ABHANDLUNGEN DES GEOGRAPHISCHEN INSTITUTS — ANTHROPOGEOGRAPHIE

HASSAN A. EL MANGOURI

The Mechanization of Agriculture as a Factor Influencing Population Mobility in the Developing Countries: Experiences in The Democratic Republic of the Sudan

(Auswirkungen der Mechanisierung der Landwirtschaft auf die Bevölkerungsmobilität in Entwicklungsländern: Fallbeispiel - die Republik Sudan)

BAND 35

DIETRICH REIMER VERLAG BERLIN


18
45

ABHANDLUNGEN DES GEOGRAPHISCHEN INSTITUTS
ANTHROPOGEOGRAPHIE

BAND 35

VERANTWORTLICH FÜR DIESEN BAND:

F. BADER

ABHANDLUNGEN DES GEOGRAPHISCHEN INSTITUTS
ANTHROPOGEOGRAPHIE

BAND 35

HASSAN A. EL MANGOURI

The Mechanization of Agriculture as a Factor Influencing Population Mobility in the Developing Countries: Experiences in The Democratic Republic of the Sudan

(Auswirkungen der Mechanisierung der Landwirtschaft auf die Bevölkerungsmobilität in Entwicklungsländern: Fallbeispiel - die Republik Sudan)

BERLIN 1983

DIETRICH REIMER VERLAG BERLIN

CIP-Kurztitelaufnahme der Deutschen Bibliothek

Mangouri, Hassan A. el:

The mechanization of agriculture as a factor influencing population mobility in the developing countries: experiences in the Democratic Republic of the Sudan = (Auswirkungen der Mechanisierung der Landwirtschaft auf die Bevölkerungsmobilität in Entwicklungsländern: Fallbeispiel - die Republik Sudan) / Hassan A. El Mangouri.
- Berlin : Reimer, 1983.
(Abhandlungen des Geographischen Instituts Anthropogeographie ; Bd. 35)
ISBN 3-496-00312-X

NE: Institut für Anthropogeographie, Angewandte Geographie und Kartographie <Berlin, West> : Abhandlungen des Geographischen ...

ISSN 0721-9687

Gedruckt mit Unterstützung
des Präsidenten der Freien Universität Berlin
und des Deutschen Akademischen Austauschdienstes DAAD

D 188

CONTENTS

PREFACE

Apart from the traditional contribution of geographers to the study of population, this particular thesis attempts to divert the emphasis of geographical enquiry towards the examination of how particular innovations affect the population distribution and the organization of human society. It deals specifically with questions concerning the demographic, social and economic impact of population mobility on both sending an receiving areas. It attempts to shed light on the different variables that work to produce a selective type of population mobility within a particular socio-economic set-up. Although various aspects of population mobility have been studied in some detail during the present decade, no attempt has been made, however, towards a concrete presentation of its multiple causes and its socio-economic impact on the areas and people that are left behind. Far from assuming complete coverage of all interrelated fields of study we attempt here to draw attention to the expected socio-economic repercussions of population mobility as induced by a particular factor, namely agricultural mechanization. Certain limitations, however, have made it difficult to deal with every aspect of population mobility in the Sudan.

The first chapter provides a general discussion of the foundations of mobility study, to be utilized as a theoretical background along the course of study. The second chapter deals with the historical explanation for population mobility in the African countries. This is meant to reflect the most important causes which induced the African people to join the process of migration in the

colonial and post-colonial times.

The third chapter attempts to shed light on the effect of rural development measures, including the adoption and expansion of agricultural mechanization, on the population mobility in the developing countries, with particular emphasis on the African countries.

The fourth chapter presents a general background to the adoption and expansion of the mechanized agriculture - both irrigated and rainfed - in the Sudan. This particular chapter is meant to reflect the scope and magnitude of the mechanized agriculture, to be related later on to the phenomenon of population mobility in the country.

Chapters five, six and seven contain three cases of study. The first one deals with the circulation of the skilled workers (tractor drivers) between the different agricultural schemes within the rural areas (rural-rural population movement); the second case of study deals with the movement of the skilled workers into the urban centres, particularly Greater Khartoum (rural-urban); the third case study deals with the impact of the technical locations of agricultural mechanization (workshops) on the rural population. By all these cases of study it is intended to provide some illustrations of the substantive contribution that a social geographer can make to the understanding of how the organization of human society in a particular region is governed by the development in the different economic sectors. By relating the mobility process of a particular population segment, the skilled labour, to the factor of mechanization, it is intended to support the view that population mobility, at

least in the developing countries, is an automatic consequence of spatial economic disparities, and not merely a behavioural process.

Chapter eight touches more briefly the different types of unskilled labour movements as caused by agricultural mechanization. With this chapter it is intended to reveal the overall impact of this particular tool of development on the spatial distribution of different groups of people.

In the last chapter it is intended to present the main findings of the study as a basis for some concluding remarks. It is hoped that the proposals raised at the end of this thesis will stimulate further researches in the field of social geography.

Finally, the author would like to register his thanks to the large number of friends and colleagues who assisted in one way or another at the various stages of preparing this thesis. He is particularly indebted to his supervisor, Prof. Dr. F. Bader, and co-superviser, Prof. Dr. G. Heinritz, for their good-natured support and encouragement through all the years of his studies in Germany. Thanks are also due to the DAAD (Deutsche Akademischer Austauschdienst) and the Hamboldt-Ritter-Stiftung for their generous financial assistance. Thanks must also go to colleagues in the Department of Geography of the University of Khartoum and to the students who kindly assisted in conducting the field surveys needed for this study.

INTRODUCTION

The study deals with socio-geographic problems within the framework of the mechanization of agriculture and, specially, possible effects of mechanization on population mobility. In previous investigations into mechanization in agriculture these socio-geographical questions were dealt with more incidentally and if at all at a macro-level, i.e. related to a country as a whole or to several countries. An important reason why, for example, decision processes in labour behaviour of agricultural employees have not been examined in more detail is that, generally, in just those areas in which mechanization has a long tradition or a continual development, the social aspects represent well-developed adjustment to the respective framework conditions and are therefore considered to be a matter of course rather than suitable material for research.

Such a reason does not apply to newly created agricultural areas where, in some cases, as a result of extensive political and economic actions entire population groups were mobilized, especially when they had no previous experience with mechanized agriculture.

Through the discussion of suitable measures to promote rural development in developing countries the question of the use of technical means has become topical again in the last few years with special emphasis on the social and economic aspects of the mechanization problem. Special attention was also given to the effects of mechanization on the population situation.

The study is limited to two main problems which are closely interrelated and particularly important in newly

created and mechanized areas: firstly, the creation of new jobs within the agricultural sector through mechanization, and the extent to which mechanization attracts the various population groups and the possible socio-economic effects of such population movements; secondly, the qualifying effect of mechanization which stimulates both rural-rural and rural-urban movements of skilled manpower, with the possible effect of increasing the pressure in the towns and creating a deficit in areas with relatively lower socio-economic incentives. However, there is no exact imagination on the extent of this particular type of mobility at the present time. Thus the purpose of this study is to disclose the relationship between the expansion of the modern agricultural sub-sector centered around mechanization and the circulation of some groups of the population in the Sudan.

Of course many factors bear upon the manpower and employment situation, but mechanization of agriculture is known to have both direct and indirect effects on the manpower needs and employment opportunities. By definition mechanization is a replacement of human labour by machines. Hence the introduction of new agricultural techniques in connection with new crops and livestock varieties as well as new cultural practices such as intensification, diversification, specialization and increasing dependency on a market-oriented production system is considered to be a factor affecting agricultural employment and consequently inducing population circulation. But the effect of agricultural mechanization on population mobility, however, could not be treated in isolation from external factors such as rapid urbanization, industrial development and infrastructure. They are also considered to be a cause and effect of the present intra- and interregional population mobility.

The republic of the Sudan with its extensive agricultural projects provides an extremely valuable situation and a somewhat rare opportunity to study the effects of mechanization on population mobility at this stage.

The traditional interest in unskilled wage-labour movements presents a somewhat restricted view of the total mobility process; thus it must be supplemented by analysis of some other short-term circulatory movements of skilled labour. It is worth mentioning here that these types of population movements remain undifferentiated even in the two census of 1956 and 1973, though it has become, particularly in recent times, a feature of the Sudanese population mobility. Thus the study that attempts to reflect its magnitude, analyze and explain its demographic and socio-economic repercussions becomes more vital than ever before.

This type of study is only possible at the so-called micro-level, i.e. at the level of the individual and small groups, since the available data offer no or only limited information about the individuals, their characteristics and behaviour. Hence this study aims to complement the aggregate studies which focus essentially on the structural characteristics of movement, i.e. the volume, distance, direction and timing. It aims to bring together the closely related elements of mechanization through agricultural development and population mobility by considering the implications of mechanization for the manpower as reflected in the pattern of movement generated. Focus is therefore placed upon a single category of migrants - the skilled labour minority within the circulating sector of the population. The fact that this minority is not randomly selected from the rest of the people and that it is characterized by a relatively higher education level and qualification imply that this group should have a pronounced effect on both areas of

origin and areas of destination. To present this effect is one of the aims of this study.

The relationship between agricultural mechanization and the mobility of skilled labour could be explained in terms of the qualifying role of mechanization. Acquiring qualification through mechanization acts as a major catalyst to the rise aspirations by offering a contact possibility with the surrounding world. Hence mechanization as a training institution resembles education as the route to socio-economic status. Although the movement associated with higher qualification represents only a small segment within the context of the Sudanese population movements, yet it is regarded as the most important one in terms of the socio-economic and political weight it possesses. The role played by this group becomes increasingly important as agricultural mechanization is continuing to dominate the Sudanese modern agricultural sub-sector, and as this sector continues to expand at the expense of the other economic sub-sectors, particularly the traditional sub-sector. Thus this study attempts to identify and explain the movement patterns resulting from adopting the present development strategies which emphasise the expansion of agricultural mechanization.

The study follows an inductive approach which begins the sequence of analysis by formulating logical and internally consistent hypotheses which are to be tested empirically against data drawn from actual observations. We sum up our main hypotheses in the following points:

- Measures to develop rural areas do not stabilize the population situation there but, on the contrary, cause a mobilization of the rural population, thus intensifying in-migration pressure in the towns and increasing the tendency to polarization. In this way

regional and sectoral disparities increase sooner than it was thought from the beginning.

- The more a place is affected by mechanization, i.e. the nearer it is situated to the functional location of mechanization (workshop) or the longer such locations already exist, the greater is the probability of increased out-migration. This migration is selective in that above all, young active males migrate. This form of migration influences not only population structure but also socio-economic conditions in both the place of origin and destination.
- The better the qualifications of a person trained as a result of the mechanization of agriculture, the better are his chances of finding a job quickly when he moves away. The low risk of unemployment at the place he moves to increases the readiness to out-migrate.
- Qualified workers have little or no job opportunities at their place of origin. To make use of the qualifications gained through the mechanization of agriculture they are compelled to migrate.
- At their destinations they act as contacts for relatives and friends still living at the home village, whom this exchange of information motivates to migrate.
- The mechanization of agriculture also causes a deterioration of the living conditions of some families (few opportunities of employment, less leasehold land, inflationary phenomena). In such families the sons can expect nothing more from their fathers. They have to look after themselves, the authority of the father declines. Such disintegrating families are more ready to migrate.

I. FOUNDATIONS OF MOBILITY STUDY

1. GENERAL NOTE

Population mobility is a subject of concern to many academic disciplines, which has recently become a rapidly developing branch. It is now studied by several groups including historians, economists, psychologists, sociologists, demographers and geographers, each one of which approaches the subject from a different point of view relative to its respective subject.

Of all types of population mobility, however, the residential movement of the human population is universally recognized as the most important and essential movement, which is both a multi-disciplinary and also, in its widest sense, an inter-disciplinary field of study. Awareness of the importance of population movement in creating and sustaining a wide range of patterns of human activity is continually increasing. To examine the various changes that accrue to human activity, a limited range of related studies is to be conducted by the different academic disciplines. Most important of these is the study of the motives of population movement, the identification of those who move, the evaluation of the structural context of places of origin and points of destination as well as the flows between them, and finally tracing out the impact of such mobility on both sending and receiving areas.

To carry out such studies, each different discipline is required to concentrate on particular fields of enquiry to the exclusion of others. For an economist, for example, the movement of labour is more important than the other types of population mobility, since he considers labour as an

important form of resource redistribution. Hence he has to discover the motives behind any labour movement and to try to show the impacts of such movement on both areas of origin and areas of destination. The major concern of a sociologist is the inter-relationships between the migrant and his own or other social groups. He is therefore inclined to study the effects of migration on the areas, communities or societies of both sending and receiving areas. The role of the migrant in the general evolution of population is the main concern of a demographer. To the traditional geographer the spatial flows, the interaction between different places and the areal differentiation between sending and receiving areas is the most important field of enquiry with regard to population mobility. Recently the field of concern of a geographer has broadened, since it has been recognized that the residential movements of the human population have spatial manifestations and that redistribution of population through horizontal mobility can have a profound impact on the whole spatial patterning of human activities, the repercussions of which may be felt long after the movement activity has stabilized. Maps of world population distribution, worked out by geographers, are nothing but a reflection of population mobility that occurred in the past with relation to patterns of natural population growth both past and present. Population mobility in the past century was, to a large extent, responsible for the present picture of population distribution in the New World. Moreover, the present suburban expansion and rural depopulation particularly in the Third World is a result of past and present population movements. But population movements are considered not only because of their impact on distributing human beings spatially but also because of their impact on redistributing and restructuring certain social and cultural attributes such as educational achievement, intelligence, occupation, age, sex, family status, social and cultural attitudes, language and religious affiliation.

Such attributes are of crucial importance in bringing about structural changes both in areas of origin and areas of destination. The scale of these structural changes depends to a considerable extent on the volume of population mobility. Accordingly, the geographer dealing with population mobility has to find out who participates in that mobility and what attributes he possesses if he is to evaluate the effect of any population mobility.It should be remembered, however, that mobility may lead to change in an individual's attributes, though this may not always be the case: it has been shown by GALTUNG (1971, p. 194) in his study of Western Sicily that immigrants undergo attitudinal changes prior to emigration and are socially lost to their Communities of origin before actual movement occurs.

Of significant importance to a geographer, apart from individual attributes, are the factors which induce people to move. He has to investigate the reasons behind the movement of certain groups of population and what aspirations they have.

2. DEFINITIONS OF POPULATION MOBILITY

The term "mobility", in the sense that will be used in this study, is generally defined as the circulation of workers between two or more places. In this study the term mobility will be used in connection with population movement which involves a change in the place of residence at a scale varying from a transfer between dwellings within the same district to intercontinental movement. Residential movement, a type of population mobility which involves migration, must centre on the migrant's place of origin as a

permanent point of reference. HAEGERSTRAND (1957, pp. 27-8), in his major study on Swedish migration fields, defines this type of migration as the change in the centre of gravity of an individual's mobility pattern. This change in the centre of gravity does not necessarily involve a change in the destinations of the mobility flows. He illustrated his arguments by the following examples:

An individual who undertakes a local intra-regional move does not necessarily need to change the termini of the journey to work, recreational and shopping movements (Fig. I.1.A), while in an inter-regional move they are required to change (Fig. I.1.B and C).

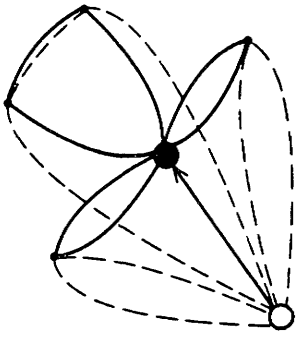


Fig. I.1.A(retaining the same termini)

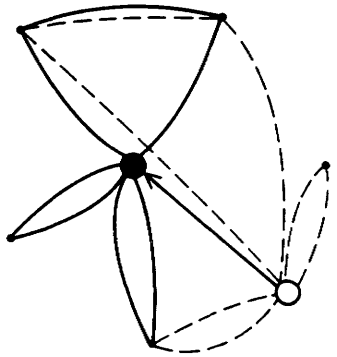
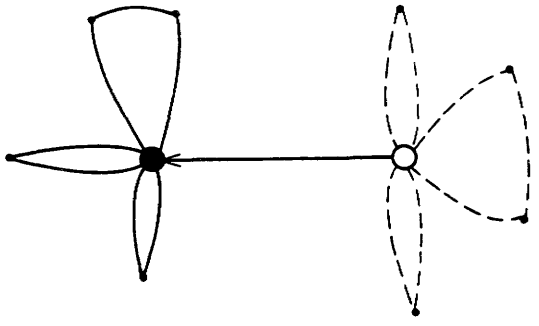


Fig.I.1.B
(partial change of previous termini)



a = previous residence
a^1 = recent residence
b,c,e,... = previous termini
b^1, c^1, e^1 = new termini

Fig. I.1.C (total change of previous termini) SOURCE : W. KULS (1980, P. 169)

C.C. ROSEMAN (1971) calls these two types of migration 'partial displacement' and 'total displacement', respectively.

While these definitional suggestions are very useful, there are some problematic cases to which such concepts do not apply, i.e. in the case of some nomads who have no fixed residential base and who are hence without a definite centre of gravity. Similarly, it is difficult to apply this concept to cases in which an individual has more than one residence.

This concept, however, is highly relevant to our case study. We use the term migration as a sub-set of mobility to mean any residential movement between administration units over a given period of time. More concretely, we confine ourselves to the movement of certain groups of people for the sake of work or betterment of their living standard. For practical reasons, we exclude other forms of population circulation which are to be touched briefly along the course of this study in their respective context.

3. DATA SOURCES OF POPULATION MOBILITY

The first of the sources for population mobility is population census, which is a source of the most important quantitative data on population movement, using the administrative units as a base for birth place migration data. This type of population mobility data is given in the form of tables showing the present residence of individuals as against their places of birth. This data, however, brings information neither about the intensity of mobility of an individual nor about the time spent at the different stages of mobility flows. For this reason it is not advisable to depend on birth place data sources derived from the population census only.

The second source of data is so-called "Continuous-data", whereby all residential moves are recorded. This type of data collection is being practised in some European countries like West Germany, Switzerland and the Netherlands. In this case only the change of residence from one "Gemeinde" to the other is registered without referring to the sets of flows between the different "Gemeinden". By calculating the period between the date of arrival and the date of departure it is possible to determine the time spent in a "Gemeinde" by an individual. As in the case of population census, the continuous data is presented in the form of tables and only in rare cases, like that of Switzerland, summary tables of population movement to and from each "Gemeinde" or "Parish" are published. In the developing countries, including our case study, such sources of migration data are lacking.

The third source, which is more commonly available than the Continuous-data, is the survey data. It is regarded as the most important source of data which provides detailed information about the characteristics of each individual migrant. Behaviour and attitudes of an individual were able to be assessed by using questionnaire-based surveys. This source of data collection is used not only as source complementary to the data acquired from the other two sources but also as the only source in cases where all other information about population flows is completely lacking. It is by far the most imporatnt source of data in studies of most developing countries. The bulk of data for this study has been acquired by this means although reference is sometimes made to population census as a complementary source. Generally speaking, quantitative data were obtainable from population census and continuous registration, wherever they were readily available for consultation (LAWTON 1978). On the other hand, qualitative data was obtainable through an extended questionnaire - based survey. The quality and coverage of national

population censuses varies considerably but most of them deal with the collection of information on how many people migrate, whence and to where over a specified period of time and within a defined framework of administrative areas. Information of certain characteristics of individuals is now commonplace only in the census of the statistically advanced countries. Hence, complete disaggregation of individuals according to their demographic, social and economic attributes are rare, or only available at unsuitable spatial scales. Such a detailed picture of the migrant participants is often obtained by resorting to survey methods.

For the purpose of evaluating the impact of population movement on a particular region, the gross flows between the regions is a vital consideration. In some places,where such gross flows are difficult to obtain, an attempt to calculate the net flows may be advisable. If data on the population totals at two different time periods (p^t and p^{t+n}) are available, and if the numbers of birth ($B^{t,t+n}$) and death ($D^t + D^{t+n}$) between t and t+n are also known, the net migration ($NM^{t,\ t+n}$) can be calculated from the formula for the basic demographic equation (Woods, R.I.,1979):

$$NM^{t,t+n} = p^{t+n} - p^t - B^{t,t+n} + D^{t,t+n}$$

Woods, in his population analysis in Geography (1979) attempted to calculate net migration for smaller demograohic groups. This was found to be possible only where p^t and p^{t+n} are available disaggregated by sex and age, and where the deaths are similarly known for this disaggregation. But even at this level such data are said to be inferior to information on gross flows in the analysis of population mobility impact.

From the discussion so far, it can be argued that the question of the definition of population mobility data are so

closely linked that the types of data available often dictate the kind of migration problems which can be examined.

4. CAUSES OF POPULATION MOBILITY

Studies on population mobility show generally that the migrants believe themselves to be more satisfied in the places of destination than in their origins. It is the perception of an individual of his surrounding world that induces him to draw a comparison between the various alternatives. But this perception does not always lead to positive results, since an erroneous perception may lead an individual to decide to change his situation and to move to other places. Thus it is hard to believe the normative explanation of population mobility which stresses particular factors and neglects consideration of perceptions prevalent at the time of starting the move. Although one or two factors may be most decisive in inducing a person to migrate, the summation of all working factors is of considerable importance in evaluating the process of migration. Only recently have attempts been made to incorporate the subject appraisals of migrants in costs-benefits models of population movements (BOGUE, 1977).

The most decisive factor that induces an individual to start migration is his perception of the different opportunities offered in spatially differentiated regions. Thus it is not only the prevalence of regional differences that induces population mobility, but also the ability of an individual to perceive such differences. In the pre-industrial period the agrarian society was almost undifferentiated in comparison to the post-industrial period, where spatial differentiation has become more manifest and has increased in

intensity particularly in the developing countries with disproportional economic development in which regional development is unevenly undertaken. RAVENSTEIN (1885) recognized the importance of economic development in stimulating population mobility, and this realisation is a basis of ZELINSKY'S (1971) work on changes in population mobility over time.

Considering the process of decision-making of potential migrants, J. WOLPERT (1965, 1966) has introduced certain behavioural concepts, among which is the notion of 'place utility which can be defined as an individual's degree of satisfaction or dissatisfaction with a place. Of course, place utility would differ markedly between different individuals because each individual would consider different attributes of a place in his scale of satisfaction or dissatisfaction. Moreover, each individual evaluates the surrounding world differently according to his limits and the quality of information he receives about other places. Information flows through letters, personal visits, conversations with others who visited other places, mass-media, etc., are very important for a potential migrant to develop an idea of place utility for a range of competing places. Thus mobility may occur either because the delineation of place variables has changed or because a new flow of information about other places becomes available. Some scholars stressed the importance of information flow between the pre-migrants and the potential migrants (TANNOUS 1942). They believed that new migrants are convinced to follow the original migrants, thus setting up the familiar pattern of a chain mobility flow; where each migration event leads to another after a time-lapse in which information is sent back by the previous migrants. Once an individual feels pressured by the insufficiency of his place utility, he starts looking for an alternative (BROWN & MOORE, 1970,p.1).

The decision to move is preceded by a period of inquiry and information flow (MICHELSON, 1977). It is quite debateable whether it is the merits of a place which is the good of a move that brings about population mobility as WOLPERT (1965) suggested. This behaviouristic approach to an explanation of the causes of population mobility, though it provides a satisfactory background to undersatnding the selectivity of migration or what is sometimes called "mobility differentials" still fails to provide a reasonable set of predictive models. The reason for this is the fact that behaviourist ideas are only fully applicable at the level of the individual decision-maker, while prediction is only possible in the social sciences at the level of aggregates.

As regards the selectivity nature of population mobility, it has been noted that age, sex, education and socio-economic status are of particular importance in explaining the likelihood of mobility among the people of a particular region.

Generally, the readiness to migrate is found to be greatest in the young adult age-groups, particularly between school-leaving and the age of thirty. Such mobility is generally associated with the search for a job, and with job changes occurring at the lower ranges of the career ladder.

The sex differences in population mobility have been treated by RAVENSTEIN (1885), who concluded that females are more mobile than males, particularly in short distance displacement. This was later considered by GRIGG (1977), who reviewed the work on nineteenth century population mobility in England, and came to different conclusions from RAVENSTEIN. In societies other than England, sex differentiation in population mobility shows that males are more mobile than the female sector of the society, particularly in the

developing countries with seasonal labour mobility, as will be seen in this study. PETERS (1976) suggested that sex may be the basis for selectivity in population mobility, but it does not operate in all cases, nor need it always operate in the same way.

Educational background had been suggested by several studies to be an important factor in migration selectivity (HANNAN, 1969; GALTUNG, 1971). It has generally been found that those who acquire a higher level of education are more mobile than those with a lower education level. The role of education in promoting the readiness to move may be attributed to the fact that education may change the attitude of the individual towards a particular place and also it may make the appraisal of available information more efficient as will be seen from the movement of school-leavers into the towns in chapter six of this study.

The socio-economic status also plays a role, as it is believed that in the developed countries selectivity operates in favour of the professional or white-collar element in the employed population, hence they are found to be overrepresented among migrants, while in the developing countries internal population mobility is more common among those of low socio-economic status (PRYOR, 1969, p. 74).

It has been suggested that some apparent occupational differentiation in population mobility may be caused by the response of the different socio-economic groups to different stimuli, manual and unskilled labourers moving for higher wages and the professional classes moving in anticipation of future promotional opportunities (HART, 1973). "With low economic standard staying becomes difficult because the necessities of life are not met. With low social standard moving becomes difficult because of the decrease

in perspective, the lack of initiative and connections." (GALTUNG, 1971, p. 205).

The movement of the poor in the developing countries stated previously by PRYOR may be explained in terms of the difficulty of life in the areas of origin and the hope of betterment in areas of destination, even where that aspiration has little chance of being fulfilled.

It may be generally said that population mobility is selective of potential movers according to a wide range of economic and social attributes of the popualtion, and that such attributes are found to differ from place to place and from one migration flow to another. Both occupational and social status of potential movers are significant in determining the type and amount of information available on which the decision to move can be based. It is for this reason that movers are not randomly selected from all population strata.

5. CLASSIFICATION OF POPULATION MOBILITY

It is important to consider a number of approaches to the problem of classifying population mobility, since such an approach provides insight into the fact that population mobility is a multi-dimensional phenomenon and that each decision may be important in its relative context.

As previously stated, the operational definition of population mobility varies from study to study according to the type of data available (see chapter I.3). "The classification of modern population appears to derive from statistics that are collected, whether or not these have any relevance to theoretical questions....." (PETERSEN, 1958, p. 264).

It is possible to classify population mobility according to the geographical distance covered by an individual. This distance is found to be extremely variable from one case to another ranging from mobility within a particular administrative unit to a crossing of international boundaries. The geographical distance is believed to be important in relation to the cultural and social distance crossed by a migrant. But this assumption should not be taken as valid for all cases, since it is possible to move long distances and even cross international boundaries without being met with differentiated cultural and social patterns as is the case in Northern Belgium in relation to the southern part of the Netherlands. On the other hand, internal movements may cross different cultural and social boundaries as in the case of India. Therefore, in considering the geographical impact of population mobility, it is not always correct to stress the geographical distance.

Another way of classifying population mobility is by the time period over which the movement is effective, whereby temporary and permanent population movements are differentiated. The former involves the seasonal movements of people over periods varying from a few months to a number of years, while the latter involves moves from which the mover never returns. This time factor is significant particularly for a returning mover, since it provides him with new attitudes and aspirations to be communicated to his community members. This sort of communication is important in two ways: in that it brings about a change in that community and in that it paves the way for other temporary or permanent moves.

It is extremely difficult, however, to identify return movers in any mobility flow, since movemeent process may continue by any particular mover till the end of his life. In some cases migrants were not able to return home though

this had been their intention at the beginning (PORTER, R. 1956). In other cases potentially permanent migrants who intend to settle down in a place of destination may prefer, by retirement, to move back to the place of origin (CRIBIER, 1975).

A third and most common means of classifying population mobility may be based on the environmental context of the sending and the receiving areas. Accordingly, it is common to differentiate between rural-rural, rural-urban, inter-urban and frontierward movement (ZELINSKY, 1971). The only drawback of this classification is its ignorance of the counterflow in the direction opposite to the mobility stream.

A fourth classification is based on the ecological attributes of the sending and receiving areas as causes behind any particular move. The term economic movement is most relevant in this context as opposed to educational and retirement movements.

These last two classifications will be followed in the course of this study in an attempt to identify the types of population movements, their characteristics, directions and intensity among a particular group of people in a particular area, with the aim of shedding light on the probable repercussions related to population mobility as induced by a particular factor, namely, agricultural mechanization.

6. DIFFERENT PATTERNS OF POPULATION MOBILITY

In the preceding discussions, some aspects of population mobility have been presented. The following sub-chapter will be devoted mainly to volume, shape, length and directions of mobility flows. These patterns are believed to be of particular importance in understanding the impact of mobility. They

are considered to be indicators of the mobility process and functional links within the mobility system between sending and receiving areas. In this sense analysis of mobility flows complements an understanding of the process of selectivity mentioned previously and provides the needed background for a comprehensive view of the multiple effects of any mobility process.

Some scholars have distinguished between two approaches that may be adopted in analyzing mobility flows (WHITE & WOOD, 1980). The deductive approach which recognizes, identifies and describes actual population mobility based on available information, and then attempts to correlate the data to discover patterns and processes which may explain population mobility. The second approach is an inductive one which begins the sequence of analysis by formulating logical and internally consistent theories which may then be tested empirically against data drawn from actual observations.

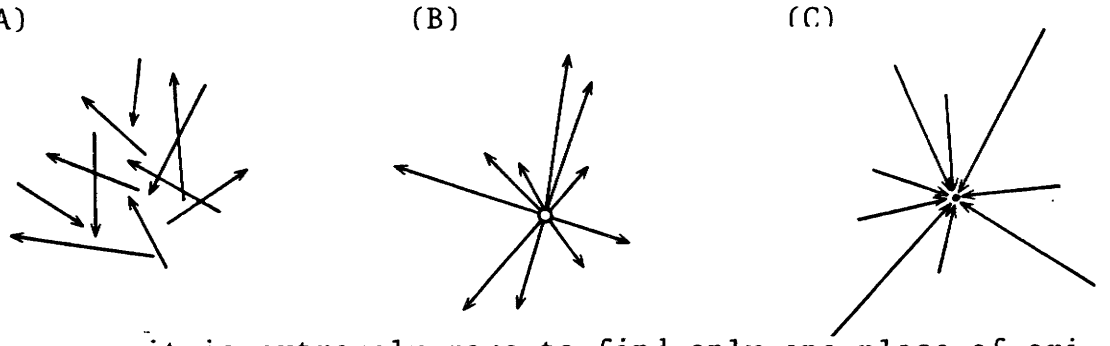
It is obvious that these two approaches are not mutually exclusive and are considered as vital ingredients of social scientific enquiries. For this reason, the present study employs a more dialectic approach, which allows for more flexibility where the actual data requires modification of the theories. However, the fact that actual data on population mobility is not adequately available requires that we depend more upon the inductive approach, formulating hypotheses and testing them empirically by means of personal findings.

7. SHAPE, DIRECTION, LENGTH AND VOLUME OF POPULATION MOBILITY FLOW

To represent mobility flows it is conventionally agreed to

link the sending and receiving areas by a straight line which can provide the length and direction of the flow. The volume of mobility flow may be represented proportionally as the width of that straight line. To provide the exact length and direction of the flow it is important to identify the exact points of origin and destination. Such identification is only possible through a field survey which is essential for drawing the mobility flows. Three possibilities of presenting such flows are shown by Fig. I.2 in which A represents the mobility flow from different places of origin to different places of destination; B deals with a case in which movements proceed from a single place of origin towards a number of places of destination, and C reflects a case in which people from different origins are heading towards a single place of destination.

Fig. I.2



However, it is extremely rare to find only one place of origin and only one place of destination for any particular flow. Our case study shows different places of origin and different places of destination as in Fig. I.2.A. Moreover, mobility flows in this study are considered as moves between areas rather than between points of origin and destination, since it is found difficult - even by census organizations - to submit such actual points. Thus the analysis of population flows in this particular study are largely concerned with skilled labour movements between administrative units, i.e. provinces or geographical regions.

Regarding the direction of population mobility, it is possible to recognize a number of scales varying between the intra-regional and international movements. In some cases it is found to be relevant to relate the directional bias in population mobility and the type of population distribution as in the case of the United States of America, where the direction of the move is from the densely populated North-East to the less populated South-West and South-East (SCHWIND, 1971). In the developing countries including our case study, the direction of the flow is in the reverse direction, i.e. from the relatively less populated provinces to the densely populated ones. As stated by GETIS & BOOTS (1978, pp. 86-120) the direction of the migration flows is constrained by the geometry of population distribution within a fixed area. The distance covered by a particular mover is another important characteristic of a mobility flow. The principle of least effort associated with the friction of distance effort has often been observed in geographical studies. It has been stated that the potential mover in his application to the place utility matrix stated earlier will choose the place of destination most near to him assuming that all other factors remain the same. The reason for this option is readily given in terms of decreased cost of movement compared with long distances. Short distances are not only important in reducing the cost of a journey but also in providing the potential mover with the needed information about other places since he is likely to know less about distant than nearby places (MILLER, 1972, p. 475). In this study a combination of short-distance and long-distance moves is followed.

In considering the volume of a mobility flow, it is important to review some of the ideas stated by some scholars. ZELINSKY (1971) argues that population mobility is a function of time, i.e. the rate of population movement increases

over time and that it is higher in the economically advanced than in the developing countries. But this argument should not be taken as valid throughout, since even the pre-industrial societies are said to have been mobile (P. CLARK, 1972). A number of studies in Africa have come to the conclusion that both short-distance population movement and age- and sex- selective long-distance movements occur (CALDWELL, 1968; RIDDELL, 1970; CLAESON, 1974; MASSER & GOULD,1975). Contrary to the findings of ZELINSKY (1971) in England, these scholars argued that high rates of mobility are fundamental characteristics of these poor societies and that these movements are both a cause and effect of the modernization and urbanization processes. Our case study makes no exceptions in this respect, since the trend is from the less-developed towards the more advanced regions. But despite this fact, ZELINSKY's view has some relevance, since residential movement particularly in its long-distance form did increase during the period of industrialization and now stands at a high level in the countries with advanced economies. In Western Europe and North America about 10% and 20% are said to be the annual average turnover rate, respectively (WHITE & WOODS, 1980, p. 31).

8. DIFFERENT LAWS OF MOBILITY

A number of scholars have contributed to population mobility theory and analysis. The most important of these are the three students of population in the nineteenth century, namely: T.R. MALTHUS (1766 - 1834); W. FARR (1807 - 1883) and E.G. RAVENSTEIN (1834 - 1913). Although their work was subject to criticism even in their lifetimes, their ideas have proved stimulating to social scientists and demographers even in the twentieth century. The most important

contribution to our knowledge of population mobility were the statements of RAVENSTEIN, which he called laws of migration. They are broad generalisations of the characteristics of migrants and migration streams and have been treated recently by a number of scholars like PORTER (1956), LEE (1966) and GRIGG (1977). It is necessary to list the statements and try to test their validity by consulting our own findings along the course of this study.

RAVENSTEIN gave ten statements which he considered to be the laws of any population mobility:

- Most migrants move only a short distance.
- The volume of migration increases with the development of industry and agriculture.
- The direction of migration is mainly from agricultural to industrial areas.
- Most long-distance migration is to the major industrial and commercial centres.
- Migration proceeds step by step.
- Each migration stream or flow has a counter-stream.
- Migrants are only adults - families rarely migrate over long distances.
- A majority of migrants are females, but males comprise a majority of industrial migrants.
- Migrants are more likely to have rural than urban origin.
- The major causes of migration are economic.

The universality of Ravenstein's statements varies from one law to another. Evidence of most of these laws has already been mentioned in the foregoing discussion. It is clear that the statements were the product of his time, hence

they are not necessarily all valid for recent times.

It is true that the migrant prefers to move short-distance to reduce the physical and financial effort, but this statement does not hold true for technologically advanced areas with modern means of transportation and communications or in cases where migration takes place in spite of the high cost of transportation, as shown by the movement of seasonal labour in the developing countries.

The volume of migration does increase with the development of industry and commerce but the correlation should not be taken as a simple linear one (ZELINSKY, 1971). Such increase in volume could also be partially attributed to the increased importance and general awareness of spatial differentiation of opportunities as a result of economic development.

In a period and place of rapid urbanization such as Ravenstein's, it is expected to find population movements directed from agricultural to urban centres. This situation is - at least at a mature stage of population mobility - still prevalent in the less developed countries, including our case study. In some of the developed countries, where nearly two-thirds of the countries' population are classified as urban, the direction of the flow may be urban-urban or even urban-rural.

Ravenstein's statement 'that movement of females are dominant may be relevant only for times when many young women were in service as in the European late nineteenth century. By contrast, the present social and economic conditions in many of the less developed countries, including our case study, reveal this statement to be particular rather than universal. This could also be said of the statement 'that most long-distance movement is to the major industrial and

commercial centres'. In contrast to Ravenstein's time, most of such movement today is directed - particularly in its initial stages - towards other rural areas, where agricultural schemes have been implemented, as will be seen from this particular study. Furthermore, this movement involves not only single adults, as stated by Ravenstein, but also children and whole families.

The statement which is most valid for the developing countries is that dealing with the causes of population movements. The reason for this may be sought in the similarity of the economic conditions in the late nineteenth century in Western Europe and in the less developed countries at present. This explanation of population mobility as a factor of economic development has been discussed by political economists since the eighteenth century. ADAM SMITH (1723 - 1790) in his Wealth of Nations (1776) maintained that 'the demand for men, like that for any other commodity, necessarily regulates the production of men', and ARTHUR YOUNG (1741 - 1820) in his Political Arithmetic (1774) claimed that "employment is the soul of population" (WHITE and WOODS, 1980, p.35). But in spite of the importance of the economic factors, it should not be taken as the only factor inducing population movements even at the present time. The whole series of potential variables, particularly those suggested by the behaviourists, should be incorporated in explaining the reasons behind population mobility. For practical reasons, particularly the lack of needed data, it is not possible to assess all the variables that induce population mobility in our case study. But nevertheless, as we shall see from the results of the field surveys carried out among a particular group of people, the economic factor is the dominant one.

Generally speaking, Ravenstein's statements have broad applicability only in the context in which they were made,

since they were inductive in origin; they stem from an analysis of particular population data derived from one particular area in a particular time-period. Recent empirical studies continue to demonstrate the applicability of these laws for societies as different as the Soviet Union and Malaysia (GRANDSTAFF, 1975; PRYOR, 1969).

Of particular relevance to our case study is the statement dealing with the process of population movement. Ravenstein stressed the step-like mobility whereby the places of those who migrate to urban centres are taken by other migrants coming from less developed regions. He showed a chain of movement comprising rural-rural, rural to small towns, small town to large city to metropolis. Although such chain movement is dominant at present in the developing countries, including our case study, it is quite difficult to assess, since population statistics are confined only to places of origin and places of destination but are completely lacking for the places in between. The only possible way is to consult a certain group of people in a particular area in a definite time-period as in the case of our empirical data collection to be presented in chapters 5, 6 and 7 of this study. For this reason it is not justified to consider such a statement as a 'law' capable of universal application.

The explanation for this type of population mobility is readily found in the individual migrant's increased access to information sources. It is clear that the migrant who moves from a backward area to the nearest small urban or industrial centre will be able to increase his information about distant relatively large centres, thus being stimulated to take a further step until he reaches the end of the spectrum where he prefers either to settle down permanently or to join the counter-stream movement.

Apart from the increase in information access, an individual may gain a new socio-economic status by his first or second step by being exposed to new opportunities of increasing his educational achievements or qualifications. Thus by acquiring a new skill, he will be stimulated to take a new step in the movement chain. Such stimulated movements have been dealt with by a number of scholars among whom is TAEUBER (1961; 1966) who has investigated the mobility patterns of rural farms, rural non-farms, small town, large town and large city populations using survey data of individuals. He concluded that different stages of movements may involve more than one generation of movers, and admitting that his survey data are not capable of testing the validity of the statement that deals with step-like population mobility. Even the data reviewed by SHYROCK & LARMON (1965) and the analysis of ELDRIDGE (1965) of the American census statistics of 1960 proved inadequate to substantiate this statement. Nevertheless, these studies stressed the importance of such chain movement in increasing the flow of information about other places or destinations. They argued that population movements comprise pioneer or primary movers and followers or secondary movers. The former group is said to be dominated by young adult males in search of a better standard of living, while the latter group consists of dependants, relatives and friends, who have received information about other places from the primary group. As will be shown later in this study, it appears that knowledge of a relative or friend already living in a place of destination can establish a crucial link in the process of population mobility. The presence of such a relative or friend is important both as a source of information to the potential mover and as assurance of accomodation at least in the first days after his arrival at the new destination. DESAI (1963), in his study amongst the Indian immigrants in Britain,

showed that the majority of the immigrants from a particular region of Western India were helped to migrate by a primary group of migrants who found them employment and accommodation and generally assisted them in making the transition to an alien culture and environment. It was the continuous communication between the origin and destination that sustained the type of chain movement. This view was supported by the findings of more recent studies such as that of E. WEBER (1977), who examined the social modernization process of nineteenth century France. GREENWOOD (1970) stressed the importance of a chain population movement as the most natural means by which mobility streams develop for the potential or secondary groups of movers.

II. POPULATION MOBILITY IN AFRICAN COUNTRIES

1. SOME HISTORICAL EXPLANATIONS

The economic history of the integration of some African peoples into production for the world market economy and the history of the consequent population mobility begins as early as the seventeenth century with the Europeans' voyages of discovery which facilitated the capture and transport of slaves to the other side of the Atlantic, where they were destined to serve in areas where the indigenous population was insufficient to carry out the needed work in the newly emerging agricultural farms of the new world. The consequence of this early population transference was an economic ruin and a near end to the further development of indigenous African culture. The prosperous capital cities of West African Kingdoms, for example, as centres of crafts and trans-Saharan trade declined abruptly (BROOKS, 1971). For European traders and plantation owners in the new world the slavery meant profit and economic development. Profits gained in the slave trade are argued to be the cause of the initial success of some of today's most reputable commercial enterprises in America and in Europe (W. RODNEY, 1972, p. 398). Thus West African regions served as a source of young adult male and female slave labourers for commodity production in the American colonies before it was turned - at the end of the nineteenth century - into a source of natural resources for European industrial expansion. In fact the transference of African labourers was stopped due to the abolition of the slave trade by the end of the nineteenth century, and accordingly population movements were directed to serve the European interests inside the Continent. This continued integration of the African people into the system of a market-oriented production began with the

establishment of a free-labour cultivation by the Colonial Governments to provide wholesome and profitable occupation (C.W. NEWBURY, 1965). The century-long depletion of the African population by the slave trade meant that there was more than enough land for the African people to continue to produce their basic necessities for themselves without further participation in the market economy had it not been for the interference of the European settlers, who siezed the best, most fertile land and took special measures to meet the problem of labour shortage. It had been reported that even in the older and more developed areas of European agriculture and mining of South Africa the transition from rural communal employment to rural or urban wage contracts was nowhere made easily or without considerable displacement of African peoples (H. HOUGHTON, 1971). It became evident that the mere political slogan of admitting a free-labour market was not enough to create expansion of exportable staples which was expected to occur automatically. To meet the increasing demand for public works, railways, the construction of the farms and mining some rural areas of South Africa had been destined to serve as labour reservoirs. To ensure a continuous flow of labourers the Native Recruiting Corporation was established by the Colonial administration in South Africa in 1912 to substitute the Witwatersrand Native Labour Association (C.W. NEWBURY, 1975). In the less endowed regions of Colonial expansion and settlement in West,Central and East Africa other methods had been adopted. Among the measures taken to mobilize the rural population to take part in the transformation of the subsistence agriculture into export-oriented agriculture both in the British-protected areas and German and French West Africa was the adoption of what was called domestic slavery - a phrase attributed to W.F. WARD (1952) - as a substitution for the external slave trade. Recruitment of liberated slaves through military or civil administrators as well as through indigenous rulers

was reported by C.W. NEWBURY (1961) to be adopted in the 1890's in West Africa. It has been argued by A.G. HOPKINS (1968) that the rise of legitimate commerce, far from bringing about the abolition of internal slavery, actually increased the demand for cheap labour within the continent, and slave raiding continued in order to meet growing domestic needs. This viewpoint could be taken as a more realistic starting point for a general study of the formation of an African wage-labour force than the rural-urban emphasis on works which concentrate on the late Colonial economic and social aspects of African manpower (C.W. NEWBURY, 1969). The recruitment of the necessary labour for the expanding market-oriented agriculture brought about the decomposition and destruction of the pre-colonial societies due to the prolonged displacement of populations, high mortality rates and the decline of the home regions.

In East Africa forced labour went hand in hand with the expropriation of all or part of the peasants' land. This was especially the case in Kenya as early as 1904 where the majority of the good quality lands were alienated to non-Africans resulting in the restriction of some tribes on inferior soils. By depriving the indigenous population of all or part of their means of subsistence they were forced to work as agricultural labourers on land that had only a few years before belonged to them. In principle, such methods of mobilizing labour for the production of commodities were not very different from the measures which had accompanied the early colonizing adventures in the Americas. But in practice they were different. In order to avoid a demographic decline which would leave the colonized lands without an adequate labour force, it appeared that some colonizers had learned that - in their own self-interest - it was necessary to exercise restraint in the disruption of indigenous production. Thus in many parts of

East Africa, the majority of the peasants were allowed to keep at least some of their land, on which they continued to meet their own subsistence (B. STOCKEY & M.A. FAY, 1980). In some of the East African countries, particularly in Kenya (East African Protectorate) there was a tendency to realize a quick transition from a system of forced labour to one of free employment by introducing wage measures for a limited time. The colonial governments were interested in implementing their economic plans by using the cheapest and, if possible most legitimate measures, since they believed that a system of slave labour and wage labour are mutually incompatible. But even the system of wage labour failed to attract African people from their traditional rural societies to regions where they were most needed. The reason for their reluctance was argued to be the mere fact that the idea of organized labour was utterly foreign to most of the tribesmen. But this assumption should not be overemphasised, since the African people had already come into contact with the European people and had become well acquainted with the system of organized labour through the adoption of domestic slavery. The most convincing explanation could be given in terms of the low wages offered by the Colonial governments as reported by W.J.MONSON (1903) in his report on slavery and free labour in the British East African Protectorate. The pull factors were not enough to detach a native worker from his secure life within his traditional social arrangement. Even the introduction of some push measures such as the adoption of head tax payments reported by P. GIROUARD (1913) proved to be insufficient to produce a continuous labour supply.

The levying of taxes was officially justified on the grounds that the colonized population should contribute to the cost of maintaining the colonial administriation which was bringing them so many benefits. But in reality the imposition of such taxes meant that the people now had need for

money to pay the newly levied taxes. There were two ways in which the indigenous population could get money:

1) by working as wage labourers in the mines or in the lands that had been expropriated by the colonists (A. KRAUTER, 1979);

2) by raising cash crops for market sales on the plots of lands that had remained in their own possession.

Thus taxation monetarized the participation of the colonized peoples in providing commodities for world market, and thereby made such participation appear 'voluntary' and a normal part of international trade. It followed that, particularly in areas where land was scarce, the production of food for local consumption fell (F. BREMER, 1977; K. HABERMEIER, 1977). The prices the peasants received for their cash crop commodities were just high enough to enable the payment of taxes and nothing could be saved to allow for the purchase of agricultural inputs which might improve the level of productivity in peasant farming. Even the wages earned were not enough to feed the workers and their families over the payment of taxes. They had to depend on the rural activities of their families for their subsistence needs (M. CAUFIELD, 1974; D. METZGER, 1976; B. ROGERS, 1978). For the wage workers themselves, employment in the European enterprises was only a temporary activity for most of them, migration became a way of life (J. FRIEDMANN, E. McLYNN, B. STUCKEY, C. WU, 1973). They practised a sort of seasonal migration whereby workers spent part of the year on the plantations and the rest at home working on their own land with their families. Only those who went to work in the cities or mines stayed away for several years at a time (R.L. SKLAR, 1975). Such temporary migrant labour offered colonial enterprises producing for the world market significant advantages over the permanent labour force. Migrant labourers provided the employer with continuous

supply of labour power without his being responsible politically or accountable financially for the long-term survival of that supply. There was no provision for illness, injury, unemployment, families or old age. All these "social needs" were provided by the rural subsistence economy provided by tha African villages. Thus the existence of the rural subsistence sector and the development of complex patterns of migration allowed capitalist enterprises operating in many areas of the Third World to externalize the costs of reproducing their labour force. To a much greater extent than in the nineteenth and twentieth centuries in Europe, the employers of wage-labourers were exempted from bearing the full costs of maintaining their labourers (B. STUCKEY and M.A. FAY, 1980).

So far it could be argued that the explanation of the swift incorporation and massive participation of Africans in employment in the modern economic sub-sector over the past half-century cannot be attributed to economic incentives alone. Part of the historical explanation may be seen in the various measures by which foreign or local administrations have sought to exert the needed 'push' to induce labourers to leave their lands and way of life. This viewpoint has been supported by the International African Institute and UNESCO (1956, p. 34) in an article dealing with the social implications of industrialization and urbanization in Africa south of the Sahara.

2. SOME EXPLANATIONS TO THE RECENT POPULATION MOVEMENTS IN AFRICA

It is only recently that sufficient demographic and economic data have been collected to show the scope and intensity of the African population movement, particularly of

African wage-labour. It has been suggested that the number of wage-earners in the African countries expanded most rapidly between 1930 and 1955 and that 'the population of Africa, although small, is still too large in proportion to the means of subsistence obtained from the soil' (ILO, 1958, p. 107).

This imbalance between subsistence production and the availability of temporary employment - rural or urban - is essential to an understanding of the pattern and persistence of population mobility in the African countries including our case study.

The dynamics of African wage-labour mobility, however, has been treated by a number of workers devoted to socio-economic problems related to population movements. Emphasis has been placed particularly on motivation and effect within the traditional societies and on the assimilation of migrants into an urban environment. The broader aspects of environmental, capital and government intervention into the labour market have only recently been synthesized in order to construct models of population mobility. One of the most important models relevant to any explanation of the development and perpetuation of mobility streams and counter-streams is that by CLYDE MITCHELL modified by WILSON (J. GUGLER, 1968). This model includes the following variables:

Rural Push	Urban Pull
Need for money to pay for food, school fees, taxes, etc.. These push factors are supplemented by social needs e. g. 'bright lights', desire to escape from a situation of stagnation that offers only heavy, unrewarding jobs with little hope of improvement.	Need for labour in the growing urban centres as pull factor for rural population, 'bright lights' of the town: social, cultural and educational facilities.
Rural Pull	**Urban Push**
Need to maintain agricultural production, land rights and social connection for purpose of security in old age, supplemented by desire to live in family surroundings (both social an geographical).	Necessity for employees to be originated in rural areas to keep their wages low and so that employers need not be responsible for housing families of workers.

The model is based on the possible exchange of labour between the traditional and the modern sectors of the economy. It demonstrates the reason for continuous flow of people to and from the relatively developed regions. It stresses the pull of wages in the modern sector and the push to supplement socio-economic needs in the traditional sector as the most important variables resulting in traditional-modern sector movement. The need to preserve socio-economic connections for the purpose of security in areas of origin as pull forces and the low wages and the lack of socio-economic security in areas of destination as other variables resulting in the counter-flow of population movements. Thus the continuity of such population movements depends on a balance of push and pull factors within a social set-up that tends to act centripetally. It has been attempted to maintain this balance even in the post colonial time to ensure the flow of cheap labour force as will be seen in this case study.

The variables of this model, however, should not be taken as applicable in all cases. In some African countries including our case study, population movements were caused not only by the wage factor and aspirations of the natives, but also by the influence of trade routes, indigenous markets, occupational specialization by different tribal groups and the intention of the administrative bodies (M. PIAAULT, 1962, pp. 323-338).

It is to be stressed, however, that recent trends in public and private investments in most of the African countries bring about a fundamental demand for wage-labour. This demand has been met with an abundant supply of labour from the relatively underdeveloped areas. To secure a continuous flow of cheap labour from areas of origin and to avoid stabilization of migrant labour in areas of destination, it has become necessary to formulate an administrative low-wage policy whereby urban wages must be kept more or less at parity with agricultural wages and no differential to defray the rural labourer's cost in displacing himself from the land to the town (A.G. HOPKINS, 1966, p. 146). This policy is thought to be essential, since it is believed that raising wages for target workers would satisfy their wants more quickly, leading to a decrease in the labour supply (E. BERG, 1961, pp. 473-489).

A number of new forms of population mobility in Africa have been reported in the last decade (RIDDELL, 1970 b; SOUTHALL, 1971). It was generally argued that the knowledge of population movements, representing as it does a cause and effect of societal process, remains fundamentally important to a complete understanding of social change, economic development and political organization (CLAESON & EGERO, 1972 a, p.1). In this sense population mobility must be regarded as a two-way process which is not only a

product of new socio-economic development and political circumstances but also a cause of change in both sending and receiving areas. This fact has been stressed by CLARKE (1965), OMINDE (1968) and CLAESON & EGERO (1972, b).

It is essential to distinguish between three significant features of recent African population mobility. The first of these is the increasing importance of the individual, i.e. recent movements involve individuals rather than the previous large-scale, long-term corporate migration as the result of the new types of labour needs in areas of destination (J.C. MITCHELL, 1961). The second feature is the change towards economically motivated movements due to the appearance of the modern economic sector as opposed to the traditional tribal moves caused by famine and/or warfare (PROTHERO, 1968).[1] The third feature is the change in the direction of the flow away from rural areas to the growing

---

1) Recent movements should be seen in the context of the 'push' factors that cause people to leave home and the 'pull' factors that attract them to a particular destination. Broad distinctions can be made between areas of low emigration and primitive subsistence economy, areas of heavy emigration which lack cash crops or in which land is short, areas of low emigration and highly developed cash economy had finally areas of high economic and education advancement with emigration at the professional level. These combinations often overlap. (For more details about these combinations reference is made to A.W. SOUTHALL, 1961).

urban centres of economic activity (CALDWELL, 1969).[2)]

As is the case in other parts of the globe, these features are the results of diverse processes operating to influence the modern population movements in Africa. Such a complexity of processes has stimulated a considerable number of studies dealing with the patterns involved at a variety of scales over varying time periods. In almost all cases it has been observed that male-dominated labour movement is a cause and effect of regional disparities in income levels, social welfare and opportunities for economic advances. These motivated moves, started since the turn of the century, are well documented as part of the population studies in Africa (RICHARDS, 1954; MIDDLETON,1960). Individual studies of the major labour supplying tribes have been supplemented by more comprehensive national surveys of labour movements within Africa (SOUTHALL, 1961; DAK, 1968; OMINDE, 1968; CLAESON, 1974).

The findings of these studies reflect a spatial pattern characterized by long-distance highly directional movements mainly from the backward areas described as underdeveloped

---

2) With rising economic awareness and with diminished working opportunities in one's own stagnating territory, there was an overwhelming tendency to move elsewhere. The move becomes a socio-economic necessity. Ecological factors push people, especially young males who have not yet acquired land but desperately need money for marriage. Ecologically favourable locations for economic practices attract people with the result of overpopulation, as is the case in almost all the river deltas, fertile plains and oases. The result of this, in some places, is the phenomenon of desertification which compels people to remigrate to other ecologically suitable places, as is the case of the shifting cultivation in the traditional agricultural sub-sector in most of the African countries south of the Sahara in general and the rain-fed mechanized cultivation in the modern agricultural sub-sector in the Sudan in particular.

periphery to the economically advanced cores. Causes for such movements have been sought in the prevailing ecological, cultural and economic conditions at areas of origin and areas of destination within a push-pull framework.

RICHARDS (1954) studied the fertile South-Central Zone in Uganda and discussed the social and economic consequences of large-scale migration to this region as reflected in the relationships formed between relatively poor labourers from peripheral districts and the wealthy South-Central region. In their destinations the immigrants show a multi-nucleated residential pattern which emerged distinguished from the bases of the geographical origin (HIRST, 1975).

The impact of population mobility is a theme also considered by CLAESON and EGERO (1972 b), who illustrate the effects of selective migration on the demographic structure of Tanzania's major towns emphasizing the dominance of adult males and the marked sex imbalance within the different age groups. Analysis of the geographical impact represents an important field of inquiry in the developing societies of Africa. The impact of sex imbalance at places of origin and places of destination resulting from labour movements has been discussed in Ghana by HUNTER (1965), in Zambia by KAY (1967) and in Kenya by OMINDE (1968).

As a result of multiplicity and complexity of population mobility in tropical Africa and due to the increasing interest in the subject, several attempts have been made to summarize and review the various findings for the whole continent (PROTHERO, 1964; GUGLER, 1968, 1969). In addition to these attempts some effort has been made to classify the various types of mobility within a quantitative frame-work (PROTHERO, 1968; HANCE, 1970). More recent comprehensive

studies, based on improved quality and quantity of population mobility information derived from improved population censuses, reflect the application of more spohisticated models and techniques in order to improve levels of explanation GODDARD, A.D., et al, 1975; HIRST, 1976).

III. RURAL DEVELOPMENT MEASURES AND POPULATION MOBILITY

1. AGRICULTURAL DEVELOPMENTS AS A CAUSE OF POPULATION MOBILITY

The critical state of the world food supply has placed agricultural production in the forefront of public attention. Food supplies must be increased to meet the requirements of a growing rural and urban population and to improve nutritional standards particularly in the less developed countries. For this purpose all available resources, particularly land, manpower, capital and technology have to be mobilized. This policy has been followed to a considerable extent in the developed countries, where the use of mobile steam engines to augment human and animal power in the late nineteenth century and the introduction of the internal combustion engine to provide light-weight, highly mobile and efficient sources of power in the beginning of the twentieth century have contributed to increasing productivity and reducing the drudgery of work for the farmer. The development of industries in particular centres has induced the mobilization of resources, particularly the rural populations, who have been displaced by the introduction of new production systems. The continuous use of a high-level technology meant that a declining number of labourers was needed to work a growing number of acres. For many millions of people this has meant a new phase of forced migration from rural homelands. Such development is significant for our assessment of the effect of agricultural mechanization on population mobility in the less developed countries. Its significance lies in the fact that the increase in output and productivity achieved through mechanization of agriculture are not being used to augment the food intake of rural populations. Rather as in the colonial past, production is

directed to the much more lucrative world market.

This process of the late nineteenth and early twentieth centuries is now going on in almost all the developing countries, including our case study. For economic factors, limited technical knowledge and social conditions the speed is relatively slow.

In the developing countries today there is a wide spectrum of development methods, since each country has its own unique set of conditions (natural resources, social, economic and political factors). Without question every country hopes to develop and improve the standards of living of its people, and specialists from many disciplines cooperate to formulate national plans and national policies to speed up the rate of development. Of crucial importance to the developing countries are measures to develop rural areas with the aim of reducing the regional disparity, particularly between rural and urban areas. They have to devise strategies especially designed to achieve the welfare of the majority of their populations.

Mainly because of their rapid population growth, the developing countries have to increase their agricultural production much faster than ever before, and at the same time do so in ways that also increase employment opportunities within the rural areas as fast as possible to reduce rural-urban population movements which are cause and effect of development disparity. But these two basic aims are not always completely compatible since the strategy that will increase the production will not necessarily solve employment problems at the same speed. Mechanization and the introduction of new cereal varieties are particularly components of such a strategy. Unfortunately, these two components have

been used unwisely, with the result of undesirable displacement of labour. In most of the developing countries an implementation of development policies is not carried out by a group of specialists, who are aware of the interconnection of the productivity and employment problems. In most cases agricultural engineers and to some extent economists have to form national policies, which give no consideration to regional development. Interdisciplinary cooperation between agricultural engineers and social scientists is not yet available to a substantial degree due to lack of adequate data base.

Generally, agriculture is such a dominant feature of the developing countries, that the strategies chosen to implement rural development will determine to a great extent the nature of the entire socio-economic development that will emerge. Agriculture will remain for decades to come the main livelihood for most of the people in the developing countries. Since the main objective of agricultural policies has been to increase the total amount of food produced, there has been relatively little concern with the wider aspects of rural development, particularly with how to bring rural population into modern life. Only recently are national governments becoming more sensitive to the broader range of issues closely related to the creation of more rural jobs and a more equal distribution of income with the aim of reducing regional disparity.

One of the most arguable attempts adopted by most of the developing countries is what is called "The Green Revolution", which is intended to play a very important part in implementing policies releated to rural development by raising productivity and incomes of many millions of peasant farmers (GRIFFIN, K., 1974). The most important

element of the Green Revolution is new high-yielding varieties of wheat, rice, maize and other coarse grains which have been spreading in the Asian countries since the mid-sixties and in the African countries only recently (D.G. DALRYMPLE, 1969).

It is not our intention to present all the repercussions of the adoption of the Green Revolution in the developing countries, but it is worth mentioning that discussions on how countries can sustain the new agricultural policy have tended to neglect the relationships between land and capital, on the one hand, and the employment of manpower on the other hand. Advocates of this new policy argued that the new varieties were to be the potential seeds of the rural regeneration that is essential to the development of the poor nations. It was expected to help provide productive jobs in the agricultural sector as well as to initiate the necessary increase in productivity in order to raise the living standards of millions of peasants in rural areas. But this new development policy could also contain danger such as the widening of socio-economic inequalities within the rural areas and the creation of unrest which may threaten any rural development. It is argued that the increased yields result only under certain conditions - the purchase of the new hybrid seeds, regular irrigation and the use of expensive high-quality inputs like pesticides and fertilizers (G. WILKES, 1977). Such inputs, of course, demand a far higher capital outlay than the average peasant in the developing countries could afford. It is further argued that 'in spite of the credit systems which are set up in some countries to allow for the participation of the smallholders in the programme, the major beneficiaries of the new agricultural policy are the large commercial farmers and the producers of the necessary agricultural inputs' (K. GOUGH, 1978, pp. 12-13).

The expansions of the Green Revolution have left their marks on the economic situation in the developing countries. Land previously used as a means of production in the rural subsistence sector has been transformed into a resource for world market production. The peasants and their families - being faced with increasing hunger in the villages - were forced to migrate. The migration patterns of the dispossessed rural population today have received far more attention in the academic literature than the expropriation of land which forced their migration. Scholars are concentrating on the complexity of migration or on searching for psychological explanations for it, rather than examining the economic situation that induces it.

The question of agricultural mechanization in relation to the Green Revolution is of particular importance in this context which will be dealt with separately and elaborately in the following discussions, since this is considered to be the most influential factor in population mobility.

2. THE PARADOX OF AGRICULTURAL MECHANIZATION IN THE DEVELOPING COUNTRIES

Mechanization of agriculture in the developing countries, including our case study, has been taking place slowly but steadily over the past few decades. Its introduction is causing cocern among governments and labour leaders with growing disagreement as to its benefits and costs. It has attracted the attention of technocrats and policy makers at national and international levels. There is a strong belief that the trend towards mechanizing agriculture is historical in nature and is brought about by economic and social processes. The rapid increase in the use of tractorization has been recently recognized as one of the most important

strategic measures relevant to rural development in the less developed countries along with the spread of the Green Revolution.

Paradoxically, the accelerating trend towards mechanization is occurring at a time of growth in the rural labour force, the result being the displacement of peasants and agricultural labour. As part of the new agricultural policy, mechanization is expected by its advocates to define the future of the whole agricultural sector, to raise productivity and income levels for many producers, to reduce the gross inequality of earnings between urban and rural areas as well as between various economic sectors, to utilize the labour force more efficiently and equitably and to lessen the frustration of job seekers, mainly the young, by enabling them to obtain the type of work or the remuneration which they consider adequate (ILO, 1972).

It is clear that even in those countries which have achieved a high level of economic development, the employment problems have remained in most cases. Indeed, successful growth, as conventionally measured has frequently exacerbated the employment situation, particularly from the standpoint of income distribution. This has been well documented in the case of the Green Revolution in countries like India, Pakistan and Latin America, where, as elsewhere in the developing countries, it has been recognized that resolving the purely economic problems, difficult though it is, is inadequate, and that this has led to a re-ordering of development priorities. Thus some countries are now giving priority to development strategies that attempt to deal with one or more aspects of the social problems associated with economic development, particularly employment problems. In this context the criteria for mechanization at the farm level can no longer relate exclusively to the objectives

of increasing farm output and incomes; nor can the effects of the innovations on rural income distribution and employment be disregarded. One of the multiple objectives on the long-term basis is the substitution of mechanical power for human and animal effort. Although this objective would appear to be essential for the achievement of a sustained increase in rural incomes per capita, it is the immediate and short-term consequences of farm mechanization which has the greatest impact on the welfare of the developing countries. It is not only the economics of mechanization at the farm level which must be considered, but also its impact on the social and political framework and the distribution of economic power and population. Thus it is not enough to argue that "since by definition, technological change means an increase in resource productivity, no such change can be intrinsically bad" (G.F. DONALDSON & J.P. MELNERNEY, 1973).

Thus the key issue to be considered in regard to agricultural mechanization in the developing countries, however, is "its paradoxity", a phrase attributed to BELL (1971) and relating to the replacement of an increasingly abundant labour force by increasingly costly machines. In the absence of specially designed policies, small farmers are deprived of the benefits of the new policy. Moreover there is the "dilemma of mechanization": the need to reduce the physiacal toil and drudgery of agricultural work, the main feature of peasant agriculture in the developing countries, without exacerbating the existing problem of unemployment, which is argued to be the main cause of the drift from rural areas to the urban centres, particularly among young people.

Although in the past decades mechanization of agriculture has proceeded at a rapid pace in some countries, implying private net benefits, few studies have attempted to measure the externalities that mechanization has created,

particularly in regard to employment and population mobility in response to the increasing regional and sectoral income disparities.

ABERCROMBIE (1972) has clearly shown that mechanization has created substantial rural unemployment and increased rural income inequality in Latin America. He estimated that three workers are displaced by each tractor in Chile and about four workers in Colombia and Guatemala. Overall he estimates that "a total of approximately 2.5 million jobs have been displaced by tractors in Latin America up to 1972". He also points out that labour displacement by mechanization increases with the size of the farm and that continued mechanization will have similar destructive effects on employment. Evidence from rice fields in Sri Lanka and the Philippines also reveals an adverse effect on employment per acre when mechanized techniques are used instead of the traditional ones (IFTIKHAR, A. 1976; B. DUFF, 1975).

The consequences of rapid mechanization in Asia have been well documented by GOTSCH (1973) with Pakistan as an example. He emphasised inequality induced by mechanization, particularly where unequal land distribution prevails. He indicated that mechanization could lead to 30% decline in labour input. Miss KUSUM (1972) conducted a study of 130 farms in 13 villages in India and stated that mechanization displaces human labour by 2,19%. These findings were confirmed by BILLINGS, M and ARJAN SINGH (1971) who examined the changes in the demand for human labour with the introduction of modern technology to agriculture in the Punjab. They stated that the aggregate of agricultural technologies resulted in a displacement of human labour by 11.5%. Similar results were reached by BOSE & CLARK (1969) in West PAkistan, who concluded that the direct social benefits of tractor mechanization appear to be less than the direct

social costs. There is no straightforward method of taking all the individual costs and benefits into account in such an analysis, but it is apparent that if they were included, the net benefit of mechanization to society would be significantly negative.

In addition to the previously mentioned negative impact of mechanization on employment, there are other potential social and economic effects. There seems to be little doubt that the pattern of tractor ownership which has emerged during the past few decades has had adverse social consequences (A. IFTIKHAR, 1976). In Pakistan 92% of the farms (accounting for 65% of the total farm area) own only 12% of the tractors. Of the total area cultivated by the private sector in 1969, 69% was on farms possessing their own tractors and 31% on custom farms, i.e. those hiring tractors (IFTIKHAR, A, 1976, p. 90). Studies in Sri Lanka show that tractors are not equally distributed among the different districts and that where they exist, they are owned by a few affluent farmers, merchants and middlemen (K. IZUMI & A.S. RANATHUNGA(1974);BILLINGS & SINGH(1970) suggested that the distribution of tractors is likely to be skewed in favour of the larger farmers, many of whom own several machines and at the same time are fairly well established in industry and trade. These findings are backed up by another study which proved that nearly half of the tractor owners are business men or planters and 14% of the rest obtained a substantial proportion of their income from non-agricultural sources (CARR, 1973). Evidence from a survey of **tractor** farms in the Pakistan Punjab clearly shows that following the acquisition of tractors, the farm size increased through land purchase. As many as 82% of tenants on farms whose owners purchased tractors were directly evicted and several more on other farms were evicted indirectly when the tractor

farms rented more land (AHMED, B., 1972, p. 123).

Apart from the inequalities arising directly from distribution of land, income and wealth in favour of the tractor owners, the recent shortage of spare parts to foreign exchange difficulties has resulted in a squeeze on those who rent tractor service, particularly the small farmers (HARRIS, B., 1974).

The above mentioned negative results of agricultural mechanization were found to be in sharp contrast to the conclusions reached by some respected institutions and scientists. In India, for example, the National Council for Applied Research in New Delhi conducted a study in 1971 regarding the impact of agricultural mechanization, and came to the conclusion that mechanization was accompanied by more intensive and diversified farming which helped to find additional employment opportunities. The study stated that the net effect was 25% more labour input per hectare. Moreover, the introduction of machines to agriculture created more non-farm employment such as machinery production, distribution, financing, insurance, repairs and maintenance, etc., though it was not established quantitively, the significant possible effect of mechanization on output showed that it gave rise to further employment of labour directly or through a multiplier effect. The study further concluded that small farms increase family and hired labour input per hectare with mechanization. On the large farms there was a tendency to employ more permanent hired labour and less casual hired labour and family labour. These findings confirmed the conclusions of LAWERENCE, R.(1970) that the costs per unit of output decreased continuously as mechanical devices were added with an overall reduction of 50% as compared to traditional methods, and that the human labour employment per

hectare on the mechanized farm remained nearly equal to the bullock operated farm.

By studying the changes in employment of farm labour under the impact of increasing use of tractors in India, Japan, North Korea, South Korea and Taiwan, HARRINGTON (1972) showed that the latter four Asian countries - more mechanized than India - use at least twice as many workers per hectare as in India. He further concluded that under-employment in rural India is a serious problem which could not be solved even by a restraint on the rate of farm mechanization. His argument was that high-yielding varieties and increased technical inputs demand more labour per hectare for land preparation, weed control, water management, insect and pest control as well as harvesting and threshing. For this reason he suggested that labour surplus countries can profitably use more farm labour with new agricultural techniques, but this desirable social goal should not be confused with unprofitable use of farm labour.

So far, conflicting conclusions have been reached regarding the effect of mechanization in displacing human labour, particularly in the densely populated countries. Such findings, however, are difficult to generalize, since they show results of studies in particular areas and in a particular time period, tracing the effects of mechanization on a defined production unit under certain socio-economic conditions. It is not mechanization as such which affects employment and productivity positively or negatively but the natural, social, economic and political context of that defined production unit.

3. HOW AGRICULTURAL MECHANIZATION CAME TO BE ADOPTED IN THE AFRICAN COUNTRIES

Before the advent of colonization and precisely up to the nineteenth century, most of the inhabitants of Subsaharan Africa were living outside the money economy. An exception to this were the cities and towns of the Savannah belt and the maritime entrepots along the East Coast. It was an agricultural economy of the household type with very limited specialization of production. Methods of production were directed by the prevailing environmental conditions and there was rarely any population pressure to force an intensification of land use. The limited volume of trade limited the output to the immediate needs of the tribe or family.

This situation was changing gradually through the impact of colonialism which created conditions conducive to raising agricultural output and commerce. The introduction of money obligations, the development of transport systems facilitated a rapid expansion of external trade that depended on a marketable surplus beyond subsistence requirements. This surplus was large enough to meet the demands of the expanding African Urban centres inhabited by the colonial administration as well as to provide for major exports such as raw materials for the expanding industries in the European countries. The return from these exports, little as it was, was necessary to finance imports needed to meet expanding demands, mostly for consumer goods, for the colonial, and some African elite classes.

To achieve an increase in agricultural production, there was a tendency to expand the cultivated area to new lands, to introduce new higher value crops and to allow for technological changes in the agricultural sector. This policy had been followed since the middle of the nineteenth century

and most notably since the first decade of the twentieth century (YUDELMAN, 1975).

Technological changes in African agriculture, defined as the introduction of new inputs in the production process, are changes that took place at the farm level. The adoption of these inputs was meant not to increase the productivity of the African farmer but to increase profitability for the colonizers.

Because a minimum requirement of scientists and technicians needed for the development of a high-technology agriculture was not locally available in the mid-nineteenth century, nearly all the science-based technology and the needed skilled persons were imported to Subsaharan Africa from the European countries. Indigenous Institutions were developed to play only a complementary role.

The first new inputs brought into Africa were introduced spontaneously by travellers and traders coming from other regions of the world. These first changes in agriculture were not so much changes in techniques of production as in the introduction of new crops (MARVIN, P.M., 1966; DE GREGORI, 1969).

Initially, in the absence of direct government intervention in agriculture, it was the missionaries and the private corporations or individuals who assumed important roles in developing agriculture (OLIVER, 1972, TOTHILL, 1940). They were responsible for the introduction and dissemination of many important export crops in Africa such as cotton, tobacco and coffee to mention only a few (YUDELMAN, 1975). Moreover, they helped to spread the improved techniques of production and created some of the conditions necessary for technological change in agriculture.

These initial contributions were later deliberately expanded by the colonial administrations which determined the pattern of agricultural development in their respective colonized countries. They adopted a policy which placed increasing emphasis on the application of the new scientific technology being followed in the European countries.

Although the principles of technological change and international transfer of technology tend to apply to all sectors of an economy, several aspects of this process are peculiar to agriculture, especially with relation to transfers from Europe to Africa. Transferred inputs included what are called the reproducible and non-reproducible agricultural inputs. The former, such as seeds and animal breeding stocks, are those which have inherent qualities of their own, influenced by the physical environment and reproducing themselves. The non-reproducible ones involve manufactured goods associated with the level of the agricultural economy. The transfer of the reproducible input underwent three stages, namely: non-systematic introduction of new crops by sailors and travellers, establishment of colonial hegemony with the desire to develop export goods and finally, creation of adequate research facilities within Africa to develop local varieties, a stage which continues today. Such research is of considerable importance since the transfer of reproducible input is faced with a number of physical constraints.

Contrary to the reproducible inputs, the non-reproducible goods must be manufactured externally and applied mostly without modifications to the African countries, irrespective of the physical constraints. A reason for this could be found in the increase in trade between the agricultural and non-agricultural regions, i.e. between the underdeveloped and the developed countries. Such a division of labour is vital to ensuring an open market for the articles

manufactured by extremely large-scale,capital-intensive, high-technology industries located in the developed countries. An increasing proportion of the inputs purchased with revenue from agricultural products must be imported. Purely economic considerations have a bearing on the appropriateness of these transferred inputs.

In the high-income countries the relative scarcity of labour and the abundance of capital necessitated application of the new technology in agriculture. By contrast, in the low-income countries, including African countries, there was a relative abundance of labour and scarcity of capital. Thus the transfer of technology that is capital-absorbing and labour-displacing was undesirable from the point of view of increasing returns to society. In fact the colonial administration did not care much about the welfare of the African countries. Their ultimate goal was the exploitation of available resources as quickly as possible. They forced the African countries to fall back on capital-intensive technologies, since they had no interest in developing less sophisticated systems because of the low value of return.

The least successful attempts to foster technological change in colonial Africa were made in the post- World War II years by encouraging the use of machine technology, particularly tractors, in the newly implemented agricultural schemes. The costs of operation and maintenance of these machines rendered these schemes impracticable. Part of a reason for these high costs was a shortage of trained and skilled domestic personnel which had to be compensated by European immigrants to Africa. Thus the transfer of agricultural technology was accompanied by a transfer of skills. It was recognized that technological change in agriculture is not a phenomenon isolated from events outside the agricultural sector. The interdependence of agriculture and the other sectors, particularly

the industrial sector in Europe, and the subsequent intersectoral linkages influence both costs and prices in agriculture, and thus, the adoption and spread of new inputs. Indeed, because agricultural progress in tropical Africa was closely linked to the development of world markets, the major impulses for introducing technological changes in African agriculture came in response to development outside Africa. In the metropolitan powers there were commercial interests eager to exploit the resources of the colonies. For example the British Cotton Growing Association (BCGA), financed by the cotton manufacturers of Liverpool, was formed in 1902 to encourage cotton production in the hope of finding an alternative source of supply to the southern states of the United States. There is no doubt that this Association assisted substantially in the founding and expanding of the cotton industry in Africa (YUDELMAN, 1975).

The trading companies were another element in the private sector which fostered investment in agriculture and hence technological changes in the African countries. They tried to provide a means of resolving the dilemma of expanding colonial hegemony while at the same time limiting governments' enterprise and extending government administrative expenses. For this purpose what was called the chartered company became an important vehicle which was employed in the British, Portuguese and German colonies. From the three British charterd companies founded in 1886, 1888, and 1889 for West, East and South Africa respectively, only one was a financial success, namely the Royal Niger Company of West Africa (YUDELMAN, 1975). The German chartered companies, called the German 'Kolonialgesellschaften' were reported to have undertaken the major task of agricultural development between 1870 and 1915 and came to play an important role in promoting technological changes in the German territories in Africa (K. HAUSSEN, 1970). The first steam ploughing

engines and fertilizers were used by the German chartered companies in irrigated cotton plantations in East Africa.

By the turn of the century, the idea that the administration of the colonies was a public responsibility was gaining acceptance. In this connection there was much disagreement as to how great a role private interests should play in agricultural development, and especially over the question of large-scale European plantations versus African smallholdings.

As the notion of the Imperial responsibility developed, the public sector of the various colonial governments assumed an increasing interest in encouraging agricultural development and technical change.

But whatever the success of the colonial administrators in executing their economic plans, there was at least one great weakness in their approach, namely their failure to give adequate regard to local conditions and particularly to the African farmer. They failed to develop institutions which could produce the indigenous manpower needed to participate effectively in the management and direction of agricultural development in their respective countries. This weakness was one of the main causes of the failure and collapse of many agricultural undertakings (BALDWIN, 1957; McKELVEY, 1965).

Colonial administration policy, insofar as it relied on large-scale capital inputs, appears to have been followed by most agricultural projects initiated towards the end of the colonial era and even in the subsequent period of independence.

Although research and investigations were emphasised by most of the African governments in the post-colonial period, no

attempt was made to develop African agriculture along its own lines to give more consideration to the socio-economic and agro-ecological factors involved in particular region.

Unlike the case in Latin-America and Asia, agricultural development based on mechanization has proceeded relatively slowly in Africa with little marked effect on income distribution and employment. CLAYTON (1972) suggested the dominance of communal land ownership and the small owner-occupiers as the reason, but did not touch the real cause of the negative results of agricultural production, namely the dilemma of mechanization. Like other developing countries African countries have to foster development, particularly in the agricultural sector if they are to approach the standard of living of their developed counterparts. But to achieve this they have to formulate development policies which give priority to mechanization irrespective of its negative consequences. This seems to be a rather strange situation particularly in countries where capital and foreign exchange are very scarce and where labour is plentiful and cheap, two features of most of the African countries, including our case study. The explanation of this anomaly is very complex, but obviously the scarcity of capital is not reflected in the prices that farmers are charged for agricultural inputs since these are substantially exempted from tariffs and taxes. As a result, agricultural equipment can be obtained at the official exchange rate for the price prevailing in the world market. Such subsidization of capital inputs not only distorts the price system in the economy but also tends to make labour-displacing machinery profitable even when wages are very low, and where there is a growing number of under-employed workers. But capital subsidization is not the only factor encouraging the use of modern agricultural inputs, particularly tractors, in the African countries. The sharp increase in agricultural machinery

over the past few decades is closely related to the expansion of credit systems. Moreover, purchase of a machine appears to be initiated by social rather than economic factors, since there is a prestige factor in owning such a machine.

In the preceding discussions an attempt is made to show the negative results of agricultural mechanization with regard to population and income distribution.

In our case study, we attempt to reflect the repercussions of adopting agricultural mechanization in one of the African countries, the Republic of the Sudan, where agricultural mechanization determines, to a great extent, the scope and intensity of agricultural development.

IV. THE CASE STUDY: THE DEMOCRATIC REPUBLIC OF THE SUDAN

1. GENERAL NOTE

Sudan, the largest country in Africa, with a land area of about one million square miles (2.5 million km², STATISTISCHES BUNDESAMT, p. 16), ten times West Germany, and with population presently estimated at about 18 million, growing at a rate of 2.8% per year (STATISTISCHES BUNDESAMT, 1978, s.9)[1], is dependent very much on its agriculture. The per Capita GNP for 1978 averaged about US 290.[2] For most of the country there is no population pressure on presently developed land. The density is calculated at less than 10 persons/km² (STATISTISCHES BUNDESAMT, 1976 p. 18).

Although a large part of the country is desert or semi-desert, the Sudan nevertheless possesses great untapped potential for agricultural development. According to conservative estimates, about 120 million feddan (50 million ha) is suitable for crop production, and a further 150 million feddans (some 65 million ha) for range and forests (MINISTRY OF FINANCE & NATIONAL ECONOMY, 1977 p. 18). Presently, a total of about 13 million feddans (5.5 million ha) is under crop production in both the traditional and modern sectors (Table 1).

---

1) The most recent census in the Sudan was carried out in 1973. While many of the results are considered as preliminary, they represent the most reliable information currently available, which will be used in this study, particularly in relation to population characteristics and distribution (STATISTISCHES BUNDESAMT,1976 s.17, 1978 s.9).

2) No data are available on variations of the per Capita GNP. The country's overall estimated GNP is determined according to the per Capita GNP in the relatively developed east-central part of the country where it is unquestionably higher than in the other parts of the country (STATISTISCHES BUNDESAMT, 1978 s.26).

Table 4.1 Area under Different Crops in Both Traditional and Modern Agricultural Sub-sectors (1974/75 in Feddan)

Crops	Traditional sector	Modern sector	Total
Cotton	70,000	1,100,000	1,170,000
Rice	-	12,000	12,000
Maize	10,000	17,000	27,000
Sugar Cane	-	35,000	35,000
Sesame	2,040,000	830,000	2,870,000
Groundnuts	1,330,000	310,000	1,640,000
Rizinus	7,000	30,000	37,000
Wheat	34,000	427,000	461,000
Dukhun (Millet)	2,507,000	33,000	2,540,000
Pulses	35,000	-	35,000
Dura (Sorghum)	870,000	3,230,000	4,100,000
Vegetables	37,000	110,000	147,000
Total	6,940,000	6,134,000	13,074,000

Source: Yearbook of agriculture, Ministry of Agriculture, Food and Natural Resources, Kh. Sudan, 1977, p.19.

The country has been able to develop the largest irrigation system in all tropical Africa, thanks to the availability of surface water from the Nile and its tributaries. It is argued that it is not so much the availability of land as the availability of water that determines the extent and intensity of agricultural development. The area under rain-fed cultivation rose from about 6 million feddan in 1969/70 to about 12 million feddan (100%) in 1974/75, whereas the area under gravity and artificial irrigation from about

1.5 million to about 2.5 million feddan in the same period (MINISTRY OF AGRICULTURE, FOOD & NATURAL RESOURCES, 1975, p. 21).

The importance of the agricultural sector lies not only in the sheer significance of its size in terms of its contribution to the GNP but also in its importance to the labour force engaged in it. It contributes about 40% of the GNP, 90% of exports and 50% of Government revenues. It provides the livelihood for about 85% of the population. From all the arable lands only 13% are presently being utilized (KISS, T. 1977, p.8). This means that the great potential resources are not fully exploited. The amount and distribution of rainfall, the presence of underground water and the possible increase in the Sudan's irrigation water from the Nile and its tributaries all speak in favour of an extension of cultivated lands both in rainfed and irrigated areas.[3] Apart from the availability of potential water reserves, the climatic conditions are favourable for a great number of agricultural products for which a world demand is continuously increasing. The agricultural sector is not only capable of supplying crops for internal and external demand, but also in contributing to the supply of animal products, most needed by the majority of the developing countries. In this respect the Sudan is regarded as the richest African country in animal wealth.[4] The World Food conference 1974 stated that the Sudan alone is potentially capable of supplying about 40% of world food demand (AFRICAN DEVELOPMENT,

---

3) For the most part of the arable alnd, there is enough rainfall for rainfed agriculture, and huge reserves of underground water estimated to be about 12% of all the African water resources (KISS, 1977, s.24).

4) According to Fao estimates, there are about 16 million head of animals in the Sudan in 1977, and this amounts to 10% of the whole African animal wealth (FAO, 1977, p. 197).

1975, No.1, p. 12).

In view of the above discussion, development in the country is likely to be primarily dependent upon development in the agricultural sector. Deviation from the present export-oriented production policy in view of the planners and policy makers is not expected, at least in the foreseeable future, mainly because of the lower cost of production relative to prospective world prices and because of the present limitations of the domestic market.

An overall examination of Sudan's agricultural development reveals a marked dualism in the form of traditional sub-sector practising traditional crop production and livestock -raising characterized by low income and primitive production techniques on the one hand and a modern sub-sector practising crop production in irrigated and rain-fed mechanized agriculture characterized by relatively high income and modern production techniques on the other. About 30% of all cultivated land is in the modern sub-sector (see Table 4.1).

The spatial distribution of these two sub-sectors turns on the question of agro-ecological and socio-economic constraints. Unequal distribution of rainfall, quality of soils, surface and underground water defines the limits of agricultural development in the different regions of the country. Accordingly, pastoral nomadism and shifting cultivation have been practised over much of the country as a sort of natural adjustment to the environmental conditions. In the Southern Sudan the main physical constraints lie in the quality of soil rather than in the amount of rainfall. A combination of all factors needed for agricultural developments are present only in limited areas. The central clay plain of the Sudan with its adequate surface and under ground water as well as good quality soil is argued to be the most favourable region for agricultural production. Thus it is not surprising

to find that nearly all the major agricultural schemes are concentrated in this region, particularly in the present Gezira, Blue Nile (previously one province), Kassala and Southern Kordofan provinces.

Apart from these physical constraints, the regional development disparity is argued to be an effect of socio-cultural factors. The stagnation of agricultural development in the souhtern region is not only due to physical constraint but also the result of the Civil War started on the eve of independence which continued undisturbed for almost two decades. The causes of this war may be readily found in the ambition of the colonial administration to separate the southern from the northern part of the country with the argument that the two are culturally different.

The concentration of the modern economic sector (agricultural modern sub-sector, industrial sector and the most important infrastructure) in the North-East Sudan is a matter of both agro-ecological and socio-economic factors, an assessment of which would take the author beyond the scope of this study. All we need in this context is to trace back the development and expansion of the modern agricultural sub-sector as a field where agricultural mechanization has been used. Such a background is vital in shedding light on the scope and intensity of agricultural mechanization in the past and present whereby a prospect for future development may be assumed. By so doing it may be possible to reflect the probable effect of increased agricultural mechanization on the mobility of the Sudan's population with its expected repercussions.

2. ADOPTION AND DEVELOPMENT OF AGRICULTURAL MECHANIZATION IN THE SUDAN

2.1 Mechanization as a Means to Develop Irrigated Agriculture in the Sudan

Like many parts of Africa, it is thought that the supply of irrigation water is the most important asset to the economic development of the Sudan. In climatic conditions such as those prevailing in the Sudan with fluctuating rainfall - particularly in the central clay plain, where other factors are argued to be in favour of large agricultural schemes - provision of irrigation water becomes an essential requisite to better economic development. This statement has been stressed by LEWIS as part of his consideration of a policy of capital investment in African agriculture (LEWIS, 1964). Hence the attempt to utilize the surface or underground water for irrigation purposes in the Sudan seems to be justified.

In the Sudan, five main methods of irrigation can be distinguished: traditional water lifting devices using animal and/or human power (Sagias and Shadufs), basin irrigation and flush irrigation making use of the natural flow of water; systematic irrigation by diesel pumps from river or underground water, and finally systematic irrigation by gravity systems.

Although the traditional irrigation systems had been known in the Sudan many centuries ago, it was only in the second quarter of this century that modern irrigated agriculture became possible on a commercial scale.[5] This modern

---

5) The possibility of a large-scale cotton cultivation had been realized as early as 1839 and the idea was toyed with throughout the nineteenth century (T. BARNETT, 1977, p. 4)

irrigation system, centred around mechanization, is of more relevance to our theme of study than the traditional irrigation system centred around animal and human power.

The first real move in the direction of developing large-scale cultivation came in 1904 at Zeidab, when an American company was granted a concession to experiment and grow cotton (BARNETT, 1977, p. 4). The success of experimentation in this area and parts of the Gezira particularly in 'Haj Abdalla' motivated the British administration to plan for irrigated agriculture in the Sudan with a primary intention to raise revenue to meet the expenses incurred in the operation of the newly established government machinery including its services. The idea was not immediately realized because the British government was unwilling to finance the enormous irrigation works recommended by the British administration in the Sudan. It was only under pressure from the Lancashire cotton industry, represented by the British Cotton Growing Assoaciation that the idea of growing cotton on a large scale was passed by the British government in 1913 BARNETT, 1977). This action coincided with the failure of the American and Egyptian crops of 1909, that brought home to Lancashire spinners the peril of relying on only two countries, especially for the longer and finer cotton (GAITSKELL, 1959, p. 54).[6)]

---

6) As early as 1904 there was considerable anxiety in Lancashire about overseas competition. This was only symptomatic of a general trend. Whereas Lancashire had in the past had a virtual monopoly of textile manufacture, in the latter decades of the nineteenth century its position had been increasingly threatened from the United States, Germany and even China. This competition resulted gradually in its being pushed into the finer end of the market and in the process into greater dependence on the fine long staple cotton produced in Egypt. But the oppression of the 'Fellah' was so great that people left the land and consequently cotton fields were dropping. This coincided with the time when demand for fine cotton was increasing, an incidence that made the position of the Lancashire cotton industry more precarious (BARNETT, 1977, p. 5).

But this explanation should not obscure the fact that there was a strategic factor in the question of establishing large irrigation works in the Sudan. The fact that the British government required an imperial grand strategy was argued to be a reason that initially motivated the British government to control the Sudan and reconquer it in 1898.[7)]

In all, it was a combination of this imperial strategy, the crisis in the British textile industry, the increasing world demand for good quality yarn and the favourable natural conditions that convinced the British parliament to allow for the construction of Sennar Dam some 350 km. south of Khartoum. Construction works were interrupted by the outbreak of World War I, and it was only in 1925 that dam construction and canalization were completed. Duly, the Gezira scheme, the largest and most significant agricultural undertaking got under way to start gravity irrigation on a large scale in the Sudan.[8)] This gigantic irrigated scheme is regarded as the most remarkable example of development achieved by combining the entrepreneurial spirit of private enterprise with the paternalistic spirit of colonial government[9)]. For the Sudan the scheme was regarded as a model of agricultural development to be followed in all the schemes.

---

7) The Sudan was of utmost importance to the strategy of the British Empire. It formed an important link in the vision of a stretch of red on the map from the Cape to Cairo. Most importantly, it was an area which was essential to safeguarding the Suez Canal and the route to India (BARNETT, 1977, p. 4).

8) The history of the Gezira scheme and its development has been described in some considerable detail elsewhere (GAITSKELL, 1959, ABDAL RAHIM, 1968 and BARNETT, 1977, to mention a few.)

By 1950, when the Sudan Plantation Syndicate was replaced by the Sudan Gezira Board (a government corporation) the total area under irrigation was already over one million feddans (about 1/2 million ha), which reached nearly 2 million feddans by 1958 when the Managil Extension was completed (REPUBLIC OF THE SUDAN, SUDAN GEZIRA BOARD, 1963, p.14).[10)]

It is to be mentioned at this juncture that the relative success arising from this gigantic scheme at that time was the main stimulus for applying the same experience in the agricultural schemes that followed, particularly in the privately-owned pump schemes.

This group of schemes was started parallel to the Gezira schemes since the first decade of this century. They were concentrated at first along the banks of the Nile in the Northern province and later came to dot the banks of the White Nile due to the erection of the Jebel Aulia Dam in 1937 (SUDAN COTTON GROWERS ASSOCIATION, 1964). The increase in cotton production and proceeds in the Gezira scheme stimulated the private capital to venture into pump-irrigated

---

9) The creation of the Gezira scheme under the management of the British commercial companies (the Sudan Plantation Syndicate, SPS) and later also the Kassala Cotton Company (KCC) with the aid of a large loan guaranteed by the British Government, as having been a fortunate coincidence (GAITSKELL, 1959, p.53).

10) By this stadium the number of tenants rose to 96,000 with an additional 1 million seasonal workers who participate yearly in the production of the cotton crop. Nearly half of the seasonal workers have to be recruited every season from other provinces, a feature of all other agricultural schemes (ILO, 1976, p. 256, NEUE ZÜRCHER ZEIT. 1977) This will be elaborated in relation to population mobility.

cotton production with great vigour, a 'white gold' rush.[11] Accordingly their production rose from only 10% in the early post World War II period to 30-40% of the whole cotton production of the Sudan by the mid-fifties. The number of pump schemes increased fron 893 in 1952 to 2,468 in 1960, of which a number of 1,227 (49.7%) were concentrated in only one province, Blue Nile (DAVIES, 1966, p. 199).[12] According to the agricultural census of 1963 the area cultivated by some 2,283 pump schemes was 1.20 million feddans mainly concentrated in the Blue Nile and Northern provinces. They provided a livelihood for some 97,000 tenants and their families. Unlike the case in the Gezira the schemes were owned and operated by one or more investors whose main residence was in Khartoum or other big town. He provided the mechanical equipment, land and water. This investment branch was the most attractive field of private capital up to 1958 (WYNN, 1971, p. 557). Cooperative schemes were extremely rare, only 9% of the whole pump schemes up to the mid-sixties (BARDELEBEN, 1968, p. 33; THORNTON, 1964, p. 289).

By 1968, however, the Agricultural Reform Corporation was formed to take over control and administration of the private pump schemes with the following objectives:

---

11) Between 1935 and 1955 cotton production in the Gezira scheme rose by 70% mainly because of mechanization and disease control. The proceeds increased 800 % because of the rise in the world price of cotton brought about by the Korean War in 1950 (SHAKAK, K.I., 1977, p. 106).

12) HERZOG (1961, p. 54) stated that the total number of the pump schemes in the Sudan had already reached 2,766 by 1959, (quoted after OSTERDIEKHOFF, 1980, p.302).

The second of these schemes is El Suki scheme executed in 1971/ 72 to commence an area of 90,000 feddans.[14] The third and the most recently implemented one is El Rahad scheme with a target area of 800.000 feddans. The first stage was expected to be completed by 1980/81 to cover an

---

13) (CONTD.) According to the investigation of the Hydrological Department in 1953, a narrow rocky gorge near Khashm el Girba was recommended as an excellent dam site. The first preliminary studies on the soil and configuration were carried out in 1954 which estimated the potentialities of the scheme area. But, according to political and economic reasons, the scheme execution was delayed till 1964, when it was thought necessary for the resettlement of the Halfaui people, being displaced by the construction of the King Dam, a coincidence which left its marks on the scheme development(EL MANGOURI, 1978; G. HEINRITZ, 1978).

14) The scheme was planned to make use of the Nile water gained due to the construction of the Roseires Dam (1966). The scheme was meant as a trial for a possible future improvement of the dominant land tenure system and water rates practised in the Gezira. New land tenure and water rates have to be tried in this to inject more incentives for increasing productivity and to be tested for further possible application in the prospective development schemes. It was also meant to test the use of electric pumps on a large scale and full mechanization of production. It produces cotton and ground nuts at 100% intensity and is supposed to offer a living for the semi-nomadic people of the area between the Blue Nile and the River Dinder. The trial to resettle part of Red Sea nomads in this scheme proved to be a failure (ABDEL SALAM, 1976, p. 47).

- to undertake necessary steps to improve management
- to try methods to reduce production costs
- to plan and supervise the execution of a production policy drawn on commercial bases
- to ensure flexibility. effectiveness and commercial soundness of these schemes

To fulfil these objectives an area of about 700,000 feddans of irrigated cotton and dura was put under its supervision and administration (OESTERDIECKHOFF, 1980, p. 302). Recently an attempt was made to reorganize the different schemes with the view of modernizing them, as part of the rehabilitation programme for all public schemes.

Apart from the development in the Gezira scheme and the privately owned pump schemes the area under irrigated agriculture has been extended by other relatively recent irrigated schemes.

The Sudan's socio-economic plans in the post-independence period emphasised the horizontal expansion of the irrigated areas as a means to increase the country's revenue by providing exportable crops, particularly cotton and oil, seeds, and substitute for imported foodstuffs particularly wheat and sugar. To achieve these objectives it was planned to implement new irrigated schemes the first of which was the Khashm el Girba scheme (presently New Halfa scheme) inaugurated in 1964 to cover an area of some 200,000 ha including a sugar plantation.[13)]

---

13) This is a gravity irrigated scheme which makes use of the dam constructed on Atbara River at Khashm el Girba town. In fact the idea to construct a dam to utilize this most northerly tributary of the main Nile goes back to the 1940's (MINISTRY OF IRRIGATION,1955).

(CONTD.

area of some 300,000 feddans.[15)]

So far, a brief review was made to show the historical development and the process of expansion in the irrigated schemes of the modern agricultural sub-sector of the Sudan. Due to the continuous expansion of the irrigated areas it is hard to present accurate data on the actual area cultivated. Some authorities estimate the area under artificial irrigation up to 1979 to be about 4 million feddan (ÖSTERDIEKELTOFF, 1980, p. 271). This reflects an enormous expansion of the irrigated sub-sector in a very limited time.[16)] Reasons for this expansion was the possibility of extending the gravity irrigation system which allows for the irrigation of more land. The increase in world demand for cotton and oil seeds was the main stimulus to convert these lands to irrigated schemes to produce mainly for the external market, a policy which will be critically

---

15) The idea of utilizing the area East of El Rahad River goes back to 1963 when it was thought to make use of the river's flood for irrigation purposes. The investigation of that year proved the possibility of having a perennial irrigation by means of a canal to be constructed from the Blue Nile. According to the pre-investment study of 1964-65 the potential development area was estimated to one million feddans. The first proposal was to construct a canal commencing at the Roseires reservoir to permit gravity irrigation for the Rahad stage 1 of 410,000 feddans. After a further consideration a modified scheme was put forawrd with a reduced area of 300,000 feddans and the idea of the gravity irrigation was replaced by a shorter supply canal which involved pumping from the Blue Nile (MINISTRY OF CULTURE AND INFORMATION, 1977). For more details see G. HEINRITZ, 1980.

16) In 1956, when the Sudan became an independent country, the area under artificial irrigation was 0.7 million feddan only (ÖSTERDIEKHOFF, 1980, p. 272).

discussed in the chapters to come. It is worth mentioning here, that the area under irrigation will be further expanded, and at present there are a number of schemes under implementation: the Rahad stage II with a planned area to 500,000 feddans, four public sugar plantations of 222,000 feddans, Settet/ Upper Atbara scheme with 600,000 feddans, Kenana scheme with 300,000 feddans, Kenaf plantation with 30,000 feddans and an extension of the pump-irrigated scheme of about 380,000 feddans. Thus by the completion of these schemes in 1990, as projected, the total area under irrigated agriculture willrise to about 5.5 million feddans (ÖSTERDIECKHOFF,1980, p. 273). It remains to give a brief review of the second part of the modern agricultural subsector namely the rainfed mechanized agriculture.

2.2 Mechanization as a Means to Develop Rainfed Agriculture

In the foregoing discussions a brief historical background is made to the development in irrigated agriculture which produces mainly export commodities particularly cotton and oil seeds. The increase in the production of the export-oriented crops was accompanied by a considerable rise in agricultural earnings, an incentive which stimulates people to participate in agricultural production, particularly food production. As the UN noted, methods of food production though essentially stationary, have changed somewhat. The expansion of irrigated and rainfed cultivation of food-crops involves improvement in methods and labour productivity, with the result that mechanization of rainfed cultivation has reached a commercial stage (UN, 1958, p. 178).

Like the case in the mechanized irrigated agriculture, the rainfed mechanized agriculture has been developed steadily but faster. It is concentrated in the area named the 'Granary of the Sudan, lying roughly between isohytes 450-800mm

(AGABAWI, 1968, p. 71). According to conservative estimations with the suitable formechanical cultivation is about 60 million feddan mostly to be developed to produce rainfed sorghum, dura, millet (dukhun), sesame and groundnuts. These potentialities have been developed in 3 stages (M.M. ABDEL SALEM, 1976,p.53)

The first stage: prior to 1953

The second stage: 1953 - 1968

The third stage: Mechanized Farming Corporation

The first stage:

Before the opening of the railway line Sennar via Gedarif in 1929, Durah production in rainfed areas was opposed on grounds that transporting the product was too difficult. But the real stimulus for the production of grains in rainfed areas was during and immediately after World War II, when the shortage of grain and the oil seeds had drawn attention to the Gedarif area. Production was started using manual labour with the objective of creating employment opportunities for the idle labour force concentrated in Khartoum. But this employment policy had to be modified by the year 1943 when the Sudan received a proposal from the Middle East Supply Corporation (MESC) to produce sesame on a large scale using mechanical methods to ease the world's shortage of oil seeds. This proposal was rejected on the ground that sesame production requires, by nature of its shattering varieties, speed to harvest for which the needed labour force was not available in the area and was not an easy task to recruit them from elsewhere under the prevailing transport conditions. As a compromise to this proposal the government decided to mechanize the durah production in the belief that the introduction of the mechanical equipment would not only increase the durah output but also free labour

for cultivation of high value products such as oil seeds.[17] Accordingly, a preliminary work was carried out in 1945 with an area of 350,000 feddans at 'Gadmbalia' near 'Gedarif' and the required machinery, mostly heavy wheeled tractors, were imported prior to attesting as to its suitability to the environment of the Sudan (HABASHI, 1968). The venture proved to be a failure because the machinery chosen was not that suitable one for the environmental conditions of the Sudan. Moreover, the tenants lacked the experience in proper husbandry and farm management techniques. Unlike the case in the irrigated cotton production, research and experimentation in economic, engineering and agronomic aspects were lacking. To achieve better results, the government took a step in 1947 to raise the status of the farmer to full-fledged partner on a crop-sharing system and to introduce cotton as a cash crop in 1952. Both attempts failed to rectify the situation.[18]

The change of machinery in 1950 from the old inadequate tracklaying and heavy-wheeled tractors to improved farm tractors and wide level discs had special significance in outlying a new phase in agricultural mechanization in the Sudan. Administratively, the control of machinery was then vested in the hands of the Agricultural Machinery Department (AMD) at Wad el Huri. This department hired machinery

---

17) In fact the need for agricultural mechanization has long been recognized in view of the great abundance of flat and fertile land in relation to the labour available for tilling the soil (R.G. LAING, 1953, p. 2).

18) It was intended to group the tenants and their families in new villages connected with roads and supplied with domestic water. But the big size of the plots to be worked by the tenant and his family reduced their participation in carrying out the needed farm work and increased their dependence on hired labour, a typical behaviour of the semi-nomadic people (see AGABAWI, 1968).

to the Chief Engineer of the Ministry of Agriculture.[19)]

By 1954 there was a need for a reappraisal of rainfed mechanized agricultural policy. Accordingly, a working party was set up which recommended that more suitable sites with more reliable rainfall should be investigated and that the role of the government should be limited to the provision of infrastructure (improved roads, more domestic water supplies, research, marketing, credit, etc.) leaving the scheme operation to private enterprise. This was the first step to encourage the private investors to participate in the mechanized rainfed agriculture. They were expected to purchase and maintain their own mechanical equipments. Thus land and capital were made available to individuals and co-operatives with the consequence of rising acreage as shown in Table 4.2.

---

19) Parallel to this was the establishment of 'Tozi' (later Abu-Naama) Research station, a landmark in the development of the mechanized rainfed agriculture in the Sudan. Part of this objective was to carry out the necessary investigation and experiments to promote production and to increase efficiency in machine works by means of training centre which offered a two month training course in tractor driving and maintenance.

Table 4.2: Acreage under Mechanized crop production in Kassala prov. for the period 1945/46 - 1959/60

Season	Surveyed and demarcated	Area cultivated in feddan
1945/46	---	12.000
46/47	---	21.000
47/48	---	3.000
48/49	---	8.000
49/50	---	6.000
50/51	---	31.000
51/52	---	20.000
52/53	---	19.000
53/54	---	12.000
54/55	---	5.000
55/56	412.000	56.000
56/57	412.000	200.000
57/58	712.000	500.000
58/59	712.000	700.000
59/60	1.212.000	1.200.000

Source: Ministry of Agriculture, Food & Natural resources, Khartoum in M. M. ABDELSALAM (1976, p. 54)

The second stage: 1953 - 1968

To put the recommendation of the working party into effective use, many authorities were involved in selecting, surveying, demarcating and registering land previously under traditional use. A Land Allotment Board was authorized to allocate lands in areas suitable for rainfed mechanized farming to individuals up to 1.000 feddans. National Co-operative Societies and registered companies were allowed to be allotted up to 5.000 feddans and in specified areas even more. Smaller units of 100 feddans were to be allotted

to small farmers. A nominal rate of 1 piaster (2.8 c. US, 1968) per feddan and year was charged to prevent users claiming ownership. The land was leased for 8 years renewable. [20] To assist financing the equipment a gevernment-owned Agricultural Bank was created to grant credits at 6 % annual interest. [21] Consequently the private sector became enthusiastic for investing in this particular sub-sector of agriculture, despite the fact that the government Mechanized Farms of 1940's and 1950's were proved to be a failure (SHAZALI, 1966). Accordingly, the area under mechanized farming was expanded to include provinces other than Kassala, most notably Blue Nile and Kordofan provinces, where the agro-ecological conditions were in favour of such an investment (see map 1).

The trend of expansion in mechanized rainfed agriculture, started in the early fifties, was enhanced in the Ten year plan of Economic and Social Development (1961/62 - 1970/71) which laid much emphasis on producing more agricultural crops particularly American cotton for export and durah for domestic use and export. [22]

---

20) Main criterion being Sudanese national, possessing the necessary capital, knowledge, experience, physical ability and time. A tractor possession or the ability to possess it was a prerequisite to participate in this enterprise. A bank guarantee of 2.000 (approx. US $ 6.000, 1968) should be obtained by those who did not posses agricultural equipments (AGABAWI, 1968).

21) This credit system was stopped because some of the farmers were unable to pay back the debt.

22) The plan aimed at opening up an additional new area of 0.5 million feddan in Gedarif area and 0.3 million feddans in Nuba mountains. After detailed soil study, the planned area was reduced to 0.6 feddan in the two areas to be cultivated on a three course rotation, cotton, durah and sesame and fallow (The Ten Years Plan).

This policy was expected to increase the area under mechanized durah production from 998,000 feddans to 1,219,000 feddans and the productivity from 440,000 tons to 668,000 tons by the end of the plan period (The Ten Year Plan, p. 94). The table below presents the actual area under rainfed mechanized farming along the plan period.

Table 4.3.: Acreage Under Rainfed Mechanized Farming (in 000 feddans) 1960/61 - 1968/69

Season	Sorghum	Sesame	Cotton	Total
1960/61	625.7	50.6	20.4	696.7
61/62	874.3	137.3	28.3	1.039.9
62/63	700.0	75.3	33.0	808.3
63/64	765.6	151.8	18.6	939.0
64/65	941.7	90.0	18.4	1.051.1
65/66	892.7	71.9	21.8	986.4
66/67	1.146.7	218.7	30.2	1.395.4
67/68	1.634.4	321.5	36.6	1.992.5
68/69	676.3	298.5	34.6	1.009.4

Source: Mechanized Farming Corporation, Ministry od Agriculture, Food and Natural Resources, in M. M. ABDELSALAM (1976, p. 56)

The third stage: 1969/70 onwards.

By 1969 the mechanized farming corporation (MFC) was formed with the responsibility to prepare land for mechanical farming, survey and demarcate farms on a sound agricultural basis, direct tenants to adopt sound agricultural production techniques, grant necessary loans subject to certain prescribed terms and to market the crop produced. In the mechanized crop production schemes (MCPS), the corporation was authorized to allocate land to private investors and cooperatives who then clear

the land and provide their own equipment, sometimes with credit from the Agricultural Bank. The total area under the MCPS was some 2.6 million feddans.

Another responsibility of the corporation was to represent the government by the supervision and the managment of the Mechanized Farming Projects (MFP), a private sector under the supervision of the state. For this group of farms which cover an area of about 400,000 feddans the corporation was responsible to provide some services (credit and machinery), clear the land and supervise farming. [23] Besides, the corporation undertakes the full operation of the state mechanized farm (SMF) which covers an area of 320,000 feddans. [24]
(see Table 4.4.)

Table 4.4.: Acreage under Rainfed Mechanized Farming (in 000 feddans) MCPS + MFCS, 1969/70 - 1974/75

Season	Sorghum	Sesame	Cotton	Total
1969/70	1.243.5	321.9	63.6	1.629.0
70/71	1.680.1	282.1	20.8	1.983.0
71/72	2.013.7	325.7	----	-------
72/73	1.746.1	513.6	22.6	2.282.2
73/74	2.421.8	730.4	34.2	3.186.4
74/75	1.488.8	571.1	28.6	2.098.4

Source: Mechanized Farming Corporation, Ministry of Agriculture, Food and Natural Resources, in M. M. ABDELSALAM (1976, p. 56).

23) The Corporation makes available the needed equipment through credits mainly from international organizations and institutions such as International Bank for Reconstruction and Development (IBRD), International Development Association (IDA) and Kuwait Development Funds (KDF).

24) The purposes of the SMF was to stabilize prices through equating supply and demand, demonstrate the use of modern technology in rainfed agriculture and to produce surplus for export.

As it could be seen from this table sorghum production covers most of the cultivated area and the total area was steadily increasing. Detailed data about the development of the rainfed mechanized agriculture in the last five years was not available at the time of data collection for this study. But in the revised Five Years Plan ending 1977, an area of some 2.8 million feddan was expected to be surveyed and demarcated (The Five Year Plan).

In the Six Year Plan 1977/78 - 1982/83 funds in the public sector should be provided to strengthen the state mechanized farms as well as to assist in rehabilitation of some private mechanized schemes that have deteriorated in productivity. Major development in this sector would, however, come through the semi-private investment to be made in the framework of the Arab Authority Programme in the Sudan. The new projects include the development of about 6 million feddans under mechanized farming in southern Kordofan, Southern Darfur, and Blue Nile. An additional 0.5 million feddan would be brought under mechanized farming in the southern region. In the prospect of the Arab Authority Programme, however, the area under mechanized rainfed agriculture would be extendet to some 30 million feddans by the year 2000 (The Six Year Plan, 1977 a). Thus, the same as in the irrigated agriculture, mechanized rainfed agriculture has been horizontally extended, a feature of the whole modern agricultural sub-sector. The present availability of large potentials of cultivable lands divert the attention from practising vertical expansion of production. Paradoxically, this horizontal expansion is taking place at a quick pace despite the fact that no evidence of increase in productivity of the mechanized durah cultivation is registered. On the contrary, the tendency is even for a declining productivity per

feddan. It was registered that the average output in 1971/72 was 0.34 tons/feddan in the mechanized crop production scheme, while for the whole country the average productivity was 0.46 tons/feddan in the same year. Extension in marginal and semi-marginal lands together with rising costs of production, would even make the situation more difficult for a viable mechanized rainland agriculture (M. M. ABDELSALAM, 1976, p. 58)

So far the different stages of the mechanized rainfed agriculture have been generally discussed as part of the development strategy of the whole agricultural modern sub-sector. This review is relevant to our case study in the way that it reflects extent and intensity of agricultural mechanization in the Sudan, since this sub-sector, unlike the traditional sub-sector, is centred around mechanization. Of crucial importance to our case study is the unequal spatial distribution of the mechanized rainfed schemes among the different regions of the Sudan, a sign of polarization to be considered in the last chapter. As shown in Table 4.5. the mechanized rainfed schemes are concentrated in the provinces of central Sudan particularly Kassala, Blue Nile, Kordofan and recently Southern Darfur.

Table 4.5.: Area under Mechanized Production in different Provinces According to Official Information (in 000 feddans) 1978

Prov.	Private Schemes	Companies	MFC Schemes	State Farm	Total
Kassala	1.352	.55	.770	.72	2.249
Blue Nile	1.411	.55	----	200	1.666
S. Kordofan	.286	---	.243	30	.559
Upper Nile	.500	---	----	30	.530
White Nile	.110	---	----	---	.110
S. Darfur	.40	---	----	70	.110
Total					5.224

Source: Mechanized Farming Corporation, Khartoum, in: ØSTERDIECKHOFF, P. (1980, p. 330)

It is obvious that this agricultural sub-sector is unequally distributed among the different regions of the Sudan. Some of the reasons were already given in terms of the prevailing agro-ecological conditions. But the policy of adopting mechanized farming in the Sudan, is part of the whole economic development policy which stresses modernization and increase in production in certain regions rather than others irrespective of the side effects which may result.

In the following chapter we attempt to reflect the effect of such a policy on population mobility and how this works to intensify the prevailing regional and sectoral disparity.

V. AGRICULTURAL MECHANIZATION AS A FACTOR OF POPULATION MOBILITY

1. GENERAL REMARKS

In this chapter an attempt is made to show the direct role played by agricultural mechanization in mobilizing some groups of people. Although many factors bear upon the manpower and employment situation in the Sudan, mechanization of agriculture is known to have both direct and indirect effects on manpower needs and employment opportunities. By definition, mechanization is the replacement of human labour by machines. The introduction of new agricultural techniques, new crops and livestock varieties as well as new cultural practices such as intensification, diversification, specialization and increasing dependency on a market-oriented production system are factors affecting employment in agriculture positively or negatively, and hence inducing population mobility. Nevertheless, the effect of agricultural mechanization on population mobility cannot be treated in isolation from other factors external to the agricultural sector. Rapid urbanization, industrial development, educational and national planning are related factors which stimulate intra- and interregional population circulation. We attempt in this particular chapter to disclose the relationship between these factors and agricultural mechanization as causes of population mobility in the Sudan.

The Sudan, as previously mentioned, has reached a substantial

degree of partial mechanization in agriculture.[1] This provides an extremely valuable situation and a somewhat rare opportunity to study the effects of agricultural mechanization on population mobility at this stage of development.

The traditional interests in unskilled labour movements present a somewhat restricted view of the whole mobility process. Thus it must be supplemented by analysis of some other short-term circulatory movements which are directly caused by agricultural mechanization. The movement of skilled labour such as tractor drivers and mechanics is found to be undifferentiated in the two census enumerations, though they have become, particularly recently, a feature of Sudanese population mobility. Accordingly, we attempt to reflect its magnitude, analyse and explain its demographic and socio-economic selectivity. This is only possible through an empirical study at a micro-level, i.e. at the level of the individual and the small group, since population censuses do not provide information concerning the characteristics and behaviour of individuals. Hence we attempt to bring together the closely related elements of modernization through agricultural development by considering the implication of mechanization for the manpower as reflected in the patterns of movement generated. Focus is therefore

---

1) Partial mechanization is a relative term to full mechanization both used to describe the level of machine involvement in various phases of farm production operations. In full mechanization a relatively large amount of the total work is carried out by machines. But full substitution of human and animal energy by the machine does not exist even in the highly developed countries. Thus the term partial mechanization is currently used to describe the stage of farm mechanization in the Sudan, where tractor performance is restricted to only a few operations, such as land preparation, seeding, weeding, pest control, and, recently, harvesting of some crops. Both scarcity of capital and abundance of labour force have reduced the use of fully equipped machines which perform all the needed agricultural operations.

placed upon a single category of migrants - the skilled labour minority - who form a small group within the circulating sector of the population but which is considered to carry significant socio-economic and political weight in the development of the Sudan.

2. MECHANIZATION AS A QUALIFYING FACTOR

Although movements associated with qualification represent only a numerically small segment within the context of the Sudanese population movements, it is argued to be the most important one. Its importance lies in the qualitative composition of this particular group of people.

Since the early years of independence the agricultural mechanization assumed a position of considerable importance as a symbol of progress and institutional position of societal advance. The central government adopted overall responsibility for the expansion and development of agricultural development (Chapter IV): In formulating national policy, mechanization was regarded as an integral part of development planning (The Ten-Year Plan, 1960; the Five Year Plan, 1970; and the Six Year Plan, 1977). The demand for skilled manpower to operate and maintain the machines and mechanical equipment, made it necessary to establish training centres and workshops attached to each agricultural scheme. The spatial distribution of the functional points to locations of modern agricultural sub-sector formed an important element in creating qualification opportunities to satisfy widespread popular demand and to fulfil the needs of hitherto under-provided areas. But despite the increase of qualification opportunities across the area under mechanized agriculture, it remains both a sex and a socio-economic selective process. Joining the functional location to mechanization

is a factor of a socio-economic status of an individual, since the available vacancies fall far short of being able to serve the potential number willing to be trained in mechanical works, particularly among the school-leavers.[2] Applicants from different locations with different characteristics and motivations have to compete for a limited number of jobs as assistant driver or assistant mechanic in a particular workshop. Generally, it may be suggested that proximity to a functional location of mechanization stimulates young male people to apply for a job in it but the selection is a question of economic and social constraints. Social relations are highly decisive in the selection methods, thus those who had relatives or friends as references in the same workshop have better chances than those without relation. In this sense joining a functional location of mechanization offers a continuation of the previous social structure so that some social groups remain cohesive despite their spatial displacement. They set up the familiar pattern of a chain mobility flow, where each participation event leads to another after a time-lag in which information is sent back by a pre-migrant to a potential migrant still living in the home area. Thus it is expected that some groups are deprived of making use of the new opportunities - only because they have no relations in these functional locations - and remain unrepresented among the skilled labour of agricultural mechanization.

---

2) In a developing country like the Sudan, with an inbalanced formal education system which offers opportunities for only a limited number of persons to attain higher education, mobility among the school-leavers has become a necessity both for access to qualification and employment opportunities. In this respect mechanization of agriculture may be regarded as a sort of informal education which offers opportunities for school-leavers to acquire new qualifications.

3. MECHANIZATION AS A CAUSE OF A RISE IN ASPIRATIONS

The movement of young people, seeking qualification, to functional locations of mechanization outside the home area represents, for many, the first significant break with parental authority and may be regarded as the initial stage in their life-cycle migration. This separation from the home environment encourages a change in social relationships and cultural values, which stimulates further migration. Traditopnal codes of behaviour, customs, and tribal discipline are more easily modified or rejected (MOLOHAN, 1957).

Rise in aspiration is considered to be among the key factors that induce the circulation of this particular group of semi-skilled labourers and it is within this context that acquiring skills through mechanization plays a vital role. As HUTTON (1973, p. 97) suggests, movements come about not only because of absolute poverty, but because 'aspirations reach a level at which they cannot be satisfied by local opportunities'. In this sense acquiring qualification through mechanization acts as a major catalyst to the rise in aspiration by offering contact possibilities with the surrounding world. Hence mechanization as a training institution resembles formal education as the route to socio-economic status. 'This is evident not only in the desire of parents that their children should have a better chance in life, but in the ambitions of young people themselves who see in qualification the highway to material success' CASTLE, 1966, p. 18).

It is relevant to raise an important question, namely: what effect does acquiring new skills have upon the subsequent migration possibilities and preferences of young people in search of employment? New skills and additional experience

inevitably increase an individual's awareness of the range of alternatives outside the area of origin and may act as a catalyst to further mobility. Moreover,the influence of parental discipline is generally weakened and the individual's role within the family alters in such a way as to encourage freedom and independence. This suggestion is similar to that of CASTLE (1966) for the changing role of a student within his family.

During the training period, which varies between one and five years, an individual may earn some money necessary to cover his limited needs, hence gradually becoming an independent family member. Consequently he becomes more stimulated to break away in order to fulfil other socio-economic aspirations gained through the technical training. This is the same as has been suggested by CALDWELL (1969, p. 60) that 'the wide ranging impact of education is possibly the most important matter to be considered in inducing rural-urban migration'.

But unlike formal education, broadening experience through technical training - as a form of non-formal education - does not automatically lead young people to consider rural life as inferior. By nature of their new experience and qualification they have to search for employment - at least in the early stages of their mobility process - within the agricultural modern sector in rural areas. Thus the volume of rural-urban movement is reduced at first by the number of trainees and newly qualified workers who are still occupying jobs in rural areas before joining the stream of rural-urban migration. It may thus be argued that if it were not for the opportunities offered by agricultural mechanization, this segment of the population would also have joined the stream of rural-urban migration to satisfy their aspirations.

In the struggle to better his financial situation, a trainee starts gathering information about other places while he is still working as an assistant. This flow of information is very essential in channeling the stream of mobility even in this early stage, since a change in the place of work will be ventured only if convincing stimulations in other places are available. In this early stage the traditional explanation in terms of the 'bright light' theory in connection with rural-urban migration is inadequate. Of greater importance is the financial situation created by the inability of some areas to provide young people with the required living standard. While in most cases the cause for joining a training technical centre is the contempt for agriculture, the cause for changing the place of work, as an assistant, is the new perception of a better life to be expected in other destination.

After a training period of 1-5 years an assistant driver or an assistant mechanic is upgraded to a driver or mechanic, who as such is differently classified from the assistant. In some cases they are awarded training certificates which enable them to compete for more rewarding jobs. Thus, acquiring a certificate or a driving licence is an additional stimulus to search for better employment opportunities which are by no means equally distributed among the various agricultural schemes. In some schemes, particularly the newly implemented ones, there is a high and urgent demand for skilled labour, while in others an over-supply is prevalent. It is expected that there will automatically be a flow from areas with excess skilled labour to balance the areas with a deficit, but the decision to move is a highly complex process involving a variety of personal constraints conditioned by cultural values and personal motivations. Thus while manipulation of technical training may be

regarded as a possible way to encourage further mechanization by creating the needed skills, the ultimate success of such a policy demands that due consideration be given to the aspirations and preferences of the young people involved. The spatial implications of occupational preferences are therefore of considerable relevance within the framework of development planning, given that at least the partial satisfaction of personal aspirations is a necessary pre-requisite for social well-being and economic progress. Hence the traditional assumption that 'rural-urban movement is a natural and inevitable consequence of the development in formal education alone' can no longer be seen as valid. Greater insight into the different factors influencing the volume, distance and direction of population flows is required.

We attempt here to identify and analyse the spatial implications of occupational preferences from the individual's viewpoint by examining the motives behind changing the place of work.

Job availability in another place does not automatically imply that an individual is motivated to move. The suggestion of WOLPERT (1965) that 'the movement of an individual is a function of three factors, namely: his characteristics, the information he has about other places and the attractiveness of the place to which he may intend to move' is not enough to explain the circulation of skilled labour in our case study. More important are the 'push'-factors, such as the overwhelming socio-economic conditions in the place of origin that induce an individual to venture to change his place of work even if the other factors are not present. Qualification is regarded in this context as a catalyst which fosters mobility, since the better the individual's qualifications and training, the better are his chances of finding a job quickly when he moves away.

The low risk of unemployment at the place of destination increases his readiness to outmigrate. To prove this hypothesis a questionnaire-based study was carried out among a sample of tractor drivers in three selected agricultural schemes, the results of which will be presented in the following discussions.

4. A CASE STUDY TO SHOW THE RURAL-RURAL CIRCULATION OF SKILLED LABOUR FORCE (TRACTOR DRIVERS)

4.1 An approach to the case study

Since adequate and detailed information about circulation of skilled labourers was lacking in the Sudan, it was necessary to conduct field study on a micro-level. We have selected three agricultural schemes in North-East Sudan which we believed to offer some representation to other similar schemes in other parts of the country.[3] They have been purposely chosen due to certain technical and practical reasons:

a) Locational reasons:

They are located in central-east Sudan where irrigated and rainfed mechanized agriculture are concentrating (see map 2). Since the early fifties this region has received adequate attention of the development planners who have tried to make use of all available potential. As previously sketched (Chapter IV), this region is dotted with a number of important development projects which stimulate in-migration of a number of people, both skilled and unskilled, from other relatively underdeveloped regions. Thus it is expected to be a region with an increasing population and increasing socio-economic importance. As settlement schemes situated between the famous Sudan granary, where rainfed mechanized agriculture is practised and the old Gezira scheme, they

---

3) The three selected shemes are: the Khashm el Girba scheme, El Suki scheme and El Rahad scheme. A brief remark has been made on them in Chapter IV.

are expected to induce an interregional popualtion circulation particularly of skilled labour.

b) Time-lapse:

The three schemes were initiated in three consecutive decades (in the period between 1960 and 1980).[4] The fact that there is a period of almost two decades between the execution of the first (the Khashm el Girba scheme) and the third (El Rahad scheme) offers a good comparison of the effect of time-lapse on stimulating population mobility. This may help to prove our hypothesis that 'the longer a functional location of mechanization exists, the greater is the probability of increased population mobility'. Moreover, the time-lapse is important to demonstrate whether or not new schemes are really more attractive to skilled manpower than the relatively older ones, as has often been suggested.

c) The scope of acreage cultivated:

In terms of area cultivated in the three schemes, it is found to be the greatest acreage after the huge Gezira scheme (Chapter IV). This implies that a huge amount of mechanical equipment was necessary to work the cultivated area. Thus it is obvious that the probability of attracting more skilled labour to operate such machines is greater than in the smaller agricultural schemes. Of course the Gezira scheme, as the largest scheme in the country, might have been capable of attracting more skilled labour than the three schemes under study collectively but for

---

4) The Khashm el Girba scheme was initiated in the early sixties, El Suki scheme in the early seventies and El Rahed scheme in the late seventies and early eighties (see footnotes 13, 14, and 15 of Chapter IV).

practical reasons we have excluded it from the field survey.[5)]

d) Subjective reasons:

In his capacity as an assistant inspector of the Department of Rural Development and a research assistant to Professor G. HEINRITZ of Munich University the writer is better

---

5) Financial situation and limited time for investigation have rendered the inclusion of this largest and oldest project a difficulty. Moreover, our intention was to pick up some examples to reflect the mobilizing effect of agricultural mechanization and not to cover all the mechanized agricultural schemes in the country. For practical reasons the rainfed mechanized schemes were also excluded from the field-survey, since the time of our investigations was outside the peak season for high demand skilled labourers. In this particular subsector the high demend for skilled workers is in the period July - September when tractors are used for land preparation, seeding and weeding. At the time of our investigation in January and February there were only a few tractor drivers still attached to this sector but scattered over a wide area, thus difficult to be covered. We were informed that the majority of the tractor drivers who had been participating in this sector had joined the irrigated agricultural schemes, particularly the sugar farm of the Khashm el Girba scheme which prefers to employ temporary tractor drivers rather than permanent due to the seasonality of production, and the desire to reduce production costs.

acquainted to these particular schemes than others.[6] This is very essential in reducing the constraints to gathering information and furnishing him with the necessary perspective on the problem.

4.2 Limitations and Difficulties of Conducting the Field Survey

The writer was faced with the extremely limited information about the scope and intensity of skilled labour circulation in the Sudan, particularly in relation to agricultural mechanization. In fact only a few empirical studies have been made in this country to present the different types of population mobility, in most cases as an effect of factors other than agricultural mechanization. In this respect reference is made particularly to the studies carried out by M.E. ABU SIN (1975), E.EL BUSHRA (1976), A. SWAR EL DAHAB (1978), M.E. GALAL EL DIN (1979) and G. HEINRITZ (1977, 1980, 1982).

---

6) The writer worked as an assistant inspector in the Department of Rural Development in Kassala province for a period of two years within which time he got more acquainted with the socio-economic set-up of the region. The field surveys he conducted in this period and afterwards in his capacity as a teaching assistant in the department of geography, University of Khartoum have increased his awareness of the socio-economic problems of the region and stimulated him to do his M. Sc. in the same region. As a research assistant to Professor G. HEINRITZ of Munich University, who conducted three field surveys in the region in the years 1977, 1979 and 1980, the writer was able to increase his knowledge of data collecting methods with appropriate techniques.

Empirical studies on the micro-level on a group of skilled labourers to test the broad hypothesis that the 'adoption and diffusion of agricultural mechanization in terms of the level or time of adoption as a factor of population mobility' is lacking. Similarly no work has been undertaken on the macro-level to test the effect of agricultural mechanization on population redistribution and the subsequent effects. Even the two national population censuses of 1956 and 1973 did not differentiate the circulation of the skilled labour force from other population segments nor did they consider the role of agricultural mechanization as a factor in population mobility. Furthermore, the lack of registration methods such as those practised in some developed countries is a feature of all developing countries, including the Sudan, which limits the information necessary to present the population structure in each region.

As a consequence of all these limitations, we have had to depend on our own investigations based on intensive field surveys on a micro-level, i.e. covering a particular segment of the skilled labour force namely the tractor drivers in a particular region. To undertake such surveys the writer was confronted with some practical difficulties which limited the desired representation: the fact that mechanized agricultural schemes cover huge areas and are, geographically, dispersed reduces the possibility of completely covering all skilled labourers working there. The seasonality of mechanical operations as a function of cultivation practices in the Sudan, limits the field survey to a limited time in the year, when the highest number of tractor drivers are present in the scheme. Furthermore, the alternating high season in the irrigated mechanized schemes with that of the rainfed mechanized schemes compelled the writer to concentrate on the former group of schemes with

the exclusion of the latter.[7)]

4.3 Methodology

Due to the practical difficulty of surveying all the irrigated mechanized agricultural schemes, we have had to select a few examples, which we expect to be somewhat representative of the rest. It was not possible even in these few examples to cover all the skilled workers, since they were dispersed all over the area of each scheme. An attempt to rely on a sampling framework such as employment lists, registration cards and payroll of workers in each scheme proved, by means of pre-tests and pilot surveys, to be insufficient for drawing a sample, because they are neither complete nor conveniently ordered. Thus a number of randomly selected blocks were covered completely, questioning all the tractor drivers present at the time of investigation.[8)] In this respect our method resembles that of J.M. BLAUT (1959, p.1) who gives great emphasis to an intensive treatment with some representative coverage as a means of achieving sufficient accuracy.

---

7) See footnote 5.

8) Each scheme is divided into a number of sections and each section is divided into a number of blocks and each block is provided with a number of tractors varying according to the variation in acreage between the different blocks. In El Rahad scheme we covered two blocks (block N.1 and N.3) with a total number of 150 tractor drivers; in El Suki two blocks (block 44 and block Salma) with 73 tractor drivers. In the Khashm el Girba scheme we covered all the tractor drivers participating in the sugar farm at the time of investigation whose number was 149. The confinement to the sugar farm as compared with the extended Khashm el Girba agricultural scheme (presently New Halfa scheme) has greatly reduced the time of investigation.

It was thought necessary to conduct face-to-face interviews to answer a set of questions designed to cover most items of the study. Group interviews were thought to be insufficient, since the aim of the study was to discover the real motives and aspirations of an individual for joining agricultural mechanization and joining the process of migration. Although the questionnaire was written in simple Arabic, it was not possible for each respondant to answer independently, for the very simple reason that not all respondants could read and understand the meaning of each question. A pilot survey revealed that even those with elementary or lower secondary school education were not all able to give the study due consideration.[9] Thus the questionnaire had to be carefully formulated and the interviewers had to be adequately instructed to give more attention to the soundness of each answer.

The main survey - conducted in the period December 1979 to March 1980 - was carried out with the help of some trained interviewers selected from the students of geography, University of Khartoum. Apart from the task of supervising and guiding the survey work of the students, the writer participated personally in carrying out part of the questionnaire work. During the survey, the writer managed to check and test the accuracy of the answers submitted by each of the interviewers to avoid erroneous information. Only in this way was it possible to minimize the errors to a considerable degree and to call the attention of the interviewers to particular issues.

The raw data collected was to be prepared for scientific analysis. The first step was carried out manually by the writer himself by doing the coding sheets and coding work. The mechanical and electrical work, involving punching and verification of the coded data was carried out by the

9) To test the practicability of a questionnaire-based field survey, a pilot survey was carried out by writer among selcted groups of tractor drivers in various agricultural schemes in the Spring of 1979.

'Leibniz-Rechenzentrum, Bayerische Akademie der Wissenschaften' according to the SPSS system, whereby the data was prepared in form of tables and cross-tables for interpretation and analysis, the main task and responsibility of the writer.

5. FINDINGS OF THE FIELD SURVEY AMONG THE TRACTOR DRIVERS

5.1 Demographic Structure

5.1.1 Age Composition

According to our field survey 73.6% of the respondants are in the age-group of 20-30 years, which reflects the youth element among the tractor drivers (Table 5.1).

Table 5.1 Age Composition of the Sample of Tractor Drivers in the Three Selected Schemes

Age groups	Number of Respondants	Percentage of Total
17-19 yrs.	20	5.4
20-25 yrs.	140	37.6
26-29 yrs.	134	36.0
Over 30 yrs	78	21.0
Total	372	100.0

Source: Our own investigation (Tractor driver survey, 1980)

This age composition may be due to the high turnover among this particular group of skilled workers. The older persons were reported to be either promoted to the rank of mechanics

stationed at the functional locations of mechanization to maintain the agricultural equipment and to instruct junior tractor drivers and mechanics, or they gave up working in this sector and joined other occupations. This suggests a continuous replacement of older, qualified tractor drivers with relatively younger, less qualified tractor drivers, since the better the qualifications of a person trained as the result of the mechanization of agriculture, the better are his chances of finding a more rewarding job elsewhere. In some cases qualified workers have little or no job opportunities at their place of origin. To make use of the qualifications gained they are compelled to change their place of work with the result of creating a deficit.

By comparing the distribution of the age groups in the three schemes, it could be seen that the tractor drivers in the Khashm el Girba scheme are relatively younger than those in the other two schemes (Table 5.2).

Table 5.2 Distribution of the Sample Tractor Drivers in Each of the Three Schemes According to Age Groups

Agric. schemes / Age Groups	Khashm. el Girba N. of resp.	%	El Rahad N. of resp.	%	El Suki N. of resp.	%
17 - 25 yrs.	97	65.1	51	34.0	12	16.4
26 - 30 yrs.	42	28.2	67	44.7	34	46.6
over 31 yrs.	10	6.7	32	21.3	27	37.0
Total	149	100.0	150	100.0	73	100.0

Source: Our own investigation (Tractor driver survey, 1980)

This result confirms our hypothesis that 'the longer the functional location of mechanization exists, the greater is the probability of increased outmigration of older workers to the newly implemented schemes and immigration of younger tractor drivers to replace them'.

The higher percentage of the age group above 25 years (83.5 %) in El Suki scheme as compared with that in the more recently implemented El Rahad scheme (66 %) should not be regarded as contradictory to our previous assumption. [10] The reason for this unexpected result could be sought in the criterion used to appoint tractor drivers for the latter. To achieve the scheme objectives it was thought necessary to attract those skilled workers who had already acquired vocational technical training rather than others. Since acquiring vocational training is a recent trend among the tractor drivers in the relatively older Khashm el Girba and El Suki schemes, the majority of the newly employed tractor drivers in El Rahad scheme were directly recruited from training instititutions, such as Abu Naama and Tawzi training centres for mechanical operations connected with agricultural mechanization. [11] Such a selection method based on training certificates, motivated some tractor drivers to

---

10) It is expected that El Rahad scheme, by virtue of its recent execution and enormous incentives will attract the older tractor drivers with better qualification and more experience than the younger tractor drivers.

11) Our findings revealed that El Rahad scheme with 57.3 % has the highest number of trained tractor drivers over El Suki (30.7 %) and the Kashm el Girba scheme (4 %).

join a vocational training as a sort of upgrading presently attained at Khartoum, Wad Medani and Juba.

The importance of the age composition of this segment of the labour force participating in agricultural mechanization may be seen in the context of the total economically active population of the Sudan. According to the census of 1973, 52 % of the total population is at the working age of 15 years and over. Of these, that part of the labour force which is actually economically active is 55.2 % of the total age-group (DEPT. OF LABOUR, 1973, p. 14). This means that agricultural mechanization, in comparison with other economic sub-sectors is not only sex-selective (100 % as compared with 79 % adult male of the total national labour force), but also age selective. This could be an important factor of population mobility, since most migrants, particularly among skilled labour, are relatively young people. This age factor will be later connected with other variables which are assumed to affect the movement of this group.

5.1.2 Marital status

A combination of marital status and the number of children reveals that 52.2 % of all respondants, at the time of investigation, are married and have children; 4.3 % are married but have no children and 43.5 % are unmarried. By comparing the three schemes with one another, it is evident that the proportion of unmarried tractor drivers in the Khashm el Girba scheme is relatively higher (73.2 %) than in El Rahad (26.0 %) and El Suki schemes (16.4 %). Reasons for this variation could be sought in the composition of age in each of the three schemes. The high

proportion of the lower age-group 20 - 25 (54.4 %) in the Khashm el Girba as compared with that in El Rahad (31.3 %) and El Suki (14.3 %) may explain the unequal distribution of the unmarried tractor drivers among them, since it is expected that marriage occurs more often among higher age-groups than among the lower age-groups.

This explanation, however, should not be taken as valid in all cases, since marriage is not only a function of age but also of socio-economic attributes of an individual. Age as a factor of marriage in the Sudan may be relevant only in relation to the ability to afford the costs of marriage. The fact that the majority of the respondants in the Khashm el Girba scheme have reported to be newly employed as tractor drivers may be taken as evidence that this group, unlike the case in the other two schemes, could not afford the marriage expenses, which are presently enormously higher than a few years ago.

5.2 Social Structure

5.2.1 Regional composition (Province of birth) of the sample

Since all three schemes were implemented in an area which had been hitherto occupied by mobile nomadic tribes, it is justified to define the majority of skilled labour force in each of them as in-migrants. Our survey indicates that 58.7 % of all respondants are from the middle and morthern Sudan (Blue Nile, Khartoum and Northern provinces), 33,3 % from western Sudan (Kordofan and Darfur) and the rest from East and Southern Sudan (Table 5.3).

Table 5.3: Distribution of the Sample Tractor Drivers According to the Geographical Regions of Origin

Geographic origin	N. of resp.	perc. of total
Middle Sudan:	218	58.7
Blue Nile province	176	47.3
Northern province	35	9.4
Khartoum province	7	1.9
Western Sudan:	124	33.3
Darfur	85	22.8
Kordofan	39	10.5
Eastern Sudan:	26	7.0
Kassala	26	7.0
Southern Sudan:	4	1.1
Bahr el Gazal	2	0.5
Equatoria	1	0.3
Upper Nile	1	0.3

Source: Our own investigation (Tractor driver survey, 1980)

As to the volume and trend of migration from each province, there are, hewever, considerable variations. The low percentage of the respondants born in the three southern provinces is less surprising than the percentage of those born in Kassale province. The southern provinces, with at least 20 % of the total population of the country, is the

most economically underdeveloped region of the Sudan. This fact should have induced a strong wave of out-migration, particularly towards the relatively prosperous regions of the north-eastern Sudan, had it not been for the deliberate colonial policy of restricting movement between the two regions. Out-migration was further restricted by the civil war between the northern and southern Sudan as a product of that colonial policy, which created and intensified socio-economic differences. [12] If the great distance which separates the two regions and the poor communication systems are taken into account, it will not be surprising to register such a low participation of the Southerners in the modern agricultural sub-sector of the North-eastern Sudan. But a change in this trend is gradually taking place and is expected to reach a substantial degree in the near future if the present favourable political conditions for the region prevail and the economic development plans are realized.

More surprising, however, is the small contribution of Kassala province in eastern Sudan to the skilled labour in connection with agricultural mechanization. This province is the second most mechanized after the Blue Nile province. The reason for the low participation (7 %) could be sought in the type of population dominant there, since it is inhabited mainly by nomadic tribes who insist on continuing with their traditional way of life centred around

---

12) The Civil War which continued for almost two decades, was brought to an end in 1972 by means of an agreement (Adis Ababa-Agreement) between representatives of the Southern Provinces and the government whereby the Southern region attained semi-autonomy. However, this Civil War should not be exclusively attributed CONTD.

their livestock. Although mechanized agriculture has been practised in this province since the early fifties, it is still regarded by many nomadic tribes as the only challenge to their inherited traditional life. They reserve their own conception of a better life and are reluctant to accept any change which disregards their inherited socio-economic set-up. [13] Perhaps, it was only an illusion to expect that 'by superimposing modern agricultural techniques on to the traditional way of life, the local population would automatically and effectively participate', since they do not always perceive the benefits of the scheme in the same way as its initiators had precalculated (The Ten Year Plan, 1960, p. 7). In fact even the nomads who managed to participate in one of the developing schemes were not convinced to adopt a settled way of life or to make use of the benefits expected. Being deprived of traditional grazing areas they were obliged to strive for a plot in the new scheme to secure their living conditions which is further aggravated by the deteriorating environmental conditions particularly in the past decade. But acquiring a plot does not automatically mean effective participation and a complete integration in the new way

---

12) CONTD. to the influence of the colonial power in the Sudan. Other factors such as differences in culture, religion and language between the predominant Arab elements of the northern Sudan and the Nidlotic tribes of the southern Sudan should be regarded as well.

13) The writer (1978) treated critically the question of integrating the nomads into the modern agricultural sub-sector as part of his evaluation of the development of the Khashm el Girba scheme (see EL MANGOURI, 1978).

of life. The writer has pointed out, elsewhere, that this was one of the most effective factors which contributed to the failure of the second largest settlement scheme in the country, namely the Khashm el Girba scheme (EL MANGOURI, 1978).

The above mentioned attitudes of the nomads may explain the low participation of their young males in agricultural mechanization to acquire new skills. PAUL (1954, p. 132) suggested that the majority of the population of this province retain their own way of life and they are reluctant to move in large numbers to the urban areas. This is to be confirmed by our own findings in relation to the rural-urban movement of the nomads among the skilled labour force as will be seen in the second part of this chapter.

It should be stressed here that even this low participation is a sign of gradual change in the nomadic way of life and it is expected that in the long run there will be more contact and more diffusion of these innovations among the various nomadic groups. A glance at the data collected in the Khashm el Girba scheme, El Suki and El Rahad schemes, reveals that the first scheme, the oldest one, has a comparatively higher proportion of nomadic elements (15.4 %) as tractor drivers than the other two schemes with 2 % and 0 % respectively. Reasons for this difference may be sought in the length of time the functional location of mechanization attached to each of them has been in existence. Thus it is likely that within the next decade the number of participants in these schemes will increase as the nomads accept a settled way of life and as the technical skills are gradually transmitted by the

present skilled persons to relatives and friends.

Apart from the Southern and Eastern Provinces, the Blue Nile Province contributed almost half of all interviewed tractor drivers. The fact that this province includes the huge Gezira scheme and other important irrigated agricultural schemes has contributed to a comparatively higher degree of mechanization which ranks first among all other provinces. Accordingly, it is the province with the highest in-migration since early in this century, with the result that it is one of the most densely populated provinces, containing almost one fifth of the contry's total population. Furthermore, it ranks third to Khartoum and the Northern province in number of educated people (A. M. S. SWAR EL DAHAB, 1978, p. 145). All these factors work together to generate a base for continous population circulation into and out of the province. The early adoption of irrigated and rainfed mechanized agriculture and its steady expansion have created a solid foundation for technical training and mechanical work. The establishment of functional locations of mechanization in each scheme formed a centre of modernization and training which stimulates young males, particularly school-leavers, to participate in agricultural mechanization as an alternative to traditional occupations or urban employment. Although elementary education in this province is more widespread than in other provinces, the acquisition of higher education level has been and continues to be restricted by the limited number of higher schools. Thus acquiring a technical skill is regarded as compensation for a discontinued formal education. [14)]

---

14) The role played by agricultural mechanization as a sort of informal education will be treated in chapter VII as part of the whole assessment of its socio-economic effects.

The longer tradition in agricultural mechanization coupled with a good communication system favours a continous diffusion of agricultural equipment and technical know-how. Furthermore, the higher per capita income - ranks second to Greater Khartoum- and the subsidization of agricultural equipment has stimulated the wide spread of tractors, cars and lorries among the tenants of the Gezira scheme. This may be taken as a further stimulus for the sons to learn a new vocation on the father's owned vehicle. This was confirmed by a number of respondants, who reported that they had been trained at the father's own workshop before they join the stream of skilled lalour circulation between the various agricultural schemes.

A comparison of the distribution of respondants originating in this province among the three schemes under study reveal clear spatial preferences. Table 5.4 shows that El Rahad scheme attracts more skilled tractor drivers originating in this province (68 %) as compared with El Suki (37.1 %) and the Khashm el Girba (16.8 %) schemes. Reasons for these preferences may be related to their technical skills which facilitate employment in El Rahad scheme where comparatively higher wages are offered. This confirmed our hypothesis that 'the better the qualifications of a person trained as a result of the mechanization of agriculture, the better are his chances of finding a job even in the newly implemented schemes with relatively higher incentives'. This is quite evident if one crosses the level of training and experience gained with the income offered in each of the three schemes separately. Our inquiries revealed that the higher the level of training and experience of a tractor driver the

higher is his income. [15]

Table 5.4: Distribution of the Sample of Tractor Drivers in each Scheme According to their Province of Origin (in % of total respondants in each scheme)

Agric. Sch.	Khashm el Girba		El Suki		El Rahad	
Prov. of birth	N. of resp.	%	N. of resp.	%	N. of resp.	%
Blue Nile	25	16.8	49	37.1	102	68.0
Darfur	71	47.7	8	11.0	6	4.0
Kordofan	21	14.1	2	2.7	16	10.7
Kassala	23	15.1	--	----	3	2.0
Khartoum	2	1.3	1	1.4	4	2.7
Northern	4	2.7	12	16.4	19	12.0
Bahar el Gazal	1	0.7	1	1.4	---	----
Equatoria	1	0.7	--	----	---	----
Upper Nile	1	0.7	--	----	---	----
T o t a l	149	100.0	73	100.0	150	100.0

Source: Our own investigation (tractor driver survey, 1980)

15) It has been recorded that El Rahad scheme offers the highest income level to tractor drivers compared with the other two schemes. This may be taken as a reason for the drift of trained tractor drivers towards this particular scheme rather than others.

The Northern Province with less than 10% of the total respondants is found to be underrepresented in comparison to the Blue Nile province. Although it is regarded as the most uninhabited province of the Sudan with only 7 % of the total population, it is believed to be the province with the longest tradition of out-migration. The history of the Nubian migration to the towns of Egypt and the Sudan, and the circulation of the Gaaliyyin in the different provinces of Sudan has been well documented elsewhere (M. E. ABU SIN, 1975; M. E. GALAL EL DIN, 1979). It is relevant here to mention some factors which we believe to be pertinent to agricultural mechanization.

From an agro-economic point of view, the privince is one of those least favoured with arable land. According to G. A. DISHONI (undated mimeo, p. 2), the cultivable area is less than 500 square miles out of the total of 240,000. In addition this small arable area is continuously diminishing because of desert encroachment and Nile erosion. Its effective use is further limited by continuous fragmentation due to the Islamic system of inheritance which, with few exceptions does not favour the introduction and expansion of agricultural mechanization to the extent of the Blue Nile and Kassala provinces. Thus the chance to acquire a technical skill through agricultural mechanization as a matter of course are quite limited.

A well-established system of education and an inherited culture which despises manual labour may explain the small proportion of the tractor drivers originating in this province. But this attitude seems to be gradually changing, since our findings revealed that there is an increasing tendency toward participating in agricultural mechanization. As shown in Table 5.4 El Rahad scheme, the most

recently implemented one, attracted more than half of the tractor drivers originating in this province (19 out of 35) as compared with 34.3 % and 11.4 % in El Suki and the Khashm el Girba schemes, respectively. An explanation of this increasing tendency may be the further deterioration of the agro-economic conditions and the high rate of population increase in the home area. Furthermore, there is increasing competition among migrants from other parts of the Sudan for employment traditionally practised by persons from this province, e. g. employment in the urban areas, particularly in the informal sector. The same could be said for Khartoum province which also contributes a very small proportion of the skilled labour relative to agricultural mechanization. As the smallest province in terms of area and arable land, and with a comparatively higher per capita income than the other provinces, it is neither expected to depend on agricultural mechanization nor is it likely that the people in it will attempt to acquire skills through it. On the contrary, by including the capitol Khartoum with its expanding industrial and service sectors, it becomes a centre of gravity for all other regions, attracting people who are in search of occupation outside their traditional areas. Thus it is continuously gaining at the expense of the other provinces, particularly with respect to the skilled labour force. In a later chapter an attempt will be made to disclose the relationships between Khartoum as the centre of attraction for many qualifications and the other regions of the Sudan as sending areas for different population groups including skilled labourers.

It remains to consider the case of the Western Provinces (Darfur and Kordofan). It is a special case because the proportion of the migrants in our case study, who

reported their origin to be this part of the country, is 33.3 % of all respondants tractor drivers, while it contains only about one fifth of the total population of the country. Although the region is separated by hundreds of miles from the north-eastern Sudan, where the modern agricultural and industrial sectors are concentrated, its natives are to be found in all parts of the Sudan, particularly in the irrigated and rainfed mechanized agricultural schemes. As casual unskilled labour, they have a long tradition of out-migration, a case to be elaborated in chapter eight in relation to population movements indirectly caused by agricultural mechanization. Generally, lack of government investment in industrial development and services together with the deteriorating environmental conditions have created push factors that induce people to change their habit of seasonal migration to permanent stay in the places of destination. The construction of the railway line to Neyala at the western border of the country and the increased transport, are both the outcome of prosperity in the north-eastern Sudan and, as an essential means of tapping the human and natural resources of this region, have greatly contributed to speeding up the process of out-migration due to reduced physical and financial difficulties of movement. Furthermore the steady expansion of the modern agricultural sub-sector in other parts of the country and the resultant demand for labour force has greatly reduced the risk of unemployment for migrants from this particular region, who proved capable of undertaking the hardest type of work, contrary to migrants from other parts of the country. These conditions were and still are the cause of increased in-migration of 'Westerners' in the most developed regions of the Sudan and the tendency toward permanent settlement in areas of destination, a feature of the Sudan's regional development policy to be treated in the last chapter of

this study.

What is striking in this context is the high proportion of skilled labour originating in this region. This seems to refute our hypothesis that 'proximity to long-established functional location of mechanization is decisive in stimulating young people to acquire new skills'. An explanation for this phenomenon can be found by comparing the distribution of the tractor drivers in the three schemes (Table 5.4). The relatively high representation of the Westerners (61.8 %) in the Khashm el Girba scheme in comparison to the 13.7 % and 14.7 % in El Suki and El Rahad respectively could be interpreted as follows:

The Khashm el Girba scheme, second largest after the Gezira scheme, has attracted a huge number of Westerners since the early days of its implementation in 1963. [16] They participated at first as daily workers on the scheme construction works and later as agricultural workers. Their number is not exactly known, but BLANKENBURG, P. von and HUBERT, K. (1969, p. 345) placed it at approximately 80,000 - 100,000 as seasonal workers in excess of the agricultural workers who have taken up residence in camps scattered among the irrigation canals. This last group, relevant to our interpretation here, was not only composed of newly recruited workers from the western provinces, but mainly of families who had been working before in the Gezira scheme and Gedarif mechanized rainfed cultivated area. The drift of in-migrant flow in the scheme was justified by the relatively higher material gains, since the tenants were ignorant of the comparative cost of agricultural operations in

---

16) 'Westerners' is a vague designation of migrants from western Sudan and west African countries.

other schemes. [17] Moreover, both the Halfawis and the nomad tenants in the scheme were not acquainted with the type of agricultural operations instructed by the scheme administration. They have to depend on hired labour particularly those who had already participated in other agricultural schemes before arriving on the scheme. Consequently, a system of petty landlordism gradually emerged and spread among the new settlers of the scheme.

These favourable conditions have stimulated the Westerners to acquire more productive importance and encouraged them to exert some pressure on the actual tenant to increase their material gains from the scheme. As the actual producers in the scheme, they began to be dissatisfied with the wages they received from the tenant and demanded to have a share in the produce as legal partners of the tenants. [18] As a consequence of this new partnership system, the Westerners began to take up permanent residence in scattered settlements close to the Halfawi villages [19].

---

17) The Halfawis, being displaced and resettled in this project, were at first rewarded with a lot of compensations, which partly served to ease the hardships of the new environment, particularly to cover the cost of agricultural operations to be carried out manually and which they could not accomplish themselves (see EL MANGOURI, 1978).

18) For more elaboration on this new form of partnership see EL MANGOURI (1978 pp. 96 - 103).

19) This type of partnership was not practised in El Suki scheme and it is gradually emerging in El Rahad scheme and for this reason the Westerners are still practising seasonal labour in these schemes without being permanently settled as are those in the Khashm el Girba scheme.

In order to tap the maximum benefits from all available opportunities, they brought their families to the scheme, thus reducing the chances of counter-migration in a home area. As settlers in the scheme, they have developed a continuous contact with the other population groups. Such contacts were necessitated by daily contacts in the New Halfa town market, the social services, the field and the scheme Head- and Subquarters. The town offers them a complementary income through participation in other occupations as porters, home or office servants, street sellers and the like. All these types of contact, however, were not enough to produce the expected homogeneous society in the scheme, since each group in the scheme preserved its own identity a feature of the Khashm el Girba scheme's social setup which is argued to be one of the factors which rendered all development planning in the region to be considered a failure (AGOUBA, M., 1980, pp. 65 - 80).
It is relevant to point out, from the viewpoint of our study here, that through the contact with agricultural machines and equipment, the young male Westerners were enabled to attain technical skills. Many of them had already attained this technical know-how before joining the Khashm el Girba scheme as the result of their previous exposure to the machines in other agricultural schemes, particularly the Gezira and the Gedarif mechanized schemes. Being prepared to do the hardest and dirtiest work, they were given priority over the young nomads and young Halfawis for whom high-rewarding and pleasant jobs were reserved. Thus the skilled worker Westerners were considered as second class after the Halfawis and the nomads. This may explain their higher representation among the tractor drivers in the sugar farm and the sugar factory of the Khashm el Girba scheme which employ mainly junior and less skilled tractor drivers who are ready to take the

job of transporting the sugar-cane to the factory at minimum wage to reduce the cost of production. Such a rare opportunity did not prevail in other agricultural schemes where highly skilled tractor drivers were demanded, and higher wages and additional incentives were offered. A comparison of the wages offered to the tractor drivers in the sugar factory (average LS. 33) [20] and in both El Suki and El Rahad schemes (average LS. 55) may confirm our explanation of the phenomena of the high representation of the Westerners in the Khashm el Girba scheme rather than in the other two schemes, a result of which is by no means to be generalized.

This new tendency of the Westerners to acquire a technical skill which is not yet widely spread may be expected, in a short time to come, to grow steadily if the present stage of agricultural mechanization further develops. The spread of information among the Westerners, both in their places of origin an destination, about the prevailing occupational opportunities for skilled workers, the prevailing regional disparities, the high turn-over among employed persons, particularly among skilled labour caused by the drift towards urban centres and the oil-rich Arab countries, and the readiness of the Westerners to work under the difficult rural socio-economic conditions - in contrast to people from north-eastern Sudan - are all factors which confirm our assumption.

5.2.2 Rural-urban Composition of the Tractor Drivers

Before going into more detail, it should be noted that more than 90 % of the Sudanese population live in rural areas with settlements of less than 20,000 persons (A. SWAR EL DAHAB, 1978, p. 137). It must be noted that

---

20) LS = US $ 2 (Apr. 1980)

the percentage of those reporting a town as their place of origin should be taken with caution, because some of them,shy to reveal their rural origin, give the name of a nearby town as their place of birth.

According to our data, 82.8 % of all respondants gave a village as their place of birth, 14.8 % a town and only 2.4 % reported themselves as nomads. The relatively high proportion of tractor drivers of urban origin in the Khashm el Girba scheme (23.5 %) as compared with that in El Rahad (10 %) and El Suki (6.8 %) may be attributed to the higher number of Westerners in it, who most likely gave inaccurate answers. This is explained by the Westerners' inability to differentiate between a town and a village and his shyness to state his actual rural origin so as not to be further discriminated against by his colleagues, particularly those who really originated in urban centres.[21] The relatively low participation of the townsfolk points to an almost one directional population movement, namely: rural-rural-urban. The reason for this may be readily found in the income disparity between urban centres and rural areas even apart from the 'bright lights' of the town. Other factors remaining the same, it is expected that skilled labour moves from areas with low economic incentives to areas with relatively higher economic incentives as will be shown later on.

---

21) Rural origin is conceived by the Sudanese people to be a sign of primitiveness and is a cause for discrimination. This attitude is justified by the prevailing rural-urban development disparity to be discussed in chapter VI.

The very low participation of the nomads in agricultural mechanization (2.4 %) reflects their negative attitude towards innovation in general and paid manual work in particular. Moreover, a nomad may also be shy to state his nomadic origin as a sign of primitiveness as compared with rural or urban origin. But a change in the attitude of the nomads towards occupations other than livestock keeping may be expected in the future through further contacts with other population groups, particularly the more sophisticated townsfolk and skilled workers from other areas. The spread of development schemes and the relevant infrastructure in areas which were hitherto dominated by nomadic groups is expected to stimulate a change in their attitide by stimulating the young to accept innovations, a step which is essential in integrating them into a settled life. This step could be facilitated not only through political decision based nearly on economic achievements, but most important, by recognizing the perception of the nomads themselves of the issue of development.

5.2.3 Educational Composition

Table 5.5 shows that the majority of the interviewed tractor drivers (71 %) have formal education. Elementary education was reported by 57.8 %, intermediate and secondary education by only 12.9 % and 0.3 % respectively.

Table 5.5: Distribution of the Sample Tractor Drivers According to their Level of Education

Education Level	N. of Resp.	% of Total
Without Education	27	7.3
Non-formal Education	81	21.8
Adult Education	6	1.6
Koran School	75	20.2
Formal Education	264	71.0
Elementary Education	215	57.8
Intermediate Education	48	12.9
Secondary Education	1	0.3
T o t a l	372	100.0

Source: Our own investigation (tractor drivers survey, 1980)

This shows a relatively higher percentage of those with formal education as compared with the countries formal education ratio. According to the ILO (1976, p. 128) the enrolment ratio at the primary level in rural areas is 30 to 35 %. This shows that agricultural mechanization is highly selective in terms of education standard, since it attracts people with at least primary education. The low proportion of highly educated persons among the respondants may be due to their disdain of manual work and their preference for the 'white-collar' jobs.

If the above findings were crossed with the rural-urban place of origin it would appear that there is a relationship between education level, place of origin and the rate

of participation in agricultural mechanization. The townsfolk, with a probable higher education level are underrepresented among the tractor drivers. [22] This is mainly because townsfolk are more likely to be attracted by 'white-collar' jobs or other jobs in the formal or informal sectors in the town rather than in rural areas.

An explanation of the dominance of those with formal education over those with informal education may be sought in the composition of respondants according to their province of origin. Since the majority of respondants originated from the Blue Nile, Northern, and Khartoum provinces with the highest enrolment of children in primary schools in the country (75 %) according to ILO (1976, p. 128), it is not strange to reach such a result. This could be seen by comparing the distribution of respondants with primary education in the three schemes under study, whereby in the Khashm el Girba scheme, the majority of whose respondants originated from Darfur and Kordofan provinces - both with relatively low enrolment. The proportion of the primery-educated people in Darfur and Kordofan provinces is 50.3 % in comparison to 84.9 % and 84.7 % in El Suki and El Rahad respectively. The majority of respondants originated from the three above mentioned provinces with the highest enrolment (Table 5.6).

---

22) This may also be said of the rural folk who succeeded in achieving a higher education level.

Table 5.6: Distribution of Respondant Tractor Drivers in Each of the Three Schemes According to Education Level

Agric. Scheme	Khashm el Girba		El Suki		El Rahad	
Education Level	N. of Resp.	%	N. of Resp.	%	N. of Resp.	%
Non-formal	74	49.7	11	15.1	23	15.3
Formal	75	50.3	62	84.9	127	84.7
T o t a l	149	100.0	73	100.0	150	100.0

Source: Our own investigation (Tractor drivers survey, 1980)

5.3 Previous Mobility

5.3.1 Mobility as an assistant driver

In this section the analysis will be confined to the factors that induced previous mobility of the present tractor drivers and the motivation for further mobility.

Our data shows that the sample of tractor drivers interviewed presents a varied migration history, which began for many with their joining a workshop connected to one of the mechanized agricultural schemes which was located (for 61.8 % of all respondants) some miles away from the parents' residence, a distance which necessitated a temporary stay there (Table 5.7).

Table 5.7: Distribution of the Sample Tractor Drivers According to the Distance Between Parents' Residence and the Nearest Workshop (in km)

Category label	N. of resp.	% of total
0 - 5	97	26.1
6 - 25	165	44.4
26 - 50	42	11.3
51 and more	68	18.3
T o t a l	372	100.0

Source: Our own investigation (tractor drivers survey, 1980)

As Table 5.7 shows, the distance between the parents' residence and the nearest workshop varies considerably. It could be said generally that those who originated from the Western provinces, where traditional agriculture is practised, had to cover longer distances than those originating from North-eastern Sudan, where the modern agricultural sector is concentrated. Although such distance is important as a decision-making factor in relation to the physical and financial friction, other working factors stimulate a person to out-migrate. The availability of other occupational opportunities in the urban centres of the North-eastern Sudan, for example, divert the young males from participating in agricultural mechanization even if its functional locations are adjacent to one's parents' residence. The distance factor works effectively only in the diffusion process of innovations, since the more a place is affected by innovations (i. e. the nearer it is situated to the functional location of innovation) the greater

is the possibility of increased participation of its people. Thus for respondants originating from the North-eastern Sudan, both the nearness and the long tradition of agricultural mechanization were factors of the steady diffusion of technical know-how, particularly among the increased number of school-leavers. Of particular importance in this context is the role played by pioneer participants in transmitting technical skills through continuous contact with their home area. They act not only as a source of information about the opportunities offered by agricultural mechanization, but also as points of contact for close relatives and friends still living in a home village. Our survey shows that 78.8 % of all respondants reported a close relative as a driver or mechanic at the time of starting work in a functional location of agricultural mechanization. Thus to join a relative elsewhere was regarded by many respondants, as a stimulus to leave the home village at this early stage of a carreer ladder. For many this was the first step in their mobility process, apart from a school visit.

This early movement of the young males, as unskilled workers, continues in a period of assistantship for the sake of better training and job opportunities. 69.1 % of our respondants reported a change of workplace (one or more times) as assistant driver, mostly for material reasons. A relative or friend was given by 79 % of the respondants as the source of their information about working conditions in the places to which they moved. Unlike the tractor drivers, as will later on be shown, the assistant drivers have limited circulation because of their still limited skills and the limited number of vacancies offered to them in other places. In normal cases, a vacancy for an assistant driver will be occupied by a person from the same place rather than from a distant one, to reduce their living cost

which could not be covered by the very low wage offered to him (presently LS 29.5 as compared with LS 13.90 a few years ago). However, sometimes an assistant driver may be compelled to search for employment elsewhere, because of the temporal nature of this particular occupation due to the seasonal nature of the agricultural mechanical operations.

During a period of assistantship, ranging from one to five years, an individual becomes gradually trained to do some mechanical operations. To escape the risk of being displaced as assistant driver, he strives for a driver's licence as a prerequisite to employment as a tractor driver, a step which necessitates, for many, the first visit to an issuing place, which is, in most cases, identical with the provincial capital (95.7 % of all respondants reported a place of issue to be outside the parents' residence and 64.8 % to be even outside the birth province).

This incidence of a first visit to an issuing place probably affects one's further movement decision, particularly the move into a town, since for many this was the first personal visit to a big town where one could change his place utility matrix due to increased information about the surrounding world.

5.3.2 Previous mobility as a driver

According to our investigations, there is a higher demand for tractor drivers than for assistant drivers. This can be seen in Table 5.8 which shows the length of the waiting period for employment as a tractor driver. Nearly three quarters of all respondants were employed immediately after being issued a driving licence. A proportion of

12.6 % were even employed before being issued a driving licence. This may reflect the rapid expansion in agricultural mechanization on the one hand and the high rate of turn-over among the older tractor drivers on the other.

Table 5.8: Distribution of Respondants According to the Length of Waiting Period to be Employed as a Tractor Driver

Category label	N. of resp.	% of total
Employed before being issued a licence	47	12.6
Employed immediately after being issued a licence	270	72.6
Employed a short time after being issued a licence	55	14.8
T o t a l	372	100.0

Source: Our own investigation (Tractor driver survey, 1980)

For a proportion of 61 % the step of being employed as a tractor driver made it necessary to move away from the parents' residence or from the place where he worked as assistant driver, since qualified tractor drivers have little or no job opportunities at their place of origin. To make use of the qualifications they gained through agricultural mechanization they are compelled to move to other places (Table 5.9).

Table 5.9: Distribution of Respondants to the First Place of Working as Tractor Driver

Category label	N. of resp.	% of total
Parents' residence as a first place of work as a driver	33	8.9
Same place where he worked a assistant but not parents' residence	112	30.1
Other places	227	61.0
T o t a l	372	100.0

Source: Our own investigation (Tractor driver survey, 1980)

This step, however, is reported to be a further stimulus to circulate between the different agricultural schemes. In fact, the tractor drivers circulate more frequently than the assistant drivers, due to the high rate of turnover created by the increased rural-urban drift of qualified persons (Table 5.10).

Table 5.10: Distribution of Respondants According to the Number of Changes in the Place of Work as a Driver

Agricultural schemes	Khashm el Girba		El Suki		El Rahad	
N. of changes	n. of resp.	%	N. of resp.	%	N. of resp.	%
0	40	26.8	3	4.1	7	4.7
1	48	32.2	11	15.1	7	4.7
2 and more	61	41.0	59	80.8	136	90.6
T o t a l	149	100.0	73	100.0	150	100.0

Source: Our own investigation (Tractor driver survey, 1980)

The reasons for variation in mobility frequency may be sought in the composition of the group of drivers in each scheme. Whereas in both El Suki and El Rahad schemes the interviewed tractor drivers are relatively older, more experienced and possess licences issued some years ago, the drivers in the Khashm el Girba scheme are younger, with newly issued licences. In the Khashm el Girba scheme nearly two thirds of the tractor drivers possess newly issued driving licences (1 - 3 years old only), whereas in El Suki and El Rahad schemes the corresponding proportions were 5.4 % and 14.7 % respectively (the rest having licences longer than three years). This means that the respondants in the latter two schemes had a longer circulation history than those in the former scheme. The relationship between the length of employment period and the frequency of mobility may be sought in the degree of qualification attained in that period. Thus it may be argued that the longer the period of employment of a person the more he is liable to be qualified; and the better his qualifications, the better are his chances of finding a job quickly when he moves away. The low risk of unemployment at the place he moves to increases his readiness to out-migrate. This may explain the higher concentration of respondants in El Rahad scheme (91.6 %) with high (0.42 - 0.54) to very high (more than 0.55) mobility rate by virtue of being the most qualified persons among the respondants in all three schemes. [23]

---

23) Mobility frequency was calculated by dividing the number of moves by the age of a driving licence which gives the number of moves in a year. The resultant mobility frequencies were then aggregated in four categories referred to as low (0. - 0.20 moves / year); medium (0.21 - 0.41 moves / year); high (0.42 - 0.54 moves / year) and very high (0.55 and more moves / year).

Table 5.11: Distribution of Respondants According to Mobility Frequency in a Year (in Each of the Three Schemes)

Agricultural Scheme	Khashm el Girba		El Suki		El Rahad	
Mobility Frequency	N. of resp.	%	N. of resp.	%	N. of resp.	%
0. - 0.20	40	26.8	3	4.1	7	4.7
0.21 - 0.41	50	33.6	17	23.3	7	4.7
0.42 - 0.54	44	29.6	18	24.7	28	19.5
0.55 and more	15	10.0	35	47.9	108	72.1
T o t a l	149	100.0	73	100.0	150	100.0

Source: Our own investigation (Tractor driver survey, 1980)

5.4 Mobility Frequency of Tractor Drivers as a Factor of Different Variables

In this section we shall attempt to present some of the determinant factors which work together or separately to affect the mobility frequency of this particular population segment. Our method was to cross the aggregated four categories of mobility frequency with different variables as will be shown in the following presentations.

5.4.1 Birth place and mobility frequency

The birth place, whether a town or a village seams to have some influence on the rate of mobility of a tractor driver. Accordning to our investigations, the majority of those born in a town (52.7 %) reported a high to a very high

mobility rate, whereas the majority of the villages (53.3 %) reported a low to medium mobility rate (Table 5.12).

Table 5.12: Distribution of Respondants According to a Combination of Birth Place and Mobility Frequency

Birth Place	Town		Village	
Category label	N. of resp.	%	N. of resp.	%
0 - 0.20	14	25.5	58	18.8
0.21 - 0.41	12	21.8	106	34.5
0.42 - 0.54	18	32.7	78	25.3
0.55 and more	21	20.0	66	21.4
T o t a l	55	100.0	308	100.0

Source: Our own investigation (Tractor driver survey, 1980)

This may be attributed to the low level of qualification among the villagers together with their limited contacts with the key figures in the different agricultural schemes who work out new applications. Through such contact persons the townsfolk are able to evaluate the working conditions prevailing in different regions and accordingly, they are always ready to shift to a more rewarding job offered in another locality, before a villager has been able to gather the needed information about it. Moreover, it is harder for a person originating from a town to fulfill his aspirations by confining his movements to a limited number of working places in the rural areas. By virtue of being born in a town with different place utility matrix than that of a villager, he always tries to achieve his goals by changing his place of work whenever a more rewarding opportunitiy becomes available. The relatively

lower risk of unemployment at a new place of destination - in contrast to a villager - increases his readiness to change his place of work.

5.4.2 Birth Province as a variable of mobility frequency

By relating the mobility frequency of a tractor driver and his province of origin, some variations will be apparent. Whereas two thirds of the people originated from north-central Sudan (Blue Nile, Gezira and Khartoum provinces), reflects a high to very high mobility rate (0.42 and more), the majority of those originating from the northern, eastern and western provinces fall within a low to medium mobility rate (below 0.41) as shown in Table 5.13.

Table 5.13: Distribution of Respondants According to the Combination of the Geographical Origin and Mobility Rate

Geographical regions	Western		Central		Eastern		Northern	
Mobility Frequency	N. of resp.	%	N. of resp.	%	N. of resp.	%	N. of resp.	%
0 - 0.20	32	25.8	29	15.8	9	34.6	3	8.6
0.21 - 0.41	38	30.6	34	18.6	7	26.9	21	60.0
0.42 - 0.54	36	29.0	47	25.7	8	30.8	7	20.0
0.55 and more	18	14.6	33	39.9	2	7.7	4	11.4
T o t a l	124	100.0	183	100.0	26	100.0	35	100.0

Source: Our own investigation (Tractor driver survey, 1980)

This result seems to confirm our previous hypothesis that 'the more primitive the place of origin, the lower is the

possibility of contact with key figures of employment boards and hence the lower is the frequency of changing the place of work. As previously mentioned, the Westerners, by virtue of their being less qualified and in lower demand, are always ready to accept the lowest-paid job in contrast to the people originating from other regions of the Sudan. They often enter temporary occupations, such as the sugar farm in the Khashm el Girba scheme. They are prepared to do seasonal work, as they had done in their capacity as unskilled seasonal labourers before joining agricultural mechanization. Their readiness to work under hard conditions increases their chance of occupying seasonal jobs particularly in the rainfed mechanized areas around Gedarif. The fact that the peak demand in the mechanized rainfed agricultural schemes alternate with the peak demands for junior tractor drivers in the sugar farm of the Khashm el Girba scheme offers them a sort of complementary employment which is reflected in the relatively higher mobility frequency in the above table, as compared with persons who originated from the eastern and northern Provinces.

In comparing the remaining regions, it becomes evident that the tractor drivers originating from the middle Sudan have a higher mobility rate than those originated from the two other regions. The relatively lower mobility rate of the respondants from the eastern and northern regions may be attributed to their relatively recent participation in agricultural mechanization as compared to people from middle Sudan. This confirms our hypotheses that 'the more a place is affected by mechanization, i. e. the nearer it is situated to the functional occasion of mechanization (workshop) or the longer such location already exists, the greater is the probability of increased mobility rates of

skilled labour, other factors remaining constant.

5.4.3 Age as a variable of mobility frequency

It is obvious that there is a correlation between age and the mobility frequency of a tractor driver. According to our investigations among the sample tractor drivers in the three schemes under study, the highest mobility frequency is reached by the age group of 17 - 25 years, since more than half the respondants in this group registered a high to very high mobility frequency. If we consider the age group 26 - 30 the mobility rate will gradually drop until it reaches a minmum by the age group 31 years and above in which more than two thirds of the respondants registered a low to medium mobility frequency (Table 5.14).

Table 5.14: Distribution of Respondants According to Age and Mobility Frequency

Age group	17 - 25		26 - 30		31 and above	
Mobility frequency	N. of resp.	%	N. of resp.	%	N. of resp.	%
0 - 0.20	35	31.9	29	20.3	11	15.9
0.21 - 0.41	39	24.4	45	31.6	36	52.3
0.42 - 0.54	45	28.1	38	26.4	15	21.7
0.55 and more	41	25.6	31	21.7	7	10.1
T o t a l	160	100.0	143	100.0	69	100.0

Source: Our own investigation (Tractor driver survey, 1980)

The explanation for the relatively higher mobility rate registered by the younger tractor drivers may be sought in the degree of dissatisfaction of this particular group with the working conditions prevailing in most of the agricultural schemes. Full of aspiration and expectations, they feel dissatisfied staying in one place. This attitude is created by the recent expansion in agricultural mechanization with an increased demand for skilled labour, in contrast to the older generations, whose circulation had been restricted by the limited employment chances for qualified drivers. Another explanation may be sought in the fact that almost all the Westerners, who registered a relatively high mobility frequency, fall within this age group.

By correlating the marital status, number of children and the rate of mobility it becomes evident that the single drivers with no children, who mostly fall in the younger age group, registered a relatively higher mobility frequency than those who are married - both with and without children (Table 5.15).

Table 5.15: Distribution of Respondants According to the Marital Status, Children and the Mobility Frequency

Marital status	Single (no child)		Married (no child)		Married (with child	
Mobility Frequency	N. of resp.	%	N. of resp.	%	N. of resp.	%
0 - 0.20	45	28.1	3	18.8	27	13.9
0.21 - 0.41	27	16.9	6	37.4	86	44.3
0.42 - 0.54	36	22.5	4	25.0	57	29.4
0.55 and more	52	32.5	3	18.8	24	12.4
T o t a l	160	100.0	16	100.0	194	100.0

Source: Our own investigation (Tractor driver survey, 1980)

An explanation for this variation may be sought in the prevailing living conditions in the various agricultural schemes. According to our own investigations most of the agricultural schemes offer only limited accommodation facilities for skilled labourers and their families. Thus the less a working place is equipped with living accommodations the smaller is the probability of increased mobility frequency of married persons, particularly with children, who prefer to stay with their families in one place where social services and accommodation are offered by the scheme authority. This is confirmed by the fact that the tractor drivers who could afford to leave their families behind, registered a comparatively higher mobility frequency than those who were accompanied by their families (Table 5.16).

Table 5.16: Distribution of Respondants According to Familiy Accompaniment and Mobility Frequency

Family accompaniment	Yes		No	
Mobility Frequency	N. of resp.	%	N. of resp.	%
0 - 0.20	8	7.6	20	19.0
0.21 - 0.41	59	56.2	15	14.3
0.42 - 0.54	25	23.8	37	35.3
0.55 and more	13	12.4	35	34.4
T o t a l	105	100.0	105	100.0

Source: Our own investigation (Tractor driver survey, 1980)

5.4.4 Education as a variable of mobility frequency

By correlating the mobility frequency registered by the respondants in the sample to their level of education, it

appears that respondants with formal education are likely to circulate more frequently than respondants with non-formal education. According to our findings, the majority of those who attained at least elementary education (63.7 %) fall within the mobility frequency category high to very high, while the majority of those with only non-formal education (54.6 %) fall within the category of medium to low as shown by the Table 5.17.

Table 5.17: Distribution of Respondants According to Education Level and Mobility Frequency

Education level	non-formal education		formal education	
Mobility frequency	N. of resp.	%	N. of resp.	%
0 - 0.20	34	31.5	41	15.5
0.21 - 0.41	25	23.1	55	20.8
0.42 - 0.54	25	23.1	73	27.7
0.55 and more	24	22,3	94	36.0
T o t a l	108	100.0	264	100.0

Source: Our own investigation (Tractor driver survey, 1980)

This may be explained in that formally educated persons are likely to be more aware of the range of alternatives in the surrounding world than the persons with non-formal education. Such awareness is argued to be one of the catalysts that increase the rate of circulation among the tractor drivers. This is found to be true in the case of persons originating from an urban centre, who are presumed to have a relatively higher education level and hance greater awareness of the

different offers than the villagers. Moreover, educated persons, by virtue of their higher aspirations, always try to search for new alternative working places with expectation of betterment of their socio-economic conditions unlike non-educated persons with limited perception and aspirations.

The degree of training attained by a person is also found to be a factor affecting mobility frequency. According to our inquiries, the majority of those with vocational training (67.4 %) registered a high to very high mobility frequency while the majority of those without vocational training (72.6 %) fall within the mobility frequency category medium to low. This may confirm our hypotheses that 'the better the qualifications of a trained person, the better are his chances of finding a job quickly when he moves away'. The low risk of unemployment at other destinations increases his readiness to change his place of work. Thus by the expansion in vocational training, which is now stressed by the development planners, it is expected that the mobility frequency among this particular group will be increased.

5.4.5 Income as a variable of mobility frequency

It is generally argued that income disparity is one of the most important factors which induce labour force circulation, with the hope of attaining the maximum possible income. According to our own investigation, it has been noticed that the mobility rate of the tractor drivers decreases proportionally with the increase in income. While the mobility frequency reaches its maximum at an income level of less than LS 49, it shows a slight fall at an income level of LS 50 - 69 and becomes more remakable by an income of more than LS 70 (Table 5.18).

Table 5.18: Distribution of Respondants According to Income Level and Mobility Frequency

Income level	Lowest to LS 49		50 - 69		More than LS 70	
Mobility frequency	N. of resp.	%	N. of resp.	%	N. of resp.	%
0 - 0.20	44	32.6	20	11.6	11	17.2
0.21 - 0.41	18	13.3	70	40.5	32	50.0
0.42 - 0.54	34	25.2	51	29.4	13	20.3
0.55 and more	39	28.9	32	18.5	8	12.5
T o t a l	135	100.0	173	100.0	64	100.0

Source: Our own investigation (Tractor driver survey, 1980)

An explanation of this phenomenon may be sought in the degree of satisfaction or dissatisfaction with the material gain, other things remaining the same. Thus persons with relatively lower income are likely to change their places of work more frequently than those with higher income, with the hope of additional gain at a new destination. This could be confirmed by correlating the motive stated for changing a place of work and the mobility frequency. As shown in Table 5.19 the mobility frequency is higher among the respondants who reported material reasons as a motive for changing a place of work, than among persons motivated by non-material reasons.

Table 5.19: Distribution of Respondants According to Motives for Changing a Place of Work and Mobility Frequency

Stated motives	Material		Non-Material	
Mobility frequency	N. of resp.	%	N. of resp.	%
0 - 0.20	18	9.3	7	5.4
0.21 - 0.41	53	27.5	54	41.9
0.42 - 0.54	66	34.2	45	34.9
0.55 and more	56	29.0	23	17.8
T o t a l	193	100.0	129	100.0

Source: Our own investigation (Tractor driver survey, 1980)

The relatively higher-paid drivers are often identical with the older, married persons who, as previously noted, tend to circulate less frequently than the comparatively lower-paid, younger unmarried persons.

Most decisive in the variation in mobility frequency, however, is the degree of information received by a person about better opportunities in other places. According to our inquiries among the sample tractor drivers, the highest mobility frequency was registered by persons who possessed adequate information about other destinations, since it was argued that adequate information reduces the risk of unemployment there. This means that through the exchange of information a person becomes aware of the differences in material and non-material gains in the various regions. In this respect the presence of a relative or a friend in

another location or periodical visits may be taken as a means of increasing one's information about that location. At present the expanded means of communication (transportation, radio, television, telephone, newspapers), particularly for those with at least elmentary education, is contributing much to the increase of information about other places, a factor which is to be treated in relation to the rural-urban movement of skilled labour in the following chapter.

So far we have been presenting the findings of our questionnaire-based investigation among the tractor drivers in three selected agricultural schemes. It becomes evident that the agricultural mechanization, by virtue of its qualifying effect, has directly contributed to the mobilization of the rural population. The mobility of persons trained as the results of agricultural mechanization is found to be more selective than other types of population mobility as far as sex, age, and education level composition of the movers is concerned. Our findings show that above all, young active males with relatively higher education and training than the rest of the residual population are participating in agricultural mechanization. For many the participation in a functional location of mechanization marks the first real step in a long migration process. We have so far been confined to the circulation of skilled labourers between the different agricultural schemes within the rural areas. Generally speaking, the movement was directed from the older to the relatively recent agricultural schemes. The factors which work to stimulate persons to change their place of work and induce a variety of mobility Frequencies among this particular group have been presented. Above all, material reasons were found to induce this type of rural-rural population mobility which were reflected in the disparity of income between the different agricultural

schemes. But disparity in income is to be observed not only between the different agricultural schemes but to a greater extent between the latter and the urban centres. Such a prevailing disparity in material gaines has been often treated as the main cause of the rural urban movement of unskilled labour. Whether this is also true or not for the skilled manpower is the theme of our following discussion which concentrates on the rural-urban movement of the tractor drivers, as a further stage of their whole mobility process. The fact that more than two thirds of the interviewed tractor drivers (69.4 %) stressed their intention to move to an urban centre for both material an non-material reasons, makes it apparent that there is a continuous rural-urban migration of this particular group. This may confirm our hypothesis that measures to develop rural areas, including agricultural mechanization, do not stabilize the population situation there but, on the contrary, cause a mobilization of the rural population thus intensifying in-migration pressure on the towns.
To prove this hypothesis empirically, it was thought necessary to follow the migrant tractor drivers in one of their urban destinations, namely Greater Khartoum, which was stated by the majority of our respondants (86.3 %) as the first urban target. As drivers, the majority of our respondants (72.7 %) were intending to join the tertiary sector as taxi or bus drivers in the town as an occupation before joining another occupation or going abroad to the oil-rich Arab countries. Thus it was thought necessary to conduct a questionnaire-based survey among a sample of taxi drivers in Greater Khartoum to find out whether they have had any participation in agricultural mechanization before they join this occupation. In the following we present our findings which, we hope, shed some light on the whole spectrum of rural-urban population mobility, particularly of the skilled manpower.

VI. RURAL-URBAN MIGRATION OF SKILLED LABOUR AS REPRESENTED BY A CASE STUDY AMONG A GROUP OF TAXI DRIVERS IN GREATER KHARTOUM (see map 2)

1. INTRODUCTION

In this chapter our analysis will be mainly confined to male migrants who joined the tertiary sector as taxi drivers. A special questionnaire was designed and adressed to a sample of taxi drivers in Khartoum by means of a complete covering of some of the taxi collecting centres. [1)] Our questionnaire was designed to reveal the demographic structure, social structure, economic structure, previous mibility, motive for in-migration, and the intentions and opinions of this particular group. It was not possible to obtain the actual number of all taxi drivers working in Khartoum conurbation because accurate registration is completely lacking, let alone the high rate of turnover among this group. To reach an approximate number we have to consult the chief director of the vehicle transportation headquarters in Greater Khartoum. According to this source there were over 17,000 vehicles registered as public transport vehicles and permitted to work in the town at the beginning of 1980. If we assume that each vehicle provides a job for a driver we could assume that the above figure may be taken as the number of working taxi drivers in Greater Khartoum in 1980. Of course, sometimes, particularly in the case of mini-buses, a co-driver or assistant driver is needed to assist in doing the job, which sometimes lasts for more than 18 hours a day. If we also consider these workers, then the number of skilled and semi-skilled

1) The whole number of in-migrants among the interviewed taxi drivers amounted to 87 persons (75.7 %). The rest were non-migrants born in Khartoum.

workers joining this particular sub-sector may rise to about 30,000 persons, which would be very difficult to cover in any single study. Thus we have to pick up samples which, though far from being representative, may give at least an idea about the most important characteristics and attitudes of the whole group, and most importantly how this group is related to the group of skilled labour participating in agricultural mechanization.

We attempt to prove our assumption that most of the skilled labour, particularly the vehicle drivers, had been participating in agricultural mechanization in one way or another before they decided to migrate to Greater Khartoum or other big towns. Our aim was to test the validity of the hypothesis that 'measures to develop rural areas, including agricultural mechanization, do not stabilize the population situation there, but on the contrary, cause a mobilization of the rural population, thus intensifying in-migration pressure on the towns and increasing the tendency to polarization.' In this sense migration to Greater Khartoum or any other town is nothing but a continuation of the circulation process started by joining the agricultural modern sub-sector as unskilled labour and continued in the form of rural circulation of skilled workers who finally enter the stream of rural-urban migration as qualified drivers or mechanics (see fig. 1). But migration to Greater Khartoum should not be understood as the final destination for all Sudanese skilled labour, since for many, as we shall reveal in this study, this is only a preparatory step before finally migrating abroad, particularly to the oil-rich Arab countries. The most effective factor in this process is the degree of qualification acquired by participating in the functional locations of mechanization or the technical institutions related to it, since the better the qualifications of a

person trained as a result of the mechanization of agriculture, the better are his chances of finding a job quickly when he moves into a town or abroad. The low risk of unemployment at the new destinations increases his readiness to migrate further, particularly if at the places of origin no job opportunities for qualified workers are available.

2. DEMOGRAPHIC STRUCTURE OF THE TAXI DRIVERS IN GREATER KHARTOUM

2.1 Age Composition

According to our investigations about 75 % of all interviewed taxi drivers were young adults in the age group 18 to 30 years (Table 6.1).

Table 6.1: Age Composition of the Sample Taxi Drivers in Greater Khartoum

Age groups	N. of resp.	%
18 - 25	31	27.0
26 - 30	55	47.8
31 and over	29	25.2
T o t a l	115	100.0

Source: Our own investigation (Taxi driver survey, March 1980)

If this composition is compared with that of the tractor drivers in Table 5.1 it could be noticed that the tractor drivers are relatively younger than the taxi drivers, since the proportion of the former in the age group under 25 years is 43 % while it is only 27 % in the case of the latter.

The corresponding proportions for the age group 'above thirty' is 21 % and 35.7 %, respectively. This may confirm our assumption that the taxi drivers are (in-migrated) former tractor drivers. To prove this we have to consider the age at the time of arrival in Khartoum by deducing the time spent in Khartoum from the age of a respondant at the time of investigation.

As shown by Table 6.2 more than half of all respondants had arrived in the past three years and less than one fifth reported a stay in Khartoum of more than 7 years.

Table 6.2: Distribution of the In-migrant Taxi Drivers According to the Time Spent in Khartoum (in Years)

Time category	N. of resp.	% of in-migrant
1 - 2	50	57.5
4 - 6	23	26.4
7 and more	14	16.1
T o t a l [1)]	87	100.0

Source: Our own investigation (Taxi driver survey, March 1980)

[1)] The rest were born in Khartoum.

We come later to consider the relationship between this age group composition and the previous mobility on the one hand and the intention to return to the places of origin or to leave the country on the other hand. At present we shall attempt to relate age to marital status in the case of the taxi drivers.

2.2 Marital Status

By comparing the marital status of the two groups we found that there was a higher proportion of married persons among the taxi than among the tractor drivers.(64.3 % as compared with 56.5 %). If we consider age as a factor which influences the incidence of marriage in the Sudan, it will not be strange to find the result above, other factors remaining constant. By virtue of being relatively older than the tractor drivers still participating in agricultural mechanization at the time of investigation, the taxi drivers can be expected to be in a position to afford marriage at least in the first one or two years after arrival at Khartoum.

This last assumption may be supported by the assumed higher income received by a taxi driver as compared with the tractor driver. The validity of the assumption of an increased income will be discussed as part of the economic structure of this group in the following pages.

3. SOCIAL STRUCTURE OF THE TAXI DRIVERS IN GREATER KHARTOUM

3.1 Birth Place Composition

It should be noted here that 24.3 % of all interviewed taxi drivers (28 out of 115) were in-migrants born in Khartoum. About 40 % of the in-migrants gave another town as their place of birth. But these figures should be accepted with great caution since it is possible that, as previously noted, some respondants may have stated an incorrect place of birth. Nevertheless, this proportion is far higher than that among the tractor drivers (14.8 %), as an indication that Greater Khartoum attracts not only

persons from rural areas but also from other relatively smaller towns. It is not strange, however, to find that the majority of Khartoum in-migrants were villagers, since more than 90 % of the country's population live in rural areas (SWAR ELDAHAB, A., 1978, p. 137).

If, instead of the birth place, we consider the latest place of out-migration to Khartoum, it will be found that about 20 % of all in-migrants came to Khartoum from another urban place and 30 % from a rural one. The rest, almost half of all in-migrants, stated an agricultural scheme as their last place of out-migration, not identical with a village or an urban centre (Table 6.3). This means that some of the respondants originating from a village or an urban centre first migrated to one or more agricultural schemes before they finally migrated to Khartoum. In this sense agricultural schemes serve as a preparatory step for many before they decide to join the rural-urban migration stream, a case to be elaborated further when we discuss the role of agricultural mechanization in intensifying rural-urban population mobility.

Table 6.3: Distribution of In-migrant Taxi Drivers According to Latest Place of Out-migration

Latest place of out-migration	N. of resp.	% of In-migr.
Urban	17	19.5
Rural, without agricultural scheme	27	31.0
Agricultural scheme	43	49.5
T o t a l	87 [1)]	100.0

Source: Our own investigation (Taxi driver survey, March 1980)

3.2 Birth Province Composition

To find out the intensity of migration flows directed towards Khartoum it is vital to determine the geographical regions from which the in-migrant taxi driver in Khartoum originated. The first remarkable point is that all of them are Sudanese citizens, contrary to the findings of Prof. G. HEINRITZ (1981) in his observations about the squatter settlement of Hay-Maio in Khartoum. He stated that a third of all respondants are foreigners who migrated to the Republic of the Sudan from neighbouring countries. Of course, since Hay-Maio, as a squatter settlement, where he conducted his study, receives migrants with different characteristics and qualifications, it is not strange that it presents such a composition of Sudanese citizens and foreigners. In our case study, however, we confined ourselves to a particular employment sector (the transport sector) which excludes the foreigners (only Sudanese citizens are able to receive driving licences), thus they are not expected to be represented.

Unlike the ways of the tractor drivers the geographical origins of the taxi drivers are found to be more widely distributed over the country but showing concentration in some regions over others. As Table 6.4 shows, the middle Sudan (presently Blue Nile, Gezira and Khartoum provinces) contributed almost one half of all taxi drivers in Khartoum, the northern Sudan (presently Northern and Nile provinces) 20 %, and the western Sudan (presently Northern and Southern Kordofan and Darfur) 12 %. The contribution of the eastern Sudan (14 .8 %) and the southern Sudan (7 %) are far higher than their contribution to the tractor drivers.

Sample

Table 6.4: Distribution of the Taxi Drivers in Khartoum According to the Geographic Region of Origin

	N. of resp.	& of total
Middle Sudan	52	46.2
Blue Nile	10	8.7
Gezira	15	14.0
Khartoum	27	23.5
Northern Sudan	23	20.0
Eastern Sudan	17	14.8
Western Sudan	15	12.0
Southern Sudan	8	7.0
T o t a l	115	100.0

Source: Our own investigation (Taxi driver survey, March 1980)

The middle Sudan ranks first among all the other geographical regions as a supply region for skilled labour to both agricultural schemes and Greater Khartoum, although it is the region with the highest per capita income in the country after Greater Khartoum, for it was the area of the huge Gezira scheme, the backbone of the Sudanese economy and other important public investments. As the largest gainer in internal migration, it has become the most densely populated region, apart from Khartoum province with the three towns - Khartoum, Khartoum North and Omdurman. It is also a region where agricultural mechanization is widely distributed and has a longer tradition than in any other region, thus facilitating the adoption and diffusion of many innovations,

particularly technical skills. This factor has been aided by a higher level of education, particularly elementary education and a comparatively well developed communication system, a factor which allows for regular contact with the capitol town. Continuous population movements reflect the socio-economic disparity between Greater Khartoum and this particular region, which is regarded as the most effective stimulus to out-migration. Thus it is not surprising to find such a high proportion of in-migrants from this region among the taxi drivers in Khartoum.

As previously mentioned, the northern Sudan contributes a comparatively lower Proportion to the number of skilled labours participating in the agricultural modern sector. Still, it ranks second to the middle Sudan in contributing to the taxi drivers in Khartoum. This may be due to the nearness of this region to Greater Khartoum and/or due to the inherited spatial preferences of an individual of this province particularly for the large towns. The prevalence of this attitude is expected to decrease in the near future, if the present trend of development in the region continues and the present inflow of migrants from other regions in Greater Khartoum increases. The first condition may increase the opportunity to be employed within the same region and the second condition may decrease the chances previously available for the in-migrants of this region in Greater Khartoum.

The contribution of the western Sudan, to the taxi drivers in Khartoum, despite its remoteness may be an effect of a regional disparity, since this region is said to be one of the most economically depressed regions of the country, with a negligable government investment programme. The proportion of the in-migrants from this region to Greater

Khartoum as taxi drivers is found to be far lower than its proportion of the taxi drivers in agricultural schemes. This finding is quite logical since it is assumed that Westerners have comparatively limited chances of acquiring technical skills in their home areas und thus they circulate between other relatively developed regions, where after a long stay, they could acquire a new qualification necessary to allow for their participation in an occupation related to a town. Hence, a Westerner leaving his home area may first join the agricultural modern sector as an unskilled worker, and after a long stay and due to a continuous contact with innovations, he may attempt to learn a new skill, as a tractor driver or a mechanic, for example.

The large number of Westerners presently participating in agricultural mechanization, as previously shown, may be taken as a cause for their participation as taxi drivers in Khartoum. Another cause may be the enormous increase in lorry transport in western Sudan, particularly in the past few decades, which has stimulated the young males to search for a job as assistant lorry driver. In this capacity he may be able to acquire further qualification which would stimulate him to join the rural-urban migration stream of skilled labour. Even the tractor drivers may work as lorry drivers in the agricultural off-season before they finally decide to join an occupation in Greater Khartoum or any other large town.

The proportion of the Westerners working as skilled labour in Greater Khartoum can be expected to grow steadily due to their continuing and increased participation in the modern agricultural sub-sector.

The relatively small contribution of the eastern Sudan to the taxi drivers in Khartoum, despite its long tradition

in agricultural mechanization may be attributed to the nature of the nomadic tribes dominating there, who only recently started to join work outside their traditional occupations. As previously stated, the nomads used to be disgusted at any paid work, preferring independent occupations. But this attitude is gradually changing due to increased government efforts to sedentrize the nomads by superimposing modern agricultural schemes on their traditional grazing areas, such as the Khashm el Girba irrigated scheme, the mechanized rainfed scheme around Gedarif town and the recently implemented Rahad irrigated scheme. Accordingly, they feel deprived of their previous grazing and rainfed cultivated areas with the result that some changes in their socio-economic life are taking place. The young males can expect nothing more from their fathers, they have to look after themselves, so that the authority of the father is continuously declining. Such disintegrating families are more liable to lose their younger generation, who perceive the change quite differently from the older generation. But such an interpretation is not enough to explain the comparatively higher participation of the people of the eastern Sudan as taxi drivers in Greater Khartoum rather than as tractor drivers in the agricultural schemes under study. It could be added that, the change in the regional economy, as a consequence of the recently implemented development schemes, has greatly stimulated a change in attitude towards livestock among the nomads. As the result of an increased demand for animal products due to an increased per capita income, perticularly in central Sudan, livestock has acquired a new qualitative, rather than the previous quantitative, value. The revenue gained by selling part of the animal wealth, is invested in new economic fields, particularly for the purchase of transport vehicles and agricultural machines, which are in some cases

regarded as a symbol of social rather than economic status. Nevertheless, the importance of this change could be seen in the new opportunities created for the young generation to operate these machines, a step which stimulates them to join new occupations within the region or in the urban centres.

Another reason for the relatively higher participation of the Easterners as taxi drivers rather than as tractor drivers may be the value of the region as a centre of attraction for migrants from all over the country, particularly from Western Sudan (MATHER, D. B., 1956). Accordingly, it is probable that some of the in-migrants in this region, may attempt to join the stream of rural-urban migration and for one reason or another they gave this region as their origin rather than the actual region of origin. SWAR EL DAHAB (1978, p. 142) suggested that it is those migrants who came to Greater Khartoum rather than the indigenous tribes of the area, who constitute less than 2 % of all in-migrants in Khartoum.

It remains to consider the southern region which accounts for only 7 % of all taxi drivers in Khartoum. Small as it is, this proportion is found to be relatively higher than the contribution of this part of the country to the skilled labour force in connection with the modern agricultural sub-sector (Table 5.3). Our findings deviate only slightly from other findings which showed the proportion of the migrants from this region in Khartoum to be 15 % (SWAR EL DAHAB, 1978, p.140). This means that the participation of this region is negligibly low, not only in the modern agricultural sub-sector, as shown by its lower participation in agricultural mechanization, but also in the other modern economic sub-sectors in connection with an urban

centre,despite the fact that it accounts for more than a quarter of the total population of the country. Unlike the case of the Westerners it has been observed that most of the Southerns migrated directly to Khartoum without any sort of participation in the agricultural schemes of the north central Sudan. Most of them arrived during the past decade and according to SWAR EL DAHAB, A. (1978, p. 141), more than two fifths during the past five years. This means that the trend is towards increasing flow in Khartoum, which is expected to grow steadily in the near future if the present political and socio-economic conditions persist.

3.3 Educational Composition

As shown by Table 6.5, more than two thirds of the sample taxi drivers are formally educated as was the case for the tractor drivers. Although the in-migrant taxi drivers were distinctively better educated than those still living in the sending areas they were far less educated than the natives of Khartoum. It was found that Greater Khartoum attracts those with formal rather than non-formal education, by virtue of having the secondary and tertiary sectors of the economy concentrated in it. It offers some alternatives, particularly for the school-leavers, to the traditional occupations in the rural areas. Thus, as in a case of the agricultural mechanization, it draws off a particular segment of the active labour force which pessess certain characteristics including education level and skills. This is confirmed by the high proportion of those with technical and vocational training among the interviewed taxi drivers (45.2 %). The rest were trained on the job. This proportion, however, is noticed to be far higher than the proportion of the tractor drivers with technical and vocational

training, which hints that Greater Khartoum attracts not only educated but also the most highly trained persons. (Table 6.5)

Table 6.5: Distribution of the Sample Taxi Drivers According to Education Level and Training

Education Level			Training		
Category Level	N. of Resp.	% of Total	Category Level	N. of Resp.	% of Total
Formal Education	80	69,6	Technical and vocational	52	45.2
Non-formal	35	30.4	on the job	63	54.8
T o t a l	115	100.0	T o t a l	115	100.0

Source: Our own investigation (Taxi driver survey, March 1980)

4. PREVIOUS CIRCULATION

It seems that the taxi drivers had a longer migration history than the tractor drivers still working in agricultural schemes. Apart from their circulation during the period of assistantship, which sometimes necessitated their stay in a location outside their birth places, the majority of them have reported a number of moves, as skilled workers within the rural areas before finally arriving in Khartoum (Table 6.6).

Table 6.6: Distribution of the Sample Taxi Drivers According to the Intensity of Circulation Between Agricultural Schemes before Arriving in Khartoum

Category Level	Absolute Frequency	Relative Frequency (%)
No Previous circulation	36	31.3
1 - 2	25	21.7
3 - 4	32	27.8
5 and more	22	19.2
T o t a l	115	100.0

Source: Our own investigation (Taxi driver survey, March 1980)

The Table above shows that more than two thirds of all respondants (90 % of in-migrants) have previously circulated between agricultural schemes before they arrived in Greater Khartoum. This means that the majority of the interviewed taxi drivers came indirectly to Khartoum from their places of origin, which confirms the step-like rural-urban migration assumption (see fig. 1). Thus the factors that induce such a step-like movement are not expected to be different from the factors which cause the circulation of the tractor drivers already mentioned at the beginning of this chapter. In the following discussion an attempt will be made to uncover the forces which cause a deviation from the rural-rural population mobility to a rural-urban population mobility.

A comparison between age and previous mobility shows that the majority of those who had not joined any agricultural

scheme before arriving at Khartoum are in the age group 18 to 25 years, those who had circulated among several schemes are in the age group 26 to 30. The highest frequency of mobility is registered among the age group above 31 years. This means that the older a taxi driver is the greater is the probability of a high previous mobility rate.

A correlation of the age composition of the tractor drivers in the selective agricultural schemes with that of the taxi drivers in Greater Khartoum reveals that the former are relatively younger than the latter. While 73 % of all interviewed taxi drivers were in the age group above 25 years, nearly half of all respondant tractor drivers were in an age group under 25 years. This may confirm our hypothesis that the taxi drivers, as part of the skilled labour force in Khartoum, were in-migrant older tractor drivers, who were replaced by relatively younger and less qualified persons (fig. 1). A direct question about the previous occupation revealed that almost 75 % of all interviewed taxi drivers had been working in occupations related to the mechanical part of the agricultural sector. (see Table 6.7)

Table 6.7: Distribution of Respondant Taxi Drivers According to Previous Occupation

Previous Occupation	Absolute Frequency	Relative Frequency
Peasant agr.	5	4.3
Mechanic	26	22.6
Tractor driver	30	26.1
Ass. driver	25	21.7
Lorry driver	23	20.0
Other Occup.	6	5.2
T o t a l	115	100.0

Source: Our own investigations (Taxi driver survey, March 1980)

As shown by Table 6.3 only a small proportion of respondants came to Khartoum from another urban centre. This indicates that the idea of a chain migration which assumes that 'the movement of the villiagers is toward smaller towns at first before they finally take the step to migrate to a larger urban centre' is not functioning in this particular case. To explain this we have to uncover the factors which induce more migration to Greater Khartoum and to other urban centres in the country.

5. SOME IN-MIGRANT DETERMINANTS

As shown by Table 6.8 two thirds of the in-migrants stated material resons to be the motive for their migration to Greater Khartoum; more than a third came with the hope of working in an industry which is thought to offer a relatively higher income than a job in the rural areas; one fifth stated that they came to Khartoum only to have a means of leaving the country for the oil-rich Arab countries; and almost one tenth were intending to work in non-technical fields of the urban centre. The rest of the in-migrants reported the 'bright lights' of the town and the educational possibilities to be the main reasons for their in-migration.[2)]

---

2) Our questionnaire is designed to reveal only the main-reasons behind in-migration. We believe that nearly all reasons are interrelated. We aggregate all the motives, stated by respondants for in-migration in three main categories: non-material reasons (education, a 'bright light' of the town, join a family or friend), material reasons (work in industry and earn more income), and leaving the country.

Table 6.8: Distribution of Sample Taxi Drivers According to Motive of In-migration

Motives	Absolute Frequency	Relative Freq. (%) of In-mig.
Material Reasons	39	44.8
To join industry	31	35.6
To join non-technical work	8	9.2
Non-material Reasons	29	33.4
'Bright lights' of the town	26	29.9
Education	1	1.1
To join a friend	2	2.3
To go abroad	19	21.8
T o t a l	87	100.0

Source: Our own investigation (Taxi driver survey, March 1980)

The proportion of those reporting the 'bright lights' of the town to be the motive for their in-migration is found to be lower than expected, inspite of the prevailing disparity between Greater Khartoum on the one hand and the rest of the country on the other with regard to the concentration of social services and means of recreation (television, cinemas, dance halls, gardens and national parks as well as other recreational centres). Contrary to what had been supposed, the 'bright lights' of the town are less attractive to the villagers than the material gains expected, since it is illogical to think of entertainment if the material possessions are limited to the necessities as is the case for the majority of the villagers in our case study. This

may be taken as an explanation for the relatively higher proportion of in-migrants who came to Greater Khartoum for the purpose of improving their material situation, either by working in Khartoum itself or by emigration to other countries. This last motive, for one reason or another is not always directly stated, and we believe that the actual proportion of those intending to leave the country is far higher than could be stated here. Although the above mentioned motives by no means include all of the motives for in-migration, they can be regarded as the most influential 'pull' factors which are aided by the 'push' factors prevailing in the sending areas (see chapter 2.2).

5.1 Income Level And Employment Opportunities In Khartoum

In fact the regional income disparity prevailing in the country is probably the most decisive factor which induces population mobility, particularly among the skilled labour force. As Table 6.9 shows 87 % of all taxi drivers receive an income of more than LS 70 a month, about the third of those reported a monthly income even higher than LS 100.

Table 6.9: Distribution of the Sample Taxi Drivers in Khartoum According to Income Level in LS

Income Category Label	Absolute Frequency	Relative Frequency (%)
Lowest to 69	15	13.0
70 - 84	32	27.8
85 - 99	29	25.2
100 and more	39	33.9
T o t a l	115	100.0

Source: Our own investigation (Taxi driver survey, March 1980)

These results are found to be not only in sharp contrast to the average per capita income in the whole country, but even to the per capita income of the skilled labour force still working in the rural areas. According to our own investigation among tractor drivers, only 17.1 % of all respondants stated a monthly income of more than LS 70 (Table 5.18). But this does not mean that this wide disparity is valid in all cases. Sometimes an individual may earn more money in rural areas than in urban centres. But it is not always possible to calculate the actual income of an individual, since some sources of income are difficult to be converted in terms of money.

Although the case of the taxi drivers in Khartoum is an exceptional one which offers a comparitively far higher income than any other equivalent occupation, it reflects an economic disparity which is likely to stimulate both regional and sectoral population mobility. As part of the tertiary sector in Greater Khartoum, taxi driving becomes an increasingly important occupation which attracts part of the skilled labour which might have been directed to cover the demand for skilled labour in the rural areas, particularly in the mechanized modern agricultural subsector. The absurdity of this sort of population mobility will be dealt with in a seperate chapter in relation to the effect of agricultural mechanization on the Sudanese economy with regard to skilled labour force mobility.

For our purposes in this context, it could be added that the growing transport sector in Greater Khartoum is not only the cause of an intensive rural-urban migration and emigration but also an effect of the latter, since emigrants, as skilled workers, are likely to collect and transfer some money to be invested in this particular economic sub-sector rather than in other sectors (see

chapter 9). Thus the demand for additional drivers is steadily growing, aided by a high turn-over among relatively older persons created by the increased demand for skilled labour in the oil-rich Arab countries, particularly in the last decade, as will be shown below. Our own findings confirm both the expanding nature of this particular occupation and the higher rate of turn-over in it. About two thirds of all interviewed taxi drivers (65.2 %) stated that their occupation is only a terporary one, which means an expected turn-over. This turn-over is confirmed by the short time required to find a job as a taxi driver in Khartoum. More than three quarters of all taxi drivers reported less than four months (Table 6.10).

Table 6.10: Distribution of Sample Taxi Drivers According to Duration of Searching for Work as Taxi Driver (in months)

Duration of Searching for Work as a Taxi Driver	Absolute Frequency	Relative Frequency % of Total
Months		
0 - 1	36	31.3
2 - 3	54	47.0
4 and more	25	21.7
T o t a l	115	100.0

Source: Our own investigation (Taxi driver survey, March 1980)

Further evidence of the high rate of turn-over among the taxi drivers is the high tendency to emigrate. 79.1 % reported an intention to emigrate to one of the Arab countries.

5.2 Presence of Contact Persons in Khartoum

Apart from the economic reasons as pull factors inducing rural-urban population mobility there are other working factors which speed up the mobility rate. Previous knowledge of the working and living conditions in areas of destination, for instance, may increase an individual's aspirations by affecting his 'place utility matrix', since it can be expected that more persons will decide to make the move if they are informed about other destinations. According to our investigations, all of the interviewed taxi drivers had been informed by one means or another before they joined the rural-urban migration stream. About 40 % of in-migrants reported a relative or friend as their source of information, 24 % knew Khartoum from their previous visits, the rest reported publicity from other sources (Table 6.11).

Table 6.11: Distribution of Respondant Taxi Drivers According to Source of Information About Khartoum Before In-migration

Source of Information	Absolute Frequency	Relative Freq. (%) of In-migr.
Relatives	35	40.3
Friends	12	13.8
Previous own visit	21	24.1
Publicity (Radio-Newspapers)	12	13.8
Other sources	07	8.0
T o t a l	87	100.0

Source: Our own investigation (Taxi driver survey, March 1980)

The above table indicates the importance of the presence of a pioneer migrant in a destination as a point of contact for secondary migrants as previously discussed. Pioneer migrants not only inform their relatives and friends still living in the sending areas, but also modify the hardships of the first stay for a secondary migrant by covering most of his needs including accommodation and maintenance. Furthermore, they mediate to find them a job without any sort of commission. As shown by Table 6.12 more than 80 % of the in-migrants reported mediation by pioneer migrants in finding their first job in Greater Khartoum.

The presence of points of contact, in Greater Khartoum for newly arrived in-migrants confirm the idea of a continuous population movement process which was started in the last century and intensified particularly in the past two decades. But this does not mean that all geographical regions are equally represented by points of contact in Greater Khartoum, since the influence of the latter is unevenly dispersed among the various regions of the Sudan.

Table 6.12: Distribution of Respondant Taxi Drivers According to Mediation to Find a Job as a Taxi Driver

Type of Mediation	Absolute Frequency	Relative Frequency (%)
Relative	56	48.7
Non-relative tribe member	31	27.0
Friend	10	8.6
Personal effort	18	15.7
T o t a l	115	100.0

Source: Our own investigation (Taxi driver survey, March 1980)

Of course, the nearer a region is to an urban centre, and the better the communication systems within it, the greater is the probability of increased in-migration to that urban centre and hence the higher is the number of pioneer migrants who act as points of contact for following migrants. Thus it can be expected that the provinces of the north-eastern Sudan (Blue Nile, Gezira, Khartoum, Kassala and the Northern Provinces) have more contact with Greater Khartoum than the provinces of the western and southern Sudan. These last two regions have been, through a deliberate policy of the colonial administration, deprived of all development plans, to the extent that they could neither provide their people with a high enough level of income nor offer them the employment situation to allow them to make temporary trips to the capital town before finally moving there. Accordingly, they are found to be less represented by pioneer migrants than other regions with a relatively higher prosperity (Table 6.4).

The importance of points of contact in a particular destination can be seen in the degree of reliance of a potential migrant on the information received from those contact persons. As Table 6.12 shows, it is not the previous personal visit to Greater Khartoum that provided the needed information about it but rather, the presence of a relative or a friend there.

6. INTENTION TO EMIGRATE

Our inquiry about the intention to emigrate revealed that more than three quarters of all interviewed taxi drivers (79.1 %) were intending to leave the country for one of the oil-rich Arab countries as soon as possible. Material gain was stated by almost all of them as the most stimulating factor. A close relative or friend was stated by 64.3 % of all those intending to emigrate as their main source of information about the working and living conditions in their respective foreign destinations.

By applying Chi-test we could not reveal any significant correlation between the intention to emigrate and variables such as place of origin, province of origin, age, marital status, duration of stay in Khartoum, intensity of previous mobility, income level and the motive for emigration. One thing was evident that the majority of those intending to emigrate (57.2 %) were well aware of the higher material rewards in the oil-rich Arab countries as compared with that in Greater Khartoum. The awareness of the income differentials appear to be the most decisive factor which worked out the socio-economic differences between them. By crossing the degree of awareness with the level of education and age it appeared to be higher among respondants with formal education than among those with non-formal or no education (65.7 % of those intending to emigrate were formally educated as compared with 23.6 % of those who did not state the intention to emigrate). This feature of education selectivity was found to be coupled with age and qualification selectivity. Nearly half of those intending to emigrate (44.2 %) were in the age group 26 - 30 years as compared with 29.7 % and 26.3 % in the lower and higher age groups respectively. The age composition of

those who were not indending to emigrate was found to be 37.7 %, 14.1 % and 48.2 % in the age groups 18 - 25, 26 - 30, 31 years and more, respectively. This meant that emigration was intended by the most dynamic persons among the skilled labour force who presumably acquired a higher degree of qualification than the relatively younger generations. The relatively lower representations of those above 31 years old among those who were intending to emigrate despite the probability of being highly qualified, could be explained by the probable working 'pull factors', mostly in terms if socio-economic and political obligations which were expected to limit their further migration. In some cases older taxi drivers were found to constitute part of those who had been previously abroad and who had managed to start a promising occupation in Khartoum.

The interrelated factors which have been working to induce the emigration of the skilled labour force in the Sudan and the result and effects will be further dealt with in the concluding chapter. To our concern in this context is to stress the point that, for the majority of the interviewed taxi drivers, Greater Khartoum was by no means the ultimate target for their migration process.
It appeared that, in the majority of cases, Greater Khartoum was regarded as a preparatory station before they enter the emigration stream. Thus it was found difficult to predict an end for the whole migration process, at least in the short view, as long as the regional socio-economic disparity prevails. In the following we attempt to reveal whether the migrant taxi drivers are intending to return back to their rural origin or to take up permanent residence in the places of destination and what are the factors which work to induce this or that decision.

7. INTENTION TO JOIN THE COUNTER-STREAM OF MIGRATION

The question of remigration in the rural area was found to be difficult to answer by the majority of respondants, since no one could say with a high degree of certainty whether he would join the remigration stream or would stay permanently in a particular destination. According to our inquiries no one among the respondants stated his intention to remigrate in a year's time; 14 % were intending to remigrate in two to three years; 23 % in four to five years; 29 % did not know at all what time they would stay in their destination and the rest (34 %) stated their intention to take up permanent residence in Khartoum. Nevertheless, the proportion of those who intend to remigrate was found remarkably higher than expected. This appeared, from the first sight, to refute the hypothesis that 'the rural-urban population movement is a cause and effect of the prevailing rural-urban income disparity'. To clear this dilemma an attempt was made to investigate the reasons behind the intention to stay in a destination or return to the rural areas.

By classifying the proportion of those who were intending to return according to their province of origin we found that 62.5 % originated in the north-east Sudan, a relatively developed region. But this variable alone would not have explained the desire to return to the rural areas, since even the relatively developed regions of the country were far behind the capital Khartoum in terms of the level of income and the attractivity of the urban life. Only by relating the intended remigrants to their places of origin could we find a somewhat soundable explanation. The high representation of those originated in an urban centre among the intended remigrants (56,4 %)

gave a clue that townsfolk by virtue of their relatively higher education and material wealth in comparison to the villagers, were in a better position to accumulate the needed capital for an investment in a rural location. This was evident from the income composition of the whole group which showed that 72.3 % of those who were intending to remigrate were in the income group LS 81 and more, while those who were not intending to remigrate were dominantly in the income group of less than LS 81. This assumed accumulated capital was reflected in the desire of the intended remigrants to start a business away from Khartoum. Our inquiries revealed that 53.9 % were intending to start a business in one of the small urban centres, particularly those in connection with the recent development schemes, where services were increasingly needed; 23 % were intending to invest in the mechanized rainfed agriculture and the rest did not exactly know what type of occupation they would join in the rural areas. Thus it might be inferred that remigration was stimulated by the financial ability to start a business in locations other than Greater Khartoum where all branches of the most rewarding occupations were monopolized by individuals and companies who possessed the means to protect themselves against any new competition. In small urban centres the vertical mobility might probably be easier than in Khartoum. This might be the reason why some of them prefered to invest in the modern agricultural sub-sector. However, the desire to invest in this particular sub-sector might be seen from the first sight, as a healthy tendency which might have worked to counteract the prevailing regional disparity which had originally caused the rural-urban population mobility. This might have been the case if the remigrants would have joined their previous occupation as skilled workers to help develop the existing public

agricultural schemes which suffer a remarkable deficit of qualified manpower as reflected in their declining contribution to the national income. The intention of the remigrants to start an independent business would be expected to intensify the existing disparities between the different population groups and hence it might cause an additional rural-urban mobility. But to convince them to do otherwise would not be an easy task under the prevailing socio-economic and political setup of the Sudan, since everyone would strive to improve his socio-economic situation irrespective of the negative impacts which might accrue to others. Perhaps the best way might have been the mobilization of this particular group in a way that they have to build cooperation in the rural areas whereby their qualification and experience would be utilized for the benefits of their respective regions to promote change and development. Only then could it be rational to speak about the merits of the rural-urban population mobility of the skilled labour for their areas of origin or for the rural areas as a whole. This subject will be part of our concluding remarks in the last chapter.

Our concern in this context is to stress the point that remigration of skilled labour force involves, in the majority of cases, persons who originate in the relatively developed regions in the country. By contrast, persons from backward regions tend to stay longer, in some cases even permanently, in their areas of destination, probably because the conditions which had originally induced their out-migration were still prevailing in their areas of origin. Unlike the case of those originating in the relatively developed regions, this group has to support financially the relatives who are still living in a home village as long as the means of production there are not

improved. Accordingly, it would be difficult for them to accumulate the needed capital to start a business like one who originates in a developed region. Moreover, for skilled workers originating in backward regions there are no or only limited chances to make use of the qualifications and the experience they gained through their migration process. By virtue of their increasing aspirations and their continually changing place utility matrix they are reluctant to return to their places of origin where their needs are hard to be locally satisfied. For the unskilled persons it is the matter of better income oportunities to cover the necessities of life that induce them to leave their home areas for other locations rather than to satisfy their growing aspirations. As has been shown by HEINRITZ, G. (1980) and SWAR EL DAHAB, A. (1978) there was a high tendency among the unskilled persons to remigrate to their respective regions after a short or long stay in the areas of destination. This is probably because of their failure to achieve economic progress in the destinations and the need to secure a life within their traditional social setup. But this should not imply that the skilled labour, by virtue of the socio-economic status they have reached, are completely detached and uprooted from their traditional societies, since there are concrete evidences of strong relations between them in terms of repeated visits and/or financial help, even if they chose to take up permanent residence away from their origin. In the next chapter we attempt to show, by means of a concrete example, how the migrant skilled persons were retaining a good relationship with their relatives still living in the home area in spite of the geographical and social displacement and the effects these relations have on the residual communities.

VII. MOBILIZATION EFFECT OF AGRICULTURAL MECHANIZATION ON THE RURAL POPULATION: A CASE STUDY IN EL SUKI DISTRICT

1. A FRAMEWORK FOR MOBILITY IMPACT STUDY

The following chapter deals with the possible effects of agricultural mechanization on the rural areas of the Democratic Republics of the Sudan. We attempt to prove the hypothesis that the rural development measures, including the adoption of agricultural mechanization, do not stabilize the population situation in the areas concerned, but rather cause a mobilization of the rural population, thus intensifying in-migration pressure on the towns and increasing the tendency towards polarization.

Within the general inter-disciplinary field of population mobility study, the dominant pattern has been a concern with three particular branches: analysis of the spatial patterns of movement, investigation of the motivations for movement and description of the effects of migration on the places of destination. There is, however, one further aspect of population mobility which has been neglected for the most part, namely, the study of the effects of population mobility on the places of origin. As LOWENTHAL and COMITAS (1962, p. 196) have pointed out: 'people who move are much more frequently considered as immigrants than as emigrants'.

Within the scope of a single chapter such as this it is impossible to consider a complete mobility repercussions study, but an attempt will be made to redress the customary imbalance of interest by providing a case study of the areas and communities left behind by rural emigrants. Our attention will be mainly directed to loss of population through migration, since this is the most measurable result in comparison to others. Moreover, we believe that all other effects are a functional volume and attributes of the persons who leave the rural areas. However, although the study of net migration loss from rural areas has a long history, particularly in the developed world (SAVILLE, 1957; BEALE, 1964), the measurement of migration loss has often created problems in defining 'rural' or 'non-metropolitan' areas as well as in collecting data in the case of the deloping countries. In the latter, including our case study, lack of accurate census reports and population registration methods has caused statistics on population gain and loss to be based on estimation rather than actual information. More important than a quantitative and qualitative examination of migration loss is examination and explanation of the interrelated factors causing that loss. Among the factors which have been most frequently considered are improved rural educational standards, regional and sectoral wage differentials, dissatisfaction with rural community life, the displacement effect of agricultural mechanization and deteriorating environmental conditions. Attempts have often been made to explain the general large scale reduction in rural population levels against the background of major social, economic and demographic changes occurring in other sectors on the local or national level. In the developed countries, population loss from rural areas has been recognized within

the context of a major transformation in the national way of life within the past century. This transformation is presently taking place in the developing countries, including our case study. Thus any analysis of the effect of large-scale rural out-migration on the communities left behind is made more complex by the need to relate change in the rural areas to those on the broader national level, separating the effects of other variables. The phenomenon of counter-streams, as noted in the studies of the developed world by SCHOFIELD (1970) is not yet a factor in the developing world, since large-scale population mobility, relative to socio-economic transformation, is a relatively recent phenomenon. Until now there has been no study on the developing countries which concentrates on the flows of incoming population with suggestions for possible reduction of the negative effect of net population loss.

Consideration of the effects of migration on the residual communities left behind with respect to the selectivity of the process has been the greatest attention in nearly all of the mobility impact studies. It has been generally found that net migration loss from rural communities has certain common features (MERLIN, 1971, pp. 67 - 92), the two most common being that most migrants are young and that males generally outnumber females. Other aspects of selectivity which have been investigated include educational achievement (HANNAN, 1969, pp. 206-207), position in the local rural social hierarchy (ISZAEVICH, 1975, p. 304) and whether or not the migrant is a social innovator (GALTUNG, 1971, pp. 190-191).

Selectivity in migration is a function of socio-economic transformation in both sending and receiving areas. Thus it should not always be taken as a negative effect of population

mobility, since a net loss of migrants from a rural area may be either beneficial or detrimental to the residual community. It is often argued that the fertility declined as a result of age - and sex-selective out-migration has caused rural migration loss to become a problem rather than a safety valve which acts to stabilize the rural social structure, partucularly in times of economic difficulties.

Studies of the residual communities have shown very similar effect on the sending areas, the most frequently considered being the two demographic effects of increased relative age of the population (DRUDY, 1978, p. 58) and the creation of a sex imbalance. These two aspects often manifest themselves in the socio-economic performance of the residual community. Socially, selective rural loss may result in a loss of potential innovators and social leadership (JONES, 1965, p. 42). Economically that loss may restrict the scope and viability of commercial activity which may induce further emigration (REITER, 1972, p. 42). On the whole, it may be argued that the effects of migration loss may be so severe that demographically, socially and economically there is little possibility of future stabilization, let alone growth and development.

2. AN APPROACH TO THE STUDY OF POPULATION MOBILITY IMPACT

It is the aim of the present chapter to make a detailed study of recent migration changes in a rural region of the Democratic Republic of the Sudan with a view to identifying the actual patterns of selectivity that have operated among migrants of some selected villages and to

examine the way in which the observed patterns of selectivity have altered the structure of the residual community. We attempt here to discriminate between the mobilizing effect of the agricultural mechanization and the mobilizing effect of other working factors.

We approached the subject by selecting a number of villages in a particular region where agricultural mechanization is wide spread and is generally accepted as the one innovation which has contributed most to bringing about the present socio-economic transformation in the region. Lack of adequate information, particularly on the population, and the restricted time for investigation have limited the scope and depth of the study. Data concerning the demographic structure of the rural areas as well as that about in- and out-migration is utterly lacking in the Sudan, particularly at the village level. Accordingly, our study is based on a field survey on the micro- rather than the macro-level. We attempt to measure the pull-effect of a functional location of agricultural mechanization on the young males of the surrounding villages. Our aim is to prove the hypothesis that the more a place is affected by agricultural mechanization (i.e. the nearer it is situated to the functional location of mechanization or the longer such a location exists), the greater is the probability of increased participation and hence increased out-migration.

In our analysis we confine ourselves to the qualifying effect of agricultural mechanization whereby the rural population is stimulated to acquire technical skills, causing a rise in aspiration which in turn induces out-migration. Thus it is attempted to examine whether the acquiring of technical skills through this type of

outmigration may be used to measure the contribution of agricultural mechanization to rural transformation. The argument is prefaced by a brief discussion of the changes which have overtaken the place in the last two decades and an analysis of the extent of rural out-migration, as caused by agricultural mechanization and its impact on rural developed. Our approach is to give a brief historical background on the expansion of the modern agricultural subsector in this particular district as part of its expansion in the whole Blue Nile Province to help explain, by means of a concrete case study, the effect of this process on the rural transformation there.

The administrative region of El Suki consists of a number of small- to large-sized villages with El Suki town (some 20,000 persons) as its largest central town. The area of study lies roughly in the centre of the former Blue Nile Province and some 40 km south of Sennar on the eastern bank of the Blue Nile. It is predominantly settled by a group of Fulani refugees who had fled Nigeria as a consequence of the British colonial invasion (DUFFIELD, 1977). The favourable natural conditions of the region (extensive unexploited lands with good quality soils as part of the central Sudan alluvial plain, extendable irrigation possibilities) have attracted other groups, particularly from the Northern Province, since the beginning of this century. As in other parts of the country's rural areas, there was no exact information available on previous in- and outmigration. Short-range but extensive population movements in the past, particularly to market centres, were reported to be fostered by the nature of land holding and by the existence of local crafts and rural industry. Although developments in other parts of the province had been communicated long before the actual transformation in this region

vocational training contributes to the rise in aspiration in the same way as formal education. It may generally be suggested that improved qualification increased an individual's chances of finding a rewarding job quickly when he migrates. The fact that qualified workers have few or no job opportunities at their places of origin induces them to move to other locations.

3. METHODOLOGY

We followed a method of complete coverage of all participants in a particular workshop with the aim of investigating their geographical origin, their age composition, their educational level, their motives in joining the workshop and their intention with respect to future migration. To investigate the problem of out-migration, as caused by agricultural mechanization, a comprehensive survey was carried out among the residual population in two selected villages which were supposed to be directly affected by agricultural mechanization according to the criteria described above. The study concentrated on the group of the out-migrants in terms of sex,age, qualification and previous occupation in comparison to the residual population. The main findings of the study are described in the following.

4. THE CASE STUDY AREA: EL SUKI DISTRICT (see map 2)

Within the context of rural depopulation, this study seeks to show how the population structure in one of the Sudan's most impoverished provinces - the Blue Nile Province - has undergone pronounced changes. An important theme developed in this section is the way in which the pattern of

began to take effect, interregional population movements had remained low due to limited aspirations, long distances and a primitive transport system. It was only after the Second World War that transformation gradually began to become apparent in the region. Like other regions in the country which have come into contact with the modern agricultural sub-sector, this region has experienced socio-economic transformation on a large scale since the beginning of this century.

The regional peasant economy of the nineteenth century, in which the village or sub-tribe defined the limits of social intercourse for the majority, communication was limited and markets were highly localized, gave way to a new phase of rural transformation. An essential element of change was and still is the mobilization of regional resources, particularly human resources, to participate in production for the world market. As elsewhere, the basis for this change does not lie in the agricultural sector itself but is the outcome of a prior expansion of non-agricultural sectors.

The main feature of change in this region, however, is the superimposition of pump-irrigated agriculture on the traditional rainfed agriculture. As a result of the rise in world cotton prices in the early fifties, the British administration attempted to promote the development and expansion of an indigenous private sector within the prevailing dependent formations. To realize this policy, land previously under communal use was newly registered and sold by the government to local merchants and companies (OSMAN, D.M., 1958, p. 40). Consequently, a number of small pump schemes appeared along the banks of the Blue Nile between Sennar and El Roseires more or less along the same lines as the tenancy system of the Gezira scheme. Few area residants

participated as tenants, rather the majority were degraded to the status of agricultural labourers on the same land which had hitherto been under their communal use. The incentive for their participation was the need for money to pay the taxes imposed by the colonial government and to buy non-agricultural commodities which began to flood the rural central markets. Thus the change in land tenure and land use may be regarded as the first real transformation of the economy of this region. The gradual spread of wage labour has been encroaching upon the traditional forms of labour process based on the cooperation of family and village members, as a result of a gradual appearance of an indigenous relatively wealthy group within the existing formations. Thus two distinct social groups appeared in the region, namely the commercial group largely based on the transport business and trade transaction and the group of paid agricultural workers. This new form of economic involvement has provided the indigenous population with the cash necessary for investment or to buy non-agricultural commodities. The effect of capital accumulation has been a gradual change in the individual's place utility matrix (see chapter 1.4), a cause of out-migration. This change has manifested itself in the gradual disappearance of the cooperative work system and the phenomenon of contempt for agricultural manual work among the peasant youth, an attitude which was further intensified by the spread of formal education.[1)] As a consequence of this development some groups, particularly the school-leavers, began to join the stream of rural-urban

---

1) The desire of a tenant to raise his socio-economic status has stimulated him to encourage his sons to join formal education at the same time that 'white-collar' jobs were highly appreciated.

migration.[2] This tendency has increased particularly since the early sixties when revenue from cotton began to fall.[3]

Parallel to the process of out-migration of the school-leavers, there has been a gradual increase in participation in the mechanical headquarters of the agricultural schemes in the same region, for the purpose of acquiring technical skills as a substitute for discontinued formal education. This effect of agricultural mechanization had more impact than merely skimming off the surplus population and began to dig deeply into the roots of the rural population. This type of population mobility reflects the deep-rooted socio-economic upheaval of shifting from a peasant-subsistant to a centralized urban-oriented way of life. The expansion of the urban centres and the attraction of their 'bright lights' was met by rising aspirations and growing discontent with rural conditions. Increased training opportunities, limited chances for employment in the region, prevailing regional wage differentials and increased information exchange were other effective factors which have been inducing the out-migration of the peasant youth. This process was highly selective in terms of sex, age, education and training level. This selectivity and its expected effect on the residual population is to be considered and tested empirically in the following discussion.

4.1 Findings of the Study Conducted Among the Participants of El Masara Workshop (see map 2).

To test the validity of our hypothesis that 'the intensity of rural population participation in the functional points of agricultural mechanization is a function of the distance

---

2) Due to the limited vacancies in higher schools (bottle-neck system of education) and because of limited chances for employment in the region the school-leavers were compelled to move away to make use of the level of education they attained.

3) As a consequence of a continuous drop in the tenant revenue, off-scheme interests became the main pursuit.

between those points and the parents' place of residence, we conducted a case study in the largest and oldest workshop in the region called El Masara workshop.[4)]

4.1.1 Social composition

All participants were found to be males of Sudanese nationality.[5)] They were in age-groups from 14-45 years as shown by Table 7.1.

Table 7.1: Age Composition of Participants of El Masara Workshop

Age group	Absolute number	% of total
Less than 15	6	2.5
15 - 20	114	46.9
21 - 25	53	21.8
26 - 30	25	10.3
31 - 35	19	7.8
36 - 40	17	7.0
More than 40	9	3.1
T o t a l	243	100.0

Source: Our own investigation (Sending areas survey.Jan. 1980)

4) El Masara workshop was installed by Abullela Group Companies in the early fifties to serve a number of private pump schemes in the region. It is located at the site of El Masara scheme about halfway between Sennar and El Suki towns and is surrounded by a number of small and middle-sized villages. The number of participants in January 1980, in the technical branch only, was 243 persons, the majority of whom were tractor drivers and assistant drivers.

5) Although there were some participants from the Fulani ethnic group, they were still regarded as Sudanese, since they possess the Sudanese nationality by virtue of being supporters of some political groups in the past.

It is apparent from the above table that the majority of participants were concentrated in the age groups 15-25 (68.7%), which reflects the attraction of the workshop particularly for young people. This was found to be manifested in the higher number of assistants among the participants (34.2%).[6] The markedly lower representation of persons in the age groups 30 years and above may be attributed to the out-migration of this particular age-group soon after acquiring the qualification necessary to compete for a job elsewhere, since for qualified persons there are usually no or only limited employment opportunities in the region and there is an increasing demand for them particularly in newly implemented schemes in other regions. The remaining older persons were either highly paid or they were bound by social obligations which compel them to stay. In fact, some of this group were found to be in-migrants, who had been purposely recruited from other locations to instruct junoir technicians and to maintain the mechanical fleet. They were accommodated in a separate quarter built especially for them and provided with the required services as an incentive to stay. It is relevant to stress the importance of this particular group in providing a model of urban life among the indigenous population (in their mode of life, dress and communication), since they were predominantly originated from urban centres. They contribute to a change in the population's place utility matrix, thus stimulating the move to other places to acquire the same standard of living.

Concerning the educational composition, we found that more than three quarters of all participants have received at least elementary education (Table 7.2). In comparison, the majority of the rural population were without a formal education (informally educated). This suggests that this

6) The job of an 'assistant' was created to attract young peasants to help in the technical work and at the same time to be instructed in order to build up a potential working cadre for further development of the scheme. It offers training with very limited financial incentives (LS. 13,900, presently LS. 29,500).

particular occupation is highly selective in terms of education level. The relatively lower representation of individuals with a higher education level may be due to the desire of the highly educated to join 'white-collar' jobs rather than working as assistant drivers or assistant mechanics. The small proportion of persons with a high secondary school level (6.2%) and holders of university degrees (1.2%) was exclusively composed of in-migrant highly skilled workers who occupied the directional posts of the workshop.

Table 7.2: Educational Composition of the Participants in El Masara Workshop

Educational level	Absolute number	% of total
Informal education	54	22.2
Elementary education	129	53.2
Lower secondary level	42	17.3
Higher secondary level	15	6.2
University level	3	1.2
T o t a l	243	100.0

Source: Our own investigation (Sending area survey.Jan. 1980)

As for the marital status of the participants it was found that almost two thirds were unmarried. Such a result appeared, at first sight, to be unusual in the rural areas, since usually marriage from the age of 18 to 25 years is quite common. The explanation for this finding may be sought in the rise of aspirations which renders marriage to be an endeavour which is to be well planned and thoroughly calculated. The accumulation of the money required to get married was impossible for many as long as they were still in the lower ranks of the

economic ladder.[7] This was evident by crossing marital status and income level which revealed that those of higher income level had an increased propensity to marry (Table 7.3).

Table 7.3 A Combination of Marital Status and Income Level of the Participants in El Masara Workshop

Income group	Married N.of pers.	%	Unmarried N. of pers.	%	Total	% of total
Less than LS 30	4	4.8	79	95.2	83	34.2
31 - 40 LS	16	25.8	46	74.2	62	25.5
41 - 51 LS	28	68.3	13	32.7	41	16.9
51 - 60 LS	21	77.8	6	22.2	27	11.1
61 - 70 LS	14	87.5	2	12.5	16	6.6
71 - 80 LS	10	90.9	1	9.1	11	4.5
More than LS 80	3	100.0	0	00.0	3	1.2

Source: Our own investigation (Sending areas survey, Jan. 1980).

The table above shows that 76.6% were in the income level of LS 50 and lower which is comparatively lower than the average income of the tractor drivers in the agricultural schemes already discussed in chapter five (Table 5.18).[8]

7) It should be noted that all assistants in the workshop (almost one third of all participants) received the minimum wage of LS 29,500 at the time of investigation in 1980. Only two years ago the minimum wage had been LS 13,900.

8) The reason for this wage differential may be explained in terms of the relatively lower experience level of the participants of this workshop in comparison to those in other agricultural schemes. Another reason may be the fact that most of the participants of this workshop were still living with their parents, thus the cost of living is relatively lower than for a person who migrates to another location and has to accomodate himself independently.

Perhaps the perception of this wage differential and the inability to accumulate the money needed to marry induce some of them to move to other places despite the fact that even the minimum wage of skilled workers in-situ was far higher than the wage received by an agricultural worker.

4.1.2 Participants' place of origin

Our investigation revealed that 47.3 % originated from the village where the workshop is located (Um Durraba village), 23.9 % in El Busata village, 2 km apart. The rest originated from other locations within and outside the same district. As Table 8.4 shows the degree of participation of the young villagers in the workshop is a function of distances between parents' residence and that workshop. (Fig. 2). This confirms our hypothesis that the proximity of the place of origin to the functional location of agricultural mechanization (workshop) increases the probability of participation. The most convincing explanation is the desire of the scheme's private owner to employ persons from the adjacent villages to eliminate the costs of accommodation and transportation and hence to be able to offer lower wages. [9] In this sense the rural places of origin contribute to the development of such functional locations not only by providing the needed reserve of potential skilled workers but also by assuming the

---

9) There were 15 houses which were meant to accomodate senior technicians who predominantly originated from distant places. House rental in the villages surrounding the workshop was still an investment seldom practised. The majority of participants commute daily between workshop and their parents' residence.

responsibility for accomodating them.

Table 7.4: Number of Participants From Each Origin and its Relation to the Distance Between that Origin and the Workshop (see Fig. 2)

Place of origin	Distance in km	N. of pers.	% of total
Um Durraba village	less than 1 km	115	47.3
El Busata village	2 km	57	23.5
Zein el Abidin village	5 km	10	4.1
Abu Tamra village	7 km	6	2.5
Hamadnalla village	10 km	2	0.8
El Suki town	12km	1	0.4
Other distant places	more than 12km	52	21.4

Source: Our own investigation (Sending areas survey, Jan. 1980)

4.1.3 Previous occupation

The majority of participants (57.2 %) had participated in the agricultural sector as unskilled labourers prior to participating in the workshop. Their motive for participation was readily given as comtempt for agricultural work (particularly in the case of the school-leavers), the desire to acquire a skill in order to be able to compete for a rewarding job elsewhere and the lack of employment opportunities outside the agricultural sector. The effect of this fact is to reduce the number of potential agricultural workers available, in compensation for whom other groups were recruited seasonally by the scheme authority in more distant places. The fact that the daily earnings of a semi-skilled worker in the workshop, however low, are far higher than the daily earnings for physically exhausting agricultural work

stimulate the rural youth to compete for such a job. The high turnover among the skilled workers increases the possibility of their participation, thus decreasing their readiness to do any sort of manual work. In fact, participation in the workshop provides the only opportunity to break through the existing rigid socio-economic conditions prevailing in their places of origin. This was confirmed by our finding that 76.7% of all participants were intending to move to other places as soon as they acquired the necessary qualification. under such conditions it may be expected that the places which come into contact with the agricultural mechanization are suffering a continuous decrease in their active labour force. To examine this expectation it was thought necessary to conduct a demographic study in two randomly selected villages in the same district. In the following we present our findings in El Kurmuta[10] and Abu Gara [11] Villages.

---

10) El Kurmuta is a small-sized village (136 persons) and one of three villages surrounding El Masara workshop (collectively called Um Durraba village) inhabited by a group of people who originated in the Northern Province and who in-migrated to the region as early as the eve of this century.

11) Abu Gara is a middle-sized village (675 persons) which lies about 15 km south of El Suki town at the site of Abu Gara irrigated scheme. By contrast it is inhabited predominantly by a group of people originating from Western Sudan who have in-migrated into the area since the late nineteenth century as part of the Westerners' settlement of the north-east Sudan. By contrast the workshop adjacent to this village is smaller and more recent than El Masara workshop near El Kurmuta village.

4.2 Findings of the Study Conducted Among the Residual Population of El Kurmuta and Abu Gara Villages of El Suki District (see map 2)

4.2.1 Aims and methodology of the study

In this study we attempted to reflect the mobilizing effect of agricultural mechanization on the rural population whose members, by virtue of its proximity to the functional locations (workshops) were able to acquire technical skills which stimulated them to emigrate. Our approach was to investigate the demographic structure of the residual population and the socio-economic composition of the emigrants. Here, too, we followed a method of complete coverage whereby all householders in each village were directly interviewed. This was the only practical method in the absence of any sort of demographic registration in the district.

4.2.2 Sex composition

Our investigation revealed that the female element dominated in both villages among the residual population. This was found to be in contrast to the sex composition of the emigrants which was found to be dominated by the male elements (Table 7.5).

Table 7.5: Sex Composition of the Residual Population and the Out-migrants of El Kurmuta and Abu Gara' Villages

Village	All Population							Residual population			
	Total Out-Migrant										
		Total	% of all pop.	Male N.	% of all Male	Female N.	% of all Fem.	Male N.	% of all Male	Female N.	% of all Fem.
El Kurmuta	136	48	35.4	39	50.0	9	15.5	39	50.0	49	84.5
Abu Gara'	675	98	14.5	81	23.5	17	5.2	264	45.8	313	94.8

Source: Our own investigation (Sending areas survey, January 1982)

The findings in the table above may be taken as the first sign of the selectivity effect of agricultural mechanization on the population left behind, since usually only males participate in the technical work in rural areas. The small proportion of females among the out-migrants was reported to be dependant householders.

4.2.3 Age structure

Our findings revealed that the selectivity effect of agricultural mechanization was not only manifested in the inbalanced sex composition but also in age structure. As shown in Table 7.6, the majority of the residual population was composed of older persons (over 35 years) and children (under 20 years). In contrast, the out-migrants were predominantly persons in the age group 21 - 35 years, who probably by this age had managed to acquire the necessary qualification to compete for more rewarding jobs in other locations.

Table 7.6 Age Composition of the Residual Male and Female Population and Out-migrants of El Kurmuta and Abu Gara Villages (in % of total number of each group)

	Residual population					Outmigrants				
Village	0-20	21-25	26-30	31-35	35+	0-20	21-25	26-30	31-35	35+
El Kurmuta	23.9	17.0	9.1	6.8	43.2	0.0	16.7	31.3	39.5	12.5
Abu Gara	21.7	16.8	8.5	6.2	46.8	2.3	18.3	29.2	37.1	13.1

Source: Our own investigation (Sending areas survey, Jan. 1980)

The finding above may be regarded as the most dangerous phenomenon as regard to the future socio-economic development

of the villages under discussion. If this trend continues it may be expected that both villages will be depopulated, since even the present younger residents (under 20 years) stated their intention to leave the village as soon as they acquire qualification in the workshop. the low representation of persons over 35 years of age among the out- migrants was not an effect of counter-migration, as is usually the case in the developed countries, but rather a reflection of the recentness of the out-migration of this particular group of skilled labourers.

4.2.4 Educational composition

Our enquiries revealed that the outmigrants were selected from the most educated elements of the male groups in the two villages. As shown by Table 7.7, more than two thirds of the out-migrants had at least elementary education, an education level similar to that of the interviewed tractor drivers and taxi drivers in the previous cases of study. In contrast, the residual population was predominantly composed of presons who had only informal education.

Table 7.7: Distribution of the Residual Population and Outmigrants According to the Level of Education (in percentage of the total number of each group)

	Residual population			Outmigrants		
Village	Informal Education	Elementary Education	Higher Education	Informal Education	Elemen. Educat.	Higher Educat.
El Kurmuta	78.4	19.3	2.3	12.5	70.8	16.7
Abu Gara'	84.9	13.0	2.1	27.5	64.3	9.2

Source: Our own investigation (Sending areas survey, Jan 1980)

The importance of this type of selectivity, however, may be seen in the tendency to deprive the rural areas of the innovators who might be expected to contribute to the transformation in the social, economic and political set-up of the rural community.

4.2.5 Economic composition

In order to reveal the relationship between agricultural mechanization and the prevailing out-migration trends, an attempt was made to classify the occupation structure of the out-migrants prior to joining the stream of out-migration. According to our findings there was a higher participation in the mechanical part of agricultural mechanization, in both villages, than in other occupations (Table 7.8).[12)]

Table 7.8 Distribution of the Out-migrants in Each of the Two Villages According to Occupations Prior to Out-migration[13)]

Village	Mech. work		Peasantry		Commerce		Personal serv.		No Occu.	
	N.	%	N.	%	N.	%	N.	%	N.	%
El Kurmuta	28	58.3	7	14.6	3	6.3	1	2.1	9	18.7
Abu Gara'	37	37.8	27	27.6	11	11.2	6	6.1	17	17.3

Source: Our own investigation (Sending areas survey, Jan. 1980)

12) Since there was a possibility of having more than one occupation at the same time we consider only the prime occupation of each person to the exclusion of any secondary occupation.

13) The occupational structure has been broken down into four categories: Mechanical = all activities in relation to the technical part of agricultural mechanization; peasantry = all non-technical activities in relation to the agricultural sector; commerce = mainly shop-keeping, food processing such as baking, butchery and restaurant keeping; personal service = housekeepers, servants, cooks and the like; dependant wives = unemployed women.

The table above shows that more than half of the out-migrants of El Kurmuta had been participating in occupations related to agricultural mechanization before they left for other locations. This means that some individuals had left their previous occupations to join the mechanical sector while they were still in the same region of origin. Such a change of occupation, enforced by the adoption of agricultural mechanization, should be interpreted as a sign of an early stage of economic transformation in such rural areas. But a change in occupation, in situ, does not automatically mean that an individual is lost to his community; on the contrary, his value may be even higher than before. The real loss appears at the time when highly qualified persons feel compelled to emigrate, particularly in cases where the out-migrant is intending to take up permanent residence in areas of destination. At that stage it becomes evident that the whole region is suffering from a drain of its most innovating elements, as is the case of the two villages under discussion. The ultimate result will be an economic stagnation or even retardation.

It is paradoxical that persons with other occupations were poorly represented among the out-migrants despite the fact that these occupations offer lower economic incentives than occupations related to agricultural mechanization. The effect of the factor of aspiration on an individual's place utility matrix (chapter 1.4) may offer an explanation for the low respresentation of this group. By virtue of their education and experience, the skilled persons may be expected to be more motivated to move than others with less qualification. Moreover, qualified workers have a lower risk of unemployment when they move away than unqualified persons.

The comparatively lower proportion of those with mechanical occupations in Abu Gara village may be explained by the recentness and size of the functional location of agricultural mechanization there rather than in the reluctance to move away. [14] The relatively higher representation of persons with other occupations may be due to the ethnic composition of the people in this particular village who, predominantly originated in the western Sudan, have a longer tradition of out-migration of unskilled persons, particularly to urban centres, than the Northerners of El Kurmuta village.

4.2.6 Period of out-migration

By retracing the period of out-migration among the members of both villages we found that out-migration increases with time (Table 7.9). It was apparent that the intensity of out-migration through time was a function of the length of existence of the functional locations of agricultural mechanization. Accordingly, El Kurmuta village seems to have a longer out-migration history of skilled labour than Abu Gara village as evident from its higher proportion of out-migrants in the period prior to 1970 as compared with that of Abu Gara village.

---

14) In comparison to El Musara workshop, the workshop of Abu Gara scheme is smaller and more recently installed. The former was installed in 1953 and, at the time of investigation, it offered employment to 243 persons in the technical branch alone, while the latter was installed in 1960 and offered employment for 78 persons.

Table 7.9: Distribution of Out-migrants According to the Period of Out-migration

Village	El Kurmuta		Abu Gara	
Period of Out-migration	N. of respondants	% of total	N. of respondants	% of total
Before 1960	8	16.7	6	6.1
1960 - 1970	11	22.9	18	18.4
1971 - 1975	13	27.0	36	36.7
1976 - 1980	16	33.4	41	41.8
T o t a l	48	100.0	98	100.0

Source: Our own investigations (Sending areas survey, January 1980)

The increasing demand for qualified persons, particularly vehicle drivers and mechanics, both in the urban centres and in the oil-rich Arab countries where higher economic incentives are offered, has served as a main catalyst to out-migration in the last few years. Were it not for the qualifying effect of agricultural mechanization, it would not be possible for the rural population to compete for relatively high-paying jobs in other destinations, which is illustrated by the relatively lower proportion of out-migrants with non-technical occupations. In this sense agricultural mechanization contributes to upgrading the qualification level of the rural population, thus increasing their chances of finding a job quickly when they move away. Such an upgrading effect, however, would have been of significant importance for the process of rural development were it not for the prevailing wage differentials between the latter and the urban areas which compel

the qualified persons to move.

By disintegrating the group of out-migrants in each of the two villages according to their places of destination at the time of the investigations it became evident that the qualified rural youth did not only abandon their places of origin but also left the agricultural sector (Table 7.10).

Table 7.10: Distribution of the Group of Out-Migrants According to their Places of Destination at the Time of Investigation

Destination	Still in agric. schemes		in Greater Khartoum		in other towns		abroad	
Village	n. of pers.	%	n. of pers.	%	n. of pers.	%	n. of pers.	%
El Kurmuta	6	12.5	22	45.8	8	16.7	12	25.0
Abu Gara	26	26.5	38	38.8	19	19.4	15	15.3

Source: Our own investigation (Sending areas survey, Jan. 1980)

The table above revealed that the end effect of the qualifying process of agricultural mechanization was the concentration of the most qualified of the rural population in the urban centres, particularly Greater Khartoum, as a step towards leaving the country entirely. [15]

15) The majority of those who were in Khartoum, other towns and abroad at the time of investigation were reported to have circulated between the different agricultural schemes before they finally arrived at these destinations (see the circulation of skilled and semi-skilled workers in chapter 5.).

The fact that only a small proportion of out-migration (11.3 % and 13.4 % in El Kurmuta and Abu Gara respectively) were reported by the interviewed relatives to have succeeded in taking up permanent residence in the places of destination indicates that this particular type of population mobility has not reached a mature stage. For the majority, Khartoum was a preparatory station in the continuing the mobility process. [16)]

4.2.7 Contact with the place of origin

To show the reflexive effect of this type of population mobility on the places of origin, an attempt was made to reveal the degree of contact of an out-migrant in the different destinations. We generally noticed that increased spatial an social displacement (horizontal and vertical mobility) of a person decreases the degree of contact with his place of origin (Table 7.11).

---

16) It was not possible for a third person to define the intended new destination of out-migrants, but there was good reason to consider them potential movers.

Table 7.11: The Relationship Between the Different Destinations and the Degree of Contact of an Out-migrant with his Origin (as a Percentage of Out-migrants in Each Destination) [17]

Destination	Agricul. schemes			Small Urban			Khartoum			Abroad		
Degree of contact	Strong	Weak	no relation	Strong	Weak	no relation	Strong	weak	no relation	Strong	Weak	no relation
El Kurmuta	83.3	16.7	00	57.1	42.9	00	40.9	50.1	9.1	25.0	58.3	16.7
Abu Gara	80.7	19.3	00	67.9	36.6	5.3	44.8	47.4	7.8	33.3	46.7	20.0

Source: Our own investigation (Sending areas survey, Jan. 1980)

The highest degree of contact (regular visits and regular financial aid), however, was reported among persons who were still joining the agricultural sector. At the other end of the spectrum, the out-migrants abroad were reported to have the lowest degree of contact, even in relation to the migrants in Khartoum. But even so, at least a quarter of the out-migrants still keep strong relations with their home area in spite of the physical distance and inefficient means of communication. The fact that out-migration is still viewed as a temporary move for the purpose of the bettering of their socia-economic situation, induces the out-migrants to maintain strong contacts with their home areas with a view to socio-economic security at the age of retirement. Whether or not these strong family relations,

17) We aggregated all types of contacts in three distinct categories: Strong = regular visits and/or regular financial aid; Weak = irregular visits and irregular financial aid; No contact = No visits and no financial aid.

a feature of the Sudanese extended family system will continue to prevail is a function of the rate of community socio-economic transformation in the sending areas and the rate of integration of out-migrants in their places of destination.

At this stage of out-migration process it was impossible to measure the resulting effect of such contacts on the places of origin. Although there were apparent changes in the way people live, dress and communicate, it was not possible to quantify this effect due to the difficulty of collecting the necessary information. It was evident, however, that in both villages there was not a single case of a return migrant. Even those who had joined the stream of counter-migration prefered to take up residence in the urban centre nearest to their place of origin as a compromise between their desire to satisfy increasing socio-economic needs and the need to be attached to the traditional community. [18)]

5. SOCIAL AND ECONOMIC IMPACT OF POPULATION MOBILITY ON AREAS OF ORIGIN

The two villages under study have been experiencing continuous socio-economic changes in the past two decades, a situation which is not untypical of many rural areas where the population for one reason or another has been induces to join the stream of rural-urban migration. The most apparent effect manifested itself in the tendency

---

18) At the time of investigation there was a small number of return migrants who had taken up residence in Sennar and El Suki towns.

toward depopulation which has been occurring as an effect of the negative migration stream rather than through national population loss (no evidence of birth control measures or of abnormally high mortality rate). With the exception of the few skilled workers who were brought in on a temporary basis from other distant localities to direct and maintain the technical work at the functional points of agricultural mechanization, there was no sign of in-migration which could play a vital role in reversing the general trend of population evolution and maintaining the demographic balance.

Because of the lack of any sort of registered data, it would be difficult to quantify the demographic effects of out-migration on the communities left behind. It is also difficult to distinguish between the effects of out-migration and the effects of other external factors. Furthermore, it is difficult to evaluate the demographic impact at this stage of population out-migration, since out-migration effect is likely to become evident only after a long period of time. This means that the out-migration of adult males now, though having an immediate effect on fertility, will deplete a particular age group for years to come.

By analysing the demographic structure at the time of investigation, it was found to be characterized by a predominance of females over males, and generally of persons in the age groups over 35 years old and children under 20 years. In contrast, the group of out-migrants was found to consist predominantly of males in the age group 20 - 34 years (Table 7.6). This suggests an enhancement of the relative importance of the elderly and a reduction in the importance of young adults, particularly

of the middle-aged, which inevitably contributes to an increase in the age ratio of the population which leades to a strain on welfare facilities and/or instability of the social structure.

We have already pointed out the selectivity effect of out-migration in terms of education level and economic occupation (Tables 7.7 and 7.8). It is relevant in this context to stress the point that in areas where the population falls numerically and structurally far short of local demand for manpower, as is the case in the area under study, out-migration is likely to have disastrous effects, particularly where the process is highly selective. In the longer term, pronounced changes in the population structure, as found in both villages under study, are likely to be accompanied by difficulties in the provision of various forms of local government services. The fact that certain facilities become redundant with a consequent loss of capital investment, such as the closing of private shops in both villages, may be taken as a reflection of the structural and numerical changes in the population resulting from selective out-migration. Such closures, however, are inevitable in a situation where buying power is reduced due to decreasing revenue from traditional occupations and the out-migration of the relatively higher-paid persons. The suggestion that this situation may be counteracted by expected remittances is not yet applicable in these particular cases, since out-migration is still a recent phenomenon and most of the out-migrants, with the exception of the few abroad are still on the lower rungs of the occupational ladder. Even those remittances sent back were found to have been chiefly invested in buildings, giving the eroneous impression of increased village population and a higher economic standard.

Occupational transfer in situ, i. e. displacement of the labour force in a particular sector, coupled with increased employment in another sector in the same region, which might have stopped or at least slowed the migration speed from such villages, has not yet been put into practice on a sufficient scale. Thus it may be inferred that population stability and the provision of social welfare facilities will be further threatened if present trends of selective out-migration continue. Inasmuch as continued out-migration on the present scale will result in a reduction in further viability and stability of rural communities, more large scale preventive and corrective measures are needed. At the present stage of socio-economic transformation in the rural areas, it should be recognized that only by halting urban growth and reducing the regional and sectoral income disparity can the rural exodus be controlled. One-sided measures to foster the development of the rural areas, such as expansion in the modern agricultural sector, as shown by this study, do not stabilize the population, rather they intensify the deleterious effects of past population mobility on the rural communities left behind. The argument that rural-urban migration contributes to the socio-economic transformation of the sending areas should, accordingly, be accepted with great caution. Of course, there are some advantages to out-migration such as the diffusion of innovations and the increase in the rate of social transformations which are manifested in the two villages under study in the way people live, dress and communicate. These gains are highly valuable to the residual population, in the shorter term only, since without such gains the rural population would remain primitive and isolated. But these gains should not obscure the long-term negative effects, since these very short term gains are likely to

cause further instability in the rural communities as a result of their stimulating potential movers to join the stream of out-migration in the absence of local employment opportunities with an effect of depopulating the rural areas, a situation which would prove disastrous for the economy of a developing country like the Sudan.

VIII. AGRICULTURAL MECHANIZATION AS AN INDIRECT FACTOR OF POPULATION MOBILITY

In this chapter we present briefly other types of population mobility which we believe have some relation to agricultural mechanization. We distinguish between two main types of population mobility, namely: rural-rural population mobility (movements of the seasonal agricultural labourers, the inter-and-intra-regional curculation of the nomads and the government controlled type of population movements) and ural-urban population mobility of unskilled labourers. Both types have been dealt with by a number of writers elsewhere. [1] All we need here is to consider agricultural mechanization as a variable which induces these types of population mobility.

1. RURAL-RURAL POPULATION MOBILITY

1.1 Rural-Rural Circulation Of Unskilled Labourers

This type of population movement is often referred to as the movement of seasonal agricultural labourers which is necessitated by the existence of a highly localized modern agricultural sub-sector, centred around mechanization, resulting in the creation of actual economic systems, a feature of the Sudan's economy.

The significance of this particular type of population mobility lies both in its magnitude with regard to the

1) Both types have been treated by a number of scholars, who attempt to reflect their magnitude and effects on both sending and receiving areas (GALAL EL DIN, M. E., 1973, 1979; EL BUSHRA, 1976; ABU SIN, M. E., 1975 and SWAR EL DAHAB, A., 1978).

number of people involved and to its socio-economic impact both on sending and receiving areas. It reflects the main mechanism of the basic socio-economic changes and the transformation of the contemporary Sudanese society. It is often represented as a function of two major factors, namely, the structural nature of the country represented by diverse environmental and cultural conditions and the adoption of agricultural innovations, particularly agricultural mechanization (chapter 4), which are concentrated in some regions rather than in others. The former is regarded as a 'push' factor, which induces people to search for compensation for their deteriorating environmental conditions by moving to more rewarding localities. The latter is a 'pull' factor which stimulates people to participate in the sort of seasonal occupation offered in the modern agricultural sub-sector. Both factors are working together, resulting in a regional and sectoral population mobility.

As previously stated, the Sudan is characterized by diverse environmental conditions reflected in a diverse pattern of land use. The people in the different geographical regions used to adapt themselves to the available resources to ensure their living, but as time goes on and due to natural and human factors, a deterioration in the environmental conditions becomes apparent and it is obvious that it is no longer possible to maintain the previous way of life with their limited knowledge and primitive production tools. Thus the only alternative, in the absence of government intervention, is the movement to other regions. This is particularly the case of the provinces Darfur and Kordofan where the off-region interest becomes a pursuit of life. The people in this province are compelled to move not only within the same region but to participate

in a long-distance, interprovincial type of movement. In this context the government as the mean decision-maker in the whole process of modernization, plays a leading role in locating and relocating the different resources including manpower.

In chapter IV we attempted to give a brief review of the process of developing the modern agricultural sub-sector. We emphasized the fact that the development trend in the Sudan was and still is towards more localized development projects which concentrate on market-oriented products. The favourability of the north-eastern Sudan centered around the Nile axis, (in terms of agro-ecological conditions and its central location to communication systems) has rendered it a centre of gravity for all types of population mobility, particularly that of seasonal agricultural labourers. In this context mechanization is the most important agricultural input which determines the scope and intensity of resource utility in the region including manpower. Mainly for economic reasons (abundance of cheap labour force, scarce capital) it was thought necessary to adopt partial rather than full mechanization practices. Thus a huge number of unskilled workers has to be mobilized from backward regions toward development poles, i. e. from the traditional sector to the modern agricultural sector. Frankly, the exact number of persons involved in this type of population mobility is not precisely known. According to ILO (1976, p. 106), there are approximately one million persons circulating annually between their home area and the different mechanized agricultural schemes. Other authorities stated that the rainfed mechanized schemes alone attract about one million workers annually, apart from the irrigated mechanized schemes which attract approximately 750,000 persons annually (GALAL EL DIN, M. E., 1979). But even if we consider the figure of one million

as the actual number participating in the agricultural modern sub-sector it becomes evident that this particular type of population mobility is of significant importance as far as population redistribution is concerned, since it constitutes 14 % of all the country's labour force and 6 - 7 % of the total population of the Sudan.

This type of population movement started as early as the first quarter of this century when the colonial government was confronted with the problems of labour shortage in the newly implemented Gezira project. The inability of the tenants and their families to do the needed manual work has induced the scheme administration to recruit agricultural workers from other regions. Thus it was thought necessary to build up recruitment committees and to open recruitment offices in a number of towns to help mobilize and persuade the indigenous people to join the work in the modern agricultural sub-sector centred around the Gezira scheme.Many devices were introduced to convince people to participate in the process (provision of food, loans and free transport). In addition, instructions were given to the local authorities to close the public drinking-places during the peak demand season to help induce the indigenous population to join the cotton-picking campaign. The recruited people have to be accompanied by the police, the tenant delegates and the labour contractors to make sure that they go where they are supposed to go (ABU SIN, M. E., 1975, p. 254).

At first the majority of the recruited people were from the West African countries who were on their way to Mecca. For this group the participation in the picking campaign was essential to collect some money for the completion of the journey. This was often argued to be the reason for the huge waves of in-migrating West-African people who

at present constitute a high proportion of the Sudanese population.[2] But due to some in-migration restrictions, this source was no longer capable of covering the increasing demand for agricultural workers in the Nile axis. Thus the main emphasis was laid on the people from Western Sudan, who by no means voluntarily participated in the process. Has it not been for the recruitment measures pursued by the government authorities, and the overwhelming environmental conditions prevailing in a region they would not have participated in the process at all. Thus it is not justified to relate their movements to the functioning of a free-labour market system according to supply and demand as has been suggested by the ILO (1976).[3] The majority of migrants were neither selective to particular occupation nor to particular destination.

Our concern in this context is to stress the fact that developments in the modern agricultural sub-sector, which centred around mechanization, have substantially widened the existing regional disparity which gives this type of population mobility more importance in regard to volume, frequency, interregional convergence and socio-economic

---

2) The study of the in-migration of the West-African people in the Sudan has been well dealt with by a number of scholars elsewhere (BARNETT, 1977; GAITSKELL, 1959; HENIN, R. A., 1961; GALAL EL DIN, 1973; MATHER, D. B., 1956; Mc LOUGHLIN, P. F. M., 1963).

3) The ILO (1976) suggested that the movement of seasonal unskilled labourers is evidence that the theory of labour supply and demand functions well between the less developed region in western Sudan and poles of development in north-eastern Sudan.

impact. It has gained momentum particularly since the sixties as the result of the tremendous expansion in both irrigated and rainfed mechanized schemes. The concentration of development poles in north-central Sudan has given this type of population mobility its converging nature, while the coincidence of the period of high demand for labour in the schemes with the period of idleness in other regions has reduced it to seasonality rather than the whole year round. But this seasonal nature does not imply that the move is exclusively a temporary one, since some of the movers, particularly in recent times have decided to stay in their areas of destination for a number of years before joining the counter-stream of migration. This decision is governed by the geographical distance between areas of origin and areas of destination, since it is unlikely that the long-distance movers will be able in one season to collect the money needed to cover the return journey and the needs of the family members in the home village. Moreover, availability of employment opportunities even in the agricultural dead season, particularly in the towns within or near the schemes, stimulates them to increase their income or to sustain themselves til the coming season. This possibility, we believe, is of significant importance, since it gives this type of population mobility its socio-economic magnitude, to be discussed in relation to the rural-urban population mobility.

1.2 Intra- And Interregional Movements Of The Nomads As Related To Agricultural Mechanization

Circulation of nomads as caused by external factors has been well treated by ABU SIN, M. E. (1975). We attempt here

to relate this type of population movement to the phenomenon of agricultural mechanization to see whether it is similarly affected by its geographicel distribution. It may be suggested that the expansion of the modern agricultural sub-sector has not only deprived the nomads of their traditional grazing lands and hence compelled them to search for new locations but also stimulated them to pursue a settled way of life. The experience of the Gezira scheme to sedentrize the mobile semi-nomadic tribes proved to be incapable of being widely practised in the region. Recent attempts to stimulate the nomads of eastern Sudan to adopt a settled life proved to be unsatisfactory.

Although some of the nomads participate in the modern agricultural sub-sector as tenants or agricultural workers, the time is not yet ripe to speak about a successful transformation process. The experiences of the Khashm el Girba, El Suki and El Rahad schemes show that the nomads participate in these schemes at present not because of their positive attitude towards innovations but only because they see this as the only way to secure their rights on their previous territories. They are not yet convinced of the good of such innovations, since their material gains lay far behind their expectations, which are governed by their own inherited perception of the positive nature of any change. Even the present measures to integrate the nomads in the modern agricultural sub-sector by providing settlements and social services have not yet proved successful for the very simple reason that the nomads were not asked to present their own perception of a settled life. If this does not occur, all other measures will be bound to fail like the functional literacy programme experiment in the Khashm el Girba scheme (AGOUBA M., 1980, p. 65 - 81).

1.3 The Government Controlled Population Movement In Relation To The Agricultural Mechanization

By this type of population movement we mean the attempt of the government to mobilize some groups from distant areas to the newly implemented irrigated or rainfed mechanized schemes. In this context we refer to the direct government involvment in large-scale resettlement projects such as that of the Khashm el Girba and El Suki projects. The implementation of the first project in the early sixties coincided with the search for a suitable alternative place to resettle the Halfawis whose home area was to be flooded by the proposed Lake Nasir in connection with the construction of the Aswan High Dam. As a means to make use of the human resource factor for the development of the newly implemented scheme the government decided to transfer the Halfawis from their home area at Wadi Halfa to the Khashm el Girba area in the Butana Plain some 600 miles away, irrespective of the reluctance of the people involved. The government's choice was based on the assumption that this particular group, with its long settled life and its agrarian experience, was likely to establish an example for the indigenous population, mainly the nomads, in developing an integrated regional economy. In this sense an attempt was made to exploit the available resources, irrigation water from the Atbara river by means of a dam, and enough land with good quality soil for modern agricultural practices, through mobilizing the Halfawi group and some of the nomadic tribes. Thus 50,000 Halfawis were induced to move in spite of their objection to the idea of transfer in general and to this particular destination in particular. It was the first experience in the country of mass resettlement. The process started in

1964 and was completed in 1968 whereby the transferred people were resettled in 25 villages with sizes varying between 175 - 250 houses with a main town (New Halfa) in the centre. The cost of the whole operation was over LS 58.3 million including the dam (7.5 million), other irrigation installation (24.8 million) and the rest (26 million) was spent on housing, compensations, provision of services etc. (EL MANGOURI, H., 1978). The study of the resettlement of the Halfawi group has been well dealt with elsewhere (DAFALLA, H., 1975; EL BAGIR, H., 1972; FAHIM, H. M., 1972 and EL BADRAWI, M., 1972, to mention a few).

Our concern in this context is to stress the fact that the expansion in the agricultural modern sub-sector has induced the government to organize and complete a transfer of this particular group. Although the Halfawis traditionally participated in the waves of internal and external migration, it is not justified to regard their transference to Khashm el Girba as a continuation of their traditional migration process, since the action was against their will. Everything was arranged for them and they had no say but to accept what the government regarded as beneficial for them. The consequence of this type of government-controlled population movement is well manifested in the unsatisfactory performance of the scheme, an assessment of which was made by the writer elsewhere (EL MANGOURI, H., 1978).

It is worth mentioning in this context that this particular scheme was not only responsible for the transference of the Halfawi group but also caused the mobilization of over 100,000 persons from different parts of the country, as tenants, traders, officials or agricultural workers. Unlike the Halfawis, ex-nomad tenants and their families were

stimulated to move to the scheme area with the hope of improving their living standard. In this sense the government measure to develop the region by means of a modern agricultural scheme was the cause of the mobilization of the nomads in the region, a process which is still going on with questionable results.

Most striking was the attempt to resettle part of the Beja tribe whose home area had considerably deteriorated due to the severe drought conditions. As part of the solutions proposed, 600 tenancies were allocated to this group and# the government increased pressure to induce them to migrate them to the new destination chosen for them. The success of the experiment is manifested in their poorest agricultural performance in comparison with other tenant groups. In spite of this negative result the government continued the process of resettlement of this group as a result of the further deterioration of the home region and the difficulty of offering them a secure way of life there. In another attempt, the government directed the educated members of this group to mobilize their tribe to accept the transfer to two other proposed schemes, namely Setit scheme some 70 miles south-east of Gedarif town and El Suki scheme on the Blue Nile. Both sites are over 400 miles from the Beja area north of Port Sudan. Although the majority of people objected to the idea of a transfer as such, the government succeeded in persuading a minority to move.

Thus some were transfered to Setit site in 1971 and others to El Suki site in 1971/1972. Although in both cases the government has attempted to provide them with the necessary services and helped them to overcome the difficulties of the first seasons, the whole operation proved to be a

failure particularly in El Suki site where the migrants deserted their planned villages and remigrated to their places of origin. It should be noted that in both cases a modern agricultural performance is pursued whereby agricultural mechanization decreases the drudgery of work, a sort of stimulation to the newly settled nomadic elements. Thus the government has been fully involved in all processes of controlled mobility. It acted not only as a decision-maker for the transfer of a particular group but also as a demarcator for the destinations, time of move, the way and its financing. Even the modes of living in areas of destination is pre-determined for the migrants by the government whose main objective was to mobilize the available resources for the sake of the modernization of the country. Hence, contrasted with other types of population mobility, this type is characterized by its involuntary nature since the decision to migrate and the whole process of migration has been made and implemented by the government. This means that it involves in the majority of cases non-potential migrants for whom the constraints of movement are modified or overcome by the government. They are influenced more by 'push' factors than by 'pull' factors and move in a group rather than as individuals, thus the normal push-pull model governed by supply and demand and freedom of decision does not function in this case. The persons involved in this mass displacement have to follow the government instruction irrespective of their own objectives. The effect of this type of population mobility may be more profound than other types of mobility since it involves a transfer of a whole group with its characteristic culture to another region with other culture groups. Whether a homogeneity will result from this cultural heterogeneity is questionable as is the case of the present situation in the settlement schemes under study. The

uprooting of such groups will affect the socio-economic set-up of the sending area, since in this case, the possibility of a counter stream is reduced to a minimum unlike in other types of population mobility.

2. RURAL-URBAN POPULATION MOBILITY

In the following discussion we confine ourselves to the rural-urban population mobility of unskilled labour which is, we believe, indirectly caused by expansion of the use of agricultural machnization. As elsewhere in the developing countries, this type of population mobility is becoming one of the main features of the developing Sudan. Its main characteristic is its converging nature, since all moves from different parts of the country converge in the big towns particularly Greater Khartoum. Its main effect is the depopulation of the rural areas and the growing of squatter settlements in the urban centres, both are a cause and an effect of regional disparity. Thus it attracts the attention of planners and technocrats to uncover its dimension and result. These have been presented in many studies, each from a particular viewpoint. Hence we need not go into more details here, all we need is to clarify the role played by agricultural mechanization in mobilizing the group of unskilled labour from their rural exodus to the urban centres.

Like other types of population mobility, this one started as early as the last quarter of the nineteenth century as a result of the gradual rise of small urban centres, particularly in the Northern and Khartoum provinces, as a result of a gradual change in the Sudan economy as it

began the primary stage of economic development. The gradual substitution of the steam- and diesel-drawn machines for the traditional agricultural equipments, necessitated land accumulation and land consolidation for the sake of producing for the internal and external market. Consequently, some groups, particularly the poor, who could not afford the cost of modernization, were obliged to search for alternative chances elsewhere. The first targets were the towns of western and central Sudan where the hinterlands were still practising a sort of subsistance economy. Well experienced in agriculture and trade, the riverain people began to introduce a cash economy in their new destinations which enabled them to accumulate wealth and to be distinctly differentiated from the indigenous populations. This was manifested in their way of living, their relatively modern houses which were grouped in quarters close to the core of the town, contrasted sharply with those of the indigenous population.

This stage, however, gained momentum by the gradual structural change of most of the Sudanese towns, due to the process of upgrading from purely local market centres, into centres with more urban amenities, service and seasonal or permanent employment opportunities, in a larger hinterland than before. This change was an effect of the gradual expansion of the modern agricultural sub-sector, particularly in the Nile axis and its tributaries, which differentiates the development of models of the modern style of life sharply from the rural style. This was further facilitated by the development of other economic fields such as small-scale industries, commerce and public utilities, all related to agricultural development, which induce further rural-urban population mobility with the hope of reducing the income disparity between the different regions.

Table 8.1: Balanced Net In-migration of the Urban Areas by Province - 1966 *
(e. g. in-migration into the urban areas of province A minus out-migration from province A into the urban areas of province B)

Province of In-migration	Blue Nile		Kassala		Khartoum		Darfur		Kordofan		Northern Province	
	total gain or loss	%	total gain or loss	%	total gain or loss	%	total gain or loss	%	total gain or loss	%	total gain or loss	%
Blue Nile	+35510	+34.5	- 4450	- 2.4	-13190	- 5.4	+ 7380	+ 5.6	+ 7440	+ 3.5	+17830	+16.1
Kassala	+ 4450	+ 5.1	+21250	+23.5	+ 2040	+ 4.1	+ 3120	+ 2.4	+ 4860	+ 4.9	+38580	+39.9
Khartoum	+13190	+ 5.4	- 2040	- 4.1	+15020	+ 9.7	+ 9380	+ 0.8	+17590	+ 6.5	+56780	+27.9
Darfur	- 7380	- 5.6	- 3120	- 2.4	+ 9380	+ 0.8	+15320	+63.2	- 1980	- 1.3	+ 1550	+ 7.9
Kordofan	- 7440	- 3.5	- 4860	- 4.9	-17590	- 6.5	+ 1980	+ 1.3	+27040	+52.8	+ 3880	+ 6.1
Northern Province	-17880	-16.4	-38580	-39.9	-56780	-27.9	- 1550	- 7.9	-27040	- 6.1	+ 3850	+67.0

* Compiled from the Department of Statistics and Population and Housing Survey, 1964/66

Unlike the case of the government-controlled types of movement, this one is vonluntary in nature since the migrants carefully plan their movement according to the degree of information they have about other destinations. It is a chain-movement in the sense that each movement induced a further one after a time-lag for information to be transmitted. It involves individuals, in some cases families, rather than whole groups or whole tribes. Its exact volume is difficult to assess,but one may refer to the attempt of the Department of Statistics to give a balanced Net In-Migration of the urban centres by province (Table 8.1).

The effect of this stage of the rural-urban mobility may be seen in the urban model it sets among the indigenous population to which they respond positively. Daily contacts and gradual spread of education were the cause of cultural diffusion and rise in aspiration, which brought about a change in an individual's place utility matrix and hence a 'push' factor which induces him to pursue an urban life. This is the cause of the huge waves of unskilled workers, who desert their home village and join the step-like migration process into a town to secure a better life. The main stimulus for their movements is the speedy economic transformation which is presently taking place in North East Sudan. The continuous increase in demand for agricultural workers to participate in the modern agricultural sub-sector has greatly reduced the risk of unemployment for a potential rural-urban migrant. They joined the mechanized agricultural schemes as seasonal agricultural workers with the hope of collecting the money they need to improve their living standard in the home village. But due to the disappointing revenue, not more than an average of LS 15 a month, and

the seasonal nature of this occupation, they are compelled to search for other complementary alternatives. Consequently, they have to move to the urban centres particularly Greater Khartoum where industries - mostly engaged in manufacturing agricultural products - and services are concentrated. At present this type of population mobility is becoming more noticeable in size and effect. It is gradually dominating the Sudanese internal mobility as far as volume, convergence and impact are concerned. The people involved are mostly unskilled, uneducated from the least populated regions with the rural peasant or nomadic background. They are less selective in their choice of occupation and areas of destination than individuals of the previous stage. Depopulation of areas of origin, sub-urban growth, appearance of squatter settlements, and ruralization of towns are some of the effects of this type of population mobility, which we return to later as part of the whole assessment of the problem of population mobility in the Sudan.

The volume of the flow from rural areas to the big urban centres is not exactly known, due to the dynamic nature of the flow itself, and the primitive means of statistical registrations. Here we refer to some studies which attempted to reflect the scope of this particular type of mobility. According to ABU SIN, M. E. (1975, p. 364) the 'cardboard' settlement dwellers increased in number from 30,000 in 1965 to about 80,000 in 1972. In Port Sudan, the second largest town in the country, the number of illegal 'deims' dwellers has risen from 20,000 to over 60,000 during the same period. He further pointed out that one settlement in southern Khartoum, now called Hay Mayo, reached a number of 20,000 inhabitants within 4 years only. This shows that the rush is continually

increasing towards Greater Khartoum in which the population grew from about 50,000 in 1900 to about 1,000,000 in 1975 mainly due to internal migration (EL BUSHRA, E., 1976, p. 75). This means that the population of the three towns was multiplied by 20 times during a 75 years period, because they have the highest concentration of industrial and commercial enterprises as well as the highest intensity of social services. According to ABU SIN, M.E. (1975, p. 119) over 40 % of the total urban population of the country in 1966 was concentrated in Greater Khartoum.

Our concern in this context is to stress the fact that the majority of Khartoum in-migrants arrived in a step-like movement and very few of them came directly from their places of origin. The survey of the Department of Statistics in 1971 quoted by SWAR EL DAHAB, A. (1978, p. 139) shows that the province of birth and the province of last previous residence are not always identical. For isntance, those who reported the Northern Province as their place of birth amount to 36.6 % of all Khartoum in-migrants while the proportion of those who directly arrived amounts to 29.4 % only. In contrast to this the proportion of those who reported the Blue Nile Province as their place of birth falls short of the proportion of those who gave the same province as their last place of out-migration. This means that, while some provinces are losing part of their population to other provinces before they join Khartoum in-migration, like Northern Province, Kordofan and Darfur Province, other provinces are gaining before they contribute to Khartoum in-migration as is the case of the Blue Nile, Gezira and Kassala Provinces (see Table 8.2). This has been recently confirmed by G. HEINRITZ (1981), who examined the mode

of in-migration in Hay Mayo in Greater Khartoum and village 17 of New Halfa town. He reached the conclusion that a considerable proportion of the in-migrants in both cases are Westerners who indirectly arrive at both destinations. This may confirm our assumption that part of the rural urban migrants had been working in the agricultural modern sub-sector before they decided to take up an occupation in an urban centre. In this sense the agricultural modern sector is a transitional stage which prepares the rural population for the move into the towns. In the absence of industrial development in rural areas, the urban centres remain the only alternative to the less rewarding agricultural employment. Of course, joining the rural-urban stream of migration is not only an effect of income disparity but also of the whole regional socio-economic disparity, the seasonality of work in the agricultural schemes, the long distance between areas of origin and areas of destination which induce permanent stay in the latter, the overwhelming 'push' factors still prevailing in the former, the expanding secondary and tertiary sectors in the towns and the recent development communication systems which increase both the information flow about other destinations and decrease the physical and financial distance.

So far we have been discussing the different types of population mobility which are indirectly caused by the adoption and expansion of agricultural mechanization. We conclude that measures to develop rural areas including the modern agricultural sub-sector do not stabilize the population there but, on the contrary, they cause different population movements which tend in the end to converge in the urban centres, thus intensifying the existing pressure on the limited resources and contributing to

the depopulation of the rural areas and the marginalization of rural population, a situation to be discussed in the next chapter.

Table 8.2: Migrants by Province of Birth and Province of Last Previous Residence (in Percent of all In-migrants)

Province	Born	In-migrated from	% of Provincial Population of the Sudan's total
Khartoum Rural	7.3	7.3	2.0
Northern	36.6	29.4	7.2
Blue Nile	17.3	18.9	20.6
Kordofan	15.3	15.2	18.3
Darfur	8.3	7.7	11.1
Kassala	5.0	8.5	10.6
Southern	4.1	5.0	26.1
Abroad	6.3	8.1	?
T o t a l	100.0	100.0	95.9 *

Source: Department of Statistics (estimate)

* This total does not add up to 100.0 % because the 'Three Towns' population are not included.

IX. PRINCIPAL FINDINGS, CONCLUSIONS AND PROPOSALS

1. PRINCIPAL FINDINGS OF THE STUDY

In this study an attempt was made to reveal the mobilizing effect of agricultural mechanization on the rural population. It has been shown that the installation of the functional locations of mechanization in relation to agricultural schemes stimulate the peasant youth, particularly the school-leavers, to acquire technical skills with the aim of being employed in highly rewarding jobs. Contempt for agricultural work and limited employment opportunity for school-leavers are the main 'push' factors which induce them to join such functional locations as assistant drivers or assistant mechanics. Soon after acquiring some skills they feel compelled to move to other locations, since in their places of origin there are only limited employment chances for qualified persons. The move to other localities is found to be a function ofwage differentials, rise in aspiration, the amount of information about other places, the degree of social obligations, and the presence of a relative or a friend in the new places of destination. From all these, the wage differential is by far the most decisive factor. This was evident in the movement of the skilled workers from the oldest schemes such as El Masara in the Blue Nile province (1950) to the Khashm el Girba in Kassala province (1964) to El Suki in The Blue Nile province (1970) to El Rahad in Kassala province (1978) and from these to other recently implemented schemes and/or to the urban centres (fig. 1). A comparison of wages in the Khashm el Girba, El Suki and El Rahad schemes revealed that the more recently a scheme was implemented the higher was the material incentive for skilled workers.

This wage differential was created by the scheme authority to attract the most qualified persons from the older schemes in order to speed up the development process in the new ones. The effect of this policy is manifested in the concentration of the most qualified persons in some new schemes, as in the case of El Rahad scheme.

The study of the tractor drivers in the three selected schemes revealed that there is a high turnover, particularly among the highly qualified persons, since there is an increased demand for qualified persons to participate in the development of the newly implemented schemes. However, it became apparent that in most cases, qualified persons tend to move to the urban centres to join non-agricultural occupations rather than circulating among the various agricultural schemes. This was evident from the study of tractor drivers presently working in El Rahad scheme, the majority of whom were intending to join work in Greater Khartoum or abroad. This was taken to be evidence not only of the geographical mobility of skilled workers but also of a sectoral mobility. This rural-urban mobility of skilled workers is again a function of wage differentials between agricultural schemes and urban centres. This was evidence from the study of taxi drivers in Khartoum which revealed that the majority of the interviewed drivers stated their previous participation in agricultural mechanization (Table 6.6). Their main motive in seeking employment in Khartoum was, in the majority of cases the expected material incentives and the probable emigration to the oil-rich Arab countries (Table 6.8). This last motive was found to be the most effective 'pull' factor which stimulates skilled workers to leave their rural working places in the agricultural modern sector with the hope of a work contract in a foreign country. The fact

that all emigration formalities are to be completed in the capital Khartoum necessitates their converging movement at this particular urban centre rather than others. In this context the presence of a close relative or a firend, as a point of contact is found to be of significant importance. Our findings revealed that the majority of in-migrant taxi drivers had relatives or friends in Khartoum who helped them to overcome the difficulties of the settling-in period and mediated for them in finding occupation. This may be taken as a sign of concentration of particular ethnic groups from particular regions, 'snow-ball-effect', which can create powerful socio-economic or political groups. Such a tendency was apparent in the overrepresentation of persons from the Blue Nile, Kassala, Gezira, Khartoum and Northern Provinces both among the tractor drivers in the three agricultural schemes studied (Table 5.3) and among the taxi drivers in Khartoum (Table 6.4). Contributions of the other provinces, with relatively little economic development remain very low at present, though the trend is towards increased participation. This implies that the more a region or locality is affected by agricultural mechanization, i. e. the more it is dominated by the modern agricultural sub-sector, the higher is the probability of increased participation of its population in the stream of rural-rural and/or rural-urban mobility of skilled labour. Our findings in the two selected villages in El Suki District revealed that the rate of participation of young rural elements in the functional location of agricultural mechanization is a function of distance between that location and the place of origin of an individual. The villages adjacent to the functional location (Umderraba, and El Busata) were found to be overrepresented in that location (fig. 2). This means that the direct effect

of agricultural mechanization as a mobility factor for the rural population is confined to areas which come into direct contact with the modern agricultural sub-sector. The other areas where traditional agricultural is predominantly practised are only indirectly affected by agricultural mechanization in terms of unskilled seasonal labourers. It is paradoxical that the measures which were undertaken to develop the rural areas are found to be incapable of stabilizing the population situation there. On the contrary, they are causing a mobility effect which intensifies the existing regional and sectoral disparity.

Unlike the other types of population mobility this type involves a particular segment of the population, namely the young and relatively well-educated elements. According to our findings the majority of the taxi drivers and tractor drivers were in the age group 20 to 30 years (Table 5.1 and 6.1), which implies that agricultural mechanization attracts the most able-bodied persons. The tendency of the young people to participate in agricultural mechanization was found to be a factor of the working 'push' factors prevailing in the sending areas,such as the limited opportunities to continue in formal education and the lack of local employment opportunities for school-leavers. This was evident from the high proportion of those with elementary education among the tractor drivers in the three selected schemes (Table 5.5) and the taxi drivers in Greater Khartoum (Table 6.5). The tremendous expansion of the modern agricultural sub-sector centred around mechanization (chapter IV,) has stimulated the young school-leavers to participate in the newly installed functional points as a sort of vocational training to substitute for their discontinued formal education.

2. CONCLUSIONS

Population mobility, whatever its cause, has long been a major feature in the structure of Sudanese society which reflects a sort of adjustment to the regional and sectoral disparity. It began as early as the late nineteenth century and it gained momentum throughout the period of colonial administration and post-independence. In the last two decades it has reached a stage which began to strike hard at the socio-economic set-up of the whole country. It has been changing in form from traditional intra-regional, recently becoming inter-regional and inter-sectoral. It has been induced by the pre-industrial character of the society and the dualism of the country's economy. For a long time the mobility had remained rural-rural in form. Rural-urban population mobility, in the present magnitude, was kept low by the factors of limited transportation, the primitive stage of economic development in the urban centres, low aspiration among the rural population and limited information about the surrounding world. Only in the early sixties did the patterns of its old forms change as a result of the spread of communication systems, the spread of education in the rural areas, increased development in the urbar centres and the prevailing 'push' factors in the rural areas. The most effective factor, however, was the fixing of a minimum wage for the labourer in government employment which was far above the average earnings of the agricultural worker, and in the most cases even above the average earnings of the peasant farmer. [1] Even the

---

1) In 1960 the annual minimum income of the unskilled labourer amounted to LS 127 including the cost of living (The New Workers Cadre: in Sudanese Economists, issue No. 122, August 1968, p. 26).

tenant farmer in the Gezira scheme, with the highest per capita income after Greater Khartoum, did not earn much more than the general worker in government employment. [2] For farmers in other modern agricultural schemes, earnings were far less than those of the Gezira tenant. Agricultural workers could hardly earn more than 75 piasters per day in the modern sector and even less in the traditional agricultural sub-sector. [3]

This regional and sectoral income disparity has been one of the main causes of the change in the nature, pattern, type, intensity and convergence of population mobility in the region. The process has been further

---

2) The average annual cash income per tenant in the Gezira was LS 162 for the year 1962/63. This cash income was estimated to make up at least 75 % of the total income of the tenant. But if one considers the money paid by the tenant of the Gezira to the agricultural worker, his net income will be considerably reduced (Ibd. p. 27).

3) In Darfur, for example, the average daily wage for an agricultural worker was estimated as about 10 piasters or less in 1954 with employment lasting only a few month at most. (E. M. Mc LOUGHLIN, 1963, p. 19).

fostered by the recent measures to increase the urban minimum wage. [4] The present minimum wage for a worker in government employment is set at LS 29,500, while the average earnings for both farmers and agricultural workers remain comparatively lower. It should be noted that substantial differentials in earnings are set in accordance with differentials in education levels and the degree of qualification. Thus it is not surprising to find that the volume of rural-urban population mobility is steadily increasing with the increase in education, formal and informal. In this context agricultural mechanization, which offers a sort of informal education, contributes much to intensifying rural-urban population mobility. Apart from its displacement effect on the rural population, the spatial distribution of its functional points form an important element in creating qualification opportunities to satisfy widespread popular demand and to fulfil the needs of hitherto underprovided areas. The movement of young people, seeking qualification, to functional locations of mechanization represents for many, the first significant break with parental authority and may be regarded as the initial stage in their life-cycle of migration. The rise of aspirations is considered to be among the key factors inducing the circulation of qualified persons and it is within this context that acquiring skills through agricultural mechanization plays a vital

---

4) Due to the recommendation of a worker cadre committee in 1965 the minimum wage for a worker in government employment was set as LS. 12,500 which was increased by the councils of Ministers, probably for political reasons, to LS. 13,900 (Sudanese Economists, op. cit., p. 25).

role in fostering existing rural-urban population mobility. Hence mechanization as a training institution resembles formal education as the route to socio-economic status, since acquiring new skills and additional experience inevitybly affects the individual's place utility matrix and may act as a catalyst to further mobility.

Although movements associated with qualification represent only a mumerically small segment within the context of the Sudanese population movement as a whole, it may be regarded as the most important one. Its importance lies in the qualitative composition of persons participating in it. The exact number of persons involved in the whole process is not precisely known, since the mobility of qualified persons has not yet been separately dealt with, even in the National Census enumerations. According to the Six Year Plan (1977, II, 18) there were approximately 12,000 tractors in 1977 participating in this particular agricultural sub-sector. But if we consider the tremendous increase in mechanized agriculture (chapter IV), particularly in the past few years, which neccessitates an increased demand for tractors, and if we consider the fact that more than one person is needed to operate the same tractor (SHAKAK, 1977)[5], we will come to a figure of more than 40,000 persons

---

5) For a mechanized scheme of 1,000 feddans the following staff is required:
2 tractor drivers for 100 days between July and September
1 tractor driver for 200 days between October and March
2 service men for 100 days between July and September
1 watchman for 360 days
1 manager for 360 days

participating in the technical part of agricultural mechanization in any particular year. Furthermore, considering the high rate of turnover, particularly among the highly qualified persons, one may reach the conclusion that this particular occupation is potentially capable of attracting additional members of the rural population to be prepared for further movement. The increasing demand for qualified persons in the urban centres and in the oil-rich Arab countries will continue to speed up the rate of turnover among the skilled workers in the rural areas. Thus it may be expected that within a short time, the number of those qualified through agricultural mechanization will increase substantially. Numerically this may still continue to constitute only a small fraction of the country's active labour force for a long time but with a higher social, economic and political weight.

The fact that this small segment is highly selected from the most dynamic elements of the population and that it consists of persons with a relatively higher level of education and qualification than the average population, justifies our considering it as one of the most vital population groups which might be expected to produce appreciable socio-economic changes in both areas of origin and areas of destination. Unlike other population groups, this group could be organized and politically mobilized, so that it could be expected to affect the political balance within and between the different regions.

The concentration of this group in particular regions which results from the concentration of development projects there, may lead to the domination of particular ethnic groups over others, since skilled labour mobility tends to reflect the familiar pattern of a chain-movement

whereby each participation event leads to another after a time-lag in which information is sent back by a pre-migrant to a relative who is still living in the home area.

In this sense agricultural mechanization will add power to particular ethnic groups with the discrimination against others. This has been confirmed by our findings that more than 75 % of all interviewed taxi drivers in Greater Khartoum were able to find a job through the mediation of a close relative and/or a tribe member (Table 6.11). In this sense joining agricultural mechanization offers a continuation of the previous social structures so that some social groups remain cohesive despite their spatial displacement.

Although migrants, particularly those from the socially and economically more developed areas, maintain strong contact with their places of origin through visits and remittances, the impact of that contact cannot be quantified at this early stage of the migration process. It may be argued that through repeated contacts some socio-economic transformations in the areas of origin have become apparent (see case study in El Kurmuta and Abu Gara villages), but this should not suggest that the out-migration from such rural locations is always a temporary move. According to our findings, 47.8 % of all interviewed taxi drivers in Khartoum did not intend to return to their places of origin, the majority of whom originated in rural areas. This means that the rural areas will continue to lose not only a large part of its population but the most dynamic elements who are expected to be the initiators of change. It is not unrealistic, therefore, to think that within a short period, the rural areas will be deprived of their innovators if the present

development strategies prevail. Concentration of development projects in certain areas rather than others and accentuation of developing particular sectors to the neglect of others, will increase the existing disparity in social welfare between the different regions and intensify the prevailing rural-urban population mobility. The ultimate effect of this process will then be a concentration of the most energetic and creative elements of the population in the big urban centres, particularly Greater Khartoum. This will intensify existing pressure on the available social services, creating an urgent need for investment in the tertiary economic sector. Explosion of the transport sector in Greater Khartoum in the last few years to cope with the increasing population numbers has further aggravated the situation, since this particular measure has further stimulated new in-migrants to compete for jobs as vehicle drivers in the town. [6] Despite the tremendous increase in the number of public vehicles in Khartoum, there is always an over-supply of vehicle drivers whose expectation of finding employment in Khartoum remains unfulfilled, thus intensifying the existing urban umemployment and/or underemployment. Even measures taken by the government to decrease the rate of unemployment by creating temporary jobs have resulted in an additional rural-urban rush, particularly of skilled labourers. In some cases it is found to be a function of the assessment of the

---

6) According to the information received from Mr. Galal Suliman, the Director of Transport and Road Section in Khartoum, the total number of public vehicles registered in 1980 was over 16,000. About a quarter of this number were reported to be newly registered in the last two years. By now the total number of all public vehicles in Khartoum, apart from the private cars, may well be over 20,000.

individuals to the probability of finding a job rather than the existing pay differentials that induce them to join the rural-urban population mobility. Thus it may be expected that every newly created job in the urban centre will attract additional numbers of rural migrants to compete for it.

Fortunately for the Sudanese skilled labour force, there is an increasing demand for their talents in the oil-rich Arab countries. In fact the emigration of the Sudanese labour force to foreign countries has long been known. But in the early sixties it began to gain momentum due to economic stagnation in the country. The process has further been fostered in the early seventies by the appearance of burgeoning opportunities for work in Saudi Arabia and the Gulf States created by sudden rise in the price of oil. At present throughout the oil-rich Arab countries as well as in parts of the world further afield, the Sudanese skilled workers are to be found working at all levels of society. Although the phenomenon of the Sudanese emigration has been touched upon by some authorities (M. E. GALAL EL DIN, 1979), there ist still no comprehensive study which reflects its magnitude, causes and impacts. All figures showing a number of Sudanese working abroad are at best only estimates. Inefficient registrations in the different government institution, corruption and the reluctance of the receiving countries to deliver exact information about Sudanese immigrants have reduced any study to mere estimation. [7] It

7) M. E. GALAL DIN (1979, p. 19) gave a figure of 231,350 as the number of Sudanese working at that time in a number of foreign countries with the highest concentration (95 %) in the oil-rich Arab countries. Although he succeeded in contacting all the internal and external official authorities which facilitate emigration of the Sudanese labour force, had admitted that his findings included by no means all the Sudanese emigrants, since some of them escape legal formalities.

remains undisputable that the number involved in this process is continuously increasing, especially among those skilled or educated migrants who emigrate to obtain substantially more remunerative work in the Petro-Dollars-Countries.

In a developing country like the Sudan with huge unexploited natural resources and a scarcity of capital, the succeeding waves of human resource emigration will no doubt produce profound socio-economic effects. Even the expected material gains, if any, will contribute to social and regional inequality, in itself the main cause of emigration. Creation of new consumption habits rather than planned economic investment will continue to accelerate the rate of inflation, which is also a prime cause of emigration. Most dangerous for the country as a whole is the emigration of the top stratum of each profession, which leaves the country at the mercy of its least efficient skilled persons.

It is not our purpose here to convey all the expected impacts of the Sudanese emigration on the socio-economic development of the country, but only to stress the statement of M. E. GALAL EL DIN (1977) that 'emigration will eventually perpetuate the imbalance it appears to correct and sustain the underdevelopment it claims to attack' (quoted after SUDANOW, January 1981, p. 60). [8)]

---

8) SUDANOW is a national news-magazine published in Khartoum every first day of the month by the Ministry of Culture and Information. The magazine contributed to the problem of the Sudanese emigration with three informative and evaluative articles which appeared in December 1976, October 1980 and January 1981.

Strangely enough, in spite of all perceived negative results, migrating abroad is increasingly becoming for many not only a sophisticated endeavour but a socio-economic necessity. All the government measures intended to control the phenomenon have proven insufficient due to increased illegal attempts to emigrate. The main reasons for the perpetuation of these intractable problems may be sought in the financial reward expected abroad [9] as well as the prevailing internal 'push' factors, such as limited employment opportunities, particularly for skilled workers, rising cost of living, increasing inflation rates and the desire to reduce the socio-economic disparity which is primarily created by emigration itself. Furthermore, the measures taken by the government to provide the emigration with first and second class housing units in Khartoum and other urban centres as a means of absorbing their hard currency (directed by the critical situation in the balance of payments) has further aggravated the problem. As a consequence of this policy, land prices have risen drastically, compelling some professional people to emigrate, motivated by encouraging import facilities and rewarding exchange incentives. Our concern in this context is to stress the fact that turnover among the skilled labour force in Khartoum will stimulate further rural-urban population movement with the ultimate goal of emigration thus making the process self-perpetuating. In the shorter view this will create a defecit of skilled labour in some rural localities as presently reflected in the unsatisfactory performance of a number of the development projects. In

---

9) According to ALI A. ALI a Sudanese worker abroad earns 2,500 % of his domestic wage. (Quoted after SUDANOW, January 1981, p. 60)

the longer view this out-migration process may cause a drain-off of the most dynamic and creative elements potentially needed to produce a socio-economic transformation in the whole country. In this context the mechanization of agriculture which was initially intended to develop rural areas will indirectly contribute to the existing regional and social disparity. By virtue of its effect of educating the rural population, it prepares the qualified manpower demanded in the urban centres and abroad. This side-effect of agricultural mechanization could have been substantially significant for a developing country like the Sudan had it not been for other working factors external to mechanization itself which induced a rural-urban drift of the skilled and unskilled labour force. Limiting the magnitude of such rural-urban drift does not lie in mechanization as such, but rather in re-orienting the country's development plans in accordance with available resources and to securing the socio-economic equity between various regions. In the following we shall attempt to offer some proposals as to how this may be achieved.

PROPOSALS

In a developing country like the Sudan with limited employment opportunities in the urban centres it would be wise to re-orientate all the available human and scarce capital resources to create employment opportunities in the rural areas where natural resources are located. Abundant unexploited cultivable land and irrigation water will continue to define the Sudan as an agricultural land for a long time to come. The agricultural sector will remain the main safety valve for the ever-increasing rural population which presently makes up over 70 % of the total Sudanese population. Thus the rational utilization of the agricultural potential at this stage of the Sudan's socio-economic transformation should still be given the utmost priority if the rising labour force surplus is to be more productively employed on the land. Although this priority has been stressed in almost all the development plans (The Ten Years, Five Years and the Six Years Plans) the results achieved so far have been far from satisfactory. The main reason has been the lack of integrated planning, which has previously concentrated on particular sectors in particular regions over others, creating as a consequence regional and sectoral disparity, a cause and effect of internal and external population mobility. Concentration on the modern agricultural sub-sector with a view to producing for the world market, while neglecting the traditional agricultural sub-sector from which the majority of the population derive their means of subsistence is in our opinion the main factor which produces the present economic vicious circle. This fact has been stressed by the ILO (1976) and ÖSTERDIECKHOFF (1980). The present tendency to expand the modern agricultural sub-sector at the expense of the traditional sector as recommended by the ILO and the World Bank in connection with the Arab

Investment strategy will not only deprive the rural population of the land which had been hitherto under their care but it will also intensify the existing regional and social disparity it claims to rectify. Instead a country-wise land reform and land distribution policy should be introduced to ensure more rational utilization of the available resources. This can only be achieved through intensified and integrated research to explore the available potential of each region separately. Particular emphasis should be placed on the improving of the food situation in the whole country. But this should not imply that all production should be oriented to satisfy local needs. Export commodity production should go hand in hand with production for the internal market even in the largest modern agricultural schemes. Only so is it possible to improve the internal food situation an to release the pressure on the Sudan's balance of payments. The present high prices for food induce a rise in urban wages, thus stimulating the prevailing rural-urban population mobility. If the rural population is to be persuaded to stay where it is, it would be wise to create employment opportunities for them by encouraging rural industry based primarily on agricultural products to satisfy their socio-economic needs and to minimize the rural-urban income inequality. The steps often taken by the government to stabilize the urban labour force by raising the minimum wages generates additional rural-urban population mobility. Instead, the government should try to stabilize prices, not by additional subsidization but by encouraging increased production, particularly of foodstuffs. Even within rural areas the present regional development disparity must be kept to a minimum to ensure the participation of the population in the development process of their own regions. The labour market should be organized to ensure rational

mobilization of human resources according to the principles of supply and demand. To achieve this, an overall educational plan is needed, based on the actual quantitative and qualitative needs for labour in the different economic sectors. The present educational system, inherited from the colonial administration, contributes to the rise of aspiration and is unsuited to the country's actual needs for qualified persons, thus resulting in the prevailing high unemployment and underemployment rates both in the rural areas and in the urban centres. An educational system which will change the present negative attitude towards manual work and rural areas is urgently needed if the country's potentialities are to be fully and economically utilized. The present wage differentials in favour of 'white-collar' jobs should be rethought to encourage the school-leavers to participate in other productive vocational areas.

Finally, there remains the need to promote social services in the rural areas in order to reduce the disparity in social welfare between rural areas and urban centres, as one of the causes of the rural-urban population drift. However, the provision of services will only be possible if the proposals to reorient the economic development are carried out. Only by mobilizing the available resources would it be possible to accumulate the needed capital to promote social services in the whole region. This is achievable only through a political will which perceives development as an integrated rather than as a disintegrated issue.

AUSWIRKUNGEN DER MECHANISIERUNG DER LANDWIRTSCHAFT AUF DIE BEVÖLKERUNGSMOBILITÄT IN ENTWICKLUNGSLÄNDERN: FALLBEISPIEL - DIE REPUBLIK SUDAN

ZUSAMMENFASSUNG

In der Diskussion über die geeigneten Maßnahmen zur Förderung der ländlichen Entwicklung in den Entwicklungsländern wurde die Frage des Einsatzes von technischen Mitteln in den letzten Jahren aktuell. Dabei sind die gesamten sozialen und wirtschaftlichen Aspekte des Mechanisierungsproblems in den Vordergrund gerückt. Besonderes Gewicht in diesem Zusammenhang kommt der Auswirkung der Mechanisierung auf die Bevölkerungssituation zu. Der Sudan macht in dieser Hinsicht keine Ausnahme.

Als Instrument zur Produktionssteigerung hat man bereits in den zwanziger Jahren mit dem Aufbau staatlicher Schlepperstationen begonnen, die aber zunächst noch experimentellen Charakter hatten und im neugeschaffenen Gezira-Projekt zu finden waren. Dieses Projekt war das große Entwicklungsvorhaben, in dem biologisch-technische und mechanisch-technische Maßnahmen eingesetzt wurden, wodurch die Baumwollproduktion in der Zeit zwischen 1935 - 1955 sich um 70 % vermehrte und sich die Einnahmen aus dieser Produktion bis zu 800 % erhöhten, dank der enorm gestiegenen Weltmarktpreise dieses Produkts besonders im Jahre 1955 (SHARAK, K. I., 1977, S. 106). Als Folge dieser Entwicklung wurden Privatunternehmer und Kapitalgeber zu Investitionen in der Baumwollproduktion motiviert, die kleine Bewässerungsprojekte durchführten, die sich ebenfalls landwirtschaftlicher Maschinen bedienen. In der Tat

gibt es private Bewässerungsprojekte am Weißen Nil schon seit Ende der zwanziger Jahre, die dann durch die Errichtung des Jebel Aulia Damms im Jahre 1937 weitere Impulse erhielten (Sudan Cotton Growers, 1964). Die Anbaufläche wurde von ca. 20.000 Feddan (8.400 ha) 1949/50 auf 215.000 Feddan (90.300 ha) 1967/68 ausgedehnt (ABDEL SALAM, M. M., 1976, S. 51). In der Nordprovinz sind bis 1968 am Nil auf einer Anbaufläche von ca. 200.000 Feddan (84.000 ha) ebenfalls Bewässerungsprojekte durchgeführt worden (ABDEL SALAM, 1976, S. 49).

Schon bald nach Ende des Zweiten Weltkrieges wurden von der Kolonialverwaltung im Sudan Pläne zur Entwicklung der Landwirtschaft entworfen, die über eine Verbesserung der Produktionsbedingungen im kleinbäuerlichen Sektor zu einer raschen Steigerung der Agrarproduktion führen sollten. Motive solcher Politik waren u. a. die Sicherung der Versorgung des britischen Mutterlandes mit landwirtschaftlichen Rohstoffen, vor allem Baumwolle und die Erwirtschaftung und Bereitstellung von eigenen Finanzierungsmitteln für die im Lande vorgesehenen Entwicklungsvorhaben (ABDEL SALAM, M. M., 1976).

Da man in den traditionellen Anbaumethoden des Hackbaus einen limitierenden Faktor für die geplante Produktionssteigerung sah, befürwortete man eine gesteigerte Mechanisierung.

Die 1950 erreichte Erhöhung der Baumwollproduktion, besonders bei Privatunternehmen, um bis zu 40 % im Vergleich zu 1945, war der materielle Anreiz für die weitere Entwicklung der mechanisierten Landwirtschaft (Sudan Cotton Growers, 1964).

Parallel zu dieser Entwicklung in der Bewässerungslandwirtschaft wurde die Mechanisierung auch in den nicht-bewässerten Gebieten schrittweise eingeführt. Erste Ansätze hierzu gab es kurz nach dem Zweiten Weltkrieg, als Nahrungsmittel und pflanzliche Rohstoffe knapp wurden (LAING, R. G., 1953).

Schon 1943 bekam der Sudan von der "Middle East Supply Corporation" (MESC) ein Angebot, Sesam im Rahmen eines relativ umfangreichen Mechanisierungsvorhabens im Raum Gedarif anzupflanzen, wo bis dahin "Durrah" manuell angebaut wurde (HABASHI, W., 1966). Da die Sesamproduktion bei der nicht-mechanisierten Ernte eine große Zahl von Arbeitskräften voraussetzt, war der Sudan über das Angebot wenig begeistert, denn er verfügt gerade in diesem Anbaugebiet nur über eine begrenzte Zahl von Arbeitskräften, und es war nicht problemlos, sie aus anderen Gebieten zu rekrutieren. Trotzdem wurde das Projekt verwirklicht, denn nach der Mechanisierung der Durrahproduktion wurden Arbeitskräfte frei, die dann im Sesamanbau eingesetzt werden konnten. Daher wurden zum ersten Mal relativ moderne Traktoren und Zubehör importiert. Diese Neuerungen hatten zur Folge, daß sich die Anbaufläche ständig ausdehnte, sowohl in den bewässerten als auch in den nicht-bewässerten Gebieten wie Damazin, Dali, Mazoum, Kordofan und neuerdings Darfur (The Ten Year Plan, 1961).

Nach der Erlangung der Unabhängigkeit 1956 wurden sowohl die Erweiterung der Bewässerungsprojekte als auch der dafür benötigte Maschineneinsatz stark forciert, wobei der Schlepperbestand beträchtlich ausgeweitet wurde, eine Entscheidung, die nicht nur wirtschaftliche, sondern auch politische Motive gehabt haben dürfte.

Im Kampf der Parteien um die Gunst des Wählers in den Parlamentswahlen von 1957 hatte das Versprechen an die bäuerlichen Wähler, den staatlichen Schleppereinsatz zu verstärken, eine wichtige Rolle gespielt. Es liegt also nahe, die neue Mechanisierungspolitik als die Einlösung eines Wahlversprechens und als Versuch der Regierungsparteien zu betrachten, sich die Unterstützung der Bauern zu sichern. In wirtschaftlicher Hinsicht wurde diese Entscheidungspolitik durch die Entwicklung der Baumwollproduktion beeinflußt, die wegen der erhöhten Weltmarktpreise (1951) stark zugenommen hatte. Es scheint, daß man in der Tat glaubte, angesichts der überragenden Bedeutung der Baumwolle für die wirtschaftliche Entwicklung des Sudans mit der Ausdehnung der Anbaufläche und dem großzügigen Einsatz moderner technischer Hilfsmittel, rasche Fortschritte erzielen zu können. Infolgedessen ist auf der Grundlage kapitalintensiver Bewässerungslandwirtschaft und staatlicher Leitung der Produktionsprozesse ein weltmarktabhängiger Sektor entstanden, der auch nach der Unabhängigkeit von den verschiedenen Regierungen übernommen und flächenmäßig auf Kosten des bisherigen traditionellen Sektors, in dem mehr als 80 % der ländlichen Bevölkerung leben, vervielfacht wurde, also eine immer größer werdende Enklave in ihm darstellte (Tabelle 4.1).

Es wurde also von Anfang an eine primär wachstumsorientierte Entwicklungsstrategie befolgt mit der Konsequenz einer Deformation der ländlichen Produktionsverhältnisse. Diese wird nicht nur durch die kapitalintensive Bewässerungswirtschaft verursacht, sondern auch durch die Mechanisierung des Regenfeldanbaus.

Den Entwicklungsplanern erschien die forcierte Veränderung durch die Anwendung hochentwickelter Produktionstechniken und massiver materieller Anreize eher wirksam zur

Produktionssteigerung als die allmählichen Verbesserungen vorhandener Strukturen durch die Aktivierung und Mobilisierung der menschlichen Resourcen. Eine Folge dieser Entwicklungspolitik ist die rasche Verbesserung des Maschinenparks.

Dieser Mechanisierungsprozeß wurde dadurch beschleunigt, daß - bereits in den sechziger Jahren - die "Agricultural Bank" Kredite an Lohnunternehmer zum Schlepperkauf zur Verfügung stellte. Allein in den Trockenfeldanbaugebiete wurde die Zahl der Traktoren mit 4.000 angegeben. Diese Zahl dürfte - nach dem "Six Year Plan" (1977, 2, S. 18) - ein Drittel des gesamten Traktorenbestandes im Sudan darstellen.

Die natürliche Ausstattung des Sudans - ungenutztes Ackerland, Bewässerungsmöglichkeiten - spricht für die weitere Ausdehnung des modernen landwirtschaftlichen Sektors, vor allem in den Regelfeldgebieten. Nach Schätzungen des "Ministry of Finance and National Economy", 1976/77 sind 50 Millionen ha als Ackerland und 32 Millionen ha für Viehzucht nutzbar. Bislang werden lediglich 13 % der nutzbaren Ackerbaufläche und 75 % der nutzbaren Weidefläche bewirtschaftet (Ministry of Finance and National Economy, 1977, S. 18).

Der Staat, die einzige konzentrierte und organisierte Macht der Gesellschaft, erschließt durch den Bau von Dämmen und Kanälen, durch Rodung und Einebnung das Land und verpachtet es unter zentraler staatlicher Leitung und Kontrolle weiter an ehemalige Kleinbauern bzw. Nomaden. Etwa die Hälfte der gesamten bewässerbaren Fläche, die ca. 10 Millionen Feddan (etwa 5 Millionen ha) beträgt, wird zur Zeit landwirtschaftlich genutzt (Ministry of Agriculture, 1978, S. 2).

Die Betriebsgröße der Pachtstellen wurde auf maximal 40 Feddan (ca. 20 ha) festgelegt, was von vornherein den Einsatz zusätzlicher Arbeitskräfte erforderlich machte.

Der mit der Ausweitung des modernen landwirtschaftlichen Sektors schnell ansteigende Bedarf an zusätzlichen Arbeitskräften mußte mehr und mehr über die Region hinaus auf Kosten des traditionellen Sektors gedeckt werden. Nach Schätzung der ILO sind jährlich über 1 Million Saison- und Wanderarbeiter unterwegs, die aus nicht-mechanisierten Regionen, wie Kordofan, Darfur, aber auch aus Zentral- und Westafrika kommen. Allein im Gezira Scheme waren 1973/74 336.000 (mehr als die Hälfte der benötigten Erntehilfen) Wanderarbeiter tätig. Dies bedeutet eine Art von Abhängigkeit des modernen vom traditionellen Sektor (ILO, 1976, S. 258).

Der mechanisierte Trockenfeldanbau wird hauptsächlich in den Provinzen Kassala und Blue Nile (Ost-Sudan) auf über 4 Millionen Feddan betrieben. Davon sind etwa eine halbe Million unter staatlicher Kontrolle, der Rest verteilt sich auf private Farmen (ILO, 1976, S. 268). Trotz des hohen Mechanisierungsgrades in diesem Sub-Sektor der modernen Landwirtschaft (4.000 Traktoren) wird eine grössere Anzahl von saisonalen Arbeitskräften benötigt, denn im Sudan, im Gegensatz zu einigen Ländern Lateinamerikas, wird nur Teilmechanisierung angewandt (hauptsächlich für Feldbestellung und Ernte).

Eine wichtige Auswirkung einer derartigen Ausdehnung des modernen landwirtschaftlichen Sektors ist in der tendenziellen Auflösung der traditionellen Produktionsverhältnisse zu sehen. Die Produktion in der mechanisierten Landwirtschaft, die hauptsächlich am Weltmarkt orientiert ist, führt zur Entfaltung des Handels, der die

unterschiedlichen Produktionssphären in Beziehung zueinander bringt, die Isolation des traditionellen landwirtschaftlichen Sektors aufhebt, neue Bedürfnisse unter der ländlichen Bevölkerung weckt, Regionen mehr und mehr durch verkehrsmäßige Erschließung zu regelmäßigem Austausch führt, die Produktion auf dem Markt Schritt für Schritt, auch in Gebieten der traditionellen landwirtschaftlichen Produktion fördert, und die Steuerung und Ausweitung der Qualifikationsmöglichkeiten und damit der Ware-Geld-Beziehungen bewirkt.

Die vorliegende Untersuchung befaßt sich mit sozialgeographischen Problemen der Mechanisierung in der Landwirtschaft. Konkret wurde nach möglichen Auswirkungen der Mechanisierung auf die Bevölkerungsmobilität gefragt. Derartige sozialgeographische Fragen wurden gegenüber den technisch-ökologischen Fragen bei den bisherigen Untersuchungen über Mechanisierung der Landwirtschaft höchstens beiläufig gestellt und, wenn überhaupt, dann vorzugsweise auf Makroebene, d. h. für ein ganzes Land oder für einige Länder. Ein wichtiger Grund dafür, daß bislang etwa Entscheidungsprozesse und Arbeitsverhalten der Menschen in der Landwirtschaft sozialgeographisch noch nicht gründlicher untersucht wurden, ist sicher darin zu sehen, daß in der Regel das Sozialverhalten gerade in den Räumen, in denen die Mechanisierung auf eine lange Tradition bzw. eine stetige Entwicklung zurückblicken kann, völlig an die jeweiligen Rahmenbedingungen angepaßt ist, so daß sie eher als Selbstverständliches denn als etwas Untersuchungswertes gelten (die für die Modernisierung des traditionellen Sektors nötig sind, über den Handel versorgen zu können). Ein solcher Grund entfällt sicher bei neugeschaffenen landwirtschaftlichen Gebieten, in denen im Zuge umfangreicher politisch-wirtschaftlicher Aktionen Bevölkerungsbewegungen beschleunigt verliefen, vor allem dann, wenn

dort bis dahin keine Erfahrung mit mechanisierter Landwirtschaft vorlag.

Die Republik Sudan mit ihren umfangreichen landwirtschaftlichen Projekten, in denen Mechanisierungsmaßnahmen im Vordergrund stehen, bietet ein gutes Beispiel dafür, daß durch die Mechanisierung verschiedene Bevölkerungsgruppen mobilisiert werden können (siehe Kapitel 8).

Diese Untersuchung beschränkt sich vor allem auf zwei Problemkreise, die zweifellos in einem engen gegenseitigen Kontakt stehen und gerade in neugeschaffenen mechanisierten Agrarräumen von besonderer Bedeutung sein dürften. Es geht dabei einmal um die Schaffung neuer Arbeitsplätze innerhalb der Landwirtschaft, und es geht zum anderen um die Frage, wie weit die verschiedenen Bevölkerungsgruppen durch die Mechanisierung angezogen werden und welche sozio-ökonomischen Auswirkungen sich aus solchen Bevölkerungsbewegungen ergeben können. Über das Ausmaß dieser Mobilität besteht freilich keine exakte Vorstellung.

Diese Untersuchung zeigt, daß die Entwicklung des ländlichen Raumes, darunter auch die Mechanisierung nicht zu einer Stabilisierung der Bevölkerungsverhältnisse führen, sondern im Gegenteil eine Mobilisierung der ländlichen Bevölkerung bewirken können, die den Zuwanderungsdruck auf die Städte nur noch verstärkt und damit die Polarisierungstendenz vergrößert. Dadurch werden regionale und sektorale Disparitäten sogar verstärkt, obwohl man zunächst das Gegenteil angenommen hatte (siehe Kapitel 5, 6, 7).

Die Mechanisierung der Landwirtschaft spielt in diesem Zusammenhang eine wichtige Rolle. Da der Einsatz technischer Hilfsmittel, vor allem kapitalintensiver und

arbeitssparender Maschinen, einen bedeutenden Teil der Arbeitskräfte freisetzt, ist dieser gezwungen, andere Beschäftigungsmöglichkeiten, auch in den Städten, zu suchen. Über solche Mobilitäten wurde von vielen, die sich mit der Mechanisierung der Landwirtschaft beschäftiten, häufig berichtet (GALAL EL DIN, M. E., 1973; HEINRITZ, G., 1977, 1982). Aber dies ist nur ein Teil der verschiedenen durch die Mechanisierung verursachten Bevölkerungsmobilitäten (Fig. 1).

Anders als der traditionelle setzt der moderne landwirtschaftliche Sektor qualifizierte Arbeitskräfte voraus, die gerade in einem Entwicklungsland wie dem Sudan fehlen. Zur Ausbildung von Fachkräften sind daher in allen mechanisierten Projekten Lehr- und Reparaturwerkstätten eingerichtet worden, was zunächst zu einer Zuwanderung von vor allem Grundschulabsolventen führte, die keinen Zugang zur Höheren Schule hatten und die bis dahin eine Reserve-Armee für die Entwicklung des traditionellen Sektors bildeten (siehe Kapitel 7).

Die Befragungen in einigen ausgewählten Herkunftsorten von Traktorfahrern und Mechanikern haben gezeigt, daß die Wahrscheinlichkeit der Abwanderung steigt, je stärker ein Ort von der Mechanisierung betroffen ist, d. h. je näher er bei Funktionsstandorten der Mechanisierung gelegen ist bzw. je länger derartige Funktionsstandorte existieren (Fig. 2). Diese Abwanderung ist insofern selektiv, als vor allem aktive, junge, männliche Personen abwandern (Tabellen 7.6 und 7.7). Das starke Ausmaß dieser Bevölkerungsmobilität hat dazu geführt, daß die Bevölkerungsstruktur sowohl der Herkunfts- als auch der Zielgebiete schon deformiert wurde, obwohl die Mechanisierung noch eine neue Erscheinung ist (Tabelle 7.5).

Die Untersuchungen haben ferner gezeigt, daß die Chancen, am Wanderungszielort schnell eine Arbeitsstelle zu erhalten, umso größer ist, je höher die Qualifikation einer im Zuge der Mechanisierung der Landwirtschaft ausgebildeten Person ist. Das geringe Risiko der Arbeitslosigkeit am Zielort erhöht die Bereitschaft zur Abwanderung. Untersuchungen unter den noch zu qualifizierenden Personen in einigen ausgewählten Lehrwerkstätten deuteten darauf hin, daß jeder nicht nur zur Abwanderung bereit, sondern dazu sogar gezwungen ist, um eine seiner durch die Mechanisierung der Landwirtschaft erworbenen Qualifikation entsprechende Arbeitsstelle zu erhalten; denn für qualifizierte Arbeitskräfte existieren am Herkunftsort keine bzw. nur begrenzte Beschäftigungsmöglichkeiten (Tabelle 7.8). Informationsaustausch über das begrenzte Vorhandensein von Arbeitsplätzen in anderen Gebieten ist bereits während der Ausbildungszeit gegeben. Verwandte und Bekannte, die in anderen Gebieten tätig sind, dienen nicht nur als Informationsquelle, sondern auch als Ablaufstellen für die, die noch im Herkunftsort oder in anderen Gebieten sind. Die Bereitschaft zur Abwanderung ist also nicht nur durch zuverlässige Informationsquellen, sondern auch durch die Sicherung von Unterkunft und Unterhalt während der Suche nach einem Arbeitsplatz motiviert (Kapitel 7). Entscheidend aber sind die Lohnunterschiede zwischen den verschiedenen Regionen. Es wurde bei den Untersuchungen in drei Bewässerungsprojekten [1] festgestellt, daß die Mobilitätsbereitschaft der Traktorfahrer und Mechaniker

---

1) Khashm el Girba am Atbarafluß etwa 400 km östlich von der Hauptstadt Khartoum mit 200.000 ha und 21.000 Pächtern; El Rahad Projekt zwischen Rahadfluß und Blauem Nil etwa 300 km südöstlich von Khartoum mit einer geplanten Fläche von 328.000 ha und El Suki Scheme am Blauen Nil südlich von Sennar mit 37.800 ha. (Die Untersuchung fand im Zeitraum November 1979 - März 1980 statt.)

außerordentlich hoch ist, so daß schon relativ geringe Lohnunterschiede Anlaß zum Arbeitsplatzwechsel in erheblichem Umfang sein können (siehe Kapitel 6). Die gesteigerte Nachfrage nach Traktorfahrern und Mechanikern in neugeschaffenen mechanisierten Agrargebieten in jüngster Zeit - wo entsprechend höhere Löhne angeboten wurden - hat mehrfach in den alten Agrarräumen dazu geführt, daß die Zahl der dort beschäftigten Traktorfahrer und Mechaniker sich so stark reduzierte, daß Fachkräftemangel herrschte. Zum Ausgleich dieses Defizits wanderten andere Bevölkerungsgruppen von ihren Herkunftsorten zu (Fig. 1).

Den Höhepunkt solcher Bewegungen bildet die Abwanderung der durch die Mechanisierung qualifizierten Arbeitskräfte vom Agrarsektor in die Städte, vor allem in die Hauptstadt Khartoum und von dort ins Ausland, und somit spiegelt sich die Fachkräftemobilität nicht nur räumlich, sondern auch sektoral wieder (Fig. 1).

Qualifizierte Arbeitskräfte erstreben eher als unqualifizierte einen höheren Lebensstandard. Da die sozial-ökonomischen Aufstiegsmöglichkeiten auf dem Land sehr begrenzt sind, zeigen sich die durch die Mechanisierung der Landwirtschaft qualifizierten Arbeitskräfte zur Abwanderung in die Städte und ins Ausland bereit. Bei meinen Untersuchungen in den drei ausgewählten Bewässerungsprojekten wurde festgestellt, daß der überwiegende Teil (86.3 %) der Traktorfahrer und Mechaniker beabsichtigt, in die Hauptstadt Khartoum zu wandern, um dort eine Beschäftigung außerhalb des landwirtschaftlichen Sektors zu suchen (Kapitel 5). Diese Feststellung wurde bestätigt durch die Ergebnisse einer Befragung unter ausgewählten Taxi- und Busfahrern in Khartoum, wonach der überwiegende

Teil (70.4 %) von ihnen bereits als Traktorfahrer und/ oder Mechaniker in mechanisierten landwirtschaftlichen Gebieten gearbeitet hat (Tabelle 6.7). Als Hauptgrund für ihre Abwanderung nach Khartoum sind u. a. die städtische Attraktivität, erwartete Aufstiegschancen und nicht zuletzt die Möglichkeit, ins Ausland abzuwandern, genannt worden (Tabelle 6.8). Diejenigen, die Verwandte und Bekannte in Khartoum haben, sind unter den Befragten stark repräsentiert (Tabelle 6.12). Diese Feststellung ist sehr wichtig, denn gerade in den Städten, im Gegensatz zu den ländlichen Gebieten, sind die Beschäftigungsmöglichkeiten für Traktorfahrer und Mechaniker sehr gering. Sie müssen normalerweise mit langer Arbeitslosigkeit rechnen, bevor sie eine ihrer Qualifikation entsprechende Beschäftigung finden. In den meisten Fällen sind sie aber gezwungen, anderen Beschäftigungen nachzugehen, die mit ihrer Qualifikation gar nichts zu tun haben, in der Hoffnung, daß sie im Laufe der Zeit ihre Ziele doch noch erreichen können. Damit haben sie ihre bisherigen Tätigkeiten im Agrarsektor verlassen, und sie neigen nun dazu, ins Ausland abzuwandern.

Eine Beendigung derartiger Abwanderungsprozesse bzw. eine Rückkehr zu ländlichen Gebieten ist noch nicht feststellbar. Eine Entscheidung darüber ist offenbar von den sozioökonomischen Verhältnissen der verschiedenen Regionen des Sudans abhängig; denn die sozio-ökonomischen Disparitäten, die ursprünglich die bisherige Bevölkerungsmobilität verursachten, herrschen immer noch zwischen den verschiedenen Regionen. Es scheint, daß diese Mobilität anhalten wird, solange ein Lohngefälle zwischen den mechanisierten und nicht-mechanisierten Regionen besteht und solange die Qualifizierung von Arbeitskräften in Funktionsstandorten der Mechanisierung möglich ist.

Die jetzigen Bestrebungen der Regierung, die mechanisierte Anbaufläche auf Kosten der traditionellen Anbaugebiete erheblich auszudehnen, werden mit Sicherheit die intra- und interregionale Abwanderungstendenz sowie die ohnedies gravierenden Land-Stadt-Abwanderungsprobleme weiter verstärken. Die Abwanderung ins Ausland wird dadurch begünstigt, daß qualifizierte Arbeitskräfte in den Ölländern gefragt sind; dies zeigt die überragende Bedeutung der Mechanisierung als Qualifikationsquelle.

F A Z I T

Die Abwanderung der durch die Mechanisierung der Landwirtschaft qualifizierten Arbeitskräfte von den ländlichen Gebieten in die Städte und von dort ins Ausland beschleunigt die bisherige Land-Stadt-Abwanderung und verstärkt somit den Druck auf die Ballungsgebiete. Diese Entwicklung, die durch die Ausdehnung des modernen landwirtschaftlichen Sektors auf Kosten des traditionellen Sektors hervorgerufen worden ist, hinterließ nur geringe induktive Effekte auf die Entfaltung der übrigen Wirtschaftsbereiche. Das Endresultat ist eine verstärkte sektorale Disparität innerhalb der und zwischen den verschiedenen Regionen und verschiedenen Einkommensgruppen.

Diese Disparitäten werden dadurch weiter verstärkt, daß die Importe von Inputs, die für die Entfaltung und Fortsetzung des modernen Sektors, bei Fehlen einer Produktionsmittelindustrie, notwendig sind, zu mehr Agrarexportgütern zwingen, auch bei sinkenden Erlösen, um dem Produktionsprozess die notwendigen Gelder zuführen zu können. Diese Tendenzen bewirken eine verstärkte Bevölkerungsabwanderung, die zu einer Beschränkung der Überschußproduktion im traditionellen Sektor führen kann.

Anders als die saisonale Abwanderung der unqualifizierten Arbeitskräfte, die keinen nennenswerten Auflösungsprozeß der traditionellen Formen der Produktion bewirkt, ist die Abwanderung der durch die Mechanisierung der Landwirtschaft qualifizierten Arbeitskräfte, sofern sie Verbindungen mit ihren Herkunftsorten noch haben, als Ausgangspunkt der Transformation der ländlichen Gebiete zu betrachten. Sie sind tendenziell in den nationalen Produktionsprozeß eingebunden. Dennoch behindert dieser Teil der Arbeitskräfte, aufgrund seiner höheren Mobilitätsrate und seiner Neigung zur permanenten Ansiedlung in den Ballungsgebieten, sowohl die Entwicklung des modernen landwirtschaftlichen Sektors als auch die Erzielung und Ausweitung eines Produktionsüberschusses in den traditionellen Sektoren. Beide Arten von Behinderungen erschweren jede Art der Akkumulation, die für die Entwicklung des Landes notwendig ist. Die dadurch verursachten verzerrten ökonomischen Strukturen können nur durch die Beseitigung der fehlenden Integration in beiden Sektoren behoben werden. Einseitige Versuche der Transformierung der Produktionsverhältnisse innerhalb eines Sektors sind unzureichend. Ich vertrete die These, daß die Konservierung der traditionellen Produktionsstrukturen ein notwendiger Bestandteil des Reproduktionsprozesses im Sudan ist, der überwiegend durch den Ausbau des modernen landwirtschaftlichen Sektors gekennzeichnet ist, der in seiner Entwicklung von der zeitweiligen Verfügbarkeit über Arbeitskräfte aus der traditionellen Landwirtschaft stark abhängig ist (TETZLAFF, R., 1979). Jede Art von Maßnahmen, die zur Hebung der Produktion im Substanzbereich beitragen kann, würde die jetzige Abwanderungsintensität ohne Zweifel zunächst vermindern, langfristig könnten aber überschüssige Arbeitskräfte freigesetzt werden, die dann produktiv in den anderen Produktionsbereichen eingesetzt werden könnten. Es

müssen aber im traditionellen Sektor Maßnahmen ergriffen werden, die über den eigenen Bedarf hinaus, zur Erhöhung der Exportproduktion und zur Substitution der Importe beitragen können. Nur dann werden sowohl die regionalen als auch die sektoralen Disparitäten vermindert, die die Ursache und Auswirkung von Bevölkerungsmobilität sind. Ein solcher Umwandlungsprozeß braucht aber eine bewußte, gezielte staatliche Intervention, die durch klare Prioritätensetzung innerhalb eines umfassenden Entwicklungsprogrammes charakterisiert ist.

LIST OF REFERENCES

ABD AL RAHIM, A. W., 1968:
An enonomic history of the Gezira scheme 1900 - 1956. (Unpublished Ph. D. Thesis, University of Manchester.)

ABDEL SALAM, M. M., 1976:
Agriculture in the Sudan. In: An introduction to the Sudan economy. (Ed.) A. M. El Hassan. Khartoum, pp. 38 - 75.

ABERCROMBIE, K. C., 1973:
Agricultural mechanization and employment in Latin America. International Labour Review. July 1972, pp- 11 - 45.

ABU SIN, M. E., 1975:
A survey and analysis of population mobility within northern and central Sudan. (Unpublished Ph. D. Thesis, Bedford College, England.)

AFRCAN DEVELOPMENT NEWSPAPER, 1975: No. 1

AGABAWI, K. A., 1968:
Some development in the rain-fed agriculture in Central Sudan. Sudan Notes and Records. 49 (1968), pp. 53 - 82, Khartoum.

AGOUBA, M., 1980:
A functional literacy programme and its impact on agricultural development: an experimental project in Khashm el Girba. In: Non-formal education and development in the Sudan. (Ed.): Sadig RAHEED & Terry DANDELL. Khartoum; pp. 65 - 81. (University of Khartoum. Faculty of Economic and Social Studies and Research Centre.)

AHMED, B., 1972:
Farm mechanization and agricultural development: A case study of the Pakistan Punjab. (Unpublished Ph. D. Diss., Michigan State University.)

BALDWIN, K. O. S., 1957:
The Niger agricultural project: An experiment in African development. Oxford.

BARDELEBEN, M., 1968:
Das Genossenschaftswesen im Sudan. Diss. Hamburg.

BARNETT, T., 1975:
Production of cotton and the reproduction of underdevelopment. In: Beyond the sociology of development. Economy and society in Latin America and Africa, I. OXAAL, T. BARNETT and D. BOOTH (Eds.), London, pp. 75 - 93.

BARNETT, T., 1977:
Gezira scheme. An illusion of development. London.

BART, Duff, 1975:
Output, employment and mechanization in Philippine agriculture. Paper presented at the meeting of the FAO/OECD expert panel on the effects of farm mechanization, Rome, 4 - 7 February, 1975. In: Employment, technology and development. Oxford, p. 70.

BASIC PROGRAMME:
Arab Fund for Economic and Social Development. Basis programme for agricultural development in the Democratic Republic of the Sudan 1975 - 85. Summary and conclusions. kuwait, 1976.

BEALE; C. L., 1964:
Rural depopulation in the United States: Some demographic consequences of agricultural adjustment, Demography 1, pp. 264 - 272.

BELL, C., 1971:
Landlords, landless and the distribution of income. Sussex. (University of Sussex. Institute of Development Studies.)

BERG, Eliot, 1961:
Backward sloping supply functions in dual economies: The Africa case.
Quarterly Lournal of Economics. 75 (1961); pp. 473 - 489.

BILLINGS, M. and S. ARJAN, 1970:
Mechanization and rural employment with some implications for rural income distribution. Economic and Political Weekly. Vol. 5, No. 26; pp. 21 - 64. Review of agriculture.

BILLINGS, M. and S. ARJAN, 1971:
The effect of technology on farm employment in two Indian states (Punjab and Maharashtra). In: Employment and unemployment problems of the Near East and South Asia. (Ed.): G. RONALD and H. LUBELL, New Delhi, Vol. 2; pp. 502 - 534.

BLANKENBURG, P. von and HUBERT, K., 1969:
The Khashm el Girba Settlement Scheme in the Sudan. An Appraisal for the World Food Programme, Rome, Institut für ausländische Landwirtschaft der Technischen Universität Berlin, in: Zeitschrift für ausländische Landwirtschaft, Vol. 8, pp. 328 - 364.

BLAUT, J. M., 1959:
"Micro-geographic sampling": A quantitative approach to regional agricultural geography. Economic geography. 35 (1959); pp. 79 - 88.

BOGUE, D. J., 1977:
A migrant's eye view of the costs and benefits of migration to a metropolis, in: BROWN, A. A. and NEUBERGER, E. (eds), Internal migration: A comparative perspective, pp. 167 - 182 (New York: Academic Press).

BOSE, S. R. and E. H. CLARK, 1969:
Some basic considerations on agricultural mechanization in West Pakistan.
Pakistan Development Review, 9 (1969); pp. 273 - 308.

BREMER, F., 1977:
Endlose Voraussetzungen peripherer Entwicklungsprozesse an der Elfenbeinküste. Karlsruhe.

BROOKS, L., 1971:
Great civilizations of ancient Africa. New York.

BROWN, L. A. and MOORE, E. G., 1970:
The intra-urban migration Process: a perspective, Geografiska Annaler, 52B, pp. 1 - 13

CALDWELL, J. C., 1968:
Determinants of rural-urban migration in Ghana, Population Studies, 22, pp. 361 - 377.

CALDWELL, J. C., 1969:
African rural-urban mogration: The movement to Ghana's towns (Canberra: Australian National U. P.).

CARR, M., 1973:
Tractors in a rural economy. Some social and economic aspects of the introduction of tractors into a rural economy: The case of Ceylon (University of Edinburgh. Appopriate Technology Conference. Paper No. RE/A-06).

CASTLE, B., 1966:
Growing up in East Africa. Oxford.

CAUFIELD, M., 1974:
Imperialism, the family and cultures of resistance. Socialist Revolution. No. 20 pp. 67 - 85.

CLEASON, C. F., 1974:
Inter-regional population movement and cumulative demographic disparity: an analysis of census data in Tanzania, Geografiska Annaler, 56B, pp. 105 - 120.

CLEASON, C. F. and EGERO, B., 1972a:
Migration in Tanzania. A review based on the 1967 population census, Research Notes No. 11, University of Dar el Salam, Bureau of Resource Assessment and Land Use Planning.

CLEASON, C. F. and EGERO, B., 1972b:
Migration and the urban population - analysis of population census data for Tanzania, Geografiska Annaler, 54B, pp. 1 - 18.

CLARK, P,, 1972:
The migrant in Kentish towns, 1580 - 1640, in: CLARK, P. and SLACK, P. (eds), Crisis and Order in English Towns, pp. 117 - 163 (Londond: Routledge and Kegan, Paul).

CLARKE, J. I., 1965:
Sex ratios in Sierra Leone, Bulletin - Journal of the Sierra Leone Geographical Association, p, pp. 72 - 77.

CLAYTON, E. S., 1972:
"Mechanization and Employment in East African Agriculture", in: International Labour Review, April 1972, pp. 309 - 334, Geneva.

CRIBIER, F., 1975:
Retirement migration in France, in: Kosinski, L. A. and Prothero, R. M. (eds), People on the Move, pp. 361 - 373 (London: Methuen).

DAFALLA, H., 1975:
The Nubian exodus, Khartoum.

DAK, O., 1968:
A geographical analysis of the distribution of migrants in Uganda. Kampala, Makerere University. Department of Geography. Occasional Paper No. 11.

DALRYMPLE, D. G., 1969:
Import and Planting of high-yielding varieties of wheat and rice in the less-developed nations. Washington (USDA Foreign Agricultural Service).

DAVIES, H. R. J., 1966:
Nomadism in the Sudan. Aspects of the problem and suggested lines for its solution (Tijdschrift v. Econ en soc. Geographie, 57, pp. 193 - 202). Rotterdam.

DE GREGORI, T. R., 1969:
Technology and the economic development of the tropical African Frontier. Cleveland, Ohio.

DEPARTMENT OF.....
see REPUBLIC OF THE SUDAN, DEPARTMENT OF ...

DESAI, R. 1963:
Indian immigrants in Britain. Oxford.

DONALDSON, G. F. and MELNERNEY, J. P., 1973:
Changing machine technology and agricultural adjustment. Paper presented to the joined conference of the American Agricultural Economics Society and the Canadian Agricultural Economic Society, Edmonton, Canada, August 1973.

DUFFIELD, M., 1978a:
Hausa and Fulani settlement and the development of capitalism in the Sudan. (Ph. D., Centre of West African Studies, University of Birmingham).

DUFFIELD, M., 1978b:
Peripheral capitalism and the social agricultural production in the village of Maiurno near Sennar. Khartoum.

DRUDY, P. J., 1978:
Depopulation in a prosperous agricultural sub-region, Regional studies, 12, pp. 49 - 60.

EL BADRAWI, M., 1972:
The transfer of Nubians to Khashm el Girba and its impact on the social life. (M. A. Thesis, submitted in Arabic to the Faculty of Arts, Cairo, Egypt.).

EL BAGIR, H., 1972:
Nubians in their new homes. (Unpublished M. A. Thesis submitted in Arabic to the Faculty of Arts, Cairo, Egypt).

EL BUSHRA, E., 1976:
An atlas of Khartoum conurbation, Khartoum.

EL HASSAN, A. M. (ed.), 1976:
An introduction to the Sudan economy. Khartoum.

EL MANGOURI, H., 1978:
Planning and development of irrigated settlement schemes in developing countries: Experiences from the Khashm el Girba scheme in the Democratic Republic of the Sudan. Diploma Thesis, Free University of Berlin, West Germany.

EL MANGOURI and HEINRITZ, G., 1981:
Luftbild New Halfa - Projektgebiet (Republik Sudan).
Die Erde. 112 (1981); pp. 1 - 10.

ELDRIDGE, H. T., 1965:
Primary, secondary and return migration in the United States, 1955 - 1960.
Demography. 2 (1965); pp. 444 - 455.

FAHIM, H. M., 1972:
Nubian resettlement in the Sudan. Cairo. (American University in Cairo. Social Research Centre. Peprint Series. Nr. 13)

FAO PRODUCTION YEARBOOK 1977.
Rome.

(The) Five Year Plan of economic and social development 1970/71 - 1974/75. Khartoum 1970. (Republic of the Sudan. Ministry of National Planning.)

FRIEDMANN, J., E. McCLYNN, B. STUCKEY & C. WU, 1973:
Unbanization and national development: A comparative study in urbanization and national development. Los Angeles.

GAITSKELL, A., 1959:
"Gezira": A story of development in the Sudan. London.

GALAL EL DIN, M. E., 1973:
Internal migration in the Sudan since World War II, with special reference to migration to Greater Khartoum. (Ph. D. London.), London.

GALAL EL DIN, M. E., 1979:
The Sudanese emigration. (Republic of the Sudan. National Research Council.) Khartoum. (In Arabic.)

GALTUNG, J., 1971:
Members of two worlds: A development study of three villages in western Sicily. Oslo.

GETIS, A. & B. BOOTS, 1978:
Models of spatial processes. Cambridge.

GIROURARD, Sir PERCY, 1913:
In: East African Standard, February 8th, 1913. Cited in: Raymond I. Buell: The native problem in Africa. 2nd pr. Vol. 1. London 1965.

GODDARD, A. D., W. T. S. GOULD & F. I. MASSER, 1975:
Census data and migration analysis in tropical Africa.
Geografiska Annaler. 57B (1975); pp. 26 - 41

GOTSCH, C. H., 1973:
Tractor mechanization and rural development in Pakistan. International Labour Review. February 1973; pp. 133 - 166.

GOUGH, K., 1978:
'The Green Revolution in South India and North Vietnam' in: Monthly Review, Vol. 29, No. 8; pp. 1 - 56.

GRANDSTAFF, P. J., 1975:
Recent Soviet experience and Western 'Laws' of population migration, International Migration Review, 9, pp. 479 - 497.

GREENWOOD, M. J., 1970:
'Large response in the decision to migrate', Journal of Regional Science, 10, pp. 375 - 384.

GRIFFIN, K., 1974:
The political economy of agrarian change. An essay on the Green Revolution. London.

GRIGG, D. B., 1977:
'E. G. Ravenstein and the "laws of migration" ', Journal of Historical Geography, 3, pp. 41 - 54.

GUGLER, J., 1968:
The impact of labour mogration on society and economy in sub-Saharan Africa. African Social Research. 6 (1968; pp. 463 - 486.

GUGLER, J., 1969:
On the theory of rural-urban migration. In: Jackson, J. A. (ed.): Migration. Cambridge; pp. 134 - 155.

HABASHI,W., 1966:
The development of agricultural production in the Sudan. (Lectures delivered at Extra-Mural Studies, University of Khartoum, in Arabic.) Khartoum.

HABERMEIER, K., 1977:
Bäuerliche Gemeinschaften, kapitalistische Exportwirtschaft und Wanderarbeit in West-Afrika. Karlsruhe.

HAEGERSTRAND, T., 1957:
Migration and Area, in Hannerberg, D. et al. (eds), Migration in Sweden, pp. 27 - 158, Lund Studies in Geography, 13 B (Lund: Gleerup).

HANCE, W. A., 1970:
Population, Migration and Urbanization in Africa (New York: Columbia U. P.).

HANNEN, D. F., 1969:
Migration motives and migrations differentials among Irish rural Youth, Sociologia Ruralis, 9, pp. 195 - 220.

HARRINGTON, R. E., 1972:
Changes in Employment of farm labour under the impact of increasing use of tractor in India, Japan, N. Korea, S. Korea and Taiwan, New York.

HARRIS, B., 1974:
The economic and spatial relations of tractorisation ind its implications for rural indebtedness in Hambantota district of Sri Lanka. Paper presented at the seminar on the project of agrarian change in rice-growing areas of Tamil Nadu and Sri Lanka, Centre of South Asian Studies, Cambridge University, December 1974.

HART, R. A., 1973:
Economic expectations and the decision to migrate: analysis by socio-economic group, Regional Studies, 7, pp. 271 - 285.

HASSAN ADAM, F. and M. KHIDIR, 1976:
Development of small-scale agriculture. In: Growth, employment and equity. A selection of papers presented to the ILO Conprehensive Employment Strategy Mission to the Sudan, 1974 - 75. (Ed.): A. M. EL HASSAN, Khartoum.

HAUSEN, K., 1970:
Deutsche Kolonialherrschaft in Afrika. Berlin.

HEINRITZ, G., 1977:
Die Entwicklung junger Bewässerungsprojekte unter dem Einfluß gruppenspezifischen Pächterverhaltens. Ein erster Bericht über sozialgeografische Untersuchungen im Khashm el Girba - Projektgebiet / Republik Sudan.
Geographische Zeitschrift. 65 (1977); pp. 188 - 215.

HEINRITZ, G., 1978:
Social geographic problems in the Khashm el Girba project, Sudan.
Land Reform. 1978, No. 2; pp. 25 - 35.

HEINRITZ, G., 1980:
Das Rahad Scheme. Ein neues Bewässerungsprojekt in der Republik Sudan (MSKT).
München.

HEINRITZ, G., 1982:
The migration of Westerners in the New Halfa and Rahad schemes, in: Heinritz, G. (ed.): Problems of agricultural development in the Sudan, Selected Papers of a seminar, Edition Herodot, Forum 2, Göttingen, 1982, pp. 69 - 87.

HENIN, R. A., 1961:
Economic development and internal migration in the Sudan. Sudan Notes and Records. 44 (1961); pp. 100 - 119.

HERZOG, R., 1966:
Sudan, Bonn.

HILL, M. F., 1956:
Planter's progress. The story of coffee in Kenya, Nairobi.

HILL, P., 1970:
Studies in rural capitalism in West Africa.
Cambridge University Press.

HIRST, M. A., 1975:
The distribution of migrants in Kampala.
East African Geographical Review. 13, (1975); pp. 37 - 57.

HIRST, M. A., 1976:
A markovian analysis of interregional migration in Uganda, Geografiska Annaler, 58 B, pp. 79 - 94.

HOPKINS, A. G., 1966:
The Lagos strike of 1897: an exploration in Nigerian labour history. Past and Present: a journal of historical studies.
No. 35.

HOPKINS, A. G., 1968:
Economic imperialism in West Africa: Lagos 1880 - 1892. Economic History Review. 21 (1968).
pp. 73 - 92.

HOUGHTON, D. H., 1971:
Economic development, 1865 - 1965.
In: The Oxford history of South Africa. Vol. 2, South Africa 1870 - 1966. Oxford.

HUNTER, J. M., 1965:
Regional patterns of population growth in Ghana. In: Essays in geography for Austin Miller. (Ed.): J. B. WHITTOW & P. D. WOOD, Reading, pp. 272 - 290.

HUTTON, C., 1973:
Reluctant farmers? A study of unemployment and planned rural development in Uganda. Nairobi.

IFTIKHAR, A., 1975:
The Green Revolution. Mechanization and employment. Geneva. (ILO mimeographed World Employment Programme research working paper. For restricted distribution only.)

IFTIKHAR, A., 1976:
The Green Revolution and tractorization; their mutual relations and socio-economic effects. Internation Labour Review. 114 (1976)

ILO (INTERNATIONAL LABOUR OFFICE)
African labour survey. Geneva, 1958.

ILO (INTERNATIONAL LABOUR OFFICE)
Employment, incomes and equality. A strategy of increasing productive employment in Kenya. Geneva, 1972.

ILO (INTERNATIONAL LABOUR OFFICE)
Growth, employment and equity. A comprehensive strategy for the Sudan. Geneva, 1976.

INGHAM, K., 1971:
Deutsch-Ostafrika: ein wirtschaftliches Experiment in Afrika.
Afrika Verein. 3. (1961; pp. 1 - 27

INTERNATIONAL AFRICAN INSTITUTE AND UNESCO
Social implications of industrialization and urbanization in Africa south of the Sahara. London 1956.

ISZAEVICH, A., 1875:
Emigrants, spinsters and priests: the dynamics of demography of Spanish Peasant Societies, Journal of Peasant Studies. 2, pp. 292 - 312.

IZUMI, K. and RANATHUNGA, A. S., 1974:
Employment and social constraints on paddy production under existing conditions. A case study of Hambantota District. Colombo. (Agrarian Research and Training Institute. Occasional Publication Series. 4).

JONES, H. R., 1965:
A study of rural migration in central Wales, Transactions. Institute of British Geographers, 37, pp. 31 - 45.

KAY, G., 1967:
Social geography of Zambia. London.

KISS, J., 1977:
Will the Sudan be an agricultural Power? Budapest.

KRAUTER, P. 1979:
Die Entwicklung des non-formalen Bildungswesend in einem Land der Dritten Welt: Das Beispiel Kenya. München (U. P. Manuscript).

KULS, W., 1980:
Bevölkerungsgeographie. Teubner Studienbücher der Geographie, Stuttgart.

KUSUM, C., 1972:
Mechanization of agriculture and labour development. New Dehli. (USAID Newsletter).

LAING, R. G., 1953:
Mechanization of agriculture in the rainlands of the Anglo-Egyptian Sudan, 1948 - 51. Khartoum.

LAWTON, R. (ed), 1978:
The census and social structure: An Interpretive Guide to Nineteenth Censuses for England and Wales (London: Cass).

LEE, E. S., 1966:
'A theory of migration'. Demography, 3. pp. 47 - 57.

LEWIS, A., 1964:
Thoughts on land settlement.
In: Agriculture in economic development. (Ed.): E. EICHER & L. WITT, New York, Toronto, San Francisco, London.

LOWENTHAL, D. and COMITTAS, L., 1962:
Emigration and depopulation: Some neglected aspects of population geography. Geographical Review, 52, pp. 195 - 210.

MALTHUS, T. R., 1798:
An Essay on the Principles of Population, reprinted for the Royal Economic Society, 1926 (London: Macmillan).

MARVIN, P. M., 1966:
Maize in tropical Africa. Madison, Wisconsin.

MASSER, I. and GOULD, W. T. S., 1975:
Inter-Regional Migration in Tropical Africa, Special Publication No. 8, Institute of British Geographers.

MATHER, D. B., 1956:
Migration in the Sudan.
In: Geographic essays on British Tropical Lands. (Ed.): R. W. STEEL & C. A. FISHER. Pp. 115 - 143. London.

McKELVEY, J., 1965:
Agricultural research in the African world : A survey of social research. New York.

McLOUGHLIN, P., 1963:
The Sudan's three towns: A demographic and economic profile of an African urban complex. Economic Development and Cultural Change. 13. (1963). Pp. 70 - 83.

MERLIN, P., 1971:
L'Exode Rural, Cahier de l'I.N.E. D. No 59 (Paris: P.U.F.)

METZGER, D., 1976:
Reproduction and production: Unpaid and underpaid female labour force in the world economy. Starnberg (Unpublished manuscript.).

MICHAELSON; W., 1977:
Environmental Choice, Human Behaviour and Residential Satisfaction (New York: Oxford U. P.).

MIDDLETON, J. F. M., 1960:
'The Lugbara', in Richards, A. I. (ed.), East African Chiefs, pp. 326 - 343 (London: Faber).

MILLER, E., 1972:
A note on the role of distance in migration: costs of mobility versus intervening opportunity, Journal of Regional Science, 12, pp. 475 - 478.

MINISTRY OF ...
see REPUBLIC OF THE SUDAN, MINISTRY OF ...

MITCHELL, C., 1962:
The causes of labour migration. In. Migrant labour in Africa south of the Sahara. Abidjan, (Interafrican Labour Institute. Commission for Technical Co-operation in Africa South of the Sahara.).

MITCHELL, J. C., 1961:
Wage labour and African population movements in Central Africa.
In: Essays on African population. London; pp. 193 - 248.

MOLOHAN, M. J. B., 1957:
Detribalization. Das es Salaam.

MONSON, W. J., 1903:
Report on slavery and free labour in the British East African Protectorate. In: Great Britain. Parliamentary Papers. Cd 1931. London.

NATIONAL COUNCIL OF APPLIED ECONOMIC RESEARCH,
Techno-economic Survey of Maharashtra, New Delhi, July 1963.

NEWBURY, C. W., 1975:
Historical Aspects of Manpower and Migration in Africa South of the Sahara, in:
P. Duignan and L. H. Gann (eds.): Colonialism in Africa 1870 - 1960, Vol. 4, the Economics of colonialismn pp. 523 - 546. Cambridge University Press, Cambridge.

NEWBURY, C. W., 1961:
The Western Slave Coast and its Rulers. Oxford, Clarendorn Press.

NEWBURY, C. W., 1965:
British Policy towards W. Africa, Selected Documents 1786 - 1874. Oxford, Clarendon Press.

NEWBURY, G. E. and NEWBURY, C. W., 1969:
'Annotated bibliography of Commonwealth migrations: the Tropical Territories: 1 Africa (Oxford. Institute of Commonwealth Studies).

ÖSTERDIECKHOFF, P., 1980:
Der Agrarsektor des Sudans.
In: Tetzlaff, R. & K. Wohlmuth (Ed.): Der Sudan. Probleme und Perspektiven der Entwicklung eines weltmarktabhängigen Agrarstaates. Frankfurt/M.; pp. 257 - 385.

OLIVER, R., 1972:
The missionary factor in East Africa. London.

OMINDE, S. H., 1968:
Land and population movements in Kenya. London.

OSMAN, D. H., 1958:
"Some Aspects of Private Pump schemes", Sudan Notes and Records, Vol. 39; pp. 40 - 48.

OSMAN, M. S., 1966:
The possibilities and problems of the mechanization of agricultural production in the Sudan. In: Agricultural development of the Sudan. (Ed.): D. J. Show. Khartoum, Vol. 2. pp. 302 - 357.

PAUL, A., 1954:
A history of the Beja tribes of the Sudan. London.

PETERS, G. L., 1976:
The sex selectivity of out-migration: an Appalachian example, Yearbook, Association of Pacific Coast Geographers, 38, pp. 99 - 109.

PETERSEN, W., 1958:
A general typology of migration, American Sociological Review, 23, pp. 256 - 266.

PIAULT, M., 1962:
The migration of workers in West Africa. In: Migrant labour in Africa south of the Sahara. Abidjan; pp. 323 - 338. (Inter-African Labour Institute. Commission for Technical Co-operation in Africa South of the Sahara).

PORTER; R., 1956:
An approach to migration through its mechanism, Geografiska Annaler, 38, pp. 317 - 343.

PROTHERO, R. M., 1968:
Migration in tropical Africa, in: Caldwell, J. C. and Okonjo, C. (eds.), The population of Tropical Africa, pp. 250 - 263 (London: Longman).

PROTHERO, R. M., 1964:
Community and change in African population mobility, in: Steel, R. W. and Prothero, R. M. (eds.), Geographers and the Tropics: Liverpool Essays, pp. 189 - 214 (London: Longman).

PRYOR, R. J., 1969:
Laws of Migration? - the experience of Malaysia and other countries. Geographica (Kuala Lumpur), 5, pp. 65 - 76.

RAVENSTEIN, E. G., 1885:
The laws of migration, Journal, Statistical Society, 48, pp. 167 - 235.

REITER, R. R., 1972:
Modernization in the South of France: the village and beyond. Anthropological Quarterly, 45, pp. 35 - 53.

REPUBLIC OF THE SUDAN; DEPARTMENT OF LABOUR:
Employer and employed persons ordinance, 1948 amendment. Khartoum, 1973.

REPUBLIC OF THE SUDAN; DARPARTMENT OF STATISTICS:
Population and housing survey, 1964/66. Khartoum, 1968.

REPUBLIC OF THE SUDAN; MINISTRY OF AGRICULTURE:
Working party's report on mechanical crop production schemes. Khartoum, 1954.

REPUBLIC OF THE SUDAN;
MINISTRY OF AGRICULTURE, FOOD AND NATURAL RESOURCES:
Bulletin of Agricultural Statistics of the Sudan (Annual Report). 1974/75, p. 45.

REPUBLIC OF THE SUDAN;
MINISTRY OF AGRICULTURE, FOOD AND NATURAL RESOURCES:
Sudan: Annual Report, 1975.

MINISTRY OF AGRICULTURE, FOOD and NATURAL RESOURCES:
Sudan: Yearbook of Agricultural Statistics, 1977.

REPUBLIC OF THE SUDAN, MINISTRY OF AGRICULTURE, FOOD AND NATURAL RESOURCES:
Food investment strategy 1977 - 1985. Khartoum, 1977.

REPUBLIC OF THE SUDAN, MINISTRY OF AGRICULTURE:
A brief review of agricultural resources. Khartoum, 1978.

REPUBLIC OF THE SUDAN, MINISTRY OF CULTURE AND INFORMATION:
Rahad Irrigation Project. Khartoum 1977.

REPUBLIC OF THE SUDAN, MINISTRY OF FINANCE AND NATIONAL ECONOMY:
Economic survey 1976/77. Khartoum, 1977.

REPUBLIC OF THE SUDAN, MINISTRY OF IRRIGATION AND HYDRO-ELECTRIV POWER:
Irrigation by gravity from River Atbara. In: Sudan Pamphlets. 26 (1955). (Quoted in: Neue Zürcher Zeitung, 25. 5. 1977), p. 4.

REPUBLIC OF THE SUDAN, SUDAN GEZIRA BOARD:
The Gezira scheme from within. Barakat, 1963.

RICHARDS, A. I. (ed), 1954:
Economic Development and Tribal Change: A study of Immigrant Labour in Buganda (Cambridge: Heffer).

RIDDELL,J. B., 1970a:
On structuring a migration model, Geographical Analysis, 2, pp. 403 - 409.

RIDDEL, J. B., 1970b:
The Spatial Dynamics of Modernization in Sierra Leone: Sturcture, Diffusion and Response (Evanston: Northwestern, U. P.).

RODNEY, W., 1972:
How Europe underdeveloped Africa. Dar es Salaam.

ROGERS, B., 1978:
African women in agriculture. Africa. No. 78, pp. 70 - 71.

ROSEMAN, C. C., 1971:
Migration as a spatial and temporal porcess. Annals of the Association of American Geographers. 61 (1971). pp. 589 - 598.

SAVILLE, J., 1957:
Rural Depopulation in England and Wales 1851 - 1951 (London: Routledge and Kegan Paul).

SCHOFIELD, R. S., 1970:
Age-specific mobility in an eighteen century rural English parish, Annales de Demographie Historique, 6, pp. 261 - 274.

SCHWIND, P. J., 1971:
Migration and regional development in the United States, 1950 - 1960. Chicago. (University of chicago. Department of Geography. Research Paper No. 133).

SHAHAK, K. I., 1977:
Mechanization of agriculture in the clay plains of the Sudan, with special reference to Gedarif region (Unoublished Ph. D., Khartoum University.). Khartoum.

SHYROCK, H. S. and E. A. LARMON, 1965:
Some longitudinal data on internal migration. Demography 2. (1965), Pp. 579 - 592.

(The) SIX YEAR PlAN of economic and social development 1977/78 - 1982/83. Khartoum 1977. (Republic of the Sudan. Ministry of National Planning.)

SKLAR, R. L., 1975:
Corporate power in an African state: The political impact of miltinational mining companies in Zambia. Berkeley.

SOUTHALL, A. W., 1961:
Population movements in East Africa, in: Barbour, K. M. and Prothero, R. M. (eds) Essays on African Population, pp. 157 - 192 (Oxford: oxford U. P.).

SOUTHALL, A. W. (ed), 1971:
Social Change in Modern Africa (Oxford: Oxford U. P.)

STATISTISCHES BUNDESAMT:
Länderbericht: Sudan. Stuttgart u. Mainz, 1976.

STATISTISCHES BUNDESAMT:
Länderbericht: Sudan. Stuttgart und Mainz, 1978.

STUCKEY, B. & M. F. FAY, 1980:
Strukturveränderung in der kapitalistischen Weltwirtschaft. In. Starnberger Studien 4. Frankfurt/M., pp. 90 - 168.

SUDAN COTTON GROWERS ASSOCIATION:
Private Cotton Estates in the Republic of the Sudan. Khartoum, February, 1964.

SWAR EL DAHAB, A. M. S., 1978:
Labour force in the manufacturing industry of N. Khartoum. A case study in demgraphic and socio-economic characteristics of industrial labour force in the Sudan. (unpublished M. A. Thesis, University of Khartoum.)

TAEUBER, K. E., 1961:
Duration of residence analysis of internal migration in the United States. Milbank Fund Quarterly, 34, pp. 116 - 131.

TAEUBER, K. E., 1966:
Cohort migration, Demography, 3, pp. 416 - 422.

TANNOUS, A. I., 1942:
Emigration, a force of social change in an Arab willage, Rural Sociology, 7, pp. 62 - 74.

(The) TEN YEAR PLAN of economic and social development 1961/62 - 1970/71. Khartoum 1960. (Republic of the Sudan. Ministry of Finance and Economy. The Economic Planning Secretariat.)

TETZLAFF, R., 1979:
Die "Durchkapitalisierung" der Landwirtschaft im Sudan und ihre Auswirkung auf den "traditionellen" Sektor. Eine Strategie zur Überwindung ländlicher Armut? In: Agrarreform in der Dritten Welt. Hrsg.: H. Elsenhans, Frankfurt/m. und New York, pp. 339 - 363.

TETZLAFF, R. und K. WOHLMUTH (Ed.), 1980:
Der Sudan. Probleme und Perspektiven der Entwicklung eines weltmarktabhängigen Agrarstaates. Frankfurt/M.

THORNTON, D. S., 1964:
The organization of production in the irrigated areas of the Sudan. Journal of Agricultural Economics. 16 (1964).

TOTHILL, J. D., 1940:
Agriculture in Uganda. Oxford, London.

UN (UNITED NATIONS)
Structure and growth of selected African economies. New York. 1958.

WARD, W. E. F., 1952:
A history of the Gold Coast, London.

WEBER, E., 1977:
Peasants into Frenchman: The Modernization of Rural France, 1870 - 1914 (London: Chatto and Windus).

WHITE, P. and WOODS, R., 1980:
The geographical impact of migration. London and New York.

WILKES, G., 1977:
The world's crop plant germplasm - an endangered resource. Bulletin of Atomic Scientists. February 1977; pp. 8 - 16

WILSON, F., 1972:
Labour in the South African gold mines, 1911 - 1969. London.

WÖRTZ, J. G. F., 1966:
Genossenschaftliche und partnerschaftliche Produktionsförderung in der sudanesischen Landwirtschaft. Frankfurt/M..

WOODS, R. I., 1979:
Population Analysis in Geography (London: Longman).

WOLPERT, J., 1965:
Behavioral aspects of the decision to migrate, Papers and proceedings, Regional Science Association, 15, pp. 159 - 169.

WOLPERT, J., 1966:
Migration as an adjustment to environmental stress, Journal of Social Issues, 22, pp. 92 - 102.

WORLD BANK:
Sudan: Appraisal of the Savanah Development Project; Eastern Africa Region; Agriculture, credit and livestock. 1977. For official use only.

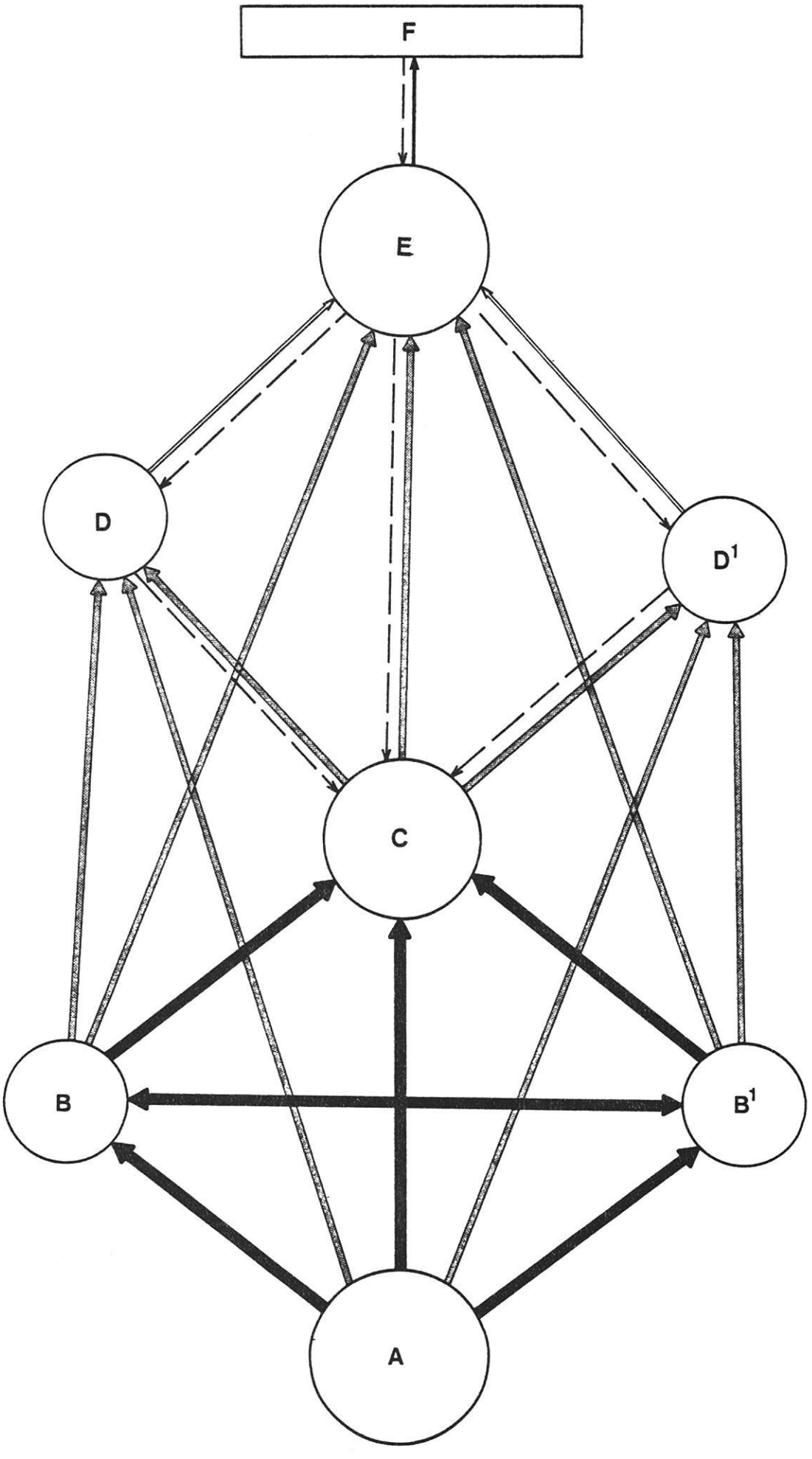
WYNN, R. F., 1971:
The Sudan's Ten Year Plan of economic development, 1961/62 - 70/71: An analysis of achievement to 1967/68.
The Journal of Developing Areas. 5. (1971).

YUDELMAN, M., 1975:
Imperialism and the transfer of agricultural techniques. In: Colonialism in Africa, 1870 - 1960. (Ed.): P. Duignan & L. H. Gann. Cambridge. Vol. 4, pp. 329 - 360.

ZELINSKY, W., 1971:
The hypothesis of the mobility transition. Geographical Review. 61 (1971), pp. 219 - 249.

A P P E N D I X

Fig. 1: **Circulation of skilled labour force in the Democratic Republic of the Sudan as caused by agricultural mechanization**



Key for Fig. 1:

A: Unmechanized areas as origin of unskilled labour force

B-B^1: Old mechanized irrigated and rain-fed agricultural schemes as training centres for rural youth

C: Recently implemented mechanized schemes as centres of attraction for qualified persons

D-D^1: Urban centres within and outside mechanized regions as alternative working places for qualified persons

E: Capital Khartoum as main target for qualified persons

F: Oil-rich Arab Countries as main preferences for high-qualified persons

Rural-rural migration of skilled persons

Rural-urban migration of skilled persons

Urban-urban migration of skilled persons

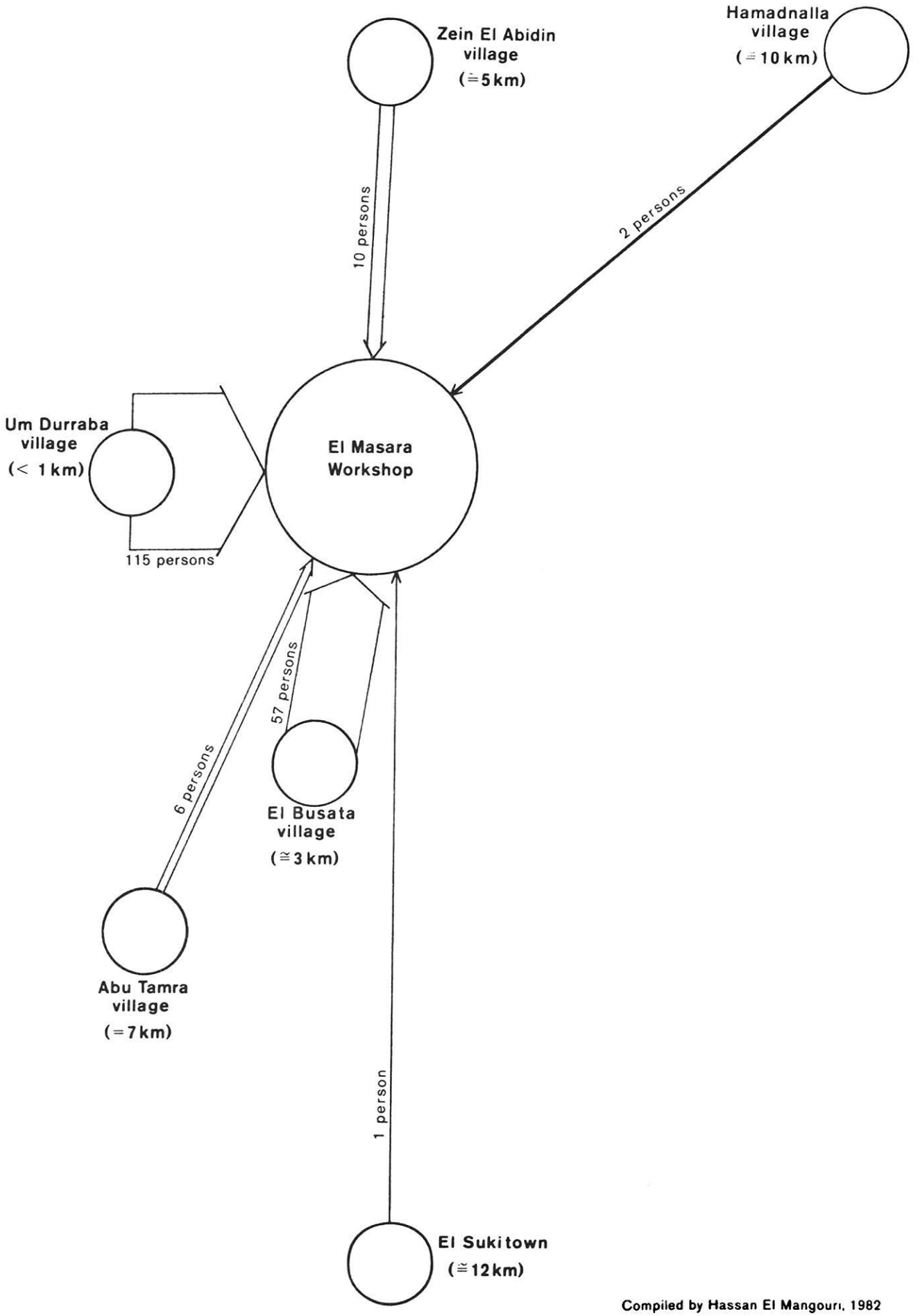
Frontierward migration of skilled persons

Counter migration of skilled persons

Compiled by Hassan El Mangouri, 1982

Fig. 2

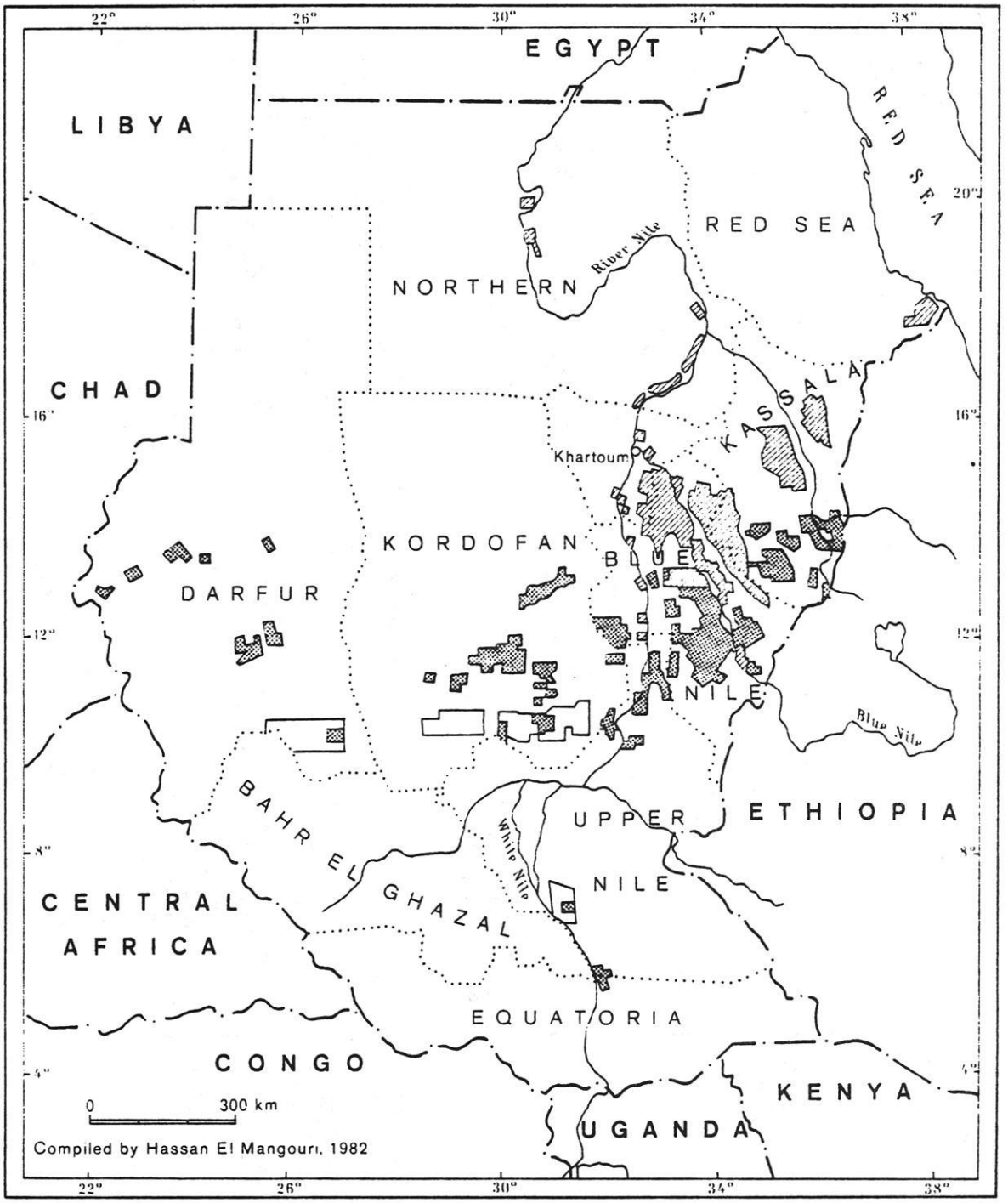
Qualifying effect of agricultural mechanization as a function of distance between place of origin and functional location (Workshop) as shown by a concrete example: El Masara Workshop in El Suki District



Compiled by Hassan El Mangouri, 1982

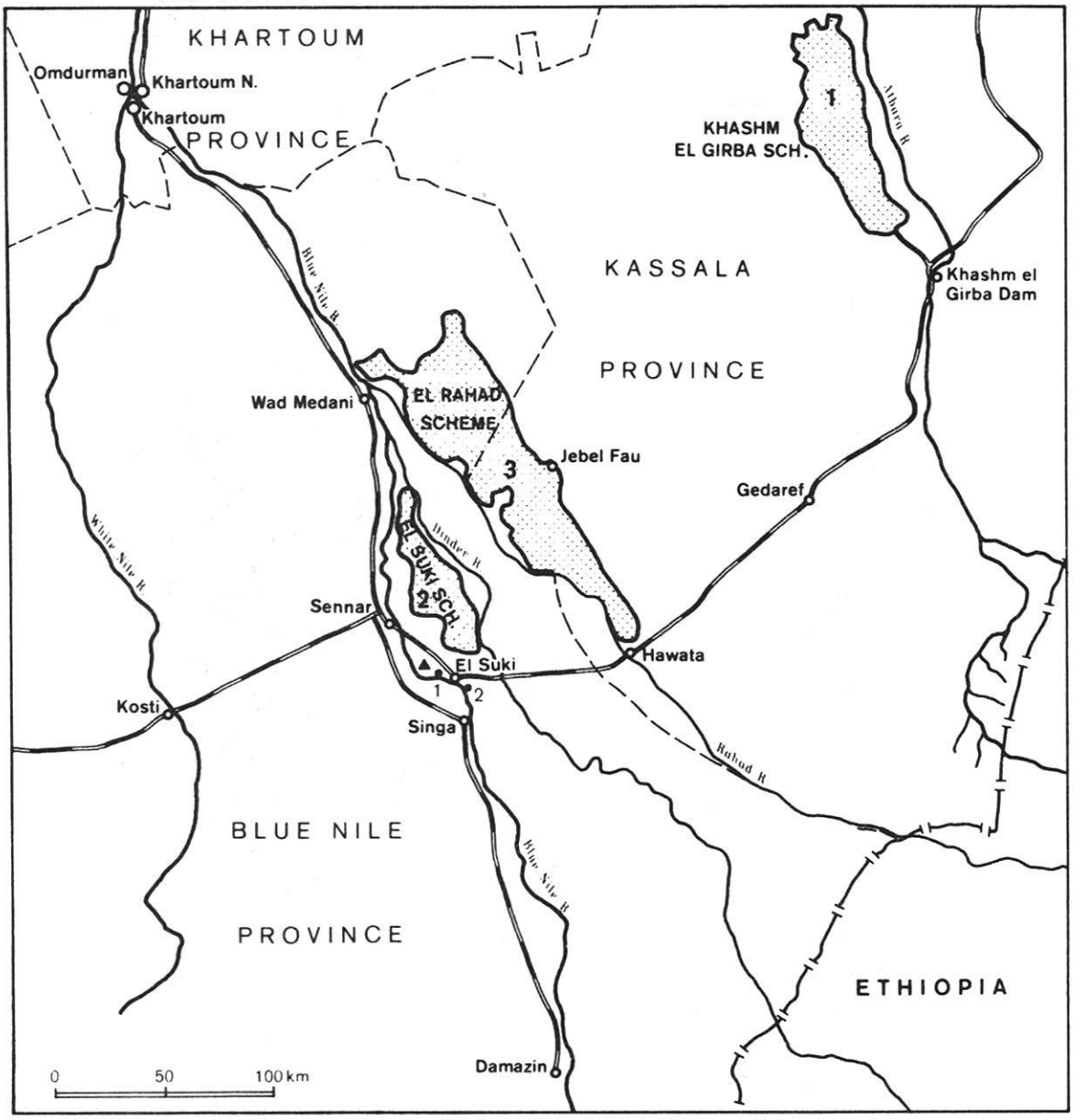
Map. 1:

The Democratic Republik of the Sudan
Regional Concentration of mechanized agriculture



Map 2

CASE STUDY AREAS : The three selected irrigation settlement schemes (Khashm el Girba, El Rahad and El Suki). Khartoum Conurbation and El Suki District with El Masara Workshop, El Kurmuta and Abu Gara villages



1 The Khashm el Girba irrigation settlement scheme

2 El Suki irrigation settlement scheme

3 El Rahad irrigation settlement scheme

Railway

River

1 El Kurmuta

2 Abu Gara

Province Boundary

▲ El Masara Workshop

Compiled by
Hassan El Mangouri 1982

ABHANDLUNGEN DES GEOGRAPHISCHEN INSTITUTS DER FREIEN UNIVERSITÄT BERLIN

Band 1: K. Schröder, Die Stauanlagen der mittleren Vereinigten Staaten. Ein Beitrag zur Wirtschafts- und Kulturgeographie der USA. 1953. 96 S. mit 4 Karten, DM 12,--

Band 2: O. Quelle, Portugiesische Manuskriptatlanten. 1953. 12 S. mit 25 Tafeln und 1 Kartenskizze. Vergriffen!

Band 3: G. Jensch, Das ländliche Jahr in deutschen Agrarlandschaften. 1957. 115 S. mit 13 Figuren und Diagrammen, DM 19,50

Band 4: H. Valentin, Glazialmorphologische Untersuchungen in Ostengland. Ein Beitrag zum Problem der letzten Vereisung im Nordseeraum. 1957. 86 S. mit Bildern und Karten,

Band 5: Geomorphologische Abhandlungen. Otto Maull zum 70. Geburtstag gewidmet. Besorgt von E. Fels, H. Overbeck und J.H. Schultze. 1957. 72 S. mit Abbildungen und Karten, DM 16,--

Band 6: K.-A. Boesler, Die städtischen Funktionen. Ein Beitrag zur allgemeinen Stadtgeographie aufgrund empirischer Untersuchungen in Thüringen. 1960. 80 S. mit Tabellen und Karten. Vergriffen!

Seit 1963 wird die Reihe fortgesetzt unter dem Titel

ABHANDLUNGEN DES 1. GEOGRAPHISCHEN INSTITUTS DER FREIEN UNIVERSITÄT BERLIN

Band 7: J.H. Schultze, Der Ost-Sudan. Entwicklungsland zwischen Wüste und Regenwald. 1963. 173 S. mit Figuren, Karten und Abbildungen. Vergriffen!

Band 8: H. Hecklau, Die Gliederung der Kulturlandschaft im Gebiet von Schriesheim/ Bergstraße. Ein Beitrag zur Methodik der Kulturlandschaftsordnung. 1964. 152 S. mit 16 Abbildungen und 1 Karte, DM 30,--

Band 9: E. Müller, Berlin-Zehlendorf. Versuch einer Kulturlandschaftsgliederung. 1968. 144 S. mit 8 Abbildungen und 3 Karten, DM 30,--

Band 10: C. Werner, Zur Geometrie von Verkehrsnetzen. Die Beziehung zwischen räumlicher Netzgestaltung und Wirtschaftlichkeit. 1966. 136 S. mit 44 Figuren. English summary. Vergriffen!

Band 11: K.D. Wiek, Kurfürstendamm und Champs-Elysées. Geographischer Vergleich zweier Weltstraßen-Gebiete. 1967. 134 S. mit 9 Fotos, 8 Kartenbeilagen, DM 30,--

Band 12: K.-A. Boesler, Kulturlandschaftswandel durch raumwirksame Staatstätigkeit. 1969. 245 Seiten mit 10 Fotos, zahlreichen Darstellungen und 3 Beilagen, DM 60,--

Band 13: Aktuelle Probleme geographischer Forschung. Festschrift anläßlich des 65. Geburtstages von Joachim Heinrich Schultze. Herausgegeben von K.-A. Boesler und A. Kühn. 1970. 549 S. mit 43 Fotos und 66 Figuren, davon 4 auf 2 Beilagen, DM 60,--

Band 14: D. Richter, Geographische Strukturwandlungen in der Weltstadt Berlin. Untersucht am Profilband Potsdamer Platz - Innsbrucker Platz. 1969. 229 S. mit 26 Bildern und 4 Karten, DM 19,--

Band 15: F. Vetter, Netztheoretische Studien zum niedersächsischen Eisenbahnnetz. Ein Beitrag zur angewandten Verkehrsgeographie. 1970. 150 S. mit 14 Tabellen und 40 Figuren, DM 19,--

Band 16: B. Aust, Stadtgeographie ausgewählter Sekundärzentren in Berlin (West). 1970. IX und 151 S. mit 32 Bildern, 13 Figuren, 20 Tabellen und 7 Karten, DM 19,--

Band 17: K.-H. Hasselmann, Untersuchungen zur Struktur der Kulturlandschaft von Busoga (Uganda). 1976. IX und 294 S. mit 32 Bildern, 83 Figuren und 76 Tabellen, DM 39,50

Band 18: J.-H. Mielke, Die kulturlandschaftliche Entwicklung des Grunewaldgebietes. 1971. 348 S. mit 32 Bildern, 18 Abbildungen und 9 Tabellen, DM 30,--

Band 19: D. Herold, Die weltweite Vergroßstädterung. Ihre Ursachen und Folgen aus der Sicht der Politischen Geographie. 1972. IV und 368 S. mit 14 Tabellen und 5 Abbildungen, DM 19,--

Band 20: Festschrift für Georg Jensch aus Anlaß seines 65. Geburtstages. 1974. XXVIII und 437 Seiten mit Abbildungen und Karten, DM 32,--

Band 21: V. Fichtner, Die anthropogen bedingte Umwandlung des Reliefs durch Trümmeraufschüttungen in Berlin (West) seit 1945. 1977. VII und 169 S., DM 22,--

Band 22: W.-D. Zach, Zum Problem synthetischer und komplexer Karten. Ein Beitrag zur Methodik der thematischen Kartographie. 1975. VI und 121 S., DM 19,--

Die Reihe wird fortgesetzt unter dem Titel:

ABHANDLUNGEN DES GEOGRAPHISCHEN INSTITUTS - ANTHROPOGEOGRAPHIE

Band 23: Ch. Becker, Die strukturelle Eignung des Landes Hessen für den Erholungsreiseverkehr. Ein Modell zur Bewertung von Räumen für die Erholung. 1976. 153 S., DM 29,50

Band 24: Arbeiten zur Angewandten Geographie und Raumplanung. Arthur Kühn gewidmet. 1976. 167 S., DM 22,--

Band 25: R. Vollmar: Regionalplanung in den USA. Das Appalachian Regional Development Program am Beispiel von Ost-Kentucky. 1976. X und 196 S., DM 18,--

Band 26: H. Jenz, Der Friedhof als stadtgeographisches Problem der Millionenstadt Berlin - dargestellt unter Berücksichtigung der Friedhofsgründungen nach dem 2. Weltkrieg. 1977. VII und 182 S., DM 18,--

Band 27: H. Tank, Die Entwicklung der Wirtschaftsstruktur einer traditionellen Sozialgruppe. Das Beispiel Old Order Amish in Ohio, Indiana und Pennsylvania, USA. 1970. 170 S., DM 20,--

Band 28: G. Wapler, Die zentralörtliche Funktion der Stadt Perugia. 1979. 132 S., DM 20,--

Band 29: H.-D. Schultz, Die deutschsprachige Geographie von 1800 bis 1970. Ein Beitrag zur Geschichte ihrer Methodologie. 1980. 488 S., DM 32,--

Band 30: M. Grupp, Entwicklung und sozio-ökonomische Bedeutung der holzverarbeitenden Industrien im Südosten der Vereinigten Staaten von Amerika. 1981. XII und 188 S. mit Anhang, DM 28,--

Band 31: G. Ramakers, Géographie physique des plantes, géographie physique des animaux und géographie physique de l'homme et de la femme bei Jean-Louis Soulavie. Ein Beitrag zur Problem- und Ideengeschichte der Geographie im achtzehnten Jahrhundert. 1981. II und 205 S. mit 8 Abbildungen, DM 28,--

Band 32: H. Asche, Mobile Lebensformgruppen Südost-Arabiens im Wandel. Die Küstenprovinz Al Bāṭinah im erdölfördernden Sultanat Oman. 1981. XII und 344 S. mit 20 Tabellen, 36 Karten und 20 Fotos, DM 36,--

Band 33: F. Scholz/J. Janzen (Hrsg.), Nomadismus - ein Entwicklungsproblem? Beiträge zu einem Nomadismus-Symposium, veranstaltet in der Gesellschaft für Erdkunde zu Berlin. 1982. VIII und 250 S. mit 6 Bildern und 25 Karten und Diagrammen, DM 22,--

Band 34: D. Voll, Von der Wohnlaube zum Hochhaus. Eine geographische Untersuchung über die Entstehung und die Struktur des Märkischen Viertels in Berlin (West) bis 1976. 1983. XII und 237 S. mit 76 Abbildungen, DM 32,--

Band 35: Hassan A. El Mangouri, The Mechanization of Agriculture as a Factor Influencing Population Mobility in the Developing Countries: Experiences in the Democratic Republic of the Sudan (Auswirkungen der Mechanisierung der Landwirtschaft auf die Bevölkerungsmobilität in Entwicklungsländern: Fallbeispiel - die Republik Sudan). 1983. VI und 288 S. mit 8 Abbildungen, 2 Karten und 49 Tabellen, DM 34,--