps to show quantitative aspects of various occurrences. Among the maps used in this study include: a map of manufacturing employment and a map of number of agricultural manufacturing establishments in Kisii District.

3.2.9 .2 Diagrams

This study has used diagrams such as bar graphs and pie charts. Bar graphs are used to represent in diagrammic form the items of a data body where no continuity exists between the individual items (Ferguson and Ngau, 1981). The length of each bar is proportional to the value the bar represents. Pie charts, on the other hand, take a circle to represent the whole body of data. The circle is then divided into sectors representing the various items considered.

3.2.9 .3 Tables

A number of tables have been used in this thesis. These tables provide summaries of the data under consideration. The summaries are useful for further detailed analysis of the data. They also provide a quick visual impression of the data, and more especially its quantitative aspects.

3.2.10 LIMITATIONS OF RESEARCH METHODOLOGY

(i) One of the most serious problems experienced during the research was the general lack of data on various aspects of industries. For instance, the District Industrial Development Office did not have sufficient records on the industries in the District. There was also lack of data on industrial operatives and on various industrial structural aspects. Various measures were taken by the researcher and his assistants to solve the problem of lack of sufficient information. These included supplementing the insufficient records with: a pilot survey before the actual research; field observations; and interviews.

(ii) In a number of cases industrialists misunderstood the purpose of the study and hence became reluctant to provide the required information. Some of the respondents gave information that seemed inaccurate. There were cases where the researcher was given appointments which were not honoured by the respondents and this led to a waste of time and money. To go round this problem, the researcher tried as much as possible to explain the aims and purpose of this study to the respondents and to create an atmosphere of ease.

(iii) Bad weather conditions also hampered the research to some extent. The research was conducted during the short rains season and this made it difficult to travel. The state of roads was also worsened by the wet weather and this implied lack of vehicles on some routes. The net effect was a delay in obtaining the essential data and an inevitable rise in transport and overall research costs. To deal with this problem, the research was mainly undertaken during the afternoon hours when the weather conditions had fairly improved.

(iv) Financial constraints were also experienced. A lot of money was utilized in the field and in having this work compiled. The available financial resources were inadequate. These financial constraints were exaggerated by the large areas covered as well as the poor state of roads when the research was conducted. However, this researcher tried to be as economical as possible with the scarce financial resources at his disposal.

(v) In some instances, some of the industrialists (especially those operating on a very small scale) were semi-illiterate and so could not comprehend the questions in the recording schedules. Thus, the interviewer and his assistants had to verbally translate the questions into Kiswahili or mother tongue (Kisii). This inevitably led to some loss of accuracy and misinterpretation of the recording schedules' content, despite the interviewer's attempts to minimise this as much as possible.

(vi) Some difficulties were encountered during statistical analyses. Some of the statistical tools originally thought to be suitable were found to be inadequate. For instance, the location quotient had to be supplemented by the coefficient of localisation. When using

the chi-square non-parametric test to determine the significance of the results obtained from the field, data cells had to be combined to increase observations so that the expected frequencies could be higher than 5 as required by the test. In the factor analysis procedure, not all the industrial location variables could be analyzed as clouded results were being obtained. Two of the variables that had been shown by descriptive statistics to be relatively unimportant had to be left out of the procedure.

(vii) Difficulties were also met in mapping. During the period of writing and correction of the thesis a new district was curved out of the study area thus creating a problem of boundary definition for the two districts. This study has utilized the administrative units set out in the 1992-1996 Kisii District Development Plan. Another problem encountered was that of lack of uniformity in map and diagram style. This was due to the large number of maps and diagrams needed for this study and which therefore had to be handled by more than one cartographer. The researcher tried to minimize this problem by having corrections and amendments made wherever possible. Understandably, a lot of expenses were also incurred in producing the large number of maps and diagrams. To solve this problem, the author had to supplement the meagre research funds with personal sources.

CHAPTER FOUR

SPATIAL INDUSTRIAL PATTERNS OF KISII DISTRICT AGRICULTURAL MANUFACTURING INDUSTRIES

4.1 INTRODUCTION

This chapter examines the spatial patterns of agro-based industries in Kisii District. The significance of such (spatial) patterns lies in their implications for intra-regional development. As already noted, the concentration of economic activities (especially manufacturing) in certain areas at the expense of others, is likely to lead to lopsided development which (development) exacerbates inequalities in a region. On the other hand, an equitable distribution of economic activities, among other things, is likely to result in equitable regional development.

The null and alternative hypotheses to be tested in this chapter states that: H_o: 'there is no significant industrial localization in Kisii District' and that: H_1: 'there is significant industrial localization in Kisii District', respectively.

It is important to point out right from the outset that some of the data used in this chapter have certain shortcomings. Data on manufacturing employees, especially in the various divisions, are based on estimates which were provided by the District Industrial Development Office. As at the time the research was being undertaken, there was no database on the number of manufacturing employees in the various divisions comprising Kisii District. Whereas the data provide an indication of the spatial patterns of agro-based industries in the study area, there is a possibility that the estimates are not accurate. Moreover, the degree of inaccuracy cannot be

determined, which in itself is an example of the problems facing policy makers and development planners not only in the study area but in Kenya as a whole. An enumeration of employees in the entire study area by the researcher and his assistants could have been impossible due to limited financial resources and time at their disposal. Thus, the estimates should be treated with caution.

4.2 INDUSTRIAL SPATIAL PATTERNS

To determine the nature of the spatial patterns of agricultural manufacturing industries in Kisii District, the techniques of coefficient of localisation and location quotient have been used. To map the location of the agricultural manufacturing establishments, two indices have been used, namely: number of employees (that is, all employees in the establishments including the operatives), and the total number of establishments. The index of number of employees employed has been used to generate a map portraying industrial spatial patterns. The criterion of total number of establishments in each division has been used to produce bar graphs for the respective divisions. The justification for the utilization of the two indices to map manufacturing lies in the need to gain additional insight into the location patterns of agricultural manufacturing in Kisii District.

Table 4.1 shows agro-based manufacturing employees in Kisii District.

TABLE 4.1: AGRO-BASED MANUFACTURING EMPLOYEES IN KISII DISTRICT

DIVISION[1]	AFP	ANFM	Total
Nyamache	301	135	436
Suneka	46	24	70
Nyamarambe	45	33	78
Marani	80	33	113
Sameta	55	30	85
Ogembo	215	89	304
Keumbu	33	23	56
Masaba	245	94	339
Kenyenya	70	48	118
Kisii Municipality	902	258	1160
Keroka Town Council	110	104	214
Total	**2102**	**871**	**2973**

Source: District Industrial Development Office 1994

AFP - Agro-based food processing

ANFM - Agro-based non-food manufacturing

On the basis of the data in table 4.1, percentages of agricultural manufacturing employees in each division have been worked in out table 4.2.

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[1]*The term division includes all the divisions in the study area as well as Kisii Municipality and Keroka Town Council*

TABLE 4.2: PERCENTAGES[1] OF EMPLOYEES IN AGRO-BASED MANUFACTURING AND THE ALLIED SERVICE SECTOR IN KISII DISTRICT

Division	Main Industrial Group	
	AFP	ANFM
Nyamache	10.1245	4.5409
Suneka	1.5473	0.8073
Nyamarambe	1.5136	1.1100
Marani	2.6909	1.1100
Sameta	1.8500	1.0091
Ogembo	7.2318	2.9936
Keumbu	1.1100	0.7736
Masaba	8.2408	3.1618
Kenyenya	2.3545	1.6145
Kisii Municipality	30.3397	8.6781
Keroka Town Council	3.7000	3.4982
Total	**70.7030**	**29.2970**

Source: Research Data, 1994

[1]*The percentages of employees for both agro-based food and agro-based non-food industries have been computed using the grand total agro-based manufacturing employees in Kisii District (2973 employees) and not the respective totals of each category of industries*

Data in table 4.2 indicates that Kisii Municipality commands a higher percentage of total employees in both agricultural food processing (30.3397%) and agricultural non-food manufacturing (8.6781%), than all the divisions.

Nyamache Division is second overall in both agro-based food and non-food industries (10.1245% and 4.5409%, respectively). Masaba Division also has a significant share of the District's employees in agro-based industries. It accounts for 8.2408% and 3.1618% employees in agro-based food and non-food industries, respectively.

The other division with a fairly significant share of agro-based employees is Ogembo with 7.2318% share in agricultural food employees and 2.9936% share in agro-based non-food employees. Keroka Town Council accounts for 3.7000% and 3.4982% of employees respectively, in both agro-based food and non-food industries. The three divisions (Nyamache, Masaba and Ogembo as well as Kisii Municipality and Keroka Town Council account for 59.6368% and 22.8726% of the employees in agro-based food and non-food industries, respectively Other divisions do not significantly contribute to the study area's share of manufacturing industries. The computed percentages thus indicate spatial concentration of manufacturing employment in Kisii Municipality.

Table 4.3 shows totals of employees in agro-based industries as well as, in non-agro based manufacturing and allied service sector.

TABLE 4.3: EMPLOYEES IN MANUFACTURING AND THE ALLIED SERVICE SECTOR IN KISII DISTRICT

Division	Combined AFP and ANFM	NAMS	Total
Nyamache	436	140	576
Suneka	70	30	100
Nyamarambe	78	34	112
Marani	113	40	153
Sameta	85	37	122
Ogembo	304	140	444
Keumbu	56	20	76
Masaba	339	148	487
Kenyenya	118	54	172
Kisii Municipality	1160	470	1630
Keroka Town Council	214	90	304
Total	**2873**	**1303**	**4176**

Source: District Industrial Development Office 1994

AFM = Agro-based food processing ANFM = Agro-based non-food manufacturing

NAMS = Non-agro-based manufacturing and allied service sector

Data in table 4.3 has been used to compute the coefficient of localisation and location quotient values. The procedure for calculating the coefficient of localization is as follows:

(i) Determination of the proportion of divisional agro-based employees in the Districts' agro-based employees.

(ii) Computation of the percentage share of the divisional total employees in the study area's total employees.

(iii) Determination of the deviations of divisional percentage of agro-based employees from corresponding Districts' percentage of employees in all manufacturing.

(iv) The coefficient of localisation (L) is the sum of either negative or positive deviations in (iii) above, divided by 100. The coefficient of localisation is calculated below:

Division	Div. agro-based employees as % of Dist. agro-based employees		Div. total manu. employees as % of Dist. total manu. employees		Differences (+ or -)	
	Div. employees	Div. % of Dist. total	Div.total manu. employees	Div. % of manu. employees		
Nyamache	436	14.665	576	13.793	0.872	
Suneka	70	2.355	100	2.395		-0.04
Nyamarambe	78	2.624	112	2.682		-0.058
Marani	113	3.801	153	3.664	0.137	
Sameta	85	2.859	122	2.921		-0.062
Ogembo	304	10.225	444	10.632		-0.407
Keumbu	56	1.884	76	1.820	0.064	
Masaba	339	11.403	487	11.662		-0.259
Kenyenya	118	3.970	172	4.119		-0.149
Kisii Mun.	1160	39.018	1630	39.033		-0.015
Keroka Town Council	214	7.200	304	7.280		-0.08
Total	**2973**	**100.00**	**4176**	**100.00**	**1.07**	**-1.07**

Div. = Division Manu. = Manufacturing Mun. = Municipality Dist. = District

$$L = \frac{1.7}{100}$$

$$= 0.017$$

where L = Localisation coefficient

The localisation coefficient computed above is low (it approaches zero), signifying identity between the two sets of data, namely, the agro-based industry data set and the manufacturing industry data set.

The coefficient therefore suggests that agro-based industries in the study area are not concentrated in any particular division. However, there is need for further detailed analysis to confirm this.

Data in tables 4.1 and 4.3 have been used to compute the location quotient values. The procedure for calculating the location quotient is outlined below:

(i) Determination of the divisional agro-based employees for both food and non-food industries.

(ii) Determination of the divisional non-agro-based employees.

(iii) Determining total agro-based employees in the entire study area.

(iv) Determining total non-agro-based manufacturing employees in Kisii District

(v) Location quotient values have been determined using the formulae below:

$$\text{L.Q. for AFP} = \frac{AFP_{DIV}}{AGM_{KD}} \times \frac{AGM_{KD} + NAMS_{KD}}{AGM_{KD} + NAMS_{DIV}}$$

where L.Q. = Location Quotient

AFP = Agro-based food processing industries

AFP_{DIV} = Total agro-based food processing divisional operatives

AGM_{KD} = Total general agro-based operatives in Kisii District

$NAMS_{DIV}$ = Total divisional non-agro-based manufacturing and allied service sector operatives

$NAMS_{KD}$ = Total non-agro-based manufacturing and allied service sector operatives in Kisii District

$$\text{L.Q. for ANFM} = \frac{ANFM_{DIV}}{AGM_{KD}} \times \frac{AGM_{KD} + NAMS_{KD}}{AGM_{KD} + NAMS_{DIV}}$$

where L.Q. = Location Quotient

ANFM = Agro-based non-food industries

$ANFM_{DIV}$ = Total agro-based non-food divisional operatives

AGM_{KD} = Total general agro-based non-food operatives in Kisii District

$NAMS_{KD}$ = Total non-agro-based manufacturing and allied service operatives in Kisii District

$NAMS_{DIV}$ = Total divisional non-agro-based manufacturing and allied service operatives

The computed location quotient values are shown in table 4.4

TABLE 4.4: LOCATION QUOTIENT VALUES FOR MANUFACTURING INDUSTRIES AND THE ALLIED SERVICE SECTOR IN KISII DISTRICT

Division	AFP	ANFM
Nyamache	0.7596	0.3407
Suneka	0.6686	0.3488
Nyamarambe	0.5840	0.4283
Marani	0.7500	0.3135
Sameta	0.6552	0.3574
Ogembo	0.7038	0.2914
Keumbu	0.6311	0.4399
Masaba	0.7312	0.2806
Kenyenya	0.5915	0.4056
Kisii Municipality	0.8043	0.2301
Keroka Town Council	0.5259	0.4973

AFP = Agro-based food processing

ANFM = Agro-based non-food manufacturing

NAMS = Non agro-based manufacturing and allied service sector

Source: Computed from research data, 1994.

The computed location quotient values indicate concentration on industries in certain parts of the District.

As far as agro-based food industries are concerned, Kisii Municipality leads with a location quotient value of 0.8043. Other leading values are recorded by: Nyamache (0.7595); Marani (0.7500); Ogembo (0.7038) and Masaba (0.7312). Keroka Town Council has a location quotient value of 0.5259. In terms of agro-based non-food manufacturing, Keroka Town Council leads with a location quotient value of 0.4973, followed by Keumbu (0.4399), Nyamarambe (0.4283), Kenyenya (0.4056) and Sameta (0.3574). Kisii Municipality has a location quotient of 0.2301.

The computed location quotient values (see table 4.4) indicate that:

(1) No part of the study area has more than its fair share of industries. This confirms the fact that the study area is still underdeveloped in terms of industries.

(2) There is a spatial concentration of agro-based manufacturing industries in the two leading urban centres in Kisii District, namely, Kisii Municipality and Keroka Town Council. The Municipality accounts for the highest location quotient value in agro-based food processing. Moreover, it accounts for the highest proportion of manufacturing employment in both agro-based food and non-food industries. Keroka Town Council has the highest location quotient value in the agro-based non-food processing establishments category.

To further determine the spatial patterns of agro-based industries in Kisii District the number of agro-based establishments in the study area during the research period (1994) is shown table 4.5.

TABLE 4.5: NUMBER OF AGRICULTURAL MANUFACTURING ESTABLISHMENTS IN KISII DISTRICT

Division	Number of establishments
Nyamache	16
Suneka	24
Nyamarambe	10
Marani	27
Sameta	5
Ogembo	9
Keumbu	10
Masaba	18
Kenyenya	14
Kisii Municipality	55
Keroka Town Council	12
Total	**200**

Source: District Trade Office, 1994.

Data in table 4.5 clears shows Kisii Municipality also leads in the number of agro-based establishments that are located in the District, followed by Marani, Suneka, Masaba and Nyamache Divisions, respectively.

To portray the spatial patterns of agro-based industries, two indices have been used namely:

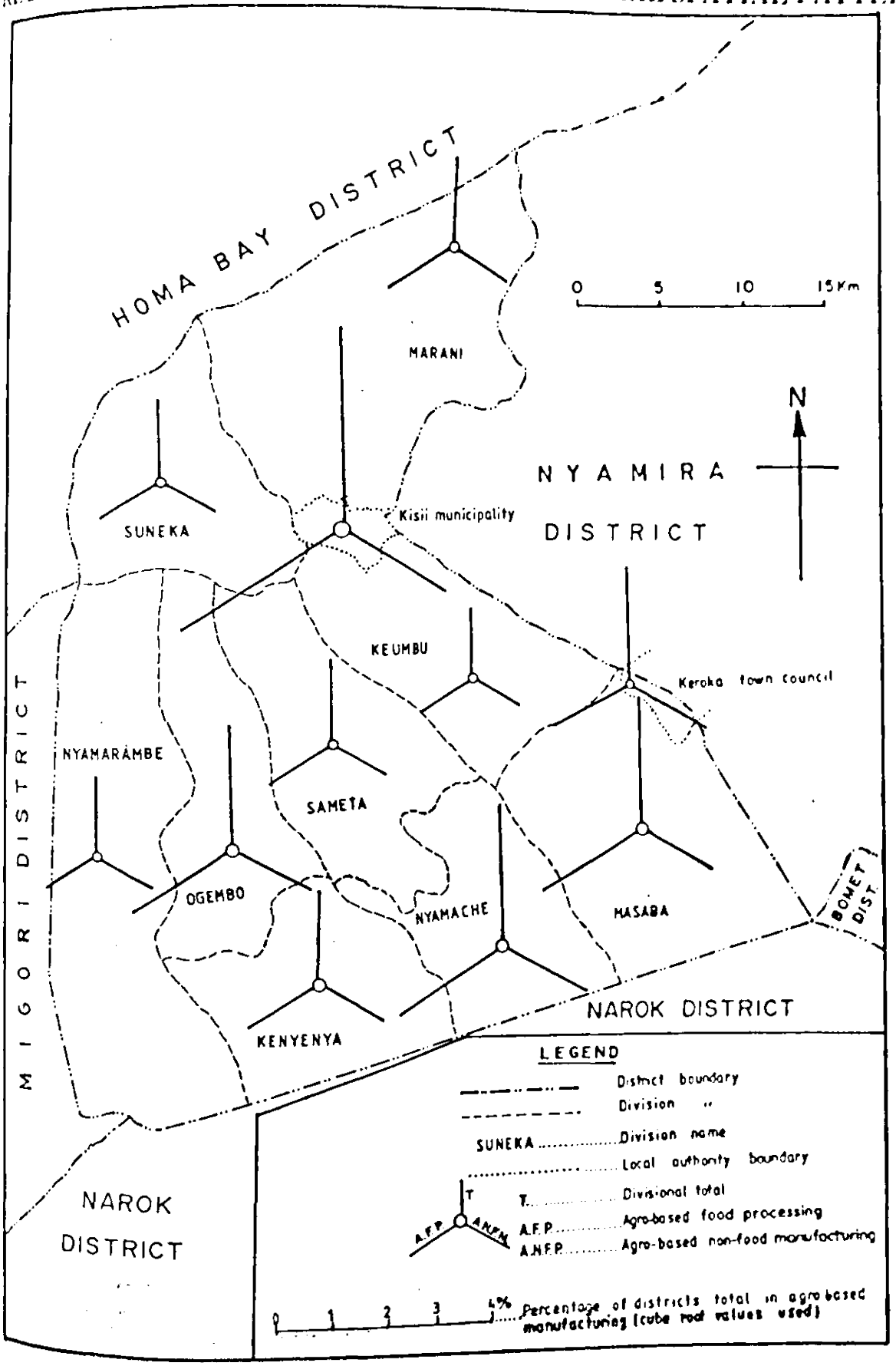
(i) number of employees, and

(ii) number of establishments.

Figure 21 portrays cartographically the spatial patterns of agro-based industries in Kisii District using manufacturing employees. Accordingly, the leading agro-based industrial areas in the study area in terms of employment include: Kisii Municipality, Nyamache, Masaba, Ogembo and Keroka Town Council, respectively. It would appear that other divisions are not significant industrial units.

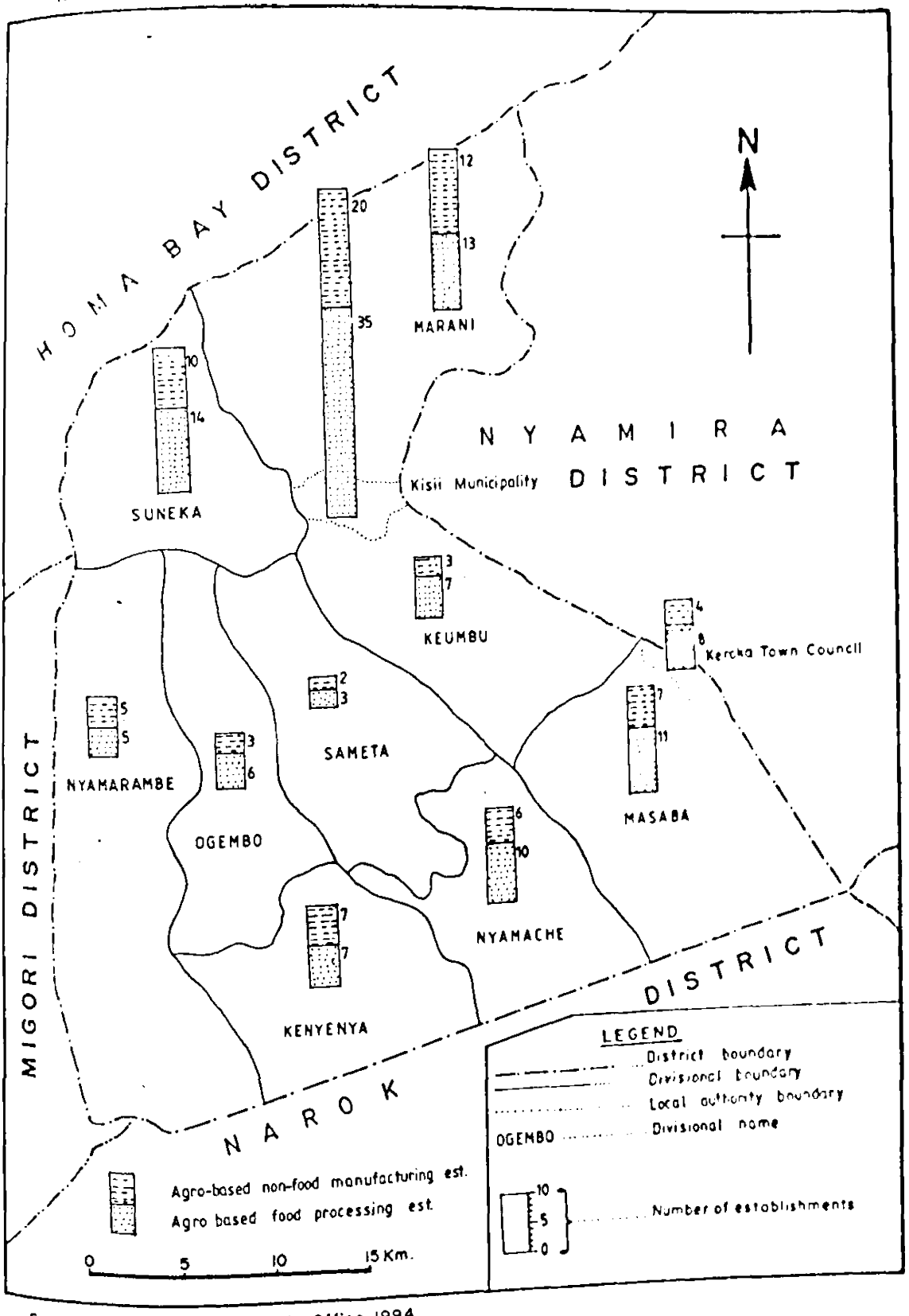
Figure 22 shows the number of agricultural manufacturing establishments per division of Kisii District. Accordingly the leading industrial areas include: Kisii Municipality, Marani, Suneka, Masaba and Nyamache.

RE 21: KISII DISTRICT: QUANTITATIVE INDUSTRIAL SPATIAL PATTERNS



Source: Based on research data, 1994

FIG. 22 KISII DISTRICT: NUMBER OF AGRICULTURAL MANUFACTURING ESTABLISHMENTS IN 1994



Source: District Industrial Trade Office, 1994.

There is an apparent discrepancy in the spatial patterns portrayed by the two methods. This can be explained in terms of the scale of operation and the number of licensed establishments. Some divisions possess relatively large numbers of establishments (for instance, Suneka and Marani) but these establishments employ relatively few people. They operate at a very small scale. Examples include: tailoring establishments, butcheries, and carpentries. On the other hand, some of the divisions have few establishments but which employ relatively large numbers of people. Good examples include Nyamache, Masaba, and Ogembo divisions and Keroka Town Council. These divisions possess establishments that employ comparatively more people. Examples include Nyamache Tea Factory in Nyamache, Kiamokama Tea Factory in Masaba and Ogembo Tea Factory in Ogembo.

Since the data on number of agricultural establishments in the study area were obtained from the District Trade Office, it is possible that some of the divisions which appear to have relatively fewer establishments, have more establishments but which may not have been licensed and therefore not registered in the District trade office. There were cases in some divisions where the researcher and his assistants "discovered" establishments which did not appear in the records of the District Trade Office. Moreover, the probable inaccuracy of data on agro-based employees has been noted elsewhere.

4.3 HYPOTHESIS TESTING

Research results clearly indicate a spatial concentration of agro-based manufacturing in Kisii Municipality. This has been determined on the basis of:(1) manufacturing employment - the Municipality leads in terms of the percentages of agro-based employees. Computed location

quotient values suggest a spatial concentration of especially agro-based food processing industries; and, (2) the number of agricultural manufacturing establishments in the study area - the Municipality leads all other divisions in terms of the number of agricultural manufacturing establishments.

On the basis of the above research findings, the null hypothesis that 'there is no significant industrial localisation in Kisii District' has been rejected. The alternative hypothesis that 'there is significant industrial localisation in Kisii District', has been adopted.

It should be noted that localisation of industries is not just within Kisii Municipality as opposed to other divisions in the District, but more especially within Kisii town[1] where most of the industries that employ relatively large numbers of people are located.

4.4 IMPLICATIONS OF FINDINGS ON INDUSTRIAL SPATIAL PATTERNS

It has been clearly established through research findings, that there is industrial localisation in Kisii Municipality as compared to other industrial centres and rural areas in Kisii District. It would appear that a core-periphery type of development pattern is prevalent in Kisii District. Kisii Municipality is core, while the rest of the District is the periphery. Although this type of development pattern is likely to be at a much lower level when compared with core-periphery at the national level, it is nevertheless significant since it implies polarization. As stated elsewhere, polarization is associated with inequalities and hence results in a type of development that is unequitable in a given region. In the light of the research findings, it is imperative that measures are taken by planners and policy makers to deal with the polarized type

[1] *Kisii town refers to the built-up area within Kisii Municipality*

of development pattern that evidently exists in Kisii District. As far as industrial spatial patterns are concerned the government should take measures to discourage localisation of industries in towns in the study area, especially, Kisii and Keroka towns and to decentralize more of the relevant industries to other parts of the District. The right incentive package is likely to go a long way in encouraging equitable industrial development. Such a package would include:

(i) Provision of infrastructural facilities such as tarmacked roads, electricity, water supply, and housing to various relevant parts of the District. This is likely to go a long way in making such parts as attractive as possible.

(ii) Budgetary controls such as credit restrictions, differential taxation and licensing and government expenditure. For instance, Kisii Municipal Council would impose lower local taxes and licensing fees in areas that are comparatively less developed in terms of industrial development and higher taxes in such areas as Kisii Municipality.

(iii) Provision of research information to industrialists on the location and site advantages and disadvantages of various areas in Kisii District regarding specific industrial enterprises;

(iv) Making of special financial relief provisions for manufacturers who locate their establishments in disadvantaged areas. Such arrangements would include, among others, low interest rate loans, tax exemptions, and low or subsidised rents.

There are a number of other measures that could be taken to rectify the apparently polarized industrial spatial pattern of Kisii District agro-based industries. A few of them are outlined below, namely:

(a) There is need to divert the inflow of development factors/determinants (particularly societal innovation and decision- making) from the Kisii town core zone to other parts of the District. Such a measure is likely to reduce regional inequalities.

(b) Effective internal demand should be built and the creation of dynamic societal structures encouraged in peripheral regions of Kisii District. People in these regions should be encouraged to retain in the relevant divisions of the study area their returns (such as wages and salaries, etc.) in order to create adequate internal demand.

(c) Those people employed in Kisii Municipality should be encouraged to send part of their financial returns to their relatives and friends in peripheral areas. This is likely to boost demand in those regions, and hence provide a basis for regional service and manufacturing industries.

(d) Societal structures that are anti-development, (for instance, unwillingness to educate children by some parents), should be highly discouraged in the study area.

(e) Kisii District is endowed with various resources, especially agricultural sources. Various crops such as tea, coffee, pyrethrum, sugarcane etc. do well in the

various agro-ecological zones. Furthermore there are other developable non-agricultural industrial resources,(such as soapstone mined in Tabaka in Nyamarambe Division) which could be utilized. It is important that the external demand for these various resources is mobilized and links established both within and outside the study area, in terms of access to external information, resources and markets. Exploitation and marketing of these extra resources, especially soapstone which is a very important non-agricultural resource, should be improved and streamlined.

(f) Formation of 'interest groups' in peripheral regions which (groups) have the capacity for mobilizing and utilizing resources is another suitable measure. Such groups would include: regional businessmen, regional intellectuals and regional politicians. These groups should identify themselves with the interests of the regions and should be capable of pressing for the regions' interests with outside decision makers.

In concluding this chapter, it is important that for the purpose of equitable regional development, the current industrial (and overall) spatial pattern (which is entropic or polarized), be corrected by appropriate measures to generate negentropic equitable spatial pattern. It is also important to encourage industrial development in the study area as a whole.

CHAPTER FIVE

LOCATION VARIABLES INFLUENCING THE LOCATION OF AGRO-BASED INDUSTRIES IN KISII DISTRICT

5.1 INTRODUCTION

This chapter focuses on the identification of the variables that have influenced the location of agro-based manufacturing industries in Kisii District.

The null and alternative hypotheses to be tested in this chapter state that: H_0: 'economic variables are not the main determinants of the location of agricultural manufacturing industries' and that H_1 'economic variables are the main determinants of the location of agricultural manufacturing industries'.

Manufacturers were asked to rank the variables known to influence the location of agro-based industries in order of importance starting with the most important to the least important variables. The ranking scale below was provided.

Rank	Points awarded
1. Very important variable influencing location of this industry	1
2. Important variable influencing location of this industry	3
3. Fairly important variable influencing location of this industry	7
4. Least important variable influencing location of this industry	10

5.2 DATA ANALYSIS AND RESULTS

The results were analyzed using means, frequencies, percentages and correlations (Appendix 7). Further detailed analysis was undertaken using the factor analysis procedure of the principal axis type.

The first variable, raw material availability, had the lowest mean 2.48. It is a very important factor of location of agro-based industries in Kisii District. This is exemplified by the fact that 61 5% (40) of the establishments in the study area viewed it as very important in their location decisions. This compares with the 10.6% (7) which viewed it as the least important factor. 24.6% (16) and 3.1% (2) indicated that raw material availability was an important and fairly important variable, respectively. The significance of raw material availability as a variable of industrial location in the study area lies in the fact that most of the agro-based manufacturing industries in Kisii District are raw material orientated.

The variable of availability of local capital plays a fairly crucial role in the location of agro-based establishments in Kisii District. It has a mean of 7.21. It was selected as very important in industrial location by 6.2% (4) of the industries. 7.7% (5) and 35.4% (23) of the establishments ranked it important and fairly important in their location decisions. 50.8% (33) of the industrialists viewed local availability of capital as the least important consideration in the location of agro-based industries.

Proximity to other establishments is not an important consideration in the location of agricultural manufacturing industries in Kisii District. This is explicitly clear from research findings and data analysis. The variable has a very high mean of 9.77. Moreover over 90% (59) of the industrialists indicated that the variable is least important in their location decisions.

Only 9.2% (6) of the industrialists felt that the variable is fairly important in the location of their establishments.

The variable of presence of urban economies has a mean of 7.34 signifying that it is fairly important though tending towards being least important in the location decisions in the study area. 3.1% (2), 3.1% (2) and 35.4% (23) chose the variable as very important, important and fairly important respectively. 58.5% (38) of the establishments indicated that the variable was least important in their location decisions. The variable has a mean of 8.34.

The availability of local market is considered as important in influencing the location of agro-based establishments in Kisii District. This is indicated by the data analytical results. The variable has a low mean of 4.56. Furthermore over 60% (41) of the industries visited indicated that the variable was either very important, important or fairly important. Only less than 40% (24) of the industries indicated that the variable is least important.

Transport costs is an equally important consideration (though not as important as availability of local market) among industrialists in location decisions. It has a fairly high mean of 6.57. It was considered very important by 18.5% (12) of the industries; 29.2% (19) important; 10.8% (12) fairly important; while 41.5% (27) considered the variable least important.

The variable of nearness to home is considered very important by industrialists in Kisii District. Over 70% (47) of the agro-based industries indicated that it was either very important, important or fairly important. Less than 30% (18) of the establishments indicated that the variable was least important. The significance of the variable is further emphasized by its low mean of 3.45. Power supply is also important in influencing the location of agro-based

manufacturing industries. It has a mean of 6.66. 21.5% (14), 27.7% (18) and 13.8% (9) of the industries chose the variable as either very important, important or fairly important. 36.9% (24) chose it as least important.

The variable of underlying rock structure is the least important variable. This conclusion is arrived at on the basis of data analysis results. The variable has the highest mean of 9.95. Furthermore almost all the establishments visited (98.5%) considered it least important in their location decisions. Otherwise only one establishment (1.5%) felt the variable was fairly important in its location.

Surface configuration is also not an important variable in the location of agro-based establishments in Kisii District. It has a high mean of 9.49. Moreover, over 90% (61) of the industrialists chose it as the least important variable in the location of their industries. Less than 10% (4) chose it as fairly important influencing location.

Availability of land is not very crucial in the study area. 3.1% (2) and 23.1% (15) of the agro-based industries visited felt that the variable was important and fairly important, respectively. 73.8% (48) of the industries regarded the variable as least important. The variable has a mean of 8.53 which further stresses the fact that is relatively unimportant in industrial location decision making in Kisii District.

The government does not play a great role in the location of agro-based industries in Kisii District. Data analysis indicates that over 80% (54) of the industries visited regarded government role in their location decisions as minimal (that is, least important). Less than 20% (11) of the industries indicated that the government played some role in the location decisions.

The variable has a high mean of 8.66 indicating its relatively insignificant role in influencing industrial location in the study area.

Local politics do not equally play an important role in the location of agro-based industries in the study area. This is exemplified by the fact that over 85% (56) of the industrialists indicated that local politics was a least important consideration in the location decisions. Less than 15% (9) of the industrialists indicated that local politics was either a very important, important, or fairly important consideration in their location decisions. Nevertheless with a mean of 8.89 local politics is relatively unimportant consideration in the location of agro-based industries in the study area.

Water supply as a variable is not important in the location of agricultural establishments in Kisii District. 1.5% (1), 6.2% (4) and 10.8% (7) of the establishments visited indicated that the variable was either very important, important or fairly important respectively. 81.5% (53) of the establishments indicated that water supply was the least important in the location decisions. The variable has a high mean of 8.45 thus emphasizing its relatively unimportant role in industrial location in Kisii District.

The variable of labour supply is fairly important though tending to being least important in industrial location. It has a mean of 7.09. 33.8% (22) of the industries visited viewed labour supply as either important or fairly important. On the other hand, over 65% (43) of the establishments viewed labour as least important in their location decisions.

Personal considerations is an important location variable of agricultural manufacturing industries in the study area. Over 78% (51) of the industrialists indicated that the variable was either very important, important or fairly important in their location decisions. Only 21.5% (14) indicated

that the variable was least important in the location of their establishments. The variable has a low mean 3.58 which further emphasizes its significant role in location decisions in Kisii District.

Having established the means, frequencies and percentages of the sixteen variables, the interrelationships (correlations) between the variables were examined. These correlations are a prelude to factor analysis.

The correlation matrix of the 16 variables is shown in appendix 8. The variables and their respective codes are identified in appendix 6. The correlation matrix shows values of the Pearson's Product Moment correlation computed for all the variables using the SPSS package.

Correlations $\pm$ 0.3000 were regarded as significant at both 0.01 and 0.001 significance levels. The correlation matrix indicates that there are significant correlations between the variables influencing the location of agro-based industries in Kisii District. For instance, significant interrelationships exist between: government influence and personal considerations (-0.6238); surface configuration and underlying rock structure (0.6015); personal considerations and local availability of raw materials (0.6115); power supply and water supply (0.5484); and personal considerations and nearness to home (0.4656).

The significant correlation between personal considerations and government influence is probably due to the fact that as government influence(s) in industrial location become more important, personal considerations are, in most cases, subordinated. The local availability of raw materials and nearness to home are, in fact, part of the considerations taken into account by industrialists in their location decisions. This explains the close relationships between these variables. The underlying rock structure and surface configuration have significant correlation.

For instance, the rock structure determines rock resistance to agents of erosion and weathering and the type of landscape formed.

To obtain more comprehensive results the correlation matrix was exposed to factor analysis. The type of factor analysis utilized in this study is the principal axis factoring (PAF). It was decided that those variables that were viewed as least important by over 90% of industrialists be left out of the factor analysis procedure. This was done mainly to leave out insignificant variables that will have only clouded the results. The variables that have been excluded from the factor analysis procedure include: underlying rock structure, surface configuration and proximity to other establishments. This leaves thirteen variables for the factor analysis procedure.

Factor analysis begins with a correlation matrix (Appendix 8). The major problem faced in factor analysis involves the decision as to how many independent factors to extract from the original data set. Three major approaches have been recommended by statisticians These include:

(a) use of a predetermined eigenvalue;

(b) use of cumulative percentage; and,

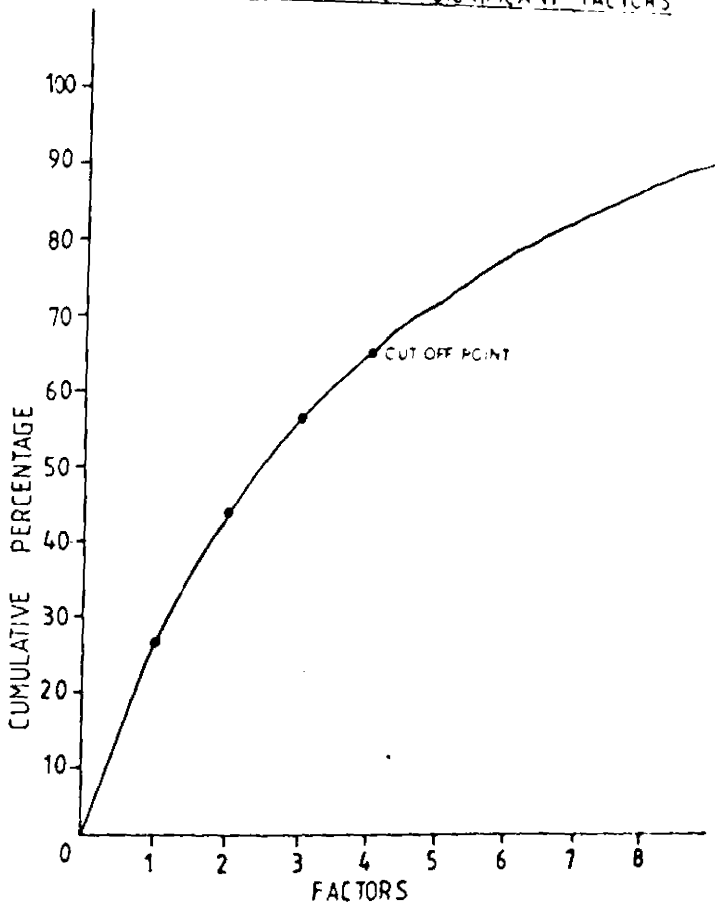
(c) scree test of the percentage of total variation.

For purposes of this study, an eigenvalue of at least above unity (above 1) was decided upon as signifying the independence of a variable from the rest. On the basis of this requirement, four factors were extracted from the original data set.

It is possible to construct a cumulative percentage curve. From the curve it will be established that the first four factors contribute to the growth of a very steep slope that accounts for 65.1 per cent of the variance in the original data set after which the graph rises less steeply (Figure 23).

Using the scree test, the cut off point for significant factors is the point where there is sharp drop in the curve showing the proportion of total variance accounted for by each factor and beyond which the curve slopes off (Figure 24).

FIG. 23 CUMULATIVE PERCENTAGE GRAPH SHOWING 'CUT OFF POINT' FOR SIGNIFICANT FACTORS



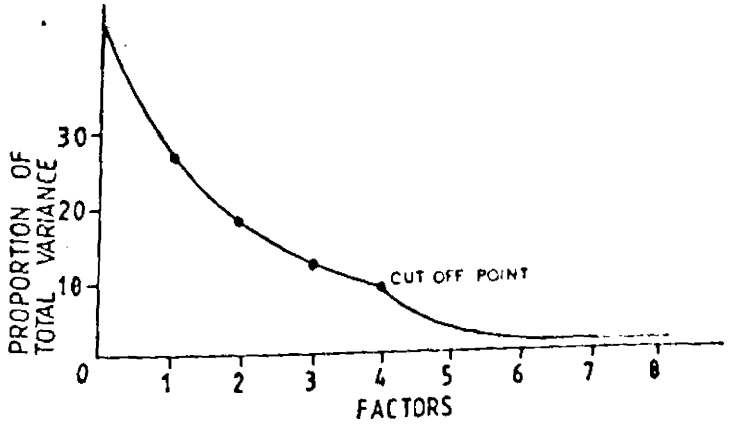


FIG. 24 PROPORTION OF TOTAL VARIANCE GRAPH SHOWING 'CUT-OFF POINT' FOR SIGNIFICANT FACTORS.

Using factor analysis, the 13 original variables have been meaningfully collapsed into four independent factors.

The communalities, eigenvalues, percentage of variance and cumulative percentages of the four variables have been extracted using the PAF procedure. These are shown in table 5.1.

TABLE 5.1: FACTOR ANALYSIS FOR INDUSTRIAL LOCATION VARIABLES

Variable	Communality	Factor	Eigenvalue	% of Variance	Cum %
V01	.79643	1	2.87327	26.6	26.6
V02	.22322	2	2.28446	17.2	43.8
V04	.33074	3	1.89091	12.4	56.2
V05	.39610	4	1.31352	8.9	65.1
V06	.26782				
V07	.10214				
V08	.26694				
V11	.20224				
V12	.14043				
V13	.46246				
V14	.50380				
V15	.43302				
V16	.66982				

Table 5.1 shows that the four factors extracted by the PAF procedure together account for 65.1 % of the total variation in the original data set.

The initial factor solution (unrotated factor matrix) was rotated using the varimax rotation. Rotation is basically aimed at enabling easy and accurate interpretation of the factors with their respective variables. Rotation makes the variance of certain variables with respect to one factor to be maximised. Hence a higher loading of certain variables on some factors is expected so as to facilitate a more accurate identification of the factor concerned. The rotated factor matrix is shown in table 5.2.

TABLE 5.2: ROTATED FACTOR MATRIX FOR INDUSTRIAL LOCATION VARIABLES

Variable	Factor 1	Factor 2	Factor 3	Factor 4
V01	.82979	-.21359	.08732	-.05865
V02	.44129	-.02646	-.16626	.01193
V04	.13021	.02113	.44195	.20321
V05	.20670	.75585	.33256	-.12508
V06	-.03334	.52890	.16818	.20818
V07	.50161	.01840	.10647	.06739
V08	.05781	.12704	.53256	.22363
V11	-.21333	.20778	.46818	.19678
V12	-.81532	-.05585	.20512	.40379
V13	-.28372	-.15606	.22656	.40221
V14	-.44195	-.12492	.28694	.41134
V15	-.04979	.01329	.13501	.69492
V16	.65509	.18323	.05825	.16816

In order to establish the main variables influencing the location of agricultural manufacturing industries in Kisii District, the various factors that derived from the factor analysis procedure, have been identified and labelled.

5.3 IDENTIFICATION AND LABELLING OF FACTORS

For easy and accurate interpretation of the factors, it was decided that only those variables that load on the factors with a value equal to or greater than ($\geq$) 0.4000 be taken into account. One of the major problems associated with the identification and labelling of factors in factor analysis is the provision of a label that adequately reflects the composite importance of the various variables associated with a factor (Taylor 1977, Wegulo 1984). Thus, bipolar and tripolar factors are common in factor analysis. In this study, an attempt has been made to ensure that the labels provided for the factors are as accurate as possible and reflective of the constituent variables.

FACTOR ONE

Variables	Loadings
Local availability of raw materials	0.82979
Personal considerations	0.65509
Nearness to home	0.50161
Availability of local capital	0.44129

Factor one is associated with four variables, which load significantly on it. These include, local availability of raw materials, personal considerations, nearness to home, and availability of local capital. This factor may be interpreted as representing variables that are personally considered by industrialists when making location decisions, affecting agro-based industries. These are variables which industrialists consider as likely to reduce their costs and/or

increase their revenue. For instance, an entrepreneur is likely to seek location near a particula raw material supplier or banker because he feels that friendship is likely to influence th availability of materials or funds (Greenhut 1956:173). Factor one has, therefore, been labelle *personal preferences*.

FACTOR TWO

Variables	Loadings
Availability of local market	0.75585
Low transport costs	0.52890

Two variables have loaded significantly in factor two. These are, availability of local marke and low transport costs. Factor two may be regarded as 'representatives of variables related t access to the market of the goods manufactured.' Factor two has therefore been labelled *marke accessibility*.

FACTOR THREE

Variable	Loadings
Power supply	0.53256
Land availability	0.46818
Urban economies	0.44195

Three variables load significantly with factor three. These include, power supply, lar availability and urban economies. The first two variables are associated with 'industrial suppo infrastructure.' Factor three has therefore been labelled *industrial support infrastructure-cun urban economies*. Factor three is an example of a 'bipolar factor.'

FACTOR FOUR

Variable	Loadings
Labour supply	0.69492
Water supply	0.41134
Government influence	0.40379
Local politics	0.40221

Four variables have been identified as loading significantly with factor four. These includ labour supply, water supply, government influence and the role of local politics. Factor fou may be identified as representing variables related to government influence (and local politic which in most cases manifests through, for example, the influence on the location of governmen sponsored projects, the influence on local council decisions, etc.). Factor four may thus b labelled as *government influence-cum-labour-water supply*. This factor is an example of tripolar factor.

In a nutshell, the main variables influencing the location of agro-based industries in Kisi District may be collapsed into four factors, as follows:

(i) Personal preferences;

(ii) Market accessibility;

(iii) Industrial support infrastructure-cum-urban economies; and,

(iv) Government influence-cum-labour-water supply.

However, certain considerations should be taken into account. These are as follows:

(a) The four factors have been identified on the basis of the major variables which were considered for the factor analysis procedure. Quite a number of other variables (mainly physical) were not considered for the factor analysis procedure. This is basically because some of the variables, (for instance, the underlying rock structure and surface configuration), were regarded as least important by over 90% of the establishments visited. When the factors were included in the factor analysis procedure, they tended to cloud the results. However, it should be noted that the variables of underlying rock structure and surface configuration, have influenced the location of agro-based establishments in the study area, albeit mainly indirectly. For example, the underlying rock structure of Kisii District, (consisting of dominantly the Bukoban rock system), has influenced the type(s) of soils and hence influencing the agro-based industrial bases. Moreover, different commercial crops in the study area (tea, coffee, maize, millets,

sugarcane and pyrethrum) do best in certain topographical zones. These influence the availability and type of industrial raw materials.

Entrepreneurs and/or their assistants noted that the influence of most of the physical variables on the location of their industries is mainly indirect. Such variables mainly influence the supply of industrial raw materials. A good example of such variables is rainfall. It was argued that rainfall amounts and reliability tended to influence the type and supply of various crops, forests and pastures, thus indirectly influencing the spatial pattern of agro-based industries. Kisii District is part of the Kenya Highlands which are noted for rich volcanic soils. These soils support a wide range of industrial raw materials.

(b) There are variations, as far as location variables are concerned, between urban and rural establishments. Urban establishments tend to prefer locations that have infrastructure (power supply, transport and communication networks, land availability, etc.) and urban economies (banking, security, insurance etc.). On the other hand, rural based industries prefer, for instance, locations with raw material supply, locations near home, etc.

5.4 EXPLANATIONS OF THE FACTORS

The first factor accounts for the highest variance in the original data set (26.6%). Hence, the variables represented by this factor, are by extension, the most important in influencing the location of agro-based industries in Kisii District. Local availability of raw materials is by far the most important variable influencing the location of agricultural manufacturing industries in

Kisii District. Industries such as flour milling, tea, coffee and sugarcane processing, saw-milling, furniture and fixtures fabrication, meat products processing, are strongly raw materia orientated. The raw materials for these industries are bulky and they have low value. Hence, manufacturers consider it uneconomical to locate such industries far from where their raw materials are obtained since high transport costs could be incurred, which in turn implies high production costs. Moreover, some of the raw materials are perishable (they lose quality), for instance, green leaf (tea). Consequently, tea factories are located within the regions where the raw material is locally procured, so that it (raw material) can be processed as soon as possible after it is picked. Personal considerations is also a very important industrial location variable in the study area. The variable influences decision making by indirectly affecting cost, partially demand; and/or providing non-pecuniary rewards (Greenhut 1956). Hamilton (1974) also notes that the choice of location is usually a non-issue for small-scale entrepreneurs initially establishing an industry. Often the entrepreneur begins to operate his business in his home town. Similarly, North (1974) argues that a familiar environment and long standing contacts are crucial in the initial success of a new firm so that the possibility of opening a factory in another area is rarely considered.

Some of the personal considerations influencing the location of industries in the study area include:

(i) Nearness to home - Some of the entrepreneurs noted that location near home meant a familiar environment which was neighbourly. Moreover, nearness to home helped to maintain the socio-economic set up and reduces transport costs

between place of work and place of residence. This is a personal cost-reducing factor (Greenhut 1956).

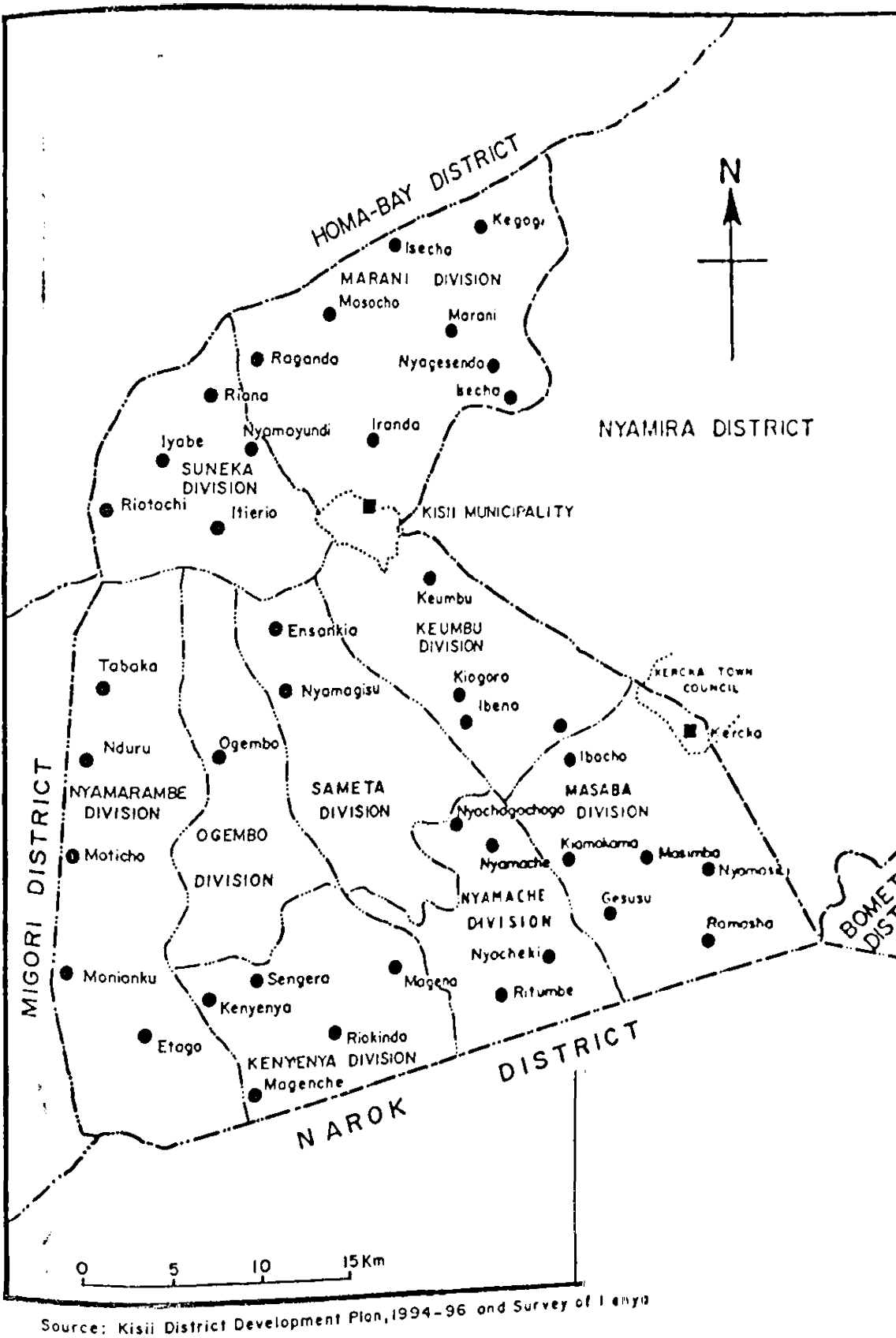
(ii) Contacts - industrialists indicated that they tended to locate in certain places in Kisii District due to the fact that they had formed contacts with customers which promoted their sales. Thus, they had access to the local market which increased their sales. This access to local market can be considered as a personal revenue-increasing factor since it indirectly influences sales (Greenhut, 1956).

(iii) Another factor related to personal preferences of the industrialists was that of the availability of local capital. This is a personal cost-reducing factor. Entrepreneurs noted that initial capital was not easy to come by. Thus, industrialists tended to locate in areas where they could locally mobilise capital through such sources as friends, and families. Onyemelukwe (1974) notes that successful capital mobilisation for businesses is frequently not through formal financial institutions, but through informal sources, especially within the entrepreneur's extended family circle and friends. Thus, even when an entrepreneur desires to establish his enterprise in another town that seems to offer better promise of industrial profitability, capital immobility may discourage long distance movement away from one's people (Opondo 1989).

The second factor accounts for 17.2% of the total variance in the original data set. It has been labelled market accessibility. Market accessibility is an important factor largely due to the desire among industrialists to reduce transport costs for both raw materials and finished

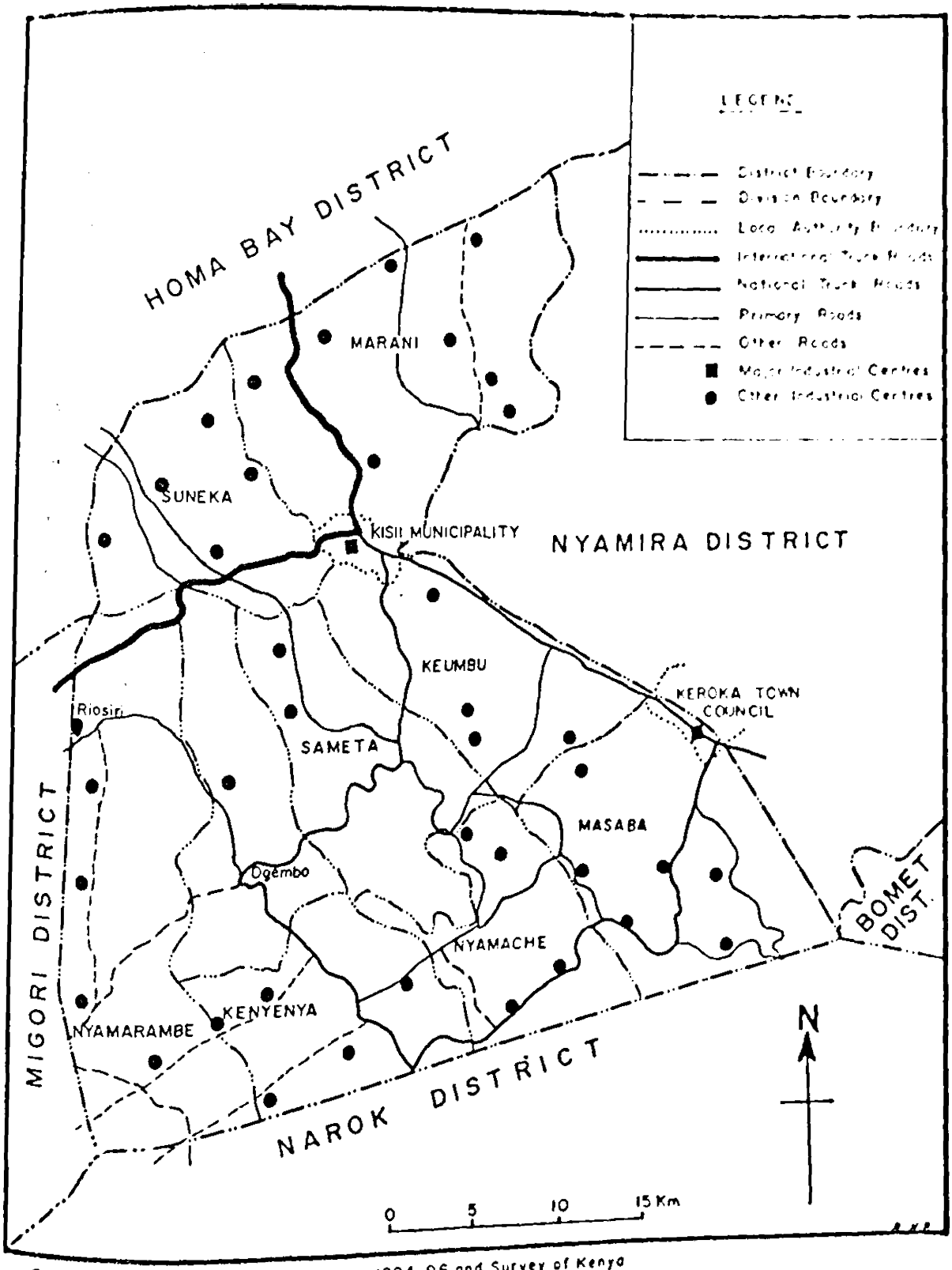
products and/or minimises losses. This is an important consideration especially in Kisii Distri where roads are poor and become impassable during the rainy season. Some of the industri in the District manufacture finished products that are bulky and fragile, for example, the so drinks and furniture and fixtures industries. These industries are market orientated. Some the industries (for instance bakeries) produce perishable products (bread and cakes). Suc industries are located near the market so that the products can be readily consumed before the go bad. Figure 25 shows the industrial centres in Kisii District. Figure 26 shows a clo relationship between the location of industrial centres and the road network of Kisii District.

FIGURE 25: INDUSTRIAL CENTRES IN KISII DISTRICT



Source: Kisii District Development Plan, 1994-96 and Survey of Kenya

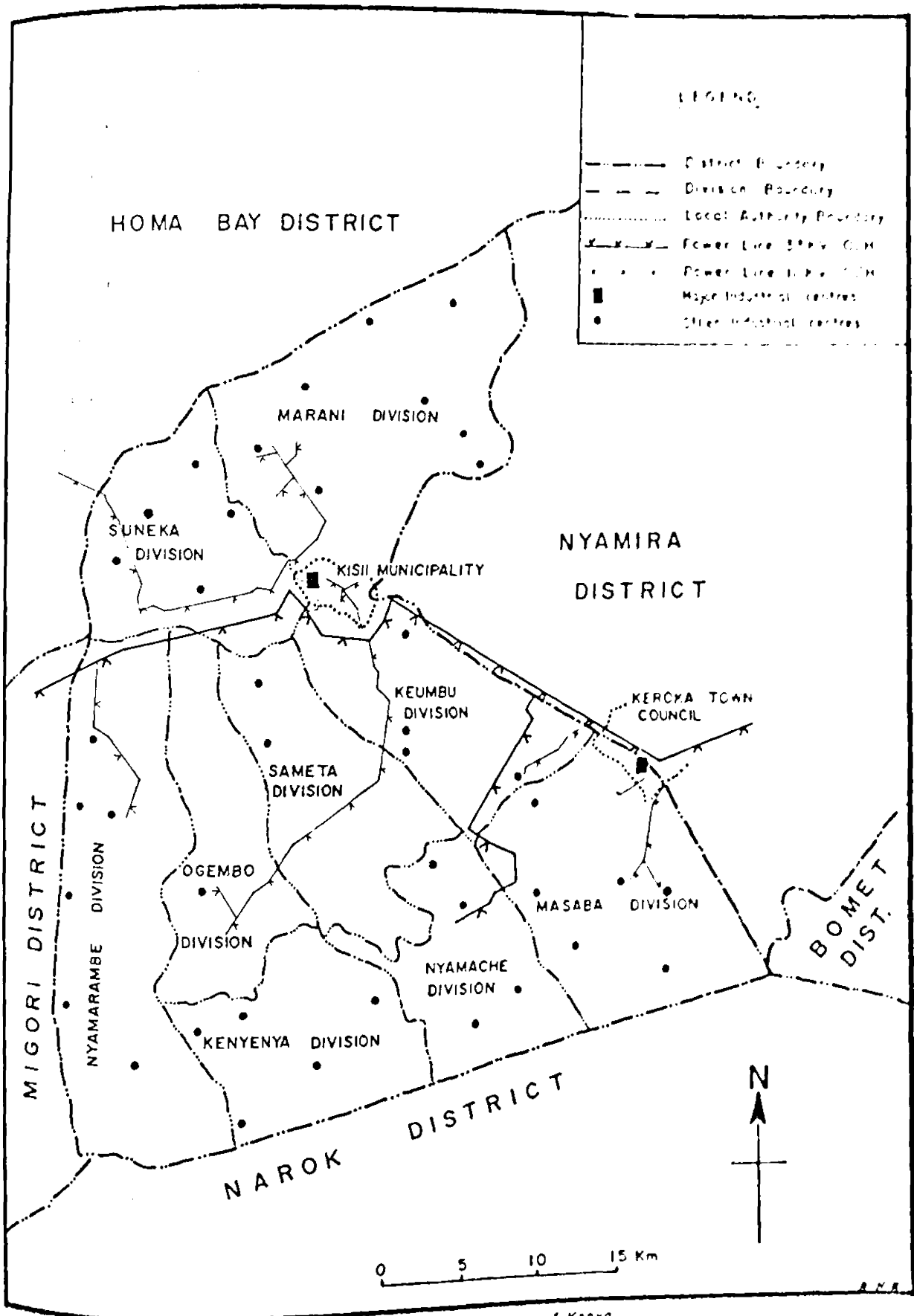
FIGURE 26: ROAD NETWORK AND QUALITATIVE INDUSTRIAL LOCATION IN KISII DISTRICT



Source: Kisii District Development Plan 1994-96 and Survey of Kenya

Factor three accounts for 12.4% of the variance in the original data set and has been labelled industrial support infrastructure-cum-urban economies. This factor is especially important among those industries located in urban areas in Kisii District for example, Kisii, Keroka, Nyamache, Ogembo towns etc. Industrial support infrastructure such as power supply, land availability, and a good transport and communication network plays an important role in influencing industrialists to locate in urban areas. Power supply in most cases implies relatively higher volumes of production within a short time since machines can be used (assuming they are available and/or industrialist can afford to purchase them). Currently there is a high demand for power among industrialists in Kisii District, which (demand) has not been met by the rural electrification programme. The leading industrial centres are those that are supplied with power (Figure 27).

FIGURE 27: POWER SUPPLY AND INDUSTRIAL LOCATION IN KISII DISTRICT



Source: Kisii District Development Plan 1996-96 and Survey of Kenya

Land availability is an important variable influencing location of industries in Kisii District. This is due to land scarcity in the District. This scarcity is related to high demand for it arising out of the high population totals (projected at 966,428 in 1994) and growth rates (3.5% per annum, District Development Plan 1994-1996) in the study area. Land is an essential prerequisite for industrial development. Factories, offices, and stores are established on the land. It is also useful for parking and for future expansion. In urban areas of Kisii District, urban economies seem to play an important role in influencing the location of agro-based industries. When interviewed, industrialists indicated that such factors as availability of banking services, security, insurance in combination with other advantages of urban areas, (such as power supply and a better transport network), play a role in their location decisions.

Factor four explains 8.9% of the variance in the original data set. This tripolar factor has been labelled, government influence-cum-labour-water supply. The factor contributes least to the variance in the original data set and by extension, the constituent variables do not play a very significant role in the location of agricultural manufacturing industries in Kisii District. Government influence in the study area has not been very strong. The government has been trying to encourage industrial development through the Kenya Industrial Estates Limited (KIE) and through encouraging *jua kali* activities. The KIE provides premises for industries, (for instance, the KIE bakery in Keroka town), as well as financial assistance to viable industrial projects. A *jua kali* shed has been constructed in Kisii town through government aid. Local politics have played some role, (albeit insignificantly), in the location of agro-based industries in the District. The most notable case(s) is in the tea industry. All the tea factories visited indicated that local politics was very important in their location. Labour supply is not a very

important consideration in Kisii District. The type of labour that is required by most industries in the District (semi-skilled and unskilled) is readily available especially in Kisii town and other urban centres where rural-urban migration has led to rapid population increase. In cases where industries require highly skilled (mainly managerial) labour, this can be sought from the District and/or other parts of Kenya. Water supply is also not very important as an industrial location variable. The establishments that require water, for instance, flour millers, meat processing establishments, soft drinks processing establishments, etc. can easily obtain it from nearby local sources.

5.5 HYPOTHESIS TESTING

The null and alternative hypotheses are tested on the basis of results obtained from factor analysis. The utility of the factor analysis procedure in hypothesis testing has been noted. For instance, Johnston (1978:158) states:

> "The search for hypothesised common patterns [in data matrices] is best conducted via the ... method of factor analysis"

He further notes that both the principal component analysis and factor analysis are "extremely flexible tools for finding order in large geographical data matrices, either inductively or as test of hypotheses" (Johnston 1978:181). Data analysis of research results indicates that the various variables influencing the location of agro-based industries can be meaningfully summarised into four factors. These are outlined below:

(i) Personal preferences;

(ii) Market accessibility;

(iii) Industrial support infrastructure-cum-urban economies; and,

(iv) Government influence-cum-labour-water supply.

A close examination of the factors and their constituent variables indicates that they are essentially economic in character. The first three factors and almost all their constituent variables are economic in nature. The fourth factor is socio-political and physical. The null hypothesis set out at the beginning of the study, that 'economic variables are not the main determinants of the location of agricultural manufacturing industries in Kisii District is therefore rejected, and the alternative hypothesis that 'economic variables are the main determinants of the location of agricultural manufacturing industries in Kisii District is, consequently, accepted. The acceptance of the alternative hypothesis is based on the analysis of research findings which indicates that the four factors identified and their constituent variables are essentially economic.

5.6 IMPLICATIONS OF RESEARCH FINDINGS ON LOCATION VARIABLES INFLUENCING AGRO-BASED INDUSTRIES

Research findings indicate that the predominant variables influencing the location of agro-based industries in Kisii District are essentially economic in character. These findings have implications for planners and policy makers interested in determining the location of agro-based industries in the study area and, consequently, influencing Kisii District's development. Some of the location variables that are found to play a leading role in the location of industries can be used as policy instruments to influence the location of these industries. In the study area, such variables include, *inter alia*, availability of raw materials, personal considerations, nearness to

home, availability of local capital, availability and access to local market, low transport costs, power supply, and land availability. Planners and policy makers should, therefore, take these variables into consideration, when planning for the location (and, indeed, overall development) of agro-based manufacturing industries in Kisii District.

Variables such as raw material availability, market availability and low transport costs are so crucial to the development of industries in the District that it is inconceivable to envisage such (industrial) development without them. The poor road network (which adversely influences transport costs) is especially a thorn in the flesh of most development in the study area, especially in the tea industry. In fact, it has been identified as one of the major constraints to the development of the study area (District Development Plan 1994-96). Tea which is a major cash crop in most parts of the study area, earns out-growers incomes at the end of the month and bonuses at the end of the year. The money earned from tea growing is a crucial capital injection into the development of study area's economy. However, one of the major problems facing the industry, and which threatens its survival is the impassable and poorly maintained network of road transportation of green leaf to the factories. The paradox is that it is during this season that leaf production is highest. The problem of transport is compounded by inadequacy of the transport facilities. Even some of the tarmacked roads are poorly maintained. The Kisii-Ogembo-Nyangusu road, which was initially tarmacked, has deteriorated so much that agricultural produce from areas such as Ogembo, where tea is grown, does not reach market centres and factories during the rainy seasons. Thus, a situation is created, in the study area, in which there are large quantities of leaf in buying centres, which are however not collected by the Kenya Tea Development Authority vehicles to the factories, or is collected much later

after it is picked. The transportation vehicles are mostly unable to reach the buying centres since, among other factors, the roads are impassable.

In essence, it is imperative that planning for the development of agricultural manufacturing industries in Kisii District, take into account, among other things, the variables that play a significant role in the location of such industries. This is due to the fact that location decisions of manufacturing (and other economic activities) play a major role in regional and indeed (overall) national development.

CHAPTER SIX

STRUCTURE OF AGRICULTURAL MANUFACTURING INDUSTRIES IN KISII DISTRICT

6.1 INTRODUCTION

This chapter examines a few selected industrial structural characteristics of agricultural manufacturing industries in Kisii District. The structural characteristics examined include:

(i) Predominant types of technology utilized;

(ii) Sources of the raw materials used;

(iii) Types of commodities manufactured;

(iv) Markets for the manufactured commodities; and,

(v) Scales of production

A number of hypotheses[1] will be tested in this chapter. These are stated below as follows:

[1] *The hypotheses tested relate to aspects of structure and on the basis of their validation or otherwise, the significance of the contribution of industrial structure of agro-based establishments in the study area has been determined.*

1. H_0 The differences between agro-based food and agro-based non-food establishments, in terms of technological orientation, are not significant.

   H_1 The differences between agro-based food and agro-based non-food establishments, in terms of technological orientation, are significant.

2. H_0 The sources of raw materials for both agro-based food and agro-based non-food manufacturing industries are not significantly different.

   H_1 The sources of raw materials for both agro-based food and agro-based non-food manufacturing industries are significantly different.

3. H_0 There is no significant difference in the types of commodities manufactured by agro-based food and agro-based non-food industries.

   H_1 There is a significant difference in the types of commodities manufactured by agro-based food and agro-based non-food industries.

4. H_0 There is no significant difference between agro-based food and agro-based non-food industries in terms of markets for manufactured commodities.

   H_1 There is a significant difference between agro-based food and agro-based non-food industries in terms of markets for manufactured commodities.

5. H_0 The scale of production of agro-based food and agro-based non-food industries is not significantly different.

H_1 The scale of production of agro-based food and agro-based non-food industries is significantly different.

In this chapter, there is extensive reliance on, (i) descriptive statistics, especially, (i) percentages, and (ii) chi-square (x^2) as a non-parametric test, at the expense of other non-parametric tests (such as the Kolmogorov-Smirnov test, the Mann-Whitney test, the Kruskal-Wallis test, among others), which require data to be on the interval scale. Such requirements could not be met because the data available from the field was largely on nominal and ordinal scales.

6.2 TECHNOLOGICAL ORIENTATION

The type of technology employed in a manufacturing establishment is an important aspect of industrial structure. It has been noted that technological orientation of a manufacturing enterprise influences, among other things, the scale of production and, hence, volume of output as well as the capacity to generate employment opportunity (Wegulo, 1984). It is therefore imperative that the type of technology predominant in any given area, should be appropriate (for instance, it should recognise the resource endowment of the given area). Kenya's development plans have recognised the fact and state that among the several strategies of increasing employment in the manufacturing sector, is the choice of appropriate technology (Kenya, 1978, 1983, 1989). In this study, technology has been examined in terms of the type that is

predominant among the agricultural manufacturing industries in the study area, whether capital-intensive or labour-intensive.

The significance of the distinction between capital-intensive and labour-intensive types of production arises from the changing relations between costs and output found in the two types of industries. In a labour-intensive industry, costs are mainly in the form of variable costs and hence, total costs will tend to rise as output rises. In the case of a capital-intensive industry, fixed costs form a substantial proportion of total costs and will tend to rise less rapidly than output (Pearson 1969). This is illustrated by figure 28 A&B which represent a labour-intensive establishment and a capital-intensive establishment, respectively.

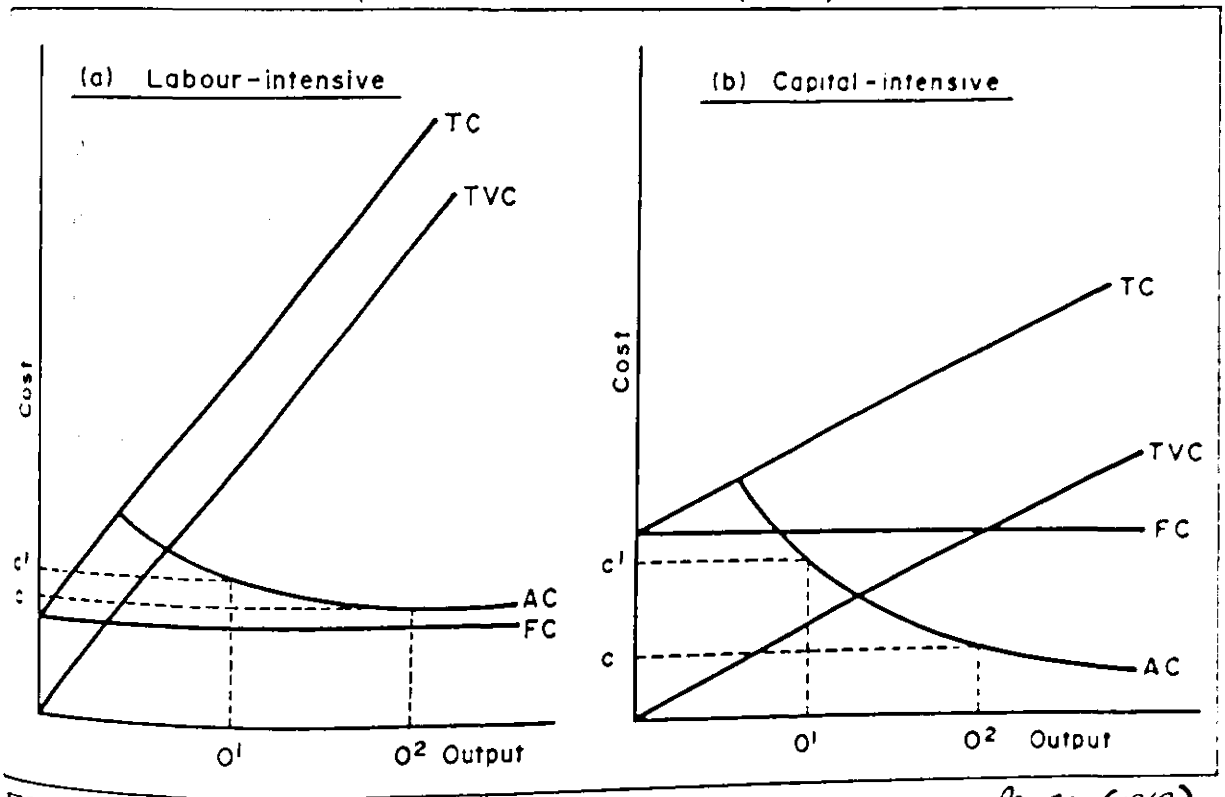


FIGURE 28 A&B: ESTABLISHMENTS A AND B

source: Pearson (1969)

In establishment A, average variable cost is twice as high as in establishment B, but fixed costs are twice as high in establishment B as in establishment A. Costs are represented by the

lines, FC (fixed costs), TVC (total variable costs), TC (total costs), and AC (average cost). At low levels of output, for instance, O_1, establishment A can produce at a lower average cost than establishment B, but as output rises, establishment A's average cost show little change whereas establishment B's drop sharply so that at high levels of output, (for example O_2), average costs in B are well below those in A.

If the amount to be sold was fixed at O_1, then A can undersell B and B's advantage at higher levels of output is unattainable. Given that the amount to be sold is determined by the size of the market and that markets in developing countries tend to be small, industries will only be established in these countries if they are relatively labour-intensive or if they can sell their products outside the domestic market. Thus, another distinction between labour-intensive production and capital-intensive production is that the former is mainly dependent on the domestic market while the latter is export market orientated. Capital-intensive industries established in developing countries will generally find the domestic market in those countries too small to enable them to operate at levels of output high enough to ensure minimum costs (Pearson 1969:65). Consequently, the market for manufactured commodities can be used as a criterion for establishing the technological orientation of industries. Accordingly labour-intensive industries are identified with the domestic (local) market production[1] and capital-intensive industries with export market production. This study has adopted the market for manufactured commodities criterion in analyzing the predominant types of technology.

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[1]*According to Pearson (1969) there is an exception to the identification of labour-intensive production with the domestic market. This is to be found in the case of industries producing for both the domestic (local) market and the export market. Such industries are termed as Janus industries (after the Roman two-headed god who could see both the past and the future.*

Table 6.1 shows the technological orientation of the 65 establishments that were visited by the researcher and /or his assistants.

TABLE 6.1: TECHNOLOGICAL ORIENTATION OF AGRICULTURAL MANUFACTURING INDUSTRIES IN KISII DISTRICT

Industrial Group	Technological Orientation		Total
	Predominantly Capital-intensive (export market production)	Predominantly Labour-intensive (local market production)	
Agro-food processing	6	24	30
Agro-non-food Manufacturing	1	21	22
Total	7	45	52[1]

Source: Research Data 1994

Field data indicates that 80 per cent of agricultural food manufacturing establishments were predominantly labour-intensive while 20 per cent of the industries were predominantly labour-intensive.

As far as agricultural non-food industries are concerned, 4.55 per cent were orientated towards a predominantly capital-intensive technology while the rest (95.45 per cent), were predominantly labour-intensive.

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[1]*The total number of establishments is not 65 because the establishments producing for both the local market and the export market are excluded from the analysis.*

In total, 13.46 per cent of the establishments visited were predominantly capital-intensive while 86.54 per cent were predominantly labour-intensive. Figure 29 shows the technological orientation of agro-based industries in Kisii District.

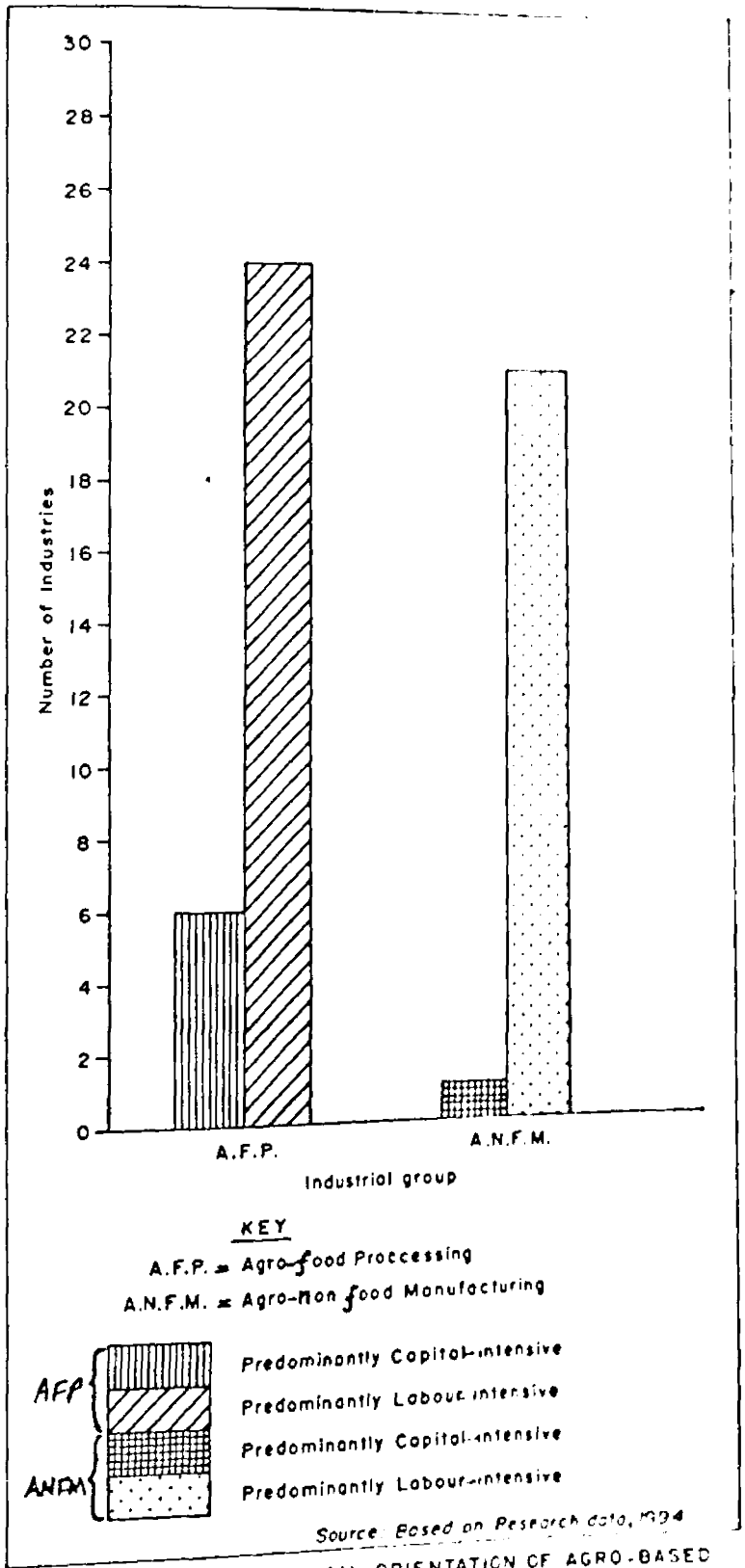

FIGURE: 29 TECHNOLOGICAL ORIENTATION OF AGRO-BASED INDUSTRIES IN KISII DISTRICT

It is also of interest to this study, to determine the extent to which the apparent differences between agro-based food and agro-based non-food establishments, in terms of technological orientation, are statistically significant. For instance, research findings indicate that the proportion of agro-based food industries that are predominantly capital-intensive is higher than that of agro-based non-food industries. On the other hand, the proportion of agro-based non-food establishments that is predominantly labour-intensive is higher than that of agro-based food establishments.

6.2.1 HYPOTHESIS TESTING

To test the significance of the differences noted above, chi-square, a non-parametric test, has been utilized. The null hypothesis to be tested states that,'the differences between agro-based food and agro-based non-food establishments, in terms of technological orientation, are not significant.' The alternative hypothesis states that 'the differences between agro-based food and agro-based non-food establishments, in terms of technological orientation, are significant'. Table 6.2 shows the observed and expected frequencies.

TABLE 6.2: OBSERVED AND EXPECTED FREQUENCIES

Industrial Group	Technological Orientation				Total
	Pred. Cap. Intensive		Pred. Lab. Intensive		
	Observed	Expected	Observed	Expected	
Agro-food processing	6	4.04	24	25.96	30
Agro-non-food Manufacturing	1	2.96	21	19.04	22
Total	7		45		52

Pred. = Predominantly Lab. = Labour

Source: Research Data 1994 Cap. = Capital

Using the above data, x^2 is computed as follows:

$$\frac{(6-4.04)^2}{4.04} + \frac{(1-2.96)^2}{2.96} + \frac{(24-25.96)^2}{25.96} + \frac{(21-19.04)^2}{19.04}$$

$= 2.6$

At 0.05 significance level and with one degree of freedom, the calculated chi-square value of 2.4 is less than the critical value of 3.84. Therefore the alternative hypothesis that 'the differences between agro-based food and agro-based non-food industries, in terms of technological orientation, are significant' is rejected and instead the null hypothesis that 'the differences between agro-based food and agro-based non-food industries, in terms of technological orientation, are not significant' is adopted.

Research results can be summarised as follows:

(i) Apparently, there is a preponderance of labour-intensive technology in agricultural manufacturing industries in Kisii District.

(ii) The proportion of agro-based food industries that is both predominantly labour-intensive and capital-intensive is higher than that of agro-based non-food industries.

Some of the possible explanations for this situation include:

1. Some of the industries in the study area, especially agro-based non-food such as most furniture and fixtures establishments, spinning and weaving industries, etc., are labour-intensive. Among the reasons for this include the nature of the products made. The nature of the products in these industries such as beds, tables, stools, sofa sets, mats, baskets, etc, must be made in as many different designs as possible. This can be accomplished by use of human labour. Furthermore, labour is relatively cheap in Kisii District and this encourages the utilization of a technology that is predominantly labour-intensive. Moreover, some parts of the District are inaccessible to power (electricity) to enable the utilization of machines, such as lathe machines which are used in the furniture and fixtures industry.

2. Factory processes in some of the industries (especially food processing) such as tea, coffee, bakeries, saw milling, grain milling, soft drinks and carbonated water, by nature require the use of machines. Moreover, the raw materials for

these industries are bulky and therefore they must maintain a given level of output, after a given period of time, which (output) can only be attained by using machines.

6.3 SOURCES OF RAW MATERIALS UTILIZED

The sources of raw materials utilized by agricultural manufacturing industries in Kisii District is another important attribute of industrial structure. In situations where largely imported raw materials are used in manufacturing enterprises in a given areal unit, such a unit is not likely to develop internally, *ceteris paribus*. This is because the materials are likely to cost the areal unit a lot in terms of financial resources, which (resources) could be devoted to development. On the other hand, in cases where largely local raw materials are used by establishment(s) in an area, the people of that area are likely to earn incomes which may ultimately be used in the development of the given area.

Table 6.3 below shows the sources of raw materials for agricultural manufacturing industries in Kisii District.

TABLE 6.3: SOURCES OF RAW MATERIALS UTILIZED BY AGRICULTURAL MANUFACTURING INDUSTRIES IN KISII DISTRICT

Industrial Group	Source of Raw Material			Total
	Local	Other Parts of Kenya	Local and Other Parts of Kenya	
Agro-food processing	28	3	2	33
Agro-non-food Manufacturing	21	2	9	32
Total	49	5	11	65

Source: Research Data 1994

Research results indicate that 84.85 per cent of agricultural food manufacturing industries obtain their raw materials locally. 9.09 per cent of the industries obtain their raw materials from other parts of Kenya while 6.09 per cent obtain from local as well as other parts of Kenya.

In terms of agricultural non-food industries, 65.63 per cent obtain their raw materials from Kisii District, 6.25 per cent from other parts of Kenya, while 28.12 per cent obtain their raw materials from both local and other parts of Kenya.

In total, 75.38 per cent of the establishments interviewed obtained their raw materials from Kisii District, 7.69 per cent from other parts of Kenya while 16.93 per cent of the establishments obtained their raw materials locally and from other parts of Kenya. Apparently, there are differences, albeit small, between agricultural food and agro-based non-food

manufacturing. For instance, the proportion of agricultural food establishments that obtain their raw materials both locally and from other parts of Kenya is higher than that of agricultural non-food establishments.

6.3.1 HYPOTHESIS TESTING

To test the significance of the differences observed, the chi-square (x^2) test has been utilized.

The null hypothesis states that 'the sources of raw materials for both food and agro-based agro-based non-food manufacturing industries are not significantly different.' The alternative hypothesis states that 'the sources of raw materials for both agro-based food and agro-based non-food manufacturing industries are significantly different.'

Table 6.4 shows the observed and expected frequencies.

TABLE 6.4: OBSERVED AND EXPECTED FREQUENCIES

Industrial Group	Source of Raw Material				Total
	Local		Local and Other Parts[1]		
	Observed	Expected	Observed	Expected	
Agro-food processing	28	24.88	5	8.12	33
Agro-non-food Manufacturing	21	24.12	11	7.88	32
Total	49		16		65

Source: Research Data 1994

Using data above, chi-square is computed as follows:

$$\frac{(28-24.88)^2}{24.88} + \frac{(5-8.12)^2}{8.12} + \frac{(21-24.12)^2}{24.12} + \frac{(11-7.88)^2}{7.88}$$

$$= 3.23$$

At 0.05 significance level and with one degree of freedom, the calculated x^2 value is 3.23 while the critical value is 3.84. The null hypothesis that 'the sources of raw materials for both food and agro-based non-food manufacturing industries are not significantly different' is accepted.

Research data clearly indicates that agricultural food and agricultural non-food industries predominantly obtain their raw materials from the study area. This is most likely due to the nature of the raw materials of the industries in question. Most of these (raw materials) are

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[1]This category has been amalgamated and consists of two categories, the 'Other Parts of Kenya' and 'Local and Other Parts of Kenya' categories (see table 6.3). This amalgamation has been necessitated by the desire to produce fewer cells with more observations so that the expected frequencies in each cell is higher than 5, as required by the chi-square non-parametric test

bulky, for example, coffee, grains, wood, meat, etc. Hence high transportation costs are likely to be incurred if the raw materials were obtained from a source distant from the factories Moreover, some of the raw materials such as tea leaves lose quality if not transported to the factories in good time. In fact the local availability of raw materials variable is one of the most important variables influencing the location of most industries in Kisii District, as noted elsewhere.

It will also be observed from the research results that some industries obtain their raw materials from other parts of Kenya—apart from Kisii District. This applies to cases where the raw materials are not locally available (in Kisii District). For instance, bakeries utilize mainly wheat flour which is obtained from other parts of Kenya. Other industries which rely on raw materials from external sources include, spinning, weaving, textiles, knitting, etc. Other industries such as saw milling and furniture and fixtures depend on both local and external sources for their raw materials. Figures 30 and 31 show the sources of raw materials for agro-based food industries and agro-based non-food industries.

FIG 30 SOURCES OF RAW MATERIALS FOR AGRO-BASED-FOOD INDUSTRIES IN KISII DISTRICT

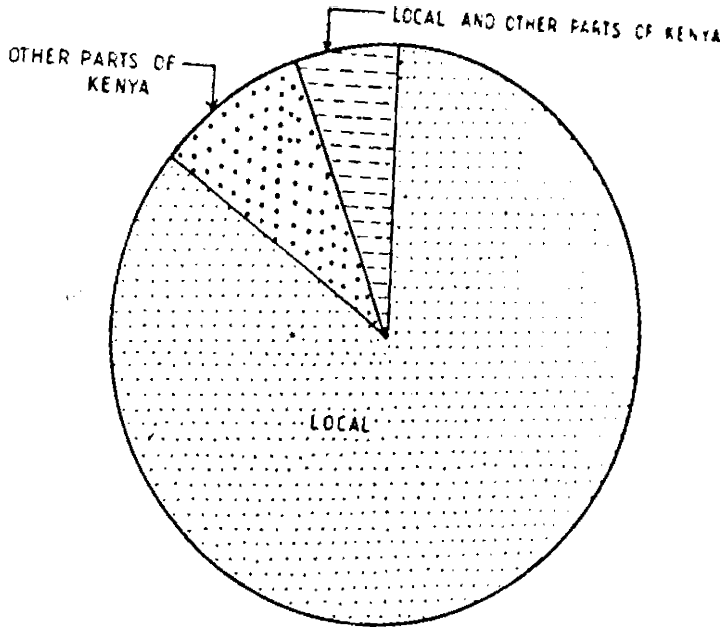
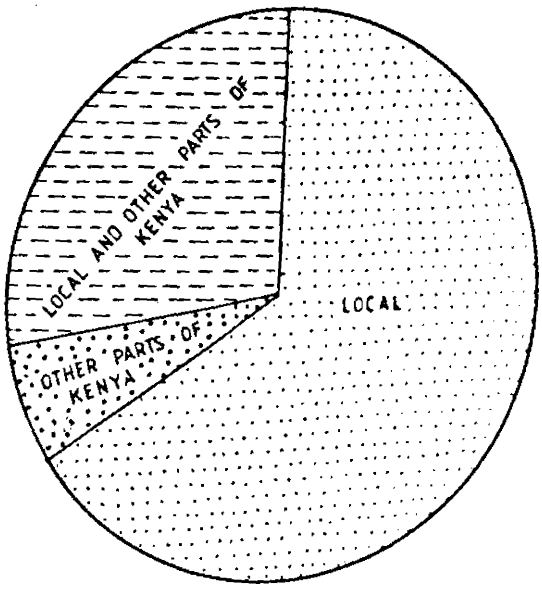


FIG. 31 SOURCE OF RAW MATERIAL FOR AGRO-BASED NON FOOD INDUSTRIES IN KISII DISTRICT



Source: Based on research data, 1994

6.4 MANUFACTURED COMMODITIES AND THEIR MARKETS

6.4.1 TYPES OF COMMODITIES MANUFACTURED

The types of products manufactured by industries is a significant industrial structural aspect. To facilitate equitable regional development, manufacturing activities should be represented in the production of consumer commodities, intermediate commodities as well as export commodities.

One of the approaches for studying industrial structure, from the point of view of the types of commodities manufactured, is the 'export base model'. The model involves making a distinction between industries producing for the local use and those producing for the external market. The *basic* industries are those that produce for export while those that serve the local market are termed as *non-basic* industries. Once the problem of separating export production from local production is overcome, the total figures for value of production or employment in the basic and non-basic sectors, can be calculated for any city or region. The basic/non-basic (B/N) ratio can be determined (which takes the form of 1:X, where X is the non-basic employment divided by basic employment). The model suffers from some limitations. As already noted, a technical problem might be encountered in making a distinction between basic and non-basic goods. Moreover, the B/N ratio is a purely descriptive device and has no value in itself in explaining why specific industries are represented as they are in particular cities or regions. This model has not been adopted in this study due to the fact that aside from its own limitations, appropriate data (that is, value of production, employment figures for basic and non-basic industries, etc.) were not available.

According to Barker et al. (1973), the types of commodities manufactured by an industry may be disaggregated into:

(i) mass consumer goods;

(ii) luxury consumer goods;

(iii) goods manufactured for export; and,

(iv) intermediate capital goods.

In this study, the types of products manufactured by the agro-based industries in Kisii District have been grouped into three major categories, namely: consumer goods, intermediate goods, and export goods.

Table 6.6 shows the types of goods manufactured by agricultural food and agricultural non-food industries.

TABLE 6.5: TYPES OF PRODUCTS MANUFACTURED BY AGRO-BASED MANUFACTURING INDUSTRIES IN KISII DISTRICT

Industrial Group	Types of Products				Total
	Consumer Goods	Export Goods	Export/ Consumer Goods	Export/ Intermediate Goods	
Agro-food processing	23	6	4	-	33
Agro-non-food manufacturing	21	-	-	11	32
Total	44	6	4	11	65

Source: Research Data 1994

Research data indicates that 69.70 per cent of agricultural food manufacturing industries process and/or fabricate consumer goods. 18.18 per cent of the industries produce export goods, while 12.12 per cent manufacture both export and consumer goods. None of these industries produces intermediate goods.

As far as agro-based non-food industries are concerned, 65.62 per cent produce consumer goods and 34.38 per cent manufacture both export and intermediate goods. None of these industries manufactures purely export and intermediate goods.

In total, 67.69 per cent of agro-based industries manufacture consumer goods, 9.23 per cent manufacture export goods, 6.15 per cent export/consumer goods and 16.92 per cent of the establishments manufacture export/intermediate goods.

6.4.1.1 HYPOTHESIS TESTING

It is of interest to this study to determine the extent to which the apparent differences between agro-based food and agro-based non-food industries, in terms of the types of goods manufactured, are statistically significant. The chi-square non-parametric test has been used to determine this.

The null hypothesis to be tested states that 'there is no significant difference in the types of commodities manufactured by agro-based food and agro-based non-food industries'. The alternative hypothesis states that 'there is a significant difference in the types of commodities manufactured by agro-based food and agro-based non-food industries'.

Table 6.6 shows the observed and expected frequencies.

TABLE 6.6: OBSERVED AND EXPECTED FREQUENCIES

Industrial Group	Types of Goods				Total
	Consumer Goods		Export/	Consumer/ Intermediate Goods[1]	
	Observed	Expected	Observed	Expected	
Agro-food processing	23	22.34	10	10.66	33
Agro-non-food manufacturing	21	21.66	11	10.34	32
Total	44		21		65

Source: Research Data 1994

The computation of chi-square is as follows:

$$\frac{(3-22.34)^2}{22.34} + \frac{(10-10.66)^2}{10.66} + \frac{(21-21.66)^2}{21.66} + \frac{(11-10.34)^2}{10.34}$$

$= 0.12$

At 0.05 significance level and with one degree of freedom, the calculated chi-square value is 0.12 while the critical value is 3.84. Therefore the null hypothesis that 'there is no significant difference in the types of goods manufactured by both agro-based food and agro-based non-food industries' is accepted. The apparent differences between the two categories of industries are most likely due to chance.

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[1]*Categories have been combined to produce fewer cells with more observations and hence higher expected frequencies (higher than 5) to fulfil the requirements of chi-square test.*

Research results clearly indicate a preponderance of consumer goods among the types of goods produced by the agro-based food industries and agro-based non-food establishments (see figures 32 and 33).

FIGURE 32: TYPES OF PRODUCTS/COMMODITIESMANUFACTURED BY AGRO-BASED FOOD ESTABLISHMENTS IN KISII DISTRICT

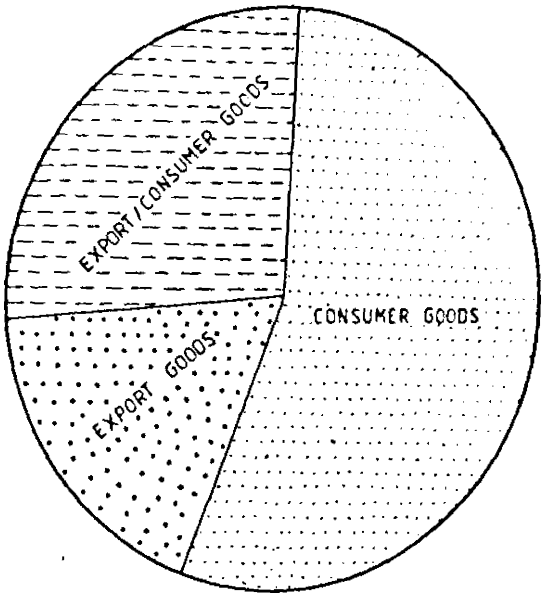
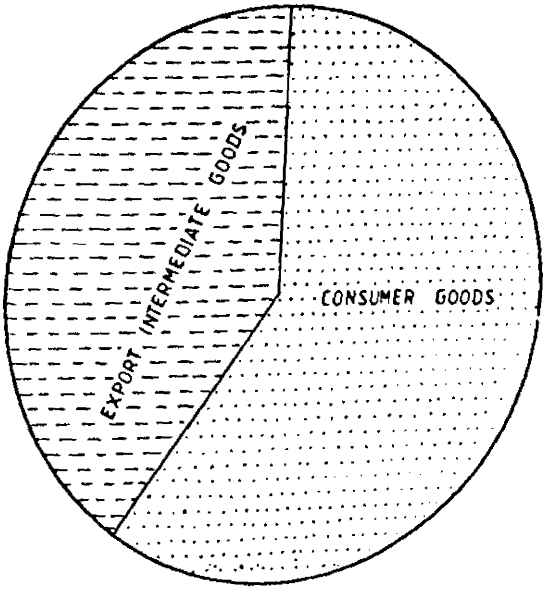


FIGURE 33: TYPES OF PRODUCTS/COMMODITIESMANUFACTURED BY AGRO-BASED NON-FOOD ESTABLISHMENTS IN KISII DISTRICT



Source: Based on research data, 1994

Some of the industries that are well represented in the consumer goods sector include: grain milling, furniture and fixtures fabrication, manufacture of wearing apparel, bakery products, meat products, etc. This can be explained by the fact that the types of goods produced by these industries respond faster to consumer demand and therefore generate more profits. Moreover, these industries are easy to initiate since they require little capital, compared to the export and intermediate goods sectors. Capital is a very essential prerequisite for industrial development especially, in developing countries, including Kenya. There are two types of capital, fixed capital and financial capital. Financial capital refers to the money needed to establish and manage an industrial establishment while fixed capital is the fixed capital equipment, such as land, machinery, buildings, and other kinds of physical plant.

Immediately after independence, The Kenya Government realized the need to develop a financial infrastructure capable of providing a base for industrial development. In addition to encouraging the growth of commercial banks, non-financial institutions and insurance companies, the Government embarked on a deliberate policy of establishing development finance institutions to specifically promote industrial development in the country. Some of these include: Development Finance Company of Kenya (DECK), the Industrial and Commercial Development Corporation of Kenya (ICDC), the Industrial Development Bank (IDK) and Kenya Industrial Estates Limited (KIE). The Kenya Industrial Estates Limited, which was established at independence to provide small indigenous entrepreneurs with opportunities to enter into the manufacturing sector, is especially important in the study area. It provides premises for industries, (for instance, the KIE bakery in Keroka town), as well as financial assistance to viable industrial projects.

The export commodities sector is not well represented especially among the agricultural non-food manufacturing sector. It would appear that agro-based non-food establishments that produce export-cum-intermediate commodities and not export products *per se*. This is especially the case with saw milling establishments, hides and skins and some furniture and fixtures establishments. On the other hand, some agro-based food establishments produce solely for export to other regions outside the study area. This category includes coffee and tea processing establishments. Most of the processed tea is sold to Mombasa from where various agents export to other parts of the world including Europe, Middle East, and Africa. Coffee beans are exported from Kisii District to Nairobi for further processing and then exported to other parts of the globe.

The intermediate goods sector is not well represented among the industries that were visited. This is probably due to the fact that more working capital is involved in the production of intermediate goods than other sectors for example the consumer goods sector. Moreover, in the short run, the profit margins from intermediate goods are relatively less.

The export-cum-consumer goods sector is represented by agro-based food processing establishments. Industries included in this category were bakery products processing, fruit juice making, as well as soft drinks and carbonated water. These industries sell their products in Kisii District as well as other neighbouring Districts such as Nyamira District.

6.4.2 MARKETS FOR MANUFACTURED COMMODITIES

A study of markets for manufactured products of industries has implications for regional development. Ideally, for purposes of regional development, there is need to manufacture both

for export and for local (internal) use. This is likely to facilitate regional development, *ceteris paribus*, through:

(1) generation of income from exported goods. Such income may be used to improve the standards of living of the people in the study area, through, say, investment of income in the productive sectors of the study area's economy. Such income may also be used to procure goods and services not available in Kisii District;

(2) satisfaction of local (regional) wants through goods produced for the local market; and,

(3) savings of foreign exchange made possible by local manufacture (some type of import-substitution).

Table 6.7 below shows research results as far as the markets for manufactured products are concerned.

TABLE 6.7: MARKETS FOR MANUFACTURED PRODUCTS OF AGRO-BASED INDUSTRIES IN KISII DISTRICT

Industrial Group	Market For Goods			Total
	Local	External	Local and External	
Agro-food processing	24	6	3	33
Agro-non-food Manufacturing	21	1	10	32
Total	45	7	13	65

Source: Research Data 1994

Research results indicate that 72.72 percent of all agro-based food industries produce for the local market (Kisii District). 18.18 per cent of the industries produce for the external market, while 9.09 per cent produce for the external and local market.

As far as agricultural non-food industries are concerned, 65.63 per cent manufacture for the local market, 3.13 per cent for the external market, while 31.25 per cent of the establishments produce both for the external and local market.

In total, 69.23 per cent of the establishments interviewed in the study area produce for the local market. 10.77 per cent manufacture products for the external market while 20 per cent of the establishments produce for local and external markets.

6.4.2.1 HYPOTHESIS TESTING

There are apparent differences between agro-based food and agro-based non-food establishments in terms of markets for manufactured goods. For instance, more agro-based food industries produce for the local and external markets than agro-based non-food industries. On the other hand, more agro-based non-food industries produce for the local-cum-export markets than agro-based food industries. To determine the significance of these differences, the chi-square non-parametric test has been used.

The null hypothesis to be tested states that 'there is no significant difference between agro-based food and agro-based non-food industries in terms of market for manufactured products.' The alternative hypothesis states that 'there is a significant difference between agro-based food and agro-based non-food industries in terms of market for manufactured products'.

Table 6.8 below shows the observed and expected frequencies.

TABLE 6.8: OBSERVED AND EXPECTED FREQUENCIES

Industrial Group	Market For Goods				Total
	Local		Local / External[1]		
	Observed	Expected	Observed	Expected	
Agro-food processing	23	22.34	10	10.66	33
Agro-non-food Manufacturing	21	21.66	11	10.34	32
Total	44		21		65

Source: Research Data 1994

The chi-square value is computed below:

$$\frac{(24-22.85)^2}{22.85} + \frac{(9-10.15)^2}{10.15} + \frac{(21-22.15)^2}{22.15} + \frac{(11-9.85)^2}{9.85}$$

$= 0.38$

With a significance level of 0.05 and one degree of freedom, the calculated x^2 is 0.38. The critical x^2 value is 3.84. The null hypothesis that 'there is no significant difference between agro-based food and agro-based non-food industries in terms of market for manufactured products' is accepted.

Data from the field suggests that both agro-based food and agro-based non-food establishments process and/or fabricate goods mainly for local market (see figure 33). This would be explained in the light of the fact that most industries operate at a very small scale, producing mainly for the local market, for instance, grain milling, furniture and fixtures, meat products processing, sugar processing and so on. The desire to operate at a small scale by most

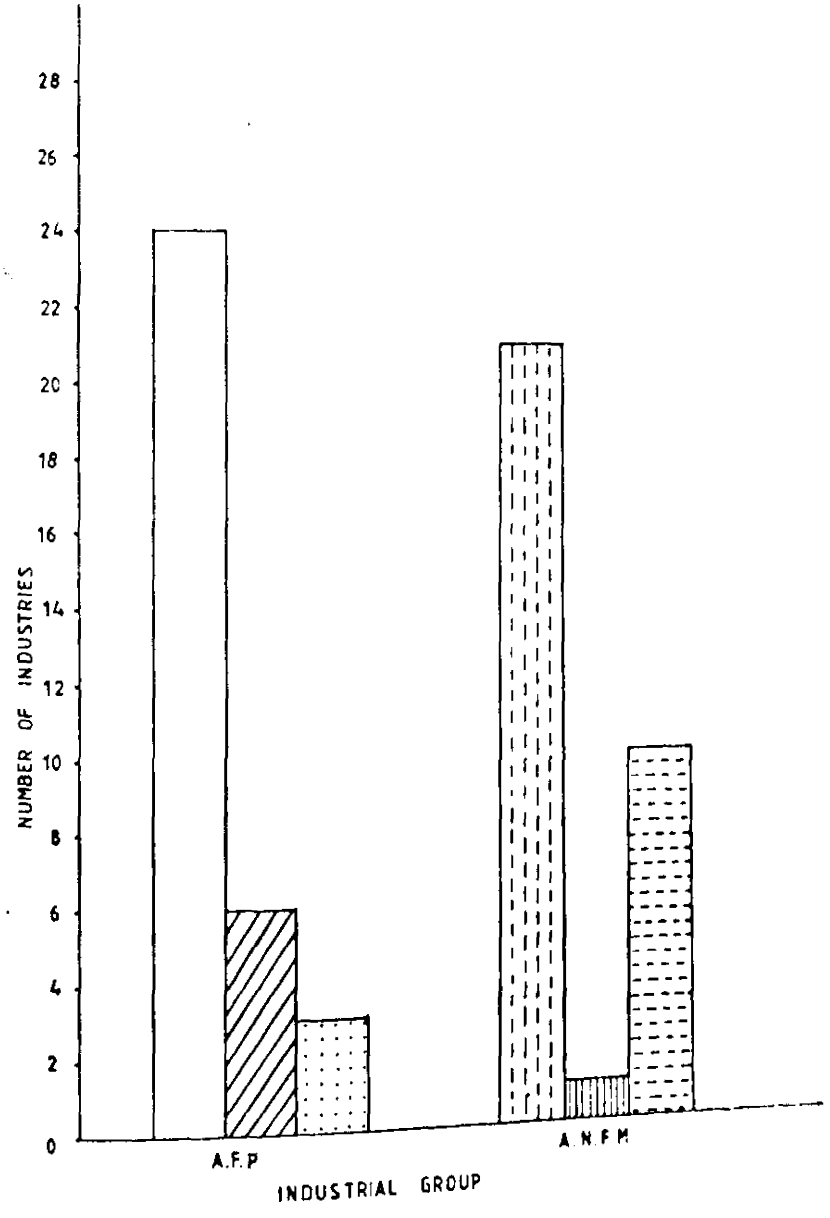
[1] *categories have been combined to produce fewer cells with more observations and hence higher expected frequencies (higher than 5) to fulfil the requirements of the chi-square test.*

of the industrialists is related to various factors, *inter alia*, lack of sufficient capital resources, lack of power (electricity) to facilitate large scale production and lack of the necessary entrepreneurial knowledge and skills.

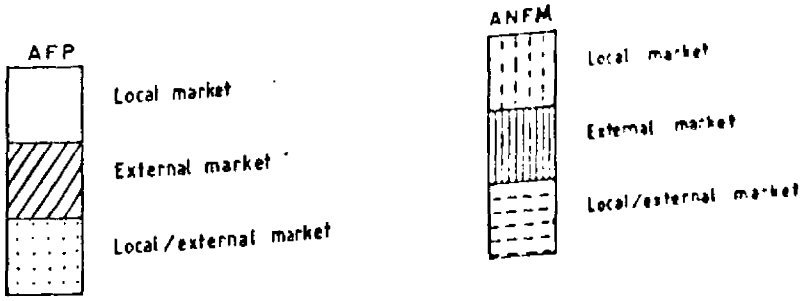
Some of the industrialists interviewed produced exclusively for the external market. This was especially the case with agro-based food processing industries, including coffee and tea processing. This can be partly explained in terms of the need for further processing of the produce, as in the case of coffee processing where coffee beans are sent for further processing. Explanations can also be couched in terms of the apparent lack of local market as well as the desire to gain external revenue, as is the case with tea which is transported to Mombasa for export to various parts of the world, including Europe, Middle East and Africa.

It will be noted that some establishments interviewed sold their products in both local and external markets. Establishments in this category included, bakery products processing, soft drinks and carbonated water, fruit juice making, saw milling and furniture and fixtures establishments. This can be explained in terms of the desire to capture both local and external markets so as to increase profit margins.

FIGURE 34: MARKETS FOR MANUFACTURED PRODUCTS OF AGRO-BASED INDUSTRIES IN KISII DISTRICT



A.F.P = Agro-based food Processing
A.N.F.M = Agro-based non-food manufacturing



Source: Based on research data, 1994

6.5 SCALE OF PRODUCTION

This is the final industrial structural characteristic examined in this chapter. The scale of production of an industry determines how many people are and/or can be employed by that industry. Scale of production is closely related to technological orientation and both have ramifications for socio-economic development of a region and/or nation, because they, *inter alia*, influence employment levels. There are several indices that can be used to measure scale of production. This study has used an index that is commonly used in Kenya, that is, the number of operatives engaged. Accordingly, the various industrial establishments in Kisii District have been categorized as follows:

(i)	1 - 4	Very small
(ii)	5 - 19	Small scale
(iii)	20 - 49	
(iv)	50 - 99	Medium scale
(v)	100 - 199	
(vi)	200 - 499	

Table 6.9 shows the scale of production of agro-based industries in Kisii District.

TABLE 6.9: SCALE OF PRODUCTION[1] OF AGRO-BASED INDUSTRIES IN KISII DISTRICT

Industrial Group	Scale of Production						
	1-4	5-19	20-49	50-99	100-199	200-499	Total
Agro-food processing	20	6	2	2	-	3	33
Agro-non-food manufacturing	15	7	6	1	3	-	32
Total	35	13	8	3	3	3	65

Source: Research Data 1994

Research data indicates that 60.61 per cent of all agro-based food manufacturing establishments each employs 1-4 operative(s). 18.18 per cent of the establishments each employs 5-19 operatives, while 6.06 per cent each employs 20-49 operatives. Another 6.06 per cent of the establishments each employs 50-99 operatives. The 100-199 operatives category of establishments is not represented in the agro-based food processing industry. 9.09 per cent of the establishments employ 200-499 operatives each.

The proportion of agro-based non-food establishments each employing 1-4 operative(s) accounted for 46.88 per cent. 21.88 per cent of the establishments each employs 5-19 operatives while 18.75 per cent each employs 20-49 operatives. The 50-99 operatives category of establishments is represented by 3.13 per cent while the 100-199 operatives category is

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[1]*The scale of production for agro-based industries is measured in terms the number of operatives engaged. The operatives have been grouped into various categories such as 1-4 operatives, 5-19 operatives, 20-49 operatives, etc.*

represented by 9.38 per cent. None of the establishments employ operatives in the 200-499 operatives category.

In total, 53.85 per cent of the establishments each employs 1-4 operatives. 20 per cent and 12.30 per cent of the establishments each employs 5-19 and 20-49 operatives, respectively. The 50-99, 100-199 and 200-499 operatives categories are each represented by 4.62 per cent of the agro-based manufacturing establishments.

6.5.1 HYPOTHESIS TESTING

To test whether there is any significant statistical difference between the various categories of industries in terms of the scale of production, the chi-square test has been utilized.

The null hypothesis states that 'the scale of production of agro-based food and agro-based non-food industries is not significantly different.' The alternative hypothesis states that 'the scale of production of agro-based food and agro-based non-food industries is significantly different.'

Table 6.10 shows the observed and expected frequencies.

TABLE 6.10: OBSERVED AND EXPECTED FREQUENCIES

Industrial Group	Scale of Production				Total
	Below 5		5-499[1]		
	Observed	Expected	Observed	Expected	
Agro-food processing	20	17.77	13	15.83	33
Agro-non-food Manufacturing	15	17.23	17	14.77	32
Total	35		30		65

Source: Research Data 1994

The chi-square value is computed as follows:

$$\frac{(20-17.77)^2}{17.77} + \frac{(13-15.23)^2}{15.23} + \frac{(15-17.23)^2}{17.23} + \frac{(17-14.77)^2}{14.77}$$

$$= 1.23$$

At 0.05 significance level, and with 1 degree of freedom, the computed chi-square value is 1.23 while the critical value 3.84. Therefore, the null hypothesis that 'the scale of production of agro-based food and agro-based non-food industries is not significantly different' is accepted.

Research findings indicate a predominance of very small and small scale industries in Kisii District (Figures 35 and 36). Some of the reasons put forward by the industrialists to explain why they operate at such very small and small scales include:

(i) lack of sufficient financial resources;

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[1]*Categories have been combined to produce fewer cells with more observations and hence higher expected frequencies to fulfil the requirements of the chi-square test.*

(ii) lack of power (electricity) to enable large scale production, for instance in some of the furniture and fixtures industries;

(iii) lack of sufficient market;

(iv) lack of sufficient raw materials, as was the case in fruit juice processing and,

(v) ease with which small establishments are managed.

FIGURE 35: SCALE OF PRODUCTION OF AGRO-BASED INDUSTRIES IN KISII DISTRICT

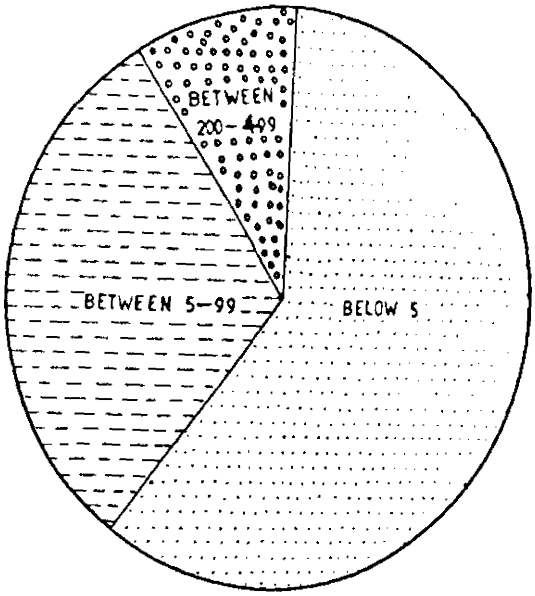
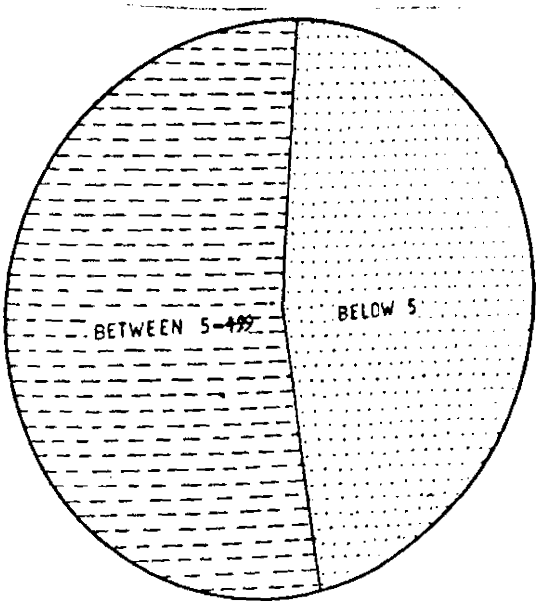


FIGURE 36: SCALE OF PRODUCTION OF NON-AGRO-BASED INDUSTRIES IN KISII DISTRICT



Source: Based on research data, 1994

From the foregoing discussion of industrial structural aspects the following summary observations emerge:

(a) The type of technology utilized in both agro-based food and agro-based non-food establishments in Kisii District is predominantly labour-intensive.

(b) The raw materials utilized by agro-based industries in Kisii District are mainly obtained mainly locally.

(c) Field results indicate that agro-based establishments manufacture predominantly for the local market with little being manufactured for external markets. Hence, little income is generated from exports to other regions. Such income is essential since it can be invested in the productive sectors of the economy of the study area, for instance, the agricultural sector. Such income can also be utilized to purchase goods and services not available in the study area. It is essential to diversify markets in order to attain regional development.

(d) Agricultural manufacturing industries in Kisii District operate mainly at small scale. This has negative implications in terms of the number of operatives these industries can employ. However, it should be noted that:

(i) According to the 'flexible specialization' model, small scale industries have their own specific niches, especially in developing countries. Accordingly, this role is bound to increase for a variety of reasons. These include: the small establishments' assumed ability to be innovative, and both entrepreneurially and organisationally flexible in their outlook (Milne 1991);

(ii) As long as the small scale industries expand horizontally, (that is, through integration with other establishments, both small and large scale, in terms of subcontracting, outsourcing, and other linkages), employment opportunities will be generated.

(e) Agricultural manufacturing industries in the study area produce mainly consumer commodities, so that intermediate goods are not well represented in the categories of goods manufactured.

6.6 IMPLICATIONS OF THE PREVAILING INDUSTRIAL STRUCTURE OF KISII DISTRICT'S AGRO-BASED INDUSTRIES

In evaluating the selected aspects of structure of agricultural manufacturing industries in Kisii District, a major conclusion that can be drawn is that the selected aspects of structure of these industries, tested in this study, are inappropriate and hence do not seem to significantly contribute to the desired kind of regional development. Views emanating from discussions with industrialists and/or their assistants as well as individuals concerned with industrial development in Kisii District tend to support this conclusion.

It is apparent that the predominant type of technology utilized by various agro-based establishments in the study area is labour-intensive. This implies that agro-based manufacturing industries in Kisii District are a source of employment for the study area which has a high population growth rate (3.6% per annum) and high population density (over 700 persons per sq. km in 1994). About 50 per cent of the total population consists of young people, a potential labour force. Yet, employment opportunities in the District are few. The agricultural sector,

which has been a significant employer in the past, can no longer support the increasing labour force. The study area's industrial sector, (which is dominated by agro-based establishments) has the responsibility of absorbing the surplus manpower in order to avert unemployment crisis, coupled, in this case, with the usual rural to urban migration together with its related problems.

One other observation made on the basis of research results is that agro-based industries in Kisii District mainly use locally available raw materials. In a situation as this, local people are likely to earn some income which may ultimately be used to improve their standards of living. This is a positive industrial structural characteristic, as far as the development of Kisii District is concerned. For instance, the tea farmers in Kisii and Nyamira District earned Ksh. 1.4 billion in 1994[1]. However one nagging problem that has especially afflicted the tea industry in the study area is related to transportation of the green leaf. There has been a lot of hue and cry from farmers and leaders alike over delays in the collection of green leaf from the buying centres. During the research period this writer noted with, a lot of concern, that some buying centres were going for up to three days without the tea being collected by the Kenya Tea Development Authority (KTDA) vehicles. This problem is especially acute when production is high during the months of April, August, November and December. These delays imply that less income is earned by farmers monthly and from the annual bonus. Delays in leaf collection have been attributed to lack of enough vehicles and impassable roads especially during the rainy season. Clearly it is imperative that these problems are urgently addressed for the sake of industrial and overall equitable development of Kisii District.

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[1] *Daily Nation, (1995): Transport crisis hurts tea growing in Kisii, Jan. 17th (Tuesday).*

In terms of commodities manufactured, it has been observed that there is a preponderance of consumer goods. Export and intermediate goods are not well represented in the commodities produced. Such a scenario has negative implications in terms of equitable regional development. One such implication is that little is produced for export and hence little export earnings. Export earnings are important since they can be invested in the productive sectors of the economy of a region. For instance, in Kisii District, they (the earnings) can be invested in the industrial and agricultural sectors. Moreover, export earnings can be used to purchase goods and services not available locally in Kisii District, for example, intermediate/producer goods.

The intermediate goods category is not well represented in the industrial sector of the study area, as already noted. This category of goods plays an important role because they (goods), *inter alia,* could be used to produce other more high value goods. For instance, textile goods can be used in the manufacturing of wearing apparel and sawn timber used in the manufacture of furniture and fixtures. This lack of sufficient representation of the intermediate goods sector in Kisii District, is a serious flaw in the study areas' industrial development, which (flaw) needs to be addressed by planners and policy makers and other relevant authorities. One possible solution is for the Government (through the relevant ministries and institutions such as KIE) to subsidize manufacturers who produce intermediate goods. This is because among the sentiments expressed by the industrialists and/or their assistants for not manufacturing especially intermediate goods, is that these goods require more capital input than consumer goods.

It has also been noted that agricultural manufacturing establishments in Kisii District produce mainly for the local market. Little is produced for export. This implies that little income is generated from exports. For purposes of regional development it is important to

diversify the market of goods manufactured by industries. Ideally a balance should be forged between production for export and production for the local market.

In terms of scale of production, a disturbing conclusion emerges, namely, that agro-based industries in Kisii District operate predominantly at both "very small scale" and a "small scale". This has ramifications in terms of number of people these industries can and/or are able to employ. In this case, agricultural establishments in the study area are not likely to be generating adequate employment opportunities. Some of the possible solutions to this problem have been addressed in the section on technological orientation. Apart from these, there is need for a detailed survey, by researchers and planners, to determine the bottlenecks that hinder large scale operations and in view of these (bottlenecks), solutions should be sought.

Appropriate industrial structural characteristics are, however, not a panacea for solving all equitable regional development problems. Nonetheless, it is imperative that measures are put in place to ensure that all the relevant aspects (see pages 66 – 69) of the industrial structure of agro-based industries in Kisii District are attended to in order to contribute significantly to realistic equitable development for the sake of present generations and for posterity.

CHAPTER SEVEN

SUMMARY OF RESEARCH FINDINGS, RELATED CONCLUSIONS AND RESULTANT RECOMMENDATIONS

7.1 INTRODUCTION

This is the concluding chapter of this study. It deals with a summary of the research findings, related conclusions and the resultant recommendations. The research findings, conclusions and recommendations are provided in view of the objectives and hypotheses of the study.

The main objectives of this study are outlined as follows:

1. To describe and portray cartographically, the spatial industrial patterns of Kisii District' agricultural manufacturing industries;
2. To evaluate the nature of the variables that have influenced the location of agricultural manufacturing industries in Kisii District; and
3. To determine whether the agro-based industrial structure of Kisii District contributes significantly to regional development.

The above objectives have been recast into respective null hypotheses, as follows:

1. There is no significant agro-based industrial localization in Kisii District.

2. Economic variables are not the main determinants of the location of agro-based manufacturing industries in Kisii District.
3. The differences between agro-based food and agro-based non-food establishments, in terms of technological orientation, are not significant.
4. The sources of raw materials for both agro-based food and agro-based non-food manufacturing industries are not significantly different.
5. There is no significant difference in the types of commodities manufactured by agro-based food and agro-based non-food industries.
6. There is no significant difference between agro-based food and agro-based non-food industries in terms of market for manufactured commodities.
7. The scale of production of agro-based food and agro-based non-food industries is not significantly different.

7.2 RESEARCH FINDINGS ON:

7.2.1 INDUSTRIAL SPATIAL PATTERNS

Research findings clearly indicated that there is a spatial concentration of agricultural manufacturing industries in Kisii District. This was determined on the basis of manufacturing employment and the number of manufacturing establishments in the study area. In terms of manufacturing employment, the Municipality commanded the highest percentage of total employees in each category of agricultural manufacturing (30.3397% and 8.6781%) in agro-based food and agro-based non-food industries, respectively). Computed location quotient values indicated concentration of agro-based food manufacturing industries in Kisii Municipality. In

terms of the number of agro-based establishments in the study area, Kisii Municipality led all the divisions as well as Keroka Town Council. It had 55 establishments, employing 1160 operatives as compared to the next nearest division, Marani with 27 establishments, employing 153 operatives.

7.2.2 INDUSTRIAL LOCATION VARIABLES

Data analysis of the industrial location variables was undertaken using the factor analysis procedure of the principal axis type. The following are the findings that emerged.

Four factors made up of various constituent variables emerged as the most important in influencing the location of agricultural manufacturing industries in Kisii District. The factors include:

(i) Personal preferences;

(ii) Market accessibility;

(iii) Industrial support infrastructure-cum-urban economies; and

(iv) Government influence-cum-labour-water supply.

These factors accounted for 65.1% of the total variance in the original data set. However, there are other variables that were not considered for the factor analysis procedure because they tended to cloud the results and/or their influence(s) on agro-based industrial location in the study area was indirect.

7.2.3 INDUSTRIAL STRUCTURAL CHARACTERISTICS

To determine the industrial structural characteristics of Kisii District's agricultural industries, manufacturers were interviewed on a few selected structural characteristics.

The results were analyzed using descriptive statistics as well as chi-square as a non-parametric goodness of fit test.

The following findings emerged from the analysis:

(a) The predominant type of technology utilized in both agro-based food and agro-based non-food establishments is labour-intensive;

(b) The raw materials utilised by agro-based industries are mainly obtained locally from the study area;

(c) There is an overwhelming preponderance of consumer goods with little being manufactured for export. Intermediate goods were also not well represented in the categories of goods manufactured;

(d) Goods are mainly manufactured for the local market in Kisii District. Very few of the industrialists interviewed processed and/or fabricated for the external market;

(e) Agro-based industries in the study area are predominantly of very small and small scales. Medium scale industries are not well represented and large scale industries are not represented in Kisii District.

7.3 CONCLUSIONS BASED ON THE FOREGOING FINDINGS AND DIRECTLY FROM THE FIELD:

7.3.1 INDUSTRIAL SPATIAL PATTERNS

Research findings clearly indicate that there is industrial localisation in Kisii Municipality, as far as agro-based industries are concerned. It would thus seem that a core-periphery type of development pattern is prevalent in Kisii District. Kisii Municipality is the core while the rest of the District is the periphery. Although this development pattern is likely to be subtle when compared with the core-periphery pattern operating at the national space economy, it is nevertheless significant, in view of the fact that it implies polarisation which (polarisation) is associated with inequalities.

7.3.2 INDUSTRIAL LOCATION VARIABLES

The most important variables influencing the location of agro-based industries in Kisii District can be meaningfully collapsed into four factors which have been identified as personal preferences, market accessibility, industrial support infrastructure-cum-urban economies and government influence-cum-labour-water supply. These factors and their constituent variables are essentially economic in character. Thus, it can be concluded that the predominant variables influencing the location of agro-based industries in Kisii District are mainly economic in character. The implication of this is that industrialists take into account mainly economic variables when establishing industries.

7.3.3 INDUSTRIAL STRUCTURAL CHARACTERISTICS

In view of research findings, based on a few selected variables, it is apparent that the industrial structure of Kisii District agricultural manufacturing industries is largely *centre*-periphery orientated and hence inappropriate for regional development.

7.4 RECOMMENDATIONS BASED ON BOTH THE FINDINGS AND RELATED CONCLUSIONS:

7.4.1 INDUSTRIAL SPATIAL PATTERNS

I PLANNERS AND POLICY MAKERS

It is imperative that measures are taken to rectify the polarised type of development pattern that evidently exists in Kisii District. Measures should be taken to discourage the localisation of industries in Kisii Municipality and encourage industrial development of other parts of the Districts. Such measures would include:

(i) An incentive package to encourage selective industrial development that gives emphasis to other parts of the District apart from Kisii town. Such incentives would include: provision of industrial support infrastructure (power supply, land, factory premises, etc.); budgetary controls (credit restrictions, differential taxation and licensing, government expenditure, etc.); financial assistance, and so on. These incentives among other things, are likely to encourage equitable industrial development in the study area. There is definitely need for more industries in the

District, including tea factories, fruit processing establishments, maize milling, and so on.

(ii) There is need to divert the inflow of development factors/determinants (particularly societal innovation and decision- making) from the Kisii town core zone to other parts of the District. Such a measure is likely to reduce regional inequalities.

(iii) Effective internal demand should be built and the creation of dynamic societal structures encouraged in peripheral regions of Kisii District. People in these regions should be encouraged to retain in the relevant divisions of the study area their returns (such as wages and salaries, etc.) in order to create adequate internal demand.

(iv) Those people employed in Kisii Municipality should be encouraged to send part of their financial returns to their relatives and friends in peripheral areas. This is likely to boost demand in those regions, and hence provide a basis for regional service and manufacturing industries.

(v) Societal structures that are anti-development, (for instance, unwillingness to educate children by some parents), should be highly discouraged in the study area.

(vii) Kisii District is endowed with various resources, especially agricultural sources. Various crops such as tea, coffee, pyrethrum, sugarcane etc. do well in the various agro-ecological zones. Furthermore there are other developable non-agricultural industrial resources,(such as soapstone mined in Tabaka in

Nyamarambe Division) which could be utilized. It is important that the external demand for these various resources is mobilized and links established both within and outside the study area, in terms of access to external information, resources and markets. Exploitation and marketing of these extra resources, especially soapstone which is a very important non-agricultural resource should be improved and streamlined.

(viii) Formation of 'interest groups' in peripheral regions which (groups) have the capacity for mobilizing and utilizing resources is another suitable measure. Such groups would include: regional businessmen, regional intellectuals and regional politicians. These groups should identify themselves with the interests of the regions and should be capable of pressing for the regions' interests with outside decision makers.

II RESEARCHERS AND SCHOLARS

(i) Researchers and scholars will find of practical use and interest, the methods used in this study to map manufacturing to derive industrial spatial patterns. Manufacturing activities in the study area have been mapped using manufacturing employment and the number of manufacturing establishments. The two methods have been used for comparisons purposes in order to gain a deeper insight in the industrial spatial patterns. Scholars and researchers will no doubt benefit from these methods. However, it should be noted that there are a number of other methods that can be used to map manufacturing activities and

which should be fully exploited. More specifically, this researcher is recommending the mapping of manufacturing activities using different indices (such as: value-added by manufacturing, number of man-hours, capital expended on new development, size, value of payroll, etc.) in order to facilitate comparisons between the emerging industrial spatial patterns.

(ii) It could be of interest to researchers to investigate the spatial patterns of manufacturing and allied service sector industries not only in Kisii District but also in other parts of the country to enable comparisons with the current study and to arrive at a more comprehensive picture of the spatial patterns of industries in Kenya. Such findings will no doubt be useful for planning and policy making.

7.4.2 INDUSTRIAL LOCATION VARIABLES

I POLICY MAKERS AND PLANNERS

(i) This study has clearly established that the variables that influence the location of agro-based industries in Kisii District are mainly economic in nature. These variables have been collapsed in four factors namely; personal preferences, market accessibility, industrial support infrastructure-cum-urban economies and government support-cum-labour-water supply. These factors (with their constituent variables), among others, should be used as a policy instruments to influence equitable industrial (and, indeed, regional and/or national) development.

(ii) It is very important to improve the road network (which influence transport costs) in the District. The poor state of roads and general scarcity of transport facilities pose a major

challenge to any meaningful equitable industrial (and indeed overall regional and/or national) development in the study area, and therefore need urgent review.

II RESEARCHERS AND SCHOLARS

(i) Industrial location, just as many other aspects of industry, is dynamic, which calls for constant evaluation. This is necessary, so as to keep abreast with the developments in this sector. There is this need for constant research activities.

(ii) There is need to carry out studies on: the location variables influencing non-agro-based manufacturing and allied service sector industries in Kisii District and other parts of the country

7.4.3 INDUSTRIAL STRUCTURAL CHARACTERISTICS

I PLANNERS AND POLICY MAKERS

(i) There is need to encourage (through assistance, support, incentives, etc.) the development of carefully selected intermediate and export goods industries in Kisii District This will ensure production of producer goods apart from generating foreign currency for the District.

(ii) Industrialists in Kisii District should be encouraged to diversify the market for their produce. They should be encouraged to be outward looking by producing for the export market in addition to the local market. This is likely to generate more profits, more employment and definitely, a higher standard of living in Kisii District.

II SCHOLARS AND RESEARCHERS

(i) It is apparent that the predominant type of technology in the study area is labour-intensive. However, there is need for more research in order to gain deeper insight into the structure of industry in the study area. Some of the industrial structural characteristics that should interest researchers include: ownership patterns [whether industries are public (mainly parastatal or Government) owned industries, public (non-government) cooperatively owned industries, and privately owned local or foreign (multinational or transnational)]; activity radii of industries [whether industries have a long, (or nationwide) activity radius, moderate potential radius and short activity radius industry]; development-inducing industries (that is, industries which plough back development funds especially into the rural areas and, hence, centrifugal in their effects) and/or development-supporting industries (that is, industries which aid and/or plough back development funds especially into the rural areas); diversification of industries; rate of growth of industries (whether industries are very fast growing industries, fast growing industries, slow growing industries and very slow growing industries); quality of goods processed and/or fabricated by industries (whether the goods are high quality goods, low quality goods and/or dangerous component(s) goods and low-quality pharmaceutical related goods); and, industrial linkages [whether industries are capable of establishing extensive (forward or backward) linkages, industries with little or very limited (forward and backward) linkages, and leading and/or key industries) (see pages 66-69).

(ii) Findings of this study also act as evidence to scholars of the fact that the structure of industries in Kisii District (as is likely to be the case in other parts of Kenya) is largely

periphery orientated and hence, inappropriate and does not significantly contribute to regional development.

(iii) It is also of significance to conduct detailed studies into the structure of industry in other parts of Kenya in order to determine whether the structure of the industries contributes significantly to the development of the equitable regional and (overall) national development.

7.5 OTHER GENERAL RECOMMENDATIONS

I PLANNERS AND POLICY MAKERS

(i) There is need to compile a comprehensive database for purposes of regional development planning. Such a database should cover the whole, District by District, or even better (say, division by division). The quality of regional databases should also be looked into, and updated from time to time. This is because the quality of a database is a major influence in defining, analyzing and planning of regions.

(ii) The elements of Ogendo's centrifugal model, (refer to pages 66-82), are very useful for comprehensive equitable regional and urban development planning. It is therefore recommended that these elements should be taken into account when planning.

II SCHOLARS AND RESEARCHERS

(i) There is need to study in greater detail those aspects of industries addressed by this study, for example: the impact of industrial development on the environment; the role of multinational corporations in the development of developing countries, especially Kenya; the appropriateness of current industrial technology in Kenya; planning for Kenya's industrial development; attracting investment in industry, industrial restructuring in developing countries, among other topics.

(ii) There is need to further establish the role of industrial establishments employing (1-4) operatives in the process of equitable regional and (overall) national development.

7.6 CONTRIBUTIONS MADE BY THE STUDY

The findings highlighted by this study should be considered in total as major contributions the study has made to work in the field of industrial geography and specifically to the understanding and general knowledge of the industrial geography of Kisii District.

One of the models that has recently been formulated for equitable regional development planning is the centrifugal model,(Ogendo 1988, 1989, see pages 66-82)This study has outlined the principal objectives of the model and how it (model) aims to achieve the objectives. This work, diagrammatically, models the centrifugal regional development planning model for the first time (Figure 7). All the elements of the model are included in the diagram. This is considered an important contribution not only to industrial geography but also to regional development planning as a whole.

Geographers, economists and planners may be interested in determining and mapping the spatial distribution of manufacturing activities. The techniques and indices used in this study provide excellent methodology. To establish industrial spatial patterns, two techniques are used, namely: the coefficient of localization and the location quotient. To map the patterns, the indices of manufacturing employees and number of establishments are utilized. The major contribution of this study is the application of more than one technique and index to establish and map manufacturing activities. This is useful not only for comparisons purposes in order to gain a deeper insight in the industrial spatial patterns.

Most of the maps used to illustrate various aspects of the study have been prepared for the first time and derive their origin from this study. These include: the industrial spatial patterns map of Kisii District (Figure 21); the map on number of manufacturing establishments in Kisii District in 1994 (Figure 22); maps showing the relationship between industrial location and road network; and, industrial location and power supply (Figures 26 and 27, respectively). All the maps, diagrams and the tables accompanying the material covered in this thesis must be considered contributions the study has made to the knowledge and understanding of industrial geography. The maps, tables and diagrams are useful sources of information and hence can be used as source materials for further analysis and general reference.

Finally, it is important to observe that all the contributions made in chapters 1-3, particularly in chapter 1 have greatly helped to spearhead all the work done in the other remaining chapters 4-7. Indeed, chapters 2 and 3 have also greatly benefitted from chapter one. Moreover, the references, select bibliography and all the appendices very much depend on several aspects of chapters 1-3.

It is justifiably correct, therefore, to state that, without chapter 1, and to a considerable extent chapters 2 and 3, this thesis could not have materialized.

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LIST OF APPENDICES

APPENDIX 1

RECORDING SCHEDULE FOR INDUSTRIAL LOCATION VARIABLES OF AGRO-BASED INDUSTRIES IN KISII District.

Name of establishment . . . . . .
Year When started . . . . . .
Location (division) . . . . . .
Date of interview . . . . . .

I. Which of the variables listed below influenced your decision to locate this establishment in this place? (Rank your variables in order of importance using the scale give below)

Rank Scale	Rank description
1	Very important variable in influencing location of this establishment.
3	Important variable in influencing location of this establishment.
7	Fairly important variable in influencing location of this establishment.
10	Least important variable in influencing location of this establishment.

Variables

1. Local availability of raw materials . . . . . .
2. Availability of local capital for investment in manufacturing . . . . . .
3. Proximity to other local establishments . . . . . .
4. Presence of urban economics (banking insurance, security etc.) . . . . . .
5. i) Accessibility to local market . . . . . .
   ii)Anticipation of market in the near future . . . . . .
6. Low transport costs . . . . . .

7. Nearness to home and familiarity with the area in which the industry is located

8. i)Availability of abundant supply of power . . . . . .
   ii) Availability of cheap power . . . . . .

9. Suitable underlying rock structure . . . . . .

10. Suitable surface configuration (flat surface etc.) . . . . . .

11 i) Availability of cheap land for expansion . . . . . .
   ii) Adequate land for expansion . . . . . .

12. Influence of government (through provision of subsidies, low taxes, market for goods, etc.) . . . . . .

13. Influence of local politics . . . . . .

II i) Are there any other variables that have influenced your decision to locate your establishment at this place? (Tick where appropriate)

Yes No.

ii) If yes, specify and rank . . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

APPENDIX 2

RECORDING SCHEDULE FOR THE INDUSTRIAL STRUCTURE OF KISII DISTRICT'S AGRICULTURAL MANUFACTURING INDUSTRIES.

Name of establishment . . . . . .
Year when started . . . . . .
location (division) . . . . . .
Date of interview . . . . . .

1. Technology utilized

a) Do you own a power generator or a similar source of power? (Tick where appropriate)

Yes No

If Yes, which of the following do you own? (Tick where appropriate)

(i) Petrol/ diesel generator

(ii) Hydro-electric power

(iii) Thermal power plant

(iv) Any other source (specify) . . . . . .

If No where do you obtain your power from . . . . . .

(b) What is your approximate monthly power costs . . . . . .

(c) What technology do you mainly use in producing goods in your establishment (Tick where appropriate)

Mainly capital-intensive (use of machines)

Mainly labour-intensive (use of labour)

(i) Give reasons for this

. . . . . .

. . . . . .

2. Commodities produced and their raw materials.

What commodities are produced in your establishment?

(a) (i) Consumer goods; (Tick where appropriate)

Foods (specify) . . . . . .
Textile (specify) . . . . . .
Wood products (specify) . . . . . .
Others (specify) . . . . . .

(ii) What raw materials are used in the production of the above goods?

Raw materials

. . . . . .

(iii) What is the main source of the raw materials already mentioned? (Tick where appropriate)

Obtained locally (within Kisii District)

Obtained from other parts of Kenya

Obtained from outside Kenya

(iv) What is the volume of production in a week . . . . . .
or a month . . . . . .
or a year . . . . . .
(State in metric tons or any other appropriate measure)

(b) (i) Intermediate goods (Tick where appropriate)

Textiles (specify) . . . . . .

3 Scale of production

(a) How many people are employed in your establishments?
(Tick where appropriate)

(i) 5 - 49

(ii) 50 - 99

(iii) 200 - 999

(iv) 1000+

(b) Of the total, how many are unskilled . . . . . .
semi-skilled . . . . . .
skilled . . . . . .

(c) Which are your main sources of employees (tick where appropriate)

Unskilled labour
(i) Kisii District
(ii) Outside Kisii District

Semi-skilled labour

(i) Kisii District
(ii) Outside Kisii District

Skilled labour
(i) Kisii District
(ii) Outside Kisii District.

(d) Are there any plans of expanding this establishment ?

(tick where appropriate)

Yes No

If yes what will the expansion involve ? Tick where appropriate

An increase in floor space
An increase in number of employees
An increase in rate of production
All the above

Others (specify) .....

4. Market for products / commodities

(a) Where are your products sold ? (Tick in order of volume of sales)

(i) Within Kisii and Gucha Districts
(ii) Other parts of Kenya
(iii) Other parts of the world

(b) What are your main sources of customers ? List in order of importance by volume of sales

(i) Kisii District
(ii) other parts of Kenya
(iii) Other parts of the world

END
THANK YOU.

APPENDIX 3

INDUSTRIAL ESTABLISHMENTS VISITED FOR RESEARCH PURPOSES, 1994

ESTABLISHMENT	PRODUCTS	(U.N.) I.S.I.C 4-DIGIT CODE
1 Gesusu Butchery	Fresh Meat	3111
2. Kisii Urban Council Slaughter House	Fresh Meat	3111
3. Sungrown Products Ltd	Passion Fruit Juice	3112
4. Nyamache Coffee Factory	Coffee Beans	3116(A)
5. Kisii Coffee Factory	Coffee Beans	"
6. Kiamokama Coffee Factory	Coffee Beans	"
7 Kenyenya Millers	Maize Flour, Wheat Flour	3116(B)
8. Oyabi Posho Mill	Maize Flour, Millet Flour, Wheat Flour	"
9. Mobamba Women Group (Mogonga) Posho Mill	Maize Flour, Millet Flour	"
10. Getare Posho Mill	Maize Flour, Millet Flour	"
11. Mosache Posho Mill	Maize Flour	"
12. Riokibeni Posho Mill	Maize Flour, Wheat Flour	"
13. Itumbe Posho Mill	Maize Flour, Millet Flour	"
14. Nyanturago Posho Mill	Maize Flour, Millet Flour	"
15. Riokindo Posho Mill	Maize Flour, Millet Flour	"
16. Etago Posho Mill	Maize Flour, Millet Flour	"
17. C16 Posho Mill	Maize Flour, Wheat Flour, Millet Flour	"
18. Entakana Millers	Maize Flour, Millet Flour	"
19. Ekona Posho Mill	Maize Flour, Millet Flour	"
20. Gesonso Posho Mill	Maize Flour, Wheat Flour, Millet Flour	"
21. Modern Posho Mill	Maize Flour, Wheat Flour, Millet Flour	"
22. Truphena Kebati Posho Mill	Maize Flour, Wheat Flour, Millet Flour	"
23. Ogembo Millers	Maize Flour, Wheat Flour, Millet Flour	"
24. Masimba Posho Mill	Maize Flour, Wheat Flour, Millet Flour	"
25. Masimba Super Carpenters	Furniture of all types	

ESTABLISHMENT	PRODUCTS	(U.N.) I.S.I.C 4-DIGIT CODE
26. Mobamba Women Group (Borangi) Posho Mill	Maize Flour, Wheat Flour, Millet Flour	-
27. Sansora Bakery Ltd	Bread, Cakes	3117
28. K.I.E Bakery	Bread	-
29. Kisii Bakeries	Bread, Cakes	-
30. Kiamokama Tea Factory	Black Tea	3121(A)
31. Nyamache Tea Factory	Black Tea	-
32. Ogembo Tea Factory	Tea	-
33. Nyakoe Malt Sugar Co.	Jaggery	3121(B)
34. Kisii Bottlers	Soft Drinks	3134
35. Nyabonyi Weaving and Spinning	Mats, Baskets, Ropes and Twine	3211(B)
36. Gekanana Knitting and Weaving	Knitted Garments	3213
37. Kurm Garments	Clothes	3220
38. Nyambunwa Tailors	Clothes	-
39. Mamu Tailoring and Dress Making	Clothes	-
40. Gesusu Tailors	Clothes	-
41. Okemwa Tailoring Shop	Clothes	-
42. Industrial Hides and Skins	Raw and Semi Tanned Hides	3231
43. Timsales (Kisii Branch)	Sawn Timber	3311
44. Oriental Mills	Sawn Timber	-
45. Kisii Sawmills	Sawn Timber	-
46. Riseta Furniture and Wood Turning	All types of furniture	3320
47. Oisebe Workshop	Furniture and Fixtures	-
48. Gesonso Furniture and Repair	Furniture	-
49. Kwach Akal	Furniture and Fixtures	-
50. Jogoo Workshop	All types of furniture	-
51. Nyamataro Carpentry	Furniture	-
52. Birongo Central Workshop	Furniture	-
53. Siocha Carpentry	Furniture and Fixtures	-
54. Anyona Carpentry	All types of furniture	-
55. Usalama Workshop	Furniture	-
56. Gekomu Carpentry	Furniture and Fixtures	-
57. Nyamache Carpenters	Furniture	-

ESTABLISHMENT	PRODUCTS	(U.N.) I.S.I.C 4-DIGIT CODE
58. Nyangusu Carpentry Workshop	Furniture	3320
59. James Anyona Carpentry	All types of furniture	"
60. Keroka Furniture Makers	All types of furniture	"
61. Daraja Mbili Furniture Makers	Furniture of all types	"
62. Kereri Carpenters	Furniture	"
63. Mose Furniture Makers	Furniture and Fixtures	"
64. Nyabigege Carpenters	Furniture	"
65. Ibacho Furniture Workshop	All types of furniture	"

APPENDIX 4

CATEGORIES OF ESTABLISHMENTS VISITED FOR RESEARCH PURPOSES

AGRICULTURAL FOOD MANUFACTURING ESTABLISHMENTS

Establishment	Number visited
Tea processing	3
Coffee processing	3
Sugar processing	1
Meat processing	1
Grain milling	20
Bakery products processing	3
Soft drinks and carbonated	1
Other food products not elsewhere classified	1
Total establishments visited	**33**

AGRICULTURAL NON-FOOD MANUFACTURING ESTABLISHMENTS

Establishment	Number visited
Furniture and fixtures fabrication	21
Saw milling	3
Manufacture of wearing apparel	5
Spinning and weaving	1
Knitting	1
Hides and skins	1
Total establishments visited	**32**

Total number of agricultural manufacturing establishments visited is 33 + 32 = 65 establishments.

APPENDIX 5
TABLE OF RANDOM NUMBERS

10	09	73	25	33	76	52	01	35	86	34	67	35	48	76	[illegible]									
37	54	20	48	05	64	89	47	42	96	24	80	52	40	37										
08	42	26	89	53	19	64	50	93	03	23	20	90	25	60										
99	01	90	25	29	09	37	67	07	15	38	31	13	11	65										
12	80	79	99	70	80	15	73	61	47	64	03	23	66	53										
66	06	57	47	17	34	07	27	68	50	36	69	73	61	70										
31	06	01	08	05	45	57	18	24	06	35	30	34	26	14										
85	26	97	76	02	02	05	16	56	92	68	66	57	48	18										
63	57	33	21	35	05	32	54	70	48	90	55	35	75	48										
73	79	64	57	53	03	52	96	47	78	35	80	83	42	82										
98	52	01	77	67	14	90	56	86	07	22	10	94	05	58										
11	80	50	54	31	39	80	82	77	32	50	72	56	82	48										
83	45	29	96	34	06	28	89	80	83	13	74	67	00	78										
88	68	54	02	00	86	50	75	84	01	36	76	66	79	51										
99	59	46	73	48	87	51	76	49	69	91	82	60	89	28										
65	48	11	76	74	17	46	85	09	50	58	04	77	69	74										
80	12	43	56	35	17	72	70	80	15	45	31	82	23	74										
74	35	09	98	17	77	40	27	72	14	43	23	60	02	10										
69	91	62	68	03	66	25	22	91	48	36	93	68	72	03										
09	89	32	05	05	14	22	56	85	14	46	42	75	67	88										
91	49	91	45	23	68	47	92	76	86	46	16	28	35	54										
80	33	69	45	98	26	94	03	68	58	70	29	73	41	35										
44	10	48	19	49	85	15	74	79	54	32	97	92	65	75										
12	55	07	37	42	11	10	00	20	40	12	86	07	46	97										
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61	19	69	04	46	26	45	74	77	74	51	92	43	37	29										
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94	55	72	85	73	67	89	75	43	87	54	62	24	44	31										
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32	17	90	05	97	87	37	92	52	41	05	56	70	70	07										
69	23	46	14	06	20	11	74	52	04	15	95	66	00	00										
19	56	54	14	30	01	75	87	53	79	40	41	92	15	85										
45	15	51	49	38	19	47	60	72	46	43	66	79	45	43										
94	86	43	19	94	36	16	81	08	51	34	88	88	15	53										
98	08	62	48	26	45	24	02	84	04	44	99	90	88	96										
33	18	51	62	32	41	94	15	09	49	89	43	54	85	81										
80	95	10	04	06	96	38	27	07	74	20	15	12	83	87										
79	75	24	91	40	71	96	12	82	96	69	86	10	25	91										
18	63	33	25	37	98	14	50	65	71	31	01	02	46	74										
74	02	94	39	02	77	55	73	22	70	97	79	01	71	19										
54	17	84	56	11	80	99	33	71	43	05	33	51	29	69										
11	66	44	98	83	52	07	95	48	27	59	38	17	15	39										
48	32	47	79	28	31	24	96	47	10	02	29	53	68	70										
69	07	49	41	38	87	63	79	19	76	35	58	40	44	01										

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APPENDIX 5
TABLE OF RANDOM NUMBERS CONTD.

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90 04 58 54 97 51 98 15 06 54 94 93 88 19 97 91 87 07 61 65 [illegible]
73 18 95 02 07 47 67 72 62 69 62 29 06 44 64 27 12 46 70 18 41 [illegible]
75 76 87 64 90 20 97 18 17 49 90 42 91 22 72 95 37 50 58 71 93 [illegible]
54 01 64 40 56 66 28 13 10 03 00 68 22 73 98 20 71 45 22 95 37 [illegible]

08 35 86 99 10 78 54 24 27 85 13 66 15 88 73 04 61 89 75 53 21 [illegible]
28 30 60 32 64 81 33 31 05 91 40 51 00 78 93 32 60 46 90 75 24 [illegible]
53 84 08 62 33 81 59 41 36 28 51 21 59 02 90 28 46 66 82 95 77 [illegible]
91 75 75 37 41 61 61 36 22 69 50 26 39 02 12 55 78 17 65 14 81 [illegible]
89 41 59 26 94 00 39 75 83 91 12 60 71 76 46 48 94 97 21 06 24 [illegible]

77 51 30 38 20 86 83 42 99 01 68 41 48 27 74 51 90 81 39 [illegible]
19 50 23 71 74 69 97 92 02 88 55 21 02 97 73 74 28 77 52 [illegible]
21 81 85 93 13 93 27 88 17 57 05 68 67 31 56 07 65 28 50 [illegible]
51 47 46 64 99 68 10 72 36 21 94 64 99 13 15 42 83 60 91 [illegible]
99 55 96 83 31 62 53 52 41 70 69 77 71 28 30 [illegible]

33 71 34 80 07 93 58 47 28 69 51 92 66 47 21 58 30 32 [illegible]
85 27 48 68 93 11 30 32 92 70 28 83 43 41 37 73 51 59 [illegible]
84 13 38 96 40 44 03 55 21 66 73 85 27 00 91 61 22 26 [illegible]
56 73 21 62 34 17 39 59 61 31 10 12 39 16 22 85 49 65 [illegible]
65 13 85 68 06 87 64 88 52 61 34 31 36 58 61 45 87 52 [illegible]

38 00 10 21 76 81 71 91 17 11 71 60 29 29 37 74 21 96 [illegible]
37 40 29 63 97 01 30 47 75 86 56 27 11 00 86 47 32 46 [illegible]
97 12 54 03 48 87 08 33 14 17 21 81 53 92 50 75 23 76 [illegible]
21 82 64 11 24 47 14 33 40 72 64 63 88 59 02 19 13 [illegible]
73 13 54 27 42 95 71 90 90 35 85 79 47 42 96 08 78 [illegible]

07 63 87 79 29 03 06 11 80 72 96 20 74 41 56 23 82 [illegible]
60 52 88 34 41 07 95 41 98 14 59 17 52 06 95 05 53 [illegible]
83 59 63 56 55 06 95 89 29 83 65 12 80 97 19 77 [illegible]
10 85 06 27 46 99 59 91 05 07 13 49 90 63 19 53 07 [illegible]
39 82 09 89 52 43 62 26 31 47 64 42 18 08 14 43 80 [illegible]

59 58 00 64 78 75 56 97 88 00 88 83 55 44 86 23 76 [illegible]
38 50 80 73 41 23 79 34 87 63 90 82 29 70 22 17 71 [illegible]
30 69 27 06 68 94 68 81 61 27 56 19 68 09 91 82 06 [illegible]
65 44 39 56 59 18 28 82 71 37 49 63 22 40 11 08 33 [illegible]
27 26 75 02 64 13 19 27 22 94 07 47 74 46 06 17 98 [illegible]

91 30 70 69 91 19 07 22 42 10 36 69 95 37 29 28 82 [illegible]
68 43 49 46 88 84 47 31 36 22 62 12 69 84 08 12 84 [illegible]
48 90 81 58 77 54 74 52 45 91 35 70 00 17 54 83 82 [illegible]
06 91 34 51 97 42 67 27 86 01 11 88 30 95 28 63 01 [illegible]
10 45 51 60 19 14 21 03 37 12 91 34 23 78 21 88 32 [illegible]

12 88 39 73 43 65 02 76 11 84 04 28 50 13 92 17 97 [illegible]
21 77 83 09 76 38 80 73 69 61 31 64 94 20 96 63 28 [illegible]
19 52 35 95 15 65 12 25 96 59 86 28 36 82 58 69 57 [illegible]
67 24 55 26 70 35 58 31 65 63 79 24 68 66 86 76 16 [illegible]
60 58 44 73 77 07 50 03 79 92 45 13 42 65 29 26 76 [illegible]

53 85 34 13 77 36 06 69 48 50 58 83 87 38 59 49 36 [illegible]
24 63 73 87 36 74 38 48 93 42 52 62 30 79 92 12 56 [illegible]
83 08 01 21 51 38 99 22 28 15 07 75 95 17 77 97 37 [illegible]
16 44 42 43 34 36 15 19 90 73 27 49 37 09 39 85 13 [illegible]
60 79 01 81 57 57 17 86 57 62 11 16 17 85 76 45 81 [illegible]

APPENDIX 6

INDUSTRIAL LOCATION VARIABLES AND THEIR CODES

VARIABLE	CODE
V01 Local availability of raw materials	RAMA
V02 Availability of local capital for investment	LOCA
V03 Proximity to other establishment	PROXI
V04 Presence of urban economies	URECO
V05 Availability of local market	LOMA
V06 Low transport cost	TRACO
V07 Nearness to home	HOME
V08 Access to power supply	POSU
V09 Suitable underlying rock structure	ROCK
V10 Suitable surface configuration	SUCO
V11 Availability of cheap land for expansion	LAND
V12 Influence of government	GOVE
V13 Influence of local politics	LOPO
V14 Adequate water supply	WASU
V15 Labour supply	LASU
V16 Influence of personal considerations	PECO

APPENDIX 7

DATA ANALYSIS RESULTS

V01 RAMA

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
ERY IMPORTANT VAR.	1	40	61.5	61.5	61.5
MPORTANT VAR.	2	16	24.6	24.6	86.2
AIRLY IMPORTANT VAR.	3	2	3.1	3.1	89.2
EAST IMPORTANT VAR.	4	7	10.8	10.8	100.0
	TOTAL	65	100.0	100.0	

V02 LOCA

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
ERY IMPORTANT VAR.	1	4	6.2	6.2	6.2
MPORT VAR	2	5	7.7	7.7	13.8
AIRLY IMPORT	3	23	35.4	35.4	49.2
EAST IMPORT	4	33	50.8	50.8	100.0
	TOTAL	65	100.0	100.0	

V03 PROXI

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
AIRLY IMPORT	3	6	9.2	9.2	9.2
EAST IMPORT	4	59	90.8	90.8	100.0
	TOTAL	65	100.0	100.0	

V04 URECO

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
ERY IMPORTANT VAR.	1	2	3.1	3.1	3.1
MPORT VAR	2	2	3.1	3.1	6.2
AIRLY IMPORT	3	23	35.4	35.4	41.5
EAST IMPORT	4	38	58.5	58.5	100.0
	TOTAL	65	100.0	100.0	

705 LOMA

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
VERY IMPORTANT VAR.	1	23	35.4	35.4	[illegible]
IMPORT VAR	2	12	18.5	18.5	[illegible]
FAIRLY IMPORT	3	6	9.2	9.2	[illegible]
LEAST IMPORT	4	24	36.9	36.9	1[illegible]
	TOTAL	65	100.0	100.0	

706 TRACO

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
VERY IMPORTANT VAR.	1	12	18.5	18.5	1[illegible]
IMPORT VAR	2	19	29.2	29.2	4[illegible]
FAIRLY IMPORT	3	7	10.8	10.8	[illegible]
LEAST IMPORT	4	27	41.5	41.5	1[illegible]
	TOTAL	65	100.0	100.0	

707 HOME

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
VERY IMPORTANT VAR.	1	12	18.5	18.5	1[illegible]
IMPORT VAR	2	16	24.6	24.6	4[illegible]
FAIRLY IMPORT	3	19	29.2	29.2	[illegible]
LEAST IMPORT	4	18	27.7	27.7	1[illegible]
	TOTAL	65	100.0	100.0	

708 POSU

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
VERY IMPORTANT VAR.	1	14	21.5	21.5	2[illegible]
IMPORT VAR	2	18	27.7	27.7	4[illegible]
FAIRLY IMPORT	3	9	13.8	13.8	[illegible]
LEAST IMPORT	4	24	36.9	36.9	1[illegible]
	TOTAL	65	100.0	100.0	

ROCK

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
ORT VAR	2	1	1.5	1.5	1.5
ST IMPORT	4	64	98.5	98.5	100.0
	TOTAL	65	100.0	100.0	

SUCO

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
IRLY IMPORT	3	4	6.2	6.2	6.2
AST IMPORT	4	61	93.8	93.8	100.0
	TOTAL	65	100.0	100.0	

LAND

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
PORT VAR	2	2	3.1	3.1	3.1
IRLY IMPORT	3	15	23.1	23.1	26.2
AST IMPORT	4	48	73.8	73.8	100.0
	TOTAL	65	100.0	100.0	

GOVE

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
RY IMPORTANT VAR.	1	1	1.5	1.5	1.5
PORT VAR	2	4	6.2	6.2	7.7
IRLY IMPORT	3	6	9.2	9.2	16.9
AST IMPORT	4	54	83.1	83.1	100.0
	TOTAL	65	100.0	100.0	

V3 LOPO

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
VERY IMPORTANT VAR.	1	5	7.7	7.7	7.7
IMPORT VAR	2	1	1.5	1.5	9.2
FAIRLY IMPORT	3	3	4.6	4.6	13.8
LEAST IMPORT	4	56	86.2	86.2	100.0
	TOTAL	65	100.0	100.0	

V4 WASU

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
VERY IMPORTANT VAR.	1	1	1.5	1.5	1.5
IMPORT VAR	2	4	6.2	6.2	7.7
FAIRLY IMPORT	3	7	10.8	10.8	18.5
LEAST IMPORT	4	53	81.5	81.5	100.0
	TOTAL	65	100.0	100.0	

V5 LASU

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
IMPORT VAR	2	1	1.5	1.5	1.5
FAIRLY IMPORT	3	21	32.3	32.3	33.8
LEAST IMPORT	4	43	66.2	66.2	100.0
	TOTAL	65	100.0	100.0	

V6 PECO

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
VERY IMPORTANT VAR.	1	5	7.7	7.7	7.7
IMPORT VAR	2	22	33.8	33.8	41.5
FAIRLY IMPORT	3	24	36.9	36.9	78.5
LEAST IMPORT	4	14	21.5	21.5	100.0
	TOTAL	65	100.0	100.0	

APPENDIX 6

CORRELATION MATRIX

Correlations:	V01	V02	V03	V05	V06
V01	1.0000				
V02	-.1520	1.0000			
V03	.1650	-.1345	1.0000		
V05	-.1039	.0557	-.0566	1.0000	
V06	.3880	.0233	-.0090	.3116	1.0000
V07	.0799	.3176	-.2152	.0114	[illegible]
V08	-.1166	.0507	-.2357	.0967	[illegible]
V11	.2588	-.1642	.2223	.1579	[illegible]
V12	.1257	-.3487	.2166	-.2576	[illegible]
V13	.1650	-.1345	-.0933	-.0566	[illegible]
V14	.2125	-.2291	.2701	-.2544	[illegible]
V15	.1412	-.0218	-.1012	.0495	[illegible]
V16	.6115	.3542	-.1953	.3287	[illegible]
V04	.0884	-.3468	.4422	-.2599	[illegible]
V09	.0714	-.1087	.4220	-.0809	[illegible]
V10	.0702	-.1001	.0529	-.1687	[illegible]

Correlations:	V08	V11	V12	V13	V14
V08	1.0000				
V11	-.1286	1.0000			
V12	.0364	.1668	1.0000		
V13	-.1179	.0910	.2858	1.0000	
V14	.5484	.1140	-.1322	.1296	1.0000
V15	-.2343	.1975	-.1221	.1360	[illegible]
V16	.1105	-.2333	-.6238	-.1953	[illegible]
V04	.4144	.1005	.2507	.2292	[illegible]
V09	-.1102	.2400	.3531	-.1036	[illegible]
V10	-.1021	.2100	.3118	-.0361	[illegible]

Correlations:	V16	V04	V09	V10
V16	1.0000			
V04	-.3049	1.0000		
V09	-.1945	.0992	1.0000	
V10	-.2105	.1092	0.6015	1.0000