CASUAL LABOUR AND ITS ECONOMIC IMPLICATION

FOR AGRICULTURAL PRODUCTION IN THE CENTRE.

By

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CHAPTER 1

(A) INTRODUCTION - LABOUR AS A FACTOR OF PRODUCTION IN LOW-INCOME COMMUNITIES.

In studying labour as a factor of production in low-income communities it is essential to review certain special characteristics of these communities and define certain general concepts of labour. These will provide the reader with a framework within which to arrange his observations and direct his inquiries and reasoning in the later chapters. It suggests where the causes and consequences of the argument are to be looked for and traces the net-work of interdependencies of the variables involved in the study. It is only when we bring these particular concepts to understanding that we can develop our argument further, and our analysis becomes more meaningful.

Discussion of these special characteristics of labour requires the use of the following terms:

1) Low-income and high-income communities.
2) Underdeveloped countries and underdeveloped areas.
3) Labour as a factor in agricultural production.
4) Labour force, and,
5) Labour productivity.

These concepts will be briefly defined in the following few paragraphs by way of introduction:

1) Low-income and high-income communities:

Low-income is a term almost synonymous with a high
percentage of labour being engaged in agriculture. Nigeria, for instance, is a country which is known for its very high percentage of labour force being engaged in agricultural production, and a correspondingly very low proportion of labour force being engaged in manufacturing. However, the proportion of labour force engaged in agriculture is not the only criteria for judgment. Some world standards of income are also taken as good measures for assessing and classifying countries into either low- or high-income countries. According to world standards a per capita income of $500 U.S.A. (i.e. 2/3 of that of U.S.A.) per year is often taken as the minimum income for high-income countries. All countries with a per capita income of $500 U.S.A. or less are taken to be low-income countries. The following table classifies 13 countries according to proportion of labour being engaged in agriculture. Although these figures were not taken in the same year, yet the variation in the period in agriculture is not so great as to proportion of labour engaged in any one country. U.S.A., U.K. and Canada are highly industrial with only 4.5%, 4.6% and 9.8% of their population being engaged in agriculture respectively. On the other hand Nigeria, Indonesia, and India are highly agricultural countries with 66.2%, 56.4% and 48.7% of their labour being engaged in agriculture respectively.
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<th>Country and Year</th>
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There is also a very high inverse correlation between per capita income and the proportion of the population engaged in agriculture. Countries with a high per capita income usually have lower proportion of their population engaged in agriculture. Some high-income countries such as Canada, Australia and New Zealand which are thought as agricultural countries are not really agricultural in terms of the proportion of their population engaged in agriculture. Their occupational structures are much the same like those of U.S.A. and U.K.

2) Underdeveloped Countries and Underdeveloped Areas

Again those are countries with a per capita income of less than $500 U.S.A. per year, or countries where share of national income in agriculture is less than the share of employment in agriculture. This also, in other words reflects the low-productivity of labour in countries of low per capita income which is a feature of underdevelopment. It is in a sense a relative measure of prosperity. It is not, however, an accurate measure of the economic status of the country since there are many areas within any one country even in the U.S.A. Italy for instance has its Northern part highly developed while its Southern part is an economic laggard. Nevertheless Italy is considered as one of the advanced countries on account of its low proportion of total population engaged in agriculture. Other difficulties of applying such definitions may be
1) That the dividing line between advanced and under-developed countries is an arbitrary one. How far above or below $500 can we go to choose our dividing line is not quite clear.

4) There is no satisfactory measure for real prosperity of nations. It is only a part of the total output of many of these countries which is sold for cost. A substantial amount of the output of underdeveloped countries have no monetary value. The use of exchange rates for expressing estimates of national product in a common currency is subject to a number of serious shortcomings. It tends to over-simplify the complex problem of evaluating a common currency unit and the total output of goods and services of different countries. There is also the difficulty of transferring per capita income in such countries into U.S.A. dollars. The transfersence must be based on what a unit dollar would fetch in the free market and not on total amount paid.

iii) Conditions of living vary widely from one year to the other. Most of these countries are predominantly agricultural and as such they depend very much on what the land produces in the form of export products and food products. The variation in output is reflected on income. The inability of peasant farmers to overcome weather difficulties, even in the short-term, and get the highest, or at least, a constant income, poses many difficulties in classifying farms and farm people. A very high
includes all gainfully employed persons with the elimination of those who are voluntarily inactive.

However, there are certain difficulties of applying this definition in all circumstances. It is very difficult to qualify a voluntary employed person in low-income countries, and the time any one labourer works is a function of many socio-economic factors. Moreover the notion of gainfully employed is not easy in low-income countries where a large proportion of the population is not fully drawn into the money and exchange economy. Agriculture, which is the main occupation under such conditions is a traditional occupation ordained by the rhythms of the seasons. Hence the supply of and demand for labour depend entirely on seasonality functions. Labour which may be idle at one time of the year, may resume full employment at another time of the year.\(^1\)

5) Labour Productivity.

Labour productivity is a relative measure of output to

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\(^1\) Johnson, R.W.M. 'Labour Economy of the Reserve' defines labour force as; '.... all persons over 6 years of age present in the Reserve for more than 15 days in the Months December - January'. This is the period of greatest demand for labour. He gave equal weight to all ages over 6 years, on the assumption that any task can be performed with about equal efficiency by either men, women or children.

Occasional Paper No. 4, Department of Economics, University College of Rhodesia & Nyasaland.
input. It is the ratio between output and the units of inputs required to produce it. There are certain difficulties which stand in the way of measuring labour productivity.

i) Production estimates are bound to be most inadequate in low-income countries.

ii) Statistics about food production and consumption are rudimentary and unrealistic.

iii) Countries making their first steps in economic development from subsistence into more commercialized economies are more dynamic than those at either extreme end of the scale. They usually continue to cultivate both food and cash crops in varying proportions. The size of the enterprise varies with variation in productive investment. It may be on so large a scale that it approaches the plantation system rather than a family enterprise.

iv) Because of the very high complexity of farming in low-income countries as being composed of livestock raising and crop production, the principal occupation is not clear. Productivity has to be related to the many diverse occupations of farming in such communities. Labourers under such conditions are not clearly grouped into classes of distinct professions and functions, neither are the hours of work regular and definite. There is also the problem of verifying productive from consumption tasks and functions.

Therefore since labour is a major function of production and it is seldom associated with large quantities of either capital
or land in low-income countries, productivity of labour is by
definition low in such countries, but the situation is often
made worse by poor performance.

b) FACTORS AFFECTING LABOUR PERFORMANCE IN AGRICULTURE.

Factors affecting labour performance in agriculture can
be classified into three main subheadings.

1) Physical factors

The level of labour productivity is a function of the
physical environment of the locality and health conditions of
the working population. The kind of labour a person can do depends,
among other things, on his own body capacity and the environment
in which he works. It is not only the acquired training and edu-
cation which determine the capacity of work but also the physical
make-up and his capacity to accept training for the job. The
physical make-up varies with different races and clans and bet-
ween individuals of the same race or clan. Some people are less
disposed to hard work as a means of life. It is not known, how-
ever, how much of this difference is due to environment, how much
is due to malnutrition, how much is due to physique, how much is
due to inheritance, or otherwise. The Dinka tribe of the Southern
Sudan are very tall and as a result were taken for many years to
be unproductive specially in cotton picking which entails frequent
bending. On the other hand the Sande tribe of Southern Sudan also
are rather short, though new social values are now crystallising
among the Sande as a result of the new outlook of the rural
population. Nevertheless, there are still some elements of the bands society at the other extreme who have turned their faces away from farming. Those are grouping themselves in a manner unfavourable to manual work and rural life associations. It is generally known that the bands people are highly reputed for their wealth of empirical agricultural knowledge and skill in making the best use of local conditions. The Bagara tribe of Western Sudan, on the other hand is a tribe known for its low performance and laziness. Women of this tribe are more industrious than men, and they usually do most of the manual work while men attend to nomadic animal husbandry.

2) Nutritional factors

Malnutrition and chronic debilitating diseases are responsible for the greater decline in productivity of labour in agriculture, they form one of the vicious circles in most underdeveloped countries. The low standard of health associated with an unbalanced diet, results in low physical body building, and high susceptibility to diseases. Thus the environment in which one works determines, to some extent, the total work capacity.

People who are accustomed to climatic conditions dissimilar to their own local areas may experience many physiological changes which impair their efficiency, sometimes to the extent of clinical disturbances. Most new somers experience certain difficulties when taking jobs outside their own homes, but with continued
experience this effect tends to decrease, although longer periods should elapse before full acclimatization is completed. The usual pattern of life in underdeveloped countries is more leisurely and less productive of material goods than that which is found in most advanced countries.

Very few low-income countries provide enough food to enable the population to have an adequate supply of calories, proteins or supplementary nutrients for more than a small proportion of the population and for a relatively short period of time. They are neither in a position to produce enough export products to make good, by enough exchange products, the deficiency in food products. Therefore, a great proportion of the population in these countries are underfed. The American Geographical Society has made a study of some tropical countries for an assessment of the extent of self-sufficiency and self-sustaining the population of these countries. Out of the seventy-four countries chosen in the sample, only three countries—Portuguese Guinea, Somalia and Thailand, have adequate diet for sustaining their populations. Twenty-four other countries have diets providing adequate energy value but inadequate protective elements. These are Guatemala, Cuba, Surinam, French West Africa (Halé), French Equatorial Africa, Dominican Republic, Trinidad, British Guiana, Nigeria, Gold Coast (Ghana), Congo Leopoldville, Uganda, Sudan, Indo China, North Borneo, Sarawak, New Guinea, New Caledonia, Fiji, Caroline Islands,
other jobs which they consider as risky or unsociable. They consider farming as a means as well as a home for living. They used to utilise their less mobile families. They can neither transfer their social environment which forms a source of mutual help. It is common for resident labour to refrain from occupations which involve a certain degree of skill and responsibility which they lack. Their activities are being directed and dictated by custom and situation. The pull of the social systems in which they are brought up is more than the pull factor of non-farm labour wages. Their obligations towards their families and departments is not only that of a financial nature, but that of a social one and a traditional character. The presence of the head of the family at funeral, wedding festivities, and the birth of a child is as such an obligation in itself as a distinction of feeling of belonging.

'It is supposed that a family of an average size of one adult man, one woman, and two children, each lose three days at least at the death of an adult, two days at the death of an infant. It is also found that five other men and five other women of the family circle lose two, and one and a half day in each case respectively.'

In areas where there is a high percentage of migration or where people in rural areas tend to rely largely on remittances from abroad, then one would export higher urban wages to discourage

*2 Sol Tax, 'Penny Capitalism in a Guatemalan Indian Economy'
employment of family members on farms. Also expansion of agricul-
tural industry relative to farm occupations is one of the main
reasons for the movement of labour into these industries. Agricu-
lture is now providing the raw material for many of these indus-
tries such as the Brewery industry, meat packing, fruit and vege-
tables canning, and many other industries. The rate at which
this movement proceeds, other things being equal, is determined
by the level of wages and terms of service in these industries
relative to farm work. If the relative wage rates become low at
a period of industrial unemployment, as the case of most under-
developed countries, then because labour can not find work outside
agriculture the rate of labour movement out of agriculture is cur-
tailed. While in a period of full employment outside agriculture,
the rate of labour movement will be accelerated, even if more
labour opportunities are available in agriculture. An improvement
in the level of wages and conditions of employment in agriculture
strengthens the pull factors, while, on the other hand, inferiority
of employment conditions and a fall in economic returns in agricul-
ture strengthens the push factors. The deterioration in the level
of wages in agriculture may be the main reason for the change of
occupation among hired labourers and probably, to some extent,
among family members whose incentives to work are being increased.
As a result of the high wages in non-farm occupations farm people
tend to hire themselves out for non-farm occupations. Mechanization
in agriculture may equally result from high wages in town which start
traditional agriculture could be accelerated more and more through the efforts of the agricultural labour force and the organizational reforms.

The major capital stock of a nation is not so much the physical quantum of money, land, and labour as it is the capacity and understanding of the way of making the best use of these various resources. The effective asset of labour is the surrounding attitudes which condition the usefulness of the labour force for the promotion of the economy. It includes the various aspects of the individual in his society either family, class, race, religion, urban, rural, or national unity. It includes the interactions of all these units and the resultant economic change thereof.

The complexity of the family in backward economies is responsible for the holding back of most people to their traditional home circles. The systems of inheritance adopted in several African countries, result in the breakdown of land holdings and its fragmentation into smaller uneconomic plots which may reduce productivity of both land and labour.

The position of the woman in low-income countries ranges from complete inferiority to full equality in status with man. In some of these countries the position of the woman as a worker is far superior than man. The woman in most of these societies enjoys a better farm occupational status. She seems to accomplish by far the greater amount of field work.
0) CASUAL LABOUR IN AGRICULTURE

1) definition:

Casual labour could be defined as labour which has a periodic mobility and utilization in a certain area which may be distant away from the home area of the casual labourers. Their utilization is governed by the rhythm of the season and variation in demand for labour. The period of their stay in work varies with variations in the length of time the occupation takes and the alternative occupation available at home or at some other place.

2) Types of casual labour:

Whether movement of labour is controlled or not, whether it is seasonal or permanent, whether it takes place within a given territory or between different territories, it has different characteristics in different countries. Therefore the duration of absence of labourers from their homes varies a great deal. In some cases absence involves several months while in others may be absent for a year or more. Reference has already been made to situations where a minimum period of 15 days during the peak of labour demand is the crucial limit. Other immigrants may find conditions suitable in the new place that they make permanent homes. The distance covered by labour movements also varies with variation in proximity of jobs to source of labour. Close contacts between immigrants and their homes may not hold good for the period the labourers are away. Such contacts are necessary to stimulate
forced into employment through migration. The fact that forced labour is basically unwilling labour was never fully comprehended by employers who found labour too lazy or too hard to inspire. Very few people in those countries are willing to do heavy work associated with force. It is true that when the money economy began to spread more widely, when the desire for possessions which only money can buy overlaid the sheer need to pay tax, it might be said that labour could go willingly to work.

(iv) Labour immobility and shortage of opportunity—

The effective size of the labour force may also be reduced by labour immobility. A particular industry or activity may be starved for labour merely because of inefficient means of transport, or because of ignorance of job opportunities. In the first place people are not informed about the right information of jobs and job opportunities. In the second place the hardships of movement under different means of transport discourage the labourers and they tend to remain idle rather than take the risk of migration. On the other hand rural people may also be tied by debts which they have to make before making any movement. Other factors are social, religious or ritual obligations.

(b) Demand.

(i) Changing the cropping pattern and methods;

Different cropping patterns have different demands for labour both in quantity and quality. Agriculture being a seasonal industry depending largely on natural variations in environment,
land and more cash crops are being introduced into the cropping system, one will expect customary resident labour to run short of demand. This tendency may be intensified in those areas where massive investment takes place e.g. by the introduction of irrigation.

But at the same time some of the resident labourers may start to look for better employment opportunities. Customs and religious beliefs are being obliterated and the family structure is being dissolved. Thus it becomes attractive for the rural areas where a surplus of labour is available to provide other areas where there is a shortage of labour.

With the rapid development of marketing, the incentives for people to hire themselves out for cash is strengthened. This is particularly true for communities in the neighbourhood of organised markets with high economic returns to their farm products. The establishment of the Banto scheme as a pilot scheme for the welfare of the Banto people provide a basis for the preceding argument. The organisation of markets and light industries round the area provided the rural population with a reason for work in the scheme. Many of the people have derived new wants and needs and developed a taste for money. Contact with urban communities has created new desires and brought about new outlooks. The desire for a standard of living higher than the rural population has known before, or at least the desire for a way of life different from that
transfer of functions is basically dependent on the investment of money for the development and upgrading of available natural resources including man himself. The major problem is to determine the form which this investment must take. As production and wages are very low in such communities, the satisfaction of elementary needs such as food absorbs a great proportion of the farm income and leaves very little or nothing for economic investment. The low incomes associated with the low productivity of labour tend to suppress the economic development of the whole country.

(ii) Effect of tribal discipline:

The introduction of new systems of production in traditional forms of agriculture threaten previous social relationships while not immediately supplying new security devices in which the labourers can fulfil their side obligations and objectives. "It is the first experience which is the worst, and the visit to some place of employment gradually becomes an institution in many African Societies so that it might become not only the recognized way of earning bride wealth, and an adventure for young men, but almost equivalent to an initiation for new types of employment".

(iii) Taxation and forced labour:

It is a literal case that a man would rather go hungry than accept a job which he considers degrading or which social convention forbids. With imposition of taxes many labourers are

"J. Moore, W.E., 'Industrialisation and Labour'.
dictates a certain kind of demand on labour resource. Demand for labour varies from season to season and even in between the seasons.

(iii) Rejected inputs on irrigation and the opening up of rainlands have also their effects on labour demand.

(iii) The changing organizations and values of have their effects on labour demand. The changing attitudes towards work as income levels rise are historically known to have a retarding effect on demand for labour. As income levels rise people tend to use more modern techniques of production and less of manual labour.

II) POSSIBLE EFFECTS ON THE PRODUCTIVITY OF LABOUR WHICH MAY ARISE FROM AGRICULTURAL DEVELOPMENT.

1) Management:

Opinions differ as to how far an organized farm could outrun a small family farm. Firms where functions are more clearly differentiated as between personnel and job allocation have their own managerial characteristics. Under family farming each family has an allotment of land, and the head of the family exercises considerable control over the farm and farm people. Control has traditionally been maintained by social status. To the extent that new generations of these communities are growing up, parents influence over offsprings is weakened particularly when such
offspring happen to have been away for some time. When such
generations come back to their homes they are full of new thought,
new ideas and new ambitions which they try to impart to their
fellowsmen. Patterns of communal labour are disrupted, though
the social tie of kinship may still hold good.

Some forms of cooperatives have been initiated in these
communities which try to preserve the tradition of communal work,
communal production and communal saving. Success or failure of
these cooperatives in different places is a matter of great con-
trast, though problems of management usually crop up in as
many countries. Though it is true that some of these countries
have met with great success in the field of cooperation, yet still
others are dragging behind. Some of the failures may be due to
the scattering of farms which makes meeting to discuss and arrange
farm concerns a real difficulty. The lack of educated people among
members of the society may further lead to problems of organization
posed by the characteristic deficient managerial ability of such
cooperatives. Some of the people authorized to lead the organi-
ization, may themselves misuse their authorities for the sake of
assuming a good fortune for themselves during the period they are
sponsored to lead the organization. Others may not be willing to
have a share in the effective running of the cooperative which
changes the cooperative to a kind of corporation based on personal
interest.
Whenever cooperatives have sought to pool labour, however, the major difficulty has been its management and method of payment. Methods of payment on equitable basis are notorious and hard to find.

2) Skill:

According to J.H. Bellerby in his study of endurance, skill and experience required in agriculture, agriculture may be expected to rank equally as regards these three characteristics, with other occupations. Any appreciable divergence from the average was considered by the author as being more probably in an upward than in a downward direction. Such findings may give the impression that agriculture is likely to come close to a middle position in any general skill requirement ranking however the findings are weighted. But as farm work requires a little of every quality and much of several of them the general skill requirement rank derived from the questionnaire of Bellerby is substantially above the median in the group of 14 trades plus agriculture. If the averages given to agriculture and to other trades are totalled, agriculture has the higher total in most of the comparisons.

However these findings apply only to skilled English labourers under their own local conditions. The flexibility of an English labourer to various demands for skills is higher than it is with a labourer in an underdeveloped country. This gives
the English labourer more credit over the African labourers as regards performance and experience in most agricultural production phases. So the application of such findings as standaridized forms of study is not advisable. Each country has its own social and economic environment which dictates the form of any one character. But, however, the findings are important as a relative measure of the importance of agriculture as an industry requiring a certain kind of skill and a certain kind of labour.

The lesson to learn from the above discussion is that as rural labour force declines, if farms remain small, each labourer requires a wide variety of talent. But owing to the healthy urban organization of labour in towns (country people are difficult to organize into causes) urban wages tend to keep ahead of rural wages. Rural workers especially the young enterprising ones move into towns. The tendency to reduce labour stiff and mechanize then persists, the rural workers seldom get adequate pay for their services.

(3) Population and land:

When talking about labour as a factor of production one has to relate labour to land. Land degradation and comparable soil phenomena are perhaps of the most important hindrances to agricultural development. Man-made land degradation in its extreme form of soil erosion, is now almost world-wide, but varies greatly from one place to another in its extent and nature. Decreasing land
fertility and decreasing crop yields are early features of soil exhaustion which may in time develop into greased land degradation. One reason for soil exhaustion may be that people can not afford to keep cattle and other animals if by doing so these animals will eat more than they can provide for them. Thus denying the land of natural manuring. Another reason may be that the pressure of making use of every inch of the land exhausts soil fertility and the marginal productivity of labour is thus reduced. This reason, however, may not be applicable to countries where there is a surplus of land that the cropping system includes resting land that help to maintain soil fertility.

Ghana, for instance, though almost agricultural, could support a much greater population than the present four million people, and more important is that farming is a profitable enterprise there. Industries based on wage employment in Ghana depend on migratory labour from neighbouring countries and the problems of soil erosion caused by over-population are very much reduced.

On the other hand a country like India, where a problem of over population has taken far steps to threaten with famine and disasters, natural resources are very much valued and preserved. Since the last seventy years a population/land balance is maintained in India only with very great sacrifices. The country is short of new land to cultivate or to settle in, and is finding great difficulties in securing a world market for its products.
Family limitations are now being enforced in India as a way of raising the standard of living. Thus an effective increase in output may be made by maintaining an able and energetic labour force.

It will be misleading to assume that the concentration of labour force is all that is required to step up productivity of labour. Action of other factors of production may in fact be no less important than labour force. It is very difficult to specify a certain size of population which, given a certain size of land, will maximize output. The crucial point is that the size of any one country's population, is in such a proportion that the available natural resources are not entirely exhausted.

Every country has got its obligation to preserve as far as possible their natural resources in the best possible condition for their future generations. A population/land ratio has to be restored in a way that will fulfill the above objective i.e. in countries with plentiful land the effect will be a change in technology to capital intensive methods; in heavily populated areas the tendency must be to allow smaller farmers to get on to a better production function.
CHAPTER (22)

THE DEVELOPMENT OF COMMERCIAL PRODUCTION IN THE SUDAN AND ITS EFFECTS ON RURAL EMPLOYMENT

(1) Prelude

It will be argued in this chapter that Sudan's strong desire to develop is concentrated in its agricultural sector, that this development has chiefly taken the form of concentrated investment in a 'modern' sector, focused in the centre of the country, particularly (but not exclusively) in the irrigated areas of the Nile Basin North and South of Khartoum. This trend has the effect of focusing labour demand in these areas and because of the nature of the cropping system and other factors results in increasing demand for casual labour. Current expansion plans suggest, taking all factors into consideration, that labour supply may be outstepped by demand, and that, therefore, the assembly of casual labour in the centre of the country may mean rising costs.

The Sudan is known to have one of the highest rates of population increase (about 3.32% per annum), and with its present general low standard of living (about £1.50 per capita income), it became essential for the country to find some means of increasing her national income. Being predominantly agricultural, the Sudan has ventured to build up her economy by building and developing production in both the traditional and commercial sectors, but particularly the latter. Through the introduction of new crops, the
intensification of crops, and the introduction of new techniques of production, a more enterprising agricultural industry is now taking shape.

With present advance in technology and the movement towards more urbanized living, there has developed a need for more paying investments in agriculture. However, with the present scanty facilities and resources, particularly capital, and the limiting factor of social and traditional background of the country, the establishment of a sound commercialized agricultural industry is yet to be completed. The objectives of such a development must aim among other things to achieve the following:

1. To strengthen the country's balance of payment by increasing the quantity and quality of export goods and the production of goods which used to be imported from outside the country.

2. To diversify production so as to reduce the element of risk and uncertainty involved in the dependancy upon one cash crop.

(2) DEVELOPMENT PLANS IN THE SUDAN:

(1) Production for Export and Import Substitution.

During the last thirty years, the Sudan has undertaken a programme by which some new agricultural schemes were established
(a) Cotton

Cotton has been cultivated in the Gezira since early 1924, and since then it has received great attention as the main cash crop of the country. For 1964/65 season total area under cotton in the scheme was 508,301 feddans. Total area of the scheme since 1950 has been more than doubled. The main reason is due to the development of the Hanagal South West Extension with a total gross area of 850,000 feddans of cultivated area. About 260,000 feddans of this area are cultivated with cotton. Apart from a small area of about 1500 feddans of the cotton area all the scheme area is cultivated with long staple Egyptian cotton.

6. The most important agricultural scheme in the country with gross area of about 2 million feddans. It is situated in the semi-island between the Blue and White Niles South of Khartoum. A map of the Gezira Scheme with its Extension - The Hanagal is attached in the appendix. Unless otherwise stated in this study, "The Gezira" refers to both the old Gezira Scheme and the Hanagal Extension.

under medium and short staple cotton. In the Ruba Mountains, there are about 237,000 faddans under medium and short staple cotton. Further expansion is expected to take place in the near future. Khana El Girba 9 scheme is now adding an area of about 35,000 faddans of medium staple cotton. The full extension of the scheme for cotton is not yet known, though a further 83,000 faddans will be possible. The Rosetta Dam will make it further possible to cultivate some 225,000 faddans of cotton on the existing 3-course rotation 10. The Bahad Project will provide some 430,000 faddans

8 Gederif area is the central clay plains of Kassala Province in Eastern Sudan. The Ruba Mountains, on the other hand, is a clay soil in Western and South Western Kordofan Province.


10 D.S. Thornton and R.F. Rynn have calculated the present distribution system can provide about 71,000 or 116,600 faddans depending on the rotation chosen—present groundnut-wheat-cotton, or Hanagal Rotation.
of arable land, one third of which will be put under cotton in
a rotation of —

Asalila cotton — Ashford groundnut — dura/fallow.

Hawata and Guneid Extension will add an area of 120,000
feddans with probably a rather similar cropping system as that
recommended for the Rahad Project.

With the installation of two Textile Factories in the
country, and a cotton demand of about 80,000 bales, and present
total export of about 50,000 bales of American cotton a year,
proposals have been put forward for increasing the total area
under short and medium staple cotton to supply these two factories
with the necessary raw material. *11

(b) Oil-Seed:

There has been a steady increase also in the production
of oil-seeds crops. Castor was first introduced in the Gezira
in 1951.*12 A trial of 11.5 feddans was attempted at Mad El Han.*13
Average yield was about 700 lbs. per feddan which is considered
reasonable at average World prices. Castor was also tried in the
Gash Delta on a larger scale where an area of about 9,000 was
first cultivated every year with fluctuations depending on volume

*11 Ten Year Plan, Opp. cit.
*12 Symons R.E., Ex-Block Inspector Abu Sin, Sudan Gezira Board
Archives.
*13 Hamad El Nil Block Inspector’s Report, Barakat Archives.
of the flood of the River Gash. According to a four-year average (1959/60 - 1963/64), total area under castor in this scheme approaches 200 feddans. A proposal is made in the Ten-Year-Plan to increase total cultivated area of castor to 20,000 feddans in the Gash and to develop a new area of 10,000 feddans in the Northern Province. According to this plan, castor production will amount to more than 12,000 tons a year. Castor is also introduced on experimental basis in Equatoria Province and conclusive results for success or failure are yet to be confirmed.

Groundnuts have also proved its importance as a crop for export as well as for home consumption. The first trial under irrigation started in 1953/54 following the recommendations of Bacon, M.H. in 1952. Prior to this trial, groundnuts were only cultivated at a very limited scope by tenants on small plots since 1947. The trial area was not more than 3,500 feddans. The area has now increased to about 60,700 feddans in the Gezira alone (1964/65 season). With present techniques of production total area of groundnuts has approached 800,000 feddans of which about 300,000 feddans are in Kordofan and Darfur Provinces. It is aimed that by

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*14 Initial attempts have met with cultivators' resistance which arises chiefly from Government's inability to make prompt payment at harvest time.

*15 Ex-Director of Agriculture, Blue Nile Province 1952.
the end of the Ten Year Plan, total area of groundnuts in the Sudan will approach 845,000 feddans. With an approximate forecast of production, this area will produce an average crop of about $\frac{3}{2}$ million tons of groundnut.

Sesame, on the other hand, can be regarded as a food as well as a crop for export. It is the main source of vegetable oil in the Sudan. Its production is mainly confined to the central clay lands and the clay lands of Kordofan and Darfur Provinces. The main producing area is Kassala Province where an area of about 400,000 feddans was cultivated in 1961/62 season. Both sesame and sesame cakes are good sources of seed, and as such sesame is also considered as one of the main export crops of the country.

Sesame production will further be increased in the Kuba Mountains and the Mechanised Crop Production Schemes (M.C.P.S.), in Kassala Province during the coming few years. According to the Ten Year Plan, the area of sesame in the Sudan will approximate 1,200,000 feddans in 1970/71. On the basis of an average yield of 0.2 tons of sesame per feddan, production will be about 240,000 tons a year.

Other oil crops in the Sudan are sunflower and safflower. The former was first tried in the Genira in 1952/53 on a very small area of 5 feddans for trial purpose. No data were available as to the extent of success on a large scale. Safflower, on the other hand, was first introduced in the same season by cultivating another
5 feddans plot in Hamad El Hil Block in the Genira. Safflower is now introduced in Khasha El Girba Scheme as a crop the people of Wadi Halfa have already cultivated and developed a taste for it in their old home area. Preliminary results about yields are so far promising.

(c) Wheat:

Wheat is cultivated in the Sudan mainly to meet the expanding needs of urban population, but a smaller proportion of the crop is also locally marketed to bring some cash income to the peasant community. Wheat is now receiving increasing importance as a substitute for dura in medium and high income groups. During 1960, the Sudan has imported about 81,000 tons of wheat and wheat flour. In the Northern Province wheat production is receiving great care by the peasant population, through increasing desires to use more fertilizer and better techniques of production. Total area in this province has increased from 16,000 feddans in 1952/53 to about 29,000 feddans in 1960/61. Average production is about 0.7 tons per feddan. Total production in 1961/62 was 29,230 tons from an area of 40,960 feddans, largely used for consumption within the province. The increase in wheat production since then was mainly due to its introduction in the Genira Scheme. Total area in the Genira now approaches 75,000 feddans.
With the availability of water from the Roseirea Dam and its use in 1966/67, a further increase of some 12,000 feddans will be put under wheat in the Gezira. By the end of the present Ten Year Plan, it is expected that the country will attain self-sufficiency in wheat, thus saving hard currency which might otherwise have been used for the import of wheat and wheat flour. The Sudan imported, during 1964, wheat and wheat flour for the value of Ls.3,517,600.

d) Sugar:

A Sugar Industry has recently started in the Sudan, and the construction of the Ganeid Sugar Factory was the first of a programme for the development of sugar in the country. The Ganeid Scheme has an area of about 21,000 feddans under sugar cane, producing some 20 tons of cane per feddan. Khashm el Girba Scheme will also provide an area of about 22,500 feddans under sugar cane. It is intended that yields of 40 tons per feddan should be obtained from these two schemes.

e) Other Cash Crops:

The Southern Sudan Provinces are also known to produce certain crops suited to environmental conditions there. Rice is the most important crop cultivated in Southern Sudan. It has been introduced in Aweil District of Bahr El Ghazal Province. An area of 15,000 feddans is being cleared from trees and bushes for
the production of rice. Statistics give the total area of rice in the country as being 3,262 feddans of which about 3,000 feddans are in Bahr El Ghazal Province. On the average of one ton per feddan, (which is higher than world average for rice production), the Scheme is expected to provide sufficient rice to meet the whole country's need. Other attempts are also made to extend the area under rice so as to produce rice for export.

Attempts are also made to introduce other cash crops in the Southern Provinces, with the objective of attaining a stable cash return to the national economy. These are crops essential to pay for outside goods and reduce imports of other goods. An area of some 10,000 feddans is being put under coffee production in Equatoria Province. Other developmental projects are planned to take place during the next few years in Maridi, Yambio, and other districts suitable for coffee production. As a result of these projects, coffee production is estimated to amount to 3,750 tons a year. Tea and tobacco are no less important crops of commercial value in the Southern Provinces. About 1,200 feddans are expected to be put under tea cultivation in Equatoria Province within the coming five years. The production from such an area under full bearing, with a final area of about 78,000 feddans, will be sufficient to run a tea factory. On the other hand tobacco was also tried in the Southern Sudan as a crop which will save hard currency. With the establishment of the Blue Nile Tobacco Company a ready market was made available, and tobacco production is now expanding
in Equatoria Province. Experiments are also being carried out to introduce the Vargisla type leaf into suitable areas in the Southern Sudan. Appendix (1) shows the commodities which are imported and which it is technically possible to produce in the Southern Sudan. Areas and average yields are shown for 1960/61 and projections are made for 1970/71.

(2) Production for Home Consumption:

Most of the crops which are cultivated in the Sudan can be considered as crops for home consumption. Since at least part of the crop is used for home consumption it becomes exceedingly difficult to assign clear cut classification of agricultural crops under export-crops and home consumption crops. However, we can consider all crops which are mainly produced for food in the country with or without a surplus for export as crops for home consumption. Under this heading come crops such as dura (Sorghum vulgare), and other crops of minor importance.

a) Dura:

During World War II, there was a steady decline in the supply of dura, and there was a higher demand for the crop, which brought the country to the verge of a food crisis in 1943. Similar conditions occurred in other countries, and the Sudan could no longer depend on import of dura to meet the shortage. It was of vital importance that the Sudan must take every possible opportunity to
maintain self-sufficiency in dura.

The Central Belt extending across the Southern part of Kassala, the Blue Nile and Kordofan Provinces, is now the main dura producing area in the country. The greater part of the crop is cultivated by hand tools though in 1965 a larger scale experiment in mechanised crop production started in the Gedarif area of Kassala Province. Appendix (1) gives the increase in area since 1955/56 up to 1962/63. On the other hand the main producing areas of irrigated dura are the Gezira Scheme and the Private Schemes along the Blue and White Niles. The area of irrigated dura has increased from 183,000 feddans in 1952/53 to more than 414,000 feddans in 1961/62. More than $\frac{3}{4}$ of this area is in the Blue Nile Province. The Extension of the Managil is responsible for the greater proportion of this increase. The Managil Extension was formerly a rainland dura producing area and its development into an irrigated scheme has reduced total area of rain cultivated dura in the country. Recent figures give total area of dura in the Managil Extension as amounting to 257,300 feddans. Total irrigated and rain cultivated dura in the country occupies about 3,520,000 feddans (1962/63 season). The building of the Roseires Dam and the availability of its waters for irrigation will further increase the irrigated dura by about 80,000 feddans.

b) Fruits and Vegetables

Great attention is being paid in recent years to the development of horticultural crops. Preservation of fruits and
vegetables is now being carefully studied. Certain canning factories are now being constructed while still others are on the way. A Date Processing Factory for the Processing of Northern Province dates and for the production of spirits was recently constructed in Kerima. An Onion dehydrating factory is also under construction in Kassala. One fruit canning factory will be established at Wau in Bahr El Ghazal Province for the canning of tropical fruits. Fruits are now becoming more popular than before specially among urban communities; and rural communities have started to develop a taste for fruits. These factories will help to reduce perishability and maintain prices at equitable level for both producer and consumer.

4) Livestock Production:

Livestock production in the Sudan is still very primitive and dependent on the nomadic life in most cases. Statistics do not provide any reliable estimates of total animal wealth in the country. However, rough estimates of livestock population give about 25 million head of all kinds of animals. This represents about 10% of total domestic gross product of the country. Average export of livestock during the last five years is about 159,000 head per year. The development of livestock production in the Sudan is handicapped by the social and traditional beliefs of the people and the marketing problems involved. However certain
measures have been taken during the last ten years to improve animal husbandry, and research is being carried out to improve the breeds and to eradicate animal diseases. Selective breeding is being introduced in many research stations opened by the Ministry of Animal Resources. Nine centres and a tanning industry are being established, and export of hides and skins account for about 5,000 tons a year. Certain conservation measures and improvement of pasture are being enforced for the purpose of increasing grazing facilities and water supply.

This diversity of objectives of commercial production can be grouped together with other food production objectives under one table. Appendix (1) shows the main eleven crops cultivated in the Sudan, with their respective acreages in the years 1960/61 and 1962/63 with the expected acreage in 1970/71 (the last year of the present Ten Year Plan). Column (4) of the table gives the percentage rate of increase in cultivated area per year as given from the areas in 1960/61 and 1962/63 seasons. Column (5) shows the peak of labour demand period for each crop. Column (6) gives the expected area in 1970/71 and the last column (7) gives the percentage rate of increase over the ten year period. By integrating and comparing columns (4) and (5), some conclusions can be made about the competition for labour by various crops at the most demanding periods of the year.

These estimates of rate of expansion of acreage may not
have the same rate throughout the period 1960/61 - 1970/71. Some of these developments have been considerably retarded while others have nearly been already achieved. The expansion in area under American cotton has nearly been completed. Dura is also one of the crops which has exhausted nearly all possibilities of being extended in area within the limits set in the Ten Year Plan, but it is the subject of further major plans for rainland development. Dura in the rainland has been considerably increased during recent past to cover some 800,000 feddans.

From column (b) of Appendix (1) it can be seen that ground-nuts have made the greatest expansion between 1960/61 and 1962/63 (about 24% per year). This is largely due to its large scale introduction in the Delta. On the other hand sesame has made the least expansion in area during the same period. The only crop which showed a decrease in area was rice. The largest proportion of rice is cultivated in Bahr El Ghazal Province (about 3,000 feddans). Therefore the reduction in cultivated area may be due to a reduction in cultivated area in this region. During the last few years a state of political unrest in the southern region has largely contributed to low production and reluctance of the Southerners to share in economic production. Cultivators and labourers are socially boycotted if they show any signs of cooperation in this field. Certain technical weaknesses in Aweil District and Aweil Rice Plant have also been revealed which may soon bring the rice project to its end.
(C) EFFECTS ON DEMAND FOR LABOUR:

On the demand side labour can be classified into two main classes according to degree of technology used and skill of employment involved:

1. Labour where no advanced techniques are used.
2. Labour where advanced techniques are used.

(1) Labour demand where no advanced techniques are used:

Considering the seven most important crops cultivated in the Sudan viz. cotton (both Egyptian and American), durra, groundnuts, sesame, castor, rice, and wheat, we can calculate the respective increments in cultivated area as compared to total population rate of increase. The total area under these eight crops approaches 5,045,100 faddans (see Appendix (1)), 1960/61 estimate. These crops have increased in two years to cover some 6,078,400 faddans in 1962/63. The difference is equivalent to a rate of area expansion of 19.3% per annum. According to the Ten Year Plan, these crops are expected to cover an area of about 7,065,700 faddans in 1970/71. The total expected increase in area at this time 1970/71 will be about 2,020,600 faddans, which is equivalent to a rate of 4.1% per annum.16

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16 The rate of increase in faddans of crops may be much greater if the rate of increase recorded between 1960/61 - 1962/63 is continued.
Compared to the rate of population increase of about 3.2% per annum in the whole country, one may proceed to make a rough estimate of future prospects of labour demand in agriculture. The rate of area expansion is a bit greater than the rate of population increase. Other things being equal (equal labour productivity, uniform labour structure, willingness to work, and nature of farming), the present rate of expansion in agricultural production will be soon checked by available labour supply.

Although this seems to be the general feature of the whole country, there are certain crops and crop practices in the country which are less affected by shortage of labour. For instance, the development of some areas in the Southern Sudan is not so great as to exhaust the available labour supply there. The two Southern Provinces of Bahr el Ghazal and Upper Nile have higher rates of population increase of 5.7% and 3.7% per annum respectively. Hence the probability that future demand for labour will be met is very great. For the Southern Provinces in particular, and for the whole country in general, the problem may not be a shortage of labour as such as it is of the distribution and quality of labour.

Based on an average requirement of labour of the different crops per feddan, we can make very rough estimates of total labour demand for various crops and crop practices.
Taking the main important crops in the country viz. cotton, dura, groundnuts and sesame, some elementary calculations can be made to find out total labour demand for each crop during the two important labour peaks of weeding and harvesting. These two operations seem to be the most labour demanding practices which require timeliness of operation. Appendix (2) (A) gives the estimates of labour per feddan for each of these four crops in each of these two operations.  

From Appendix (2) A, it can be seen that dura harvest will require by 1970/71 some 1,756,400 labour units which by far exceeds all other estimates. Sesame is known to be harvested at about the same time as dura (November-December). So if, other things being equal, a full achievement of harvesting the two crops is required some 2,380,400 labour units are to be available during this period of the year. The area under these two crops will increase by about 4.5% per annum. This is even higher than the rate of population increase. These two crops are the most important crops of N.C.P.S.

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*17 Estimates for American cotton and dura are derived from a private communication of those planning rainfed development. Estimates for Egyptian cotton are those of Sudan Genira Board of 1 labour unit per feddan per day for average yield of 4 X.P.F. and 1 labour unit per feddan per day for weeding. Estimates of groundnuts are based on 0.3 labour unit per feddan per day in both operations. Comparable figures for sesame are 0.3 and 0.1 for weeding and harvesting respectively.
On an average of one labourer per feddan per 4/5 K.P.F. cotton, total labour requirement during the cotton picking will approximate 1,320,000 by 1970/71. This figure includes tenants and tenants' families. Further assumption of cotton tenants in the Sudan at 90,000 and an average of additional 3 able-bodied persons per family, we have total tenants and working family members coming to about 360,000. This leaves out a deficiency demand for picking labour of about 1,000,000 which is to be hired from outside the family circle. Quite a reasonable proportion of this hired labour will be recruited from within the country's territories while the rest will be from neighbouring countries.

Fortunately total increase in American cotton is not as great as to affect total demand during that particular period of the year. However Egyptian cotton will increase its area by about 20.2% by 1970/71 which is by far higher than the rate of population increase. Wheat also competes for labour during the same period for wheat sowing. The tendency to fully mechanize wheat production tends to reduce demand for labour during December-January period, saving some labour for cotton picking.

(2) Labour demand where advanced techniques are used:

In most over-populated areas, the low efficiency of manual labour as apart from ignorance of the job and job practices, reduces production to a great extent. Places that experience marked
seasonal peaks of farm work like the Gezira seem particularly liable for more thoughtful techniques of production. Full allowance must be made for the stupendous amount of labour required under the new arrangements. In many rural areas of the Sudan much time is lost in household activities, in fetching water, in food preparation, and in transport and sale of produce. Ineffective and laborious methods of performing these tasks greatly reduce the amount and efficiency of labour available for field work.

The introduction of tractors and mechanical power in the Gezira and M.C.P.E., and the use of implements and machinery, and modern tools, have offered opportunities to raise the efficiency of labour and to use more fully, and perhaps, more wisely, resources of soil and water. Work is done quicker, more easily and better than it is done by hand. Some works that are difficult to do by hand such as wheat harvest are best performed by machines.

Tractor cultivation has speeded up the preparation of land for sowing. Rapid preparation for sowing soon after the end of the dry season, and before the beginning of the rainy season, has been made more efficient by machines. Early weeding of cotton and other crops is particularly important in the Gezira and the rainlands.
Where seasonal labour shortages can be eased by mechanical preparation of land for sowing, the common difficulties of finding time to weed early enough would be largely overcome by machines. Some other after-cultivation practices are essential in some areas. Recently, some mechanical means of pest and disease control have been introduced in the country. Spraying of crops by machines, and seed-dressing has been practised in the Gambia for a long time.

Tractors with trailers are also used for transport of crops, seeds, and fertilizers. They also help to speed up the marketing process and reduce time lost in travelling, and marketing organization is improved. Labour formerly used in transporting the crop to stores, and later to market is now reduced and saved for other field work.

Whatever degree of mechanization is introduced, training of staff both skilled and semi-skilled, is of fundamental importance. Few agricultural officers have had experience in the use of machinery or of mechanized farming. A mechanized scheme, even as simple as a one-tractor unit requires considerable knowledge not known before. It is not only the knowledge about machine types, but also the way they are used and their costs and maintenance. Small isolated research projects have been carried out in various places of the country though not entirely coordinated.

Mechanical cotton picking trials have been carried out at Gondal an Acma 4/42 (medium staple) cotton. The trial was
carried out by the Department of Agriculture, Engineering Division. The method, though proved suitable for such varieties, yet it has been thought advisable to continue picking by hand, at least for the foreseeable future.¹⁸ Both cotton picking and wheat harvesting make demand for labour at the same time. The period of wheat harvest has recently been cut down from 60 days to only 30 days by the use of combine harvesters in the Gezira.

(b) EFFECTS OF NEW CROPPING ON LABOUR DEMAND:

The improvement which commercial production has brought about in the Sudan has to some extent affected the traditional way of life of the people. In spite of the new introductions of production techniques, however, the demand for manual labour is still very high in certain parts of the country. Regional differences do occur. Quite a reasonable proportion of the demand for casual labour is now met by family and local labour in the country. Provided the average size of farms is reasonable, no imported casual labour is needed except in very high peaks of labour demand.

On the other hand the introduction of machines and tractors in many parts and the use of modern techniques of production, may even call for more reorganisation of farming and farm work as to serve the objectives of the new techniques. It

¹⁸ More details about ..... p. 18.
is unlikely, for years to come, that mechanization will save labour in this country. Most of the trials made so far are those of a kind which tends to supplement labour rather than save labour. Even the most highly mechanized operations in the desira do require a certain amount of manual labour. Provided people are available and skilled for the job, then their willingness to work is only a subsidiary factor in supplying labour.

With this new derive towards commercialization in agriculture, a new demand for labour, both in quantity and quality has developed. The introduction of crops not known before and the extension of others have greatly affected demand for labour. Sugar cane, tobacco, coffee and rice, are all crops which were very little known as indigenous to the country. The introduction of such crops has necessitated the employment of labour of special skills and experience. Availability of labour is fortunately no problem in most areas of the Southern Sudan where these crops are cultivated. The problem is posed by the provision of labour of the required skill and training. The eventual substitution of the traditional systems of cropping with more commercialized and more mechanized forms of farming entails the employment of more technical skills and the use of more qualified personnel.

In Behr el Ghazal Province, for instance, although the quantity of labour in the area is sufficient for any local needs,
yet the availability of this labour for work is obscured by some social and economic landscape. The Dinka tribe of Southern Sudan, for instance, has very little incentive to work for cash. Their limited needs and their traditional way of life do not allow them to see the benefits behind wage employment. They are nomadic mainly depending on cattle and as such they are less disposed to famines and disasters which push other tribes into employment out of necessity. This inherited quality of the Dinka tribe may even be stronger as to resist any change in farming. However, in the long-run, through the introduction of more schools and more incentive goods, some of these tribes may become less reluctant to economic and social changes.

Therefore the method by which a steady labour supply could be maintained implies a general reassessment of the traditions and social life of the rural population. Such reassessment may call for training of native agricultural workers, increasing their needs, and even changing the distribution of population and wealth. Employment conditions may be more improved through the initiation of incentives to work, and as a result show higher standards of performance, and exertion of more effort per unit time.

If the main reason for low productivity of labour is the reluctance of people to accept jobs in agriculture which might
involve manual effort, then we have to increase productivity by means other than increasing total number employed. Increasing productivity by increasing total number in this case is of limited reliability, because of the absence of conscious needs and consequent contentment with little improvement as the case in the Southern Sudan and some parts of Western and Eastern Sudan. The willingness of people to offer their services for wage earnings, and the shape of the curve determining the extent of response is illustrated later.

(ii) Effects of New Cropping on Labour Supply:

The main source of agricultural labour in the Sudan, as economic development proceeds, is subsistence agriculture, casual labour, family labour, and the increase in population relative to natural resources. Labour supply in the Sudan has been, and still to some extent, comprising the farmer, his family and some relatives who live with the farmer and depend upon farm output for their living. Labour from the same or distant localities, on the other hand, provide the main source of casual labour in the Sudan. Nevertheless, the employment of a certain number of migratory labour (from outside the Sudan) especially during peak periods of demand is inevitable. Local labour is partly provided by the family members and other dependants, and partly by labour from rural areas where a surplus of labour is experienced. Many of
incentive to work and the impact of social limitations. Most rural areas are known for their low needs, high preference for leisure, and their reluctance to accept wage employment which implies exerting manual effort. Some labourers may decide to migrate when their net expected income from migration depend on their village incomes and the effort-price of income in wage employment as compared to the effort-price of income in alternative income earning pursuits. The major factors determining the individual decision are therefore:

(i) the intensity of labour preference for money,
(ii) the effort-price of income earnable in village,
(iii) the effort-price of income earnable outside the village.

In the Sudan as in most low-income communities, individual reactions to changes in wage rates, prices and other market variables are influenced by traditions and community norms. Therefore, if the analysis of labour supply is to be meaningful and useful we have to assess the individual’s behaviour to different changes in agricultural production.

Casual labour in the Sudan has been so cheap that careful study of labour efficiency has generally not been considered.
worth-while. Little emphasis has been placed on methods of feeding and housing or on cropping plans such as will retain a permanent labour force contented with and capable of doing a proper day's work.*19

An important feature of labour conditions in many parts of the Sudan is the exceptionally wide differences between the wage rates for hired labour for farm work and the income which such labour can expect from working on other non-farm occupations. Wage rates may be 50% or more below what labourers can earn by working in non-farm occupations, nevertheless there is always a certain amount of casual labourers who prefer to accept farm work. This indicates not only the willingness of many rural people to enter farming as labourers but also indicates the sticking of rural people to their traditional way of life.

We can take the size of individuals' income as constant in the short-term, but in the long-term his income goals will change and as a result his response to wage employment will also change. At the same time, given his income goals, and supposing all other factors unchanged, then in the short-term the time he is prepared to spend an employment is a curve of unit negative elasticity. If wage rates are increased, the migrants are expected

*19 In East Africa a good 'numamara', headman, is the most difficult man to obtain since he is considered as the most industrious worker.
to spend proportionately less time in paid employment within certain reasonable limits. Similarly, given his income goals and the rate of wages outside, the time spent by any one labourer in agricultural employment varies inversely with and proportionally to changes in village income. If, for instance, harvest of durra and other food crops are good in Western Sudan, and hence village incomes are high, then the response to a rise in level of wages in cotton picking in the Genira is very low. Village incomes and good yields are then considered to be sufficient to allow a villager attain his limited needs and wants. It is unlikely that labourers under such conditions will go out for work regardless, within realistic limits, of level of wages.

The effect of any change in wages on the aggregate supply of labour is therefore ambiguous, since an increase in wage rates either in cash or kind is meaningless if it results in a decrease in time spent on work by other working groups. The shape of the aggregate supply curve of labour, therefore, depends on the net returns of two contrary changes that follow a change in wages. These are changes in the number of immigrants in wage employment, and changes in average time each man spends at work. The response of agricultural workers to a change in level of wages within certain realistic limits is best illustrated in Appendix (3). 20

The following explains the trend:

When wage level doubles as from \( W_1 \) to \( W_2 \), the labourer is expected to spend relatively less time in field work (a decrease from \( O_2 \) to \( O_1 \), half the time is experienced). On the other hand when income from village production rises from \( I \) to \( I_1 \), the labourer is expected to spend relatively less time in work. The time is reduced from \( O_2 \) to \( O_1 \), while attaining the same level of income \( I_1 \).

Apart from the very limited trials of the Sudan Gezira Board to collect labour statistics during cotton picking, very little is known about the nature and extent of labour utilization in the country. Some individual efforts by managers of privately owned schemes are also reported. The limitations of such records are very numerous, though the most important being:

(i) these records can be applied only on crops and crop practices for which they have been collected,

(ii) they have no historical background as to forecast future trends of labour movement,

(iii) such data may not present an average of sufficient reliability as to be applied at all times and for different cropping systems. They have practically failed to adapt the economy to meet future development requirements.
This chapter has so far reviewed the main themes of commercial agriculture in the Sudan, and the possible effects on demand for and supply of casual labour. It is, however, difficult to forecast how lasting these effects will be. At present time and assuming prevailing techniques of production, expansion of agricultural production can be expected to proceed at a faster rate than available labour supply is so far as the following assumptions also hold good:

(i) more development is expected to take place in the near future,

(ii) town-drift of rural population will continue at the same or faster rate,

(iii) diversified cropping system now adopted in many parts of the country is intensifying rather than relieving labour shortage,

(iv) wants and needs of the rural population will remain to be low, and individual reaction to changes in level of wages will remain perverse,

(v) the introduction of machines as labour-saving devices is not likely to make such a fundamental difference as to outweigh the above considerations.
CHAPTER (III)

THE STRUCTURE OF THE LABOUR FORCE IN THE GENRAL SCHEME AND THE CONDITIONS OF EMPLOYMENT:

(A) PREAmBLE:

If the hypothesis discussed in Chapter (II) (that the demand for casual labour will in future tend to exceed supply), should prove to be right, its main effect will be felt in that area which already absorbs the largest amount of casual labour. It is therefore the purpose of this Chapter to describe the structure of the labour force in the scheme with special reference to the field of labour employed on a casual basis and to examine the conditions of employment currently experienced by this casual labour.

Using already existing sources of material it will be shown:

a) that the labour force used is an intricate and varied mixture of family and hired labour, the bulk of which works on a seasonal basis; the hired labour being derived from all parts of the Sudan and beyond.

b) the conditions of employment of the hired labour are related to the specific work done. The method of payment, the result of an interaction of the characteristics of the worker's requirements, and the resources of the employers, is also complex.
(3) **GENERAL FEATURES OF LABOUR FORCE IN THE GESIRA**

The Gesira Scheme is one of the biggest large-scale agricultural schemes in Africa. It is situated between the Blue and White Niles in the peninsula south of Khartoum and north of Sennar-Kosti Railway line. The Gesira, with its new extension, the Managil, cover an area of arable land of about two million feddans, and more than half a million of this area is cropped with long staple cotton. The scheme is the result of some fifty years of planning, experimentation, and investment, aiming at the promotion of national economy and the raising of standards of living among the rural population. It involves the utilization of some two million feddans of arable land and its conservation in a rational sequence of cropping.

In 1920 the Government of the Sudan signed an agreement with the Sudan Plantation Syndicate to lease the land from its original proprietors at a nominal price of 10 P.Y. per feddan per year. Capital used to be provided by the share-holders of the Syndicate which also undertook to manage and administer the scheme for a share of the proceeds. When the Syndicate commenced operations in 1950, its managerial functions were transferred...
to a board of directors (The Sudan Genira Board), with its technical, clerical, and accounting staff. The financial side has since then been undertaken by the Sudan Government which also owns the land and provides water for irrigation. The responsibilities of the three partners, Tenant, Board, and Government are laid down in the Sudan Genira Act of 1950. 42% of the gross cotton profits accrue to the tenants, 42% to the Government, and 16% to the Sudan Genira Board. The remaining 6% are divided, 2% to the Social Development Department of the Sudan Genira Board, 2% to the Local Government in the Scheme area, and 2% to the Tenants Reserve Fund, a fund which helps to pay for deficiency in returns. The tenants are allotted areas to cultivate with dura, wheat, lubia (Folicho Lablab), and groundnuts the returns of which go to the tenant. Recently, this Act has been reviewed and as a result tenants share of cotton proceeds is increased to 50% (including 2% for Social Development and 2% for Tenants Reserve Fund) of total gross profits from Cotton.

The importance of the Scheme to the country as a whole cannot be exaggerated. Some 60% of total value of domestic exports come from irrigated products, mainly cotton, and the Genira Scheme provides a large proportion of this. The Scheme also provides employment and food for some 77,000 tenants and their families.

besides some 200,000 migratory casual labourers every year. The total area of the scheme is divided into 92 administrative blocks. These Blocks are supervised by a field staff (field inspectors, clerks, accountants, tenal guards, office messengers etc. etc.) employed by the Sudan Gezira Board. The total cultivated area is divided into small plots of an average size of 10 feddans cotton in the Gezira (main), and 5 feddans cotton in the Bankgol Extension. Other crops viz. dura, groundnuts, and lubia are cultivated as food crops on smaller plots. Dura is the main staple food crop of the population, and accounts for half the area of cotton in each tenancy. Practically every male able-bodied inhabitant of the scheme area obtained a tenancy of his own at the commencement of the scheme. The population of the scheme was initially insufficient for the required number of tenants, and as a result right-holders with more than one tenancy, and tenants of foreign origin are no exceptions in the scheme. Thus the main establishment on a tenant level was that the tenant should be the manager and decision-maker of a unit largely dependent on hired labour.

The history of the Gezira Scheme, thus provides a live example of transferring traditional agriculture into a commercialized one. It is an example of changing an economy largely supplying for local needs into one highly productive and supplying for the world market, while securing an adequate internal food market.
The total population of the Scheme is about 800,000 most of them are engaged in agriculture. The average tenancy is supplying about six persons at least three of these are considered capable of work. The original intention of the Scheme was that a man and his family would work a tenancy using outside labour only to help in heavy work times, and getting loans only for that purpose. But it is inconceivable that all the tenants and all their dependents are capable of doing the whole job in their tenancies. As far as the Managil Extension is concerned, total population of the area is composed of tenancy-holders plus their families and very few of non-tenancy-holders. Most of the residents are absorbed in the Scheme as tenants, and a very small proportion is left to provide casual labour at peaks of labour demand.

(C) EMPLOYMENT STRUCTURE IN THE SCHEME:

In the Genira interest in the subject 'labour' is as old as the Scheme itself. Records date back to as far as the inception of the Scheme. These records were particularly dealing with

23 From a rational estimate by A. Gaittikell, former Manager of Sudan Genira Board in his address of Figures Talk 1st August 1948. The figure given for the population is the result of a projection based on an average rate of population increase of 3% per annum—projected to the present year 1964/5.
may be Board-employed or tenants-employed, and other labourers recruited by persons outside the service of the Board such as contractors.

(a) Tenants:

A tenant is defined as the right holder of a tenancy in the scheme and who is under obligation to carry to his best ability all agricultural practices in his tenancy as dictated and supervised by the field staff of the Sudan Gezira Board. The total number of tenants in the Gezira scheme amount to 76013 (1963/64). The distribution of tenants and their structure is given in appendix (4). There are more tenants in the Hanagal Extension than in the Gezira (main). Perhaps this is obvious as the average size of the tenancy in the Hanagal is almost half the average size of tenancy in the Gezira (main). There are also more minor tenants in the Hanagal than in the Gezira (main). This may be due to absenteeism of right-holders who are not justified to keep tenancies while they are away. Further details about number of tenants actually working in the scheme, their degree of regular participation, and their working hours are given later in the analysis of the sample survey.

(b) Labour Force:

Labour force in the Gezira is of varied nature. The variation arises from the geographical position of the scheme, being
situated centrally in the country with every possibility of
drawing labour from almost every part of the country. A con-
siderable proportion of the labour force comes from outside the
scheme area. The nature of the labour force is not only that di-
stated by the source from which labour is withdrawn, but also some
tribal differences may have their influence. The Gezira scheme
lies between the Western Nomadic and Semi-nomadic population and
the Eastern Pastoral tribes of Eastern Sudan. With such a unique
position, as a gateway between the West and the East, North and
South, the scheme has been, and still offering great employment
opportunities.

No records are available which give the economically
active proportion of the population in the Gezira. However,
records for 1955/56 population census give total Blue Nile Province
Population as 2,398,000, with about 936,000 being economically
active at that time. The only records available are those pertaining
to seasonal labour requirements during cotton picking. The
scheme provides temporary employment for more than 500,000 casual
labourers including resident labourers during picking season.

Labour force in the Gezira could be classified according
to employer's contract into, Board-employed labourers, tenants-
employed labourers and labourers recruited by contractors. The
first and third category are, however, not very different since
contractors are usually authorized by the Board to recruit labour. Both Board and Tenants may employ labour on a temporary or permanent basis. A tenant, for instance, may hire labour on a permanent basis for irrigation of the crop or for general supervision over the whole tenancy. Such whole-year contracts are usually the contracts which hold between 'sheikhs' Ouda and 'Hamada', and the people they hire.

(1) Board employed labourers: refer to those labourers who are employed on a temporary or permanent contract by the Board to carry out specific jobs in the field, ginneries, and elsewhere. They may work on a day to day contract with daily or weekly payments. Labourers employed during the picking season to do the transportation of cotton from collection centres to the ginning factories, the weighing of seed cotton and labour employed to clean and pack ginned cotton in the ginneries, are all day-to-day or month-to-month employed labourers. Others are permanently employed such as those employed in the ploughing section, the Car Repair Shops, Canal Guards, and other permanently employed labour. Most of the temporary employed labourers are supplied by contractors on the announcement of an open tender in the local papers. Those are usually labourers required in the Ginning Factories to do the manual jobs of loading and unloading, cleaning of cotton, and the packing of the ginned cotton and seeds.
(ii) Tenants employed labourers - are those who are employed by the tenants and get their wages directly from the tenants. They are usually employed on a piece rate, though some may accept jobs on monthly basis such as watering of cotton and dura.

Picking labour comprises the largest proportion of hired casual labour employed by the tenant. The amount of casual labour employed in any one season varies with variation in yield and supply of labour available for use. As yield increases there is a higher ratio of labour per unit cultivated land of cotton. During 1961/62 with an average yield of cotton of 6.024 kantara per feddan, labour employed per feddan of cotton was 8, while in 1962/63 with an average yield of cotton of 3.35 kantara per feddan, casual labour was reduced to 7 labourers per feddan. During 1963/64 with an average yield of 2.29 K.P.F. The number of labourers per feddan was even less, only 5. This can be attributed to the fact that as expected yields of cotton is estimated to be high more labourers are attracted to the scheme with the objective of making a good fortune. Appendix (3) gives a comparative illustration of the labour response to yield variations in the Gens, and their respective sources for the last four seasons.

(B) CLASSIFICATION OF LABOUR ACCORDING TO SOURCE:

Other than the above classification tenant's labour could be classified according to source and tribe. This is the most
common classification used in the scheme when assessing labour availability during cotton picking. The structure of labour force in the Geaira according to source could be divided into three broad categories:

1) Family labour.
2) Local labour
3) Migratory labour.

1) Family Labour:

Family labour includes all unpaid family workers of the farm operator's household. It includes all members of the family and other dependents who contribute in the work of the tenancy and depend primarily on the tenant for their living. Such dependents may or may not be living under the same roof with the tenant. A blood tie, marriage relationship, religious caste, or a social obligation are all factors which help to reduce the sense of formal employment. Hence, the dependents are reluctant to accept any kind of cash wages for the work they do. Some subordinate races believe in certain religious personalities to the extent that they consider themselves honoured and blessed if they accept to do some work for the benefit of such personalities. While still others are under concealed contract to do manual work for certain people as long as they are living. People living together in the same dwelling are stimulated by customary usage, by oral tradition, by language or accent, or by law to help each
other. The degree of involvement varies from the extreme of voluntary acceptance to forced labour.

The effect of family labour in the tenancy is only that of an auxiliary nature. In many cases women and children are considered in the labour force only as long as they are highly needed for some light jobs in the field such as cotton picking and collection of cotton stalks and debris. Nevertheless, there are still a few cases where family labour may undertake to carry out whole agricultural operations without the help from hired labour.

Some tenants send their elder sons and daughters to schools away from the Scheme area. Others may resort to work in towns for sometime before they return home. This town-drift has resulted in a decrease in available family labour. The availability of family labour is a complex reference; since school boys, and girls, married women, prides in their earlier days of marriage, are not available for work.

Elder sons who have accumulated agricultural experience and shared in the hard days of economic depressions in agricultural production, are thus no longer available for agricultural work. They have started to look forward for some non-farm employment which might deprive them of the bettering obligations of farming and the farming community. It is true that quite a large
on the willingness of the present children of the tenants to
take over their parent's tenancies in the near future. Family
members are often ready to enter into work which requires help-
ing to get something done rather than assuming full and direct
responsibility of achieving work. Their nature of work is that
of an auxiliary effect. This is mostly the traditional source
of family labour in the Gesira. It is that labour force which
is used during some light jobs in peaks of demand for labour,
and being withdrawn from the labour force whenever it is economi-
cally possible to pay for hired labour.

No records are available as yet which classify labour
into sex and age distribution. However the only comparative
age and sex distribution was provided by the Department of
See Appendix (6).

ii) Local labour:

This type of casual labour includes all labourers whose
permanent homes are within the scheme area. Some of these
labourers came to live in the scheme some fifty years ago and
they provide a permanent source of casual labour throughout the year. West Africans of the 'Borgu' and Fellata tribes, contribute the majority of this type of labour, though Arabs and other alien tribes are scattered throughout the scheme. Many of these tribes were attracted to the scheme since the early days of the Sudan Plantation Syndicate.

There are some foreigners who are allotted tenancies in the scheme area, but outside the rotation area, to cultivate with 'dura', known as 'Fellata dura'. This acts as a kind of inducement for labourers to stay in the scheme to provide ready and available labour. Some local inhabitants are casually employed in agricultural jobs, while performing some other subsidiary jobs in the village. Such subsidiary jobs like lorry and tractor drivers, water-carriers, ox-drawn plough guides, and many other domestic jobs provide occupation during the slack season.

Some villages along the White and Blue Hills provide casual labour exclusively for cotton picking. In 1958 it was estimated that some 21,250 West Africans were permanently residing in these labour villages. According to the Survey of Labour Conditions in the Gezira 1959, conducted by the Department of Statistics, the following could be quoted:

picking, could be done by labour from local sources in the scheme. It is not uncommon, that some tenants do not resort to hired labour throughout the year but a few labourers during peak demand as for cotton picking.

iii) Migratory labour:

This category of labour includes all labourers who are hired during the season and whose permanent homes are outside the scheme area. The biggest source of migratory labour is the Western Sudan two Provinces of Kordofan and Darfur. These two Provinces together supply more than 50,000 casual labourers every year. Appendix 5 gives the respective labourers for picking for 4 seasons commencing 1961/62. The Appendix shows that about 60% of total picking labour in 1964/65 come from outside the scheme area, and about 30% of these come from Western Sudan. There are certain other sources besides Western Sudan. These are

a) Blue and White Nile areas.
b) Eastern Sudan (mainly Kasala Province).
c) Sources outside the Sudan viz. Nigeria, Chad, and Ethiopian Boarders.

The period of stay of such labourers from outside the Sudan is governed by the main purpose of the journey. Some of these foreigners are pilgrims on their way to Mecca, others are traditional pickers who spend part of the year in the scheme to
The labour position is now even becoming more aggravated by the extension in cultivated area. The development of the Kharga El Girba Scheme is now absorbing more labour which has been withdrawn mainly from the Gezira/Kassala district. Labour is used for construction works as well as agricultural work. The development of the Rosairas Scheme and the proposed Nahad Scheme are two other schemes which will compete for the available labour in the area. This will have the same effect on the Gezira as that of the Managil Extension in 1936, when, during that season, about 34,000 labourers used to come from the Managil to work as cotton pickers in the old Gezira. This figure is now being reduced by more than 75%. The Gezira Scheme is now faced with this competition for labour by other development projects. At the same time the Gezira itself is running short of labour for the sole reason of its diversified rotation and the ever falling productivity of labour in recent years. Men represent about 65.4% of total hired labour in the Gezira (main) and about 63.0% of total hired labour in the Managil Extension. 25 This ratio diminishes during the peak of demand to 62.3% in the Gezira (main), and increases to 64.1% in the Managil Extension. Appendix (4) shows the classification of hired labour by sex and its distribution in the Gezira (Main) and Managil Extension for the Season 1958/59, taking an average for the whole period.

25 Survey of labour conditions in the Gezira Scheme 1959, Department of Statistics, Table VI.
(2) GENERAL SURVEY OF CONDITIONS OF EMPLOYMENT IN THE GENIRA

As has been outlined in Chapter (II), the factors operating at present time with regards to employment conditions in the Genira Scheme and in the Sudan as a whole, are largely determined by the agricultural activities involved and the nature of the enterprise. The labour market is therefore very much influenced by the special characteristics of labour source and the effect of aggregate demand for labour. The purpose here is to examine general evidence of employment conditions of casual labour especially with regards to demand and supply factors and the elements which finally decides employment opportunities and choice of activity by any one labourer or a group of labourers.

We can now consider these conditions of employment as they reflect themselves on forces of demand and supply of labour in the scheme.

(1) Demand Factors:

Conditions of employment in the Genira are influenced by many changeable factors most of which are outside the control of the tenant. The decision-making of any farm operation rests largely on higher authorities and dictated by the representatives of the board in the field. Many of the decisions are derived from a calendar which lends itself very little to seasonal variations. The size of the labour force demanded by any one tenant is a
function of the size of the agricultural unit of the different crops cultivated, and of the activity to be performed. It is a function of the availability of labour force represented by the members of a family who are able and willing to work. Locational differences have their effects in the size and structure of labour force. Blocks lying nearer to places of abundant and accessible labour are more at an advantage in offering labour services. The availability of labour within any one block is affected by the prevalence of labour camps and labour villages. For this reason, the Gena (min) is generally considered enjoying a strategic position with regards to local labour compared with the Hanagal Extension. In the latter, local labour villages provide a very small proportion of total casual labour.

The last seven years, since 1957, have seen a vast increase in cultivated area in the Scheme. The cultivated area since then has been more than doubled. Between 1962/63 and 1964/65, there has been an increase of 171,489 feddans in cultivated area, giving a total area of 1,651,377 feddans in 1964/65. More than half this area is cultivated with cotton (see Appendix 7). The newly introduced intensified and diversified cropping rotation of:

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Lahra
Cotton-Sheat-Fallow-Cotton-Groundnuts-Dura-Phillipesara-Fallow,
Vegetables
will further call for a review in the supply and demand for
labour.

Apart from the change in cropping system, casual labour
is also influenced by nature of soil, average rainfall, field
variations, and climatic differences. Prior to the development
of the Managil Extension in 1957/58, total labour engaged in
picking was 257,940 for an average yield of 6.76 K.P.F. cotton.
This number has slightly increased to 269,250 in 1963/64 for an
average yield of 2.25 K.P.F. cotton. Although the total cropped
area has been more than doubled, yet total labour engaged in pick-
ing cotton has only increased by about one tenth. In 1962/63 the
labour employed fell while cropped area was tremendously increased.
It was only during 1964/65 that the physical input of labour was
positive. Two possible reasons may be stated here:

i) either that average productivity of picking labour has
deprecated, or alternatively:

ii) estimates of cotton yields made early in December were
higher than actual yields a fact which encourages more
pickers to migrate than is really needed.

Either of these reasons may be possible. The fact that
most of the traditional and more experienced pickers have been
absorbed in the Managil Extension as tenants, emphasizes the first supposition. The majority of those remaining lack the experience and skill of the old traditional pickers, and their productivity is very low. For 1964/65, it was true that estimated cotton yields were higher than actual yields because of the very late leaf-worm infestation resulting in heavy damage to the crop in its late maturing phase. It seems that cotton pickers respond very much to cotton yields and very little to an increase in level of wages. Later analysis of results in Chapter (X) will further illustrate this hypothesis.

Different categories of labour have different physical capacities for work. Such differences in performance are reflected back on the quality of labour demand at any one time of the year. Picking labour is the most exacting type of labour which has to be selected with a fair degree of caution, since many pickers have a performance next to nothing as regards quality of picked cotton and the speed of performing the job.

Besides picking labour other kinds of labourers are required during different times of the year. Cotton and dura weeding account for the next highest amount of labour in the scheme. Both cotton and dura compete for labour during late August and early September, when both crops are being established. Most of this labour comes from local resources in the scheme area though some labourers coming for cotton picking may
be involved in late cotton weeding. Sowing of both cotton and
dura also uses a certain amount of casual labour. The difficulty
in providing labour for sowing arises out of the short period
during which sowing has to be done. The very short and limited
period of sowing implies that a very high amount of labour is to
be available for the job. However, being a light job sowing
provides employment for family members, and in fact it is the
operation which attracts most family labour in the scheme.
Results on Chapter (IV) confirm this.

2) Supply Western

   The Western Sudan tribes provide the major part of migrato-
   ry casual labour for picking in the Gezira. Some of these
   tribes used to move with their animals early in January to make
   use of the dura (gassab) which the tenants collect and store for
   animal fodder. Others drive with their animals towards the bank
   of the White Nile where they can work as pickers in the Private
   Pump Scheme and Hanagal Extension. This movement usually takes
   place between December and January and by the beginning of Feb-
   ruary there is already enough labour to initiate cotton picking.

   Statistics about picking labour in the Gezira Scheme are
   rather general. The only statistics in this field are those refer-
   ring to total quantity of labour employed in picking cotton in
   any one season and the different regional sources of migratory
   labour with some basic classifications into 'local' and 'imported'
   labour.
No work study is made to show the different efficiencies of different classes of workers and the different field organizations. The Agricultural Manager's Office used to prepare an annual labour budget based on a hypothetical average yield of cotton of 4.0 L.P.F. One feddan is assumed to be picked by one labourer working full-time. This calculation is based on the assumption that

a) all labourers have the same work capacity and hence the same rate of output,

b) the average yield estimated for calculation of pickers is the actual final yield,

c) the family members work full-time during the whole length of the picking season.

Some of the picking labour are known to come from outside the scheme area, while others migrate from neighbouring countries. From Appendix (8) it could be seen that some new sources of labour have come into the picture during 1963/64 season, viz. labour from Eastern and Southern Sudan. This might be the result of some incentives which have come to act in some remote areas not known before. Inspite of the fact that 1964/65 season was not a good cotton crop season, yet the change in physical input of labour during picking was very high as compared to increase in cropped area (Appendix 7).

Picking labour responded very much to conditions at home.
areas. When rains of preceding season are favourable, and hence good food crops and grazing facilities, the willingness of local inhabitants to migrate into the scheme is very much reduced. It is true that some people who have no such obligations at home would tend to take the chance under any circumstances. On the other hand there are some people who have never seen the world outside their very limited community and who are ready to adventure and take the risk of migration. Those are usually young men who dream of making some earnings to pay for a wedding or buy some animals. Still others are left behind with old men and women, and children, to look after the animals and care for the sick and disease-stricken relatives.

(F) CONDITIONS OF EMPLOYMENT IN THE SCHEME:

(1) Recruitment:

Picking labour is the most important kind of labour which receives great attention by the tenants and the scheme authorities. Picking labour recruitment used to be the sole responsibility of the tenant. Recently the Government has reconsidered the picking situation in the desire as a result of which a resolution has been passed by the Council of Ministers by which picking costs have been transferred into the Joint Collective Accounts. The effect of this change may be of a twofold nature. On the one hand it might relieve the tenants of some of the high costs of picking
labour, but on the other hand it may reduce the effect and care of the tenants about the amount of picking labour each tenant uses. The tenant may feel that he is becoming less responsible for recruiting his picking labour and may entirely rely on the Government and Board efforts to secure an adequate supply of labour.

A Permanent Committee for Picking Labour has been formed to help in planning and labour recruitment. The management has taken decisions on account of the costs of transportation of pickers from their centres of collection to the nearest railway station to the blocks where it is intended to concentrate for further despatching in tenancies. The Government has undertaken to give free warrants to tenants and labourers. The Permanent Labour Committee which was formed in 1962/63 season vide a resolution by the Council of Ministers, includes as permanent members, representatives from the Sudan Gezira Board, Ministry of Agriculture (Department of Agriculture), Department of Labour, and a representative of the Gezira Tenants Union. Many recruitment centres were opened in various parts of Kordofan, Darfur and Blue Nile Provinces. These were administered by Local Government Officers assisted by staff from the Sudan Gezira Board, members of the Permanent Committee for Picking Labour, and members of the Gezira Tenants Union. These agents cooperate to help representatives of tenants in their mission to recruit labour. These representatives of tenants may
be members of Block Councils, Village Councils or some reliable older men of villages who are sponsored to do the job for the rest of the tenants. Individual tenants may also make direct contacts with heads of labour groups or tribes in adjacent areas such as the White and Blue Nile areas.

Another Committee for urges tenants and their families to pick cotton was also founded in December 1960. The successful results obtained so far are encouraging for further improvement in the extent of family labour contribution in agricultural work. It has been a great achievement which helped to supplement hired labour, especially during peaks of labour demand, and reduce labour costs. The Gezira Tenants’ Union is also making great efforts in encouraging tenants to minimize as far as possible on their production costs by putting more personal efforts in their tenancies. Some nominal and monetary rewards are being made by the Committee for urging tenants and their families. Such rewards may help to create some kind of competition among tenants and between Blocks, and increase the natural momentum towards higher productivity by creating more incentives for work. Such incentives may in future develop into a custom, an end which is highly recommended and required.

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27 Cash rewards and cups are being offered to the best performance of family labour for cotton harvest and post-harvest operations.

28 The Social Research Officer at Massed, Gezira Board, is making great effort to evaluate social factors limiting labour utilization in the Scheme. His results and recommendations provide some basis for future planning which may lead to more tentative conclusions.
Recruitment must be concentrated on the most able-bodied persons who are experienced and skilled for the job. If it takes that trend, then demand for labour will be cut down and efficiency maintained. At present, labour recruitment aims at recruiting the highest amount of labour. A family or a group of labourers are not necessarily composed of all persons experienced and skilled for the job. Some members of the family or the group may be young children coming for the first time, others may be old men whose efficiency is even less than young children. Nevertheless, they get the same cash advance and the same free food. Some tenants recruit families because they are assumed to be more reliable and generally more responsible than individuals who have no obligations to stay with the same tenant for the whole period. This statement is, however, open to be proved or disproved.

By recruiting the most industrious labourers we can achieve higher outputs in the same length of time by the same amount of labourers, or alternatively achieve the same output by less people.

Recruitment is a time consuming activity which entails waiting for a certain period of time before pickers are available for actual work. Recruitment for cotton picking starts as early as late December and continues for several weeks to the end of January or the beginning of February. Recruitment may find some difficulties at the beginning of the season, as many of those
pickers are framers themselves who depend on rain cultivation.

The Gezira scheme is at an advantage by virtue of its centrally situated position as to be a focus for attraction of labourers from most parts of the country. Recent improvements in means of transport have improved the labour position during picking. In the Gezira (main) where local labourers in some villages are more handy than in the Hamagil Extension, because of proximity of those villages to tenancies, movement of labour from one part of the Scheme to the other is very much accelerated. The distance to travel is short and the time taken to travel is relatively reduced. The proximity of tenancies might not be the sole reason for this increase in effective use of labour, yet it is one of the most important reason. Others might be related to relatively more experienced local labourers, and their natural inclination to work for tenants who could help them when they are in need for help.

As already mentioned labourers differ in their inclination to work with one and the same tenant each time they come to the scheme. Some labourers are ready to accept the first jobs offered. Such labourers are often cheap to recruit and cheap to employ, though they are very difficult to retain since they can be persuaded by the slightest increase in level of wages.

As we have stated earlier pickers who migrate into the
scheme are on the whole either rain-cultivators or animal-rearers. They are restricted in their stay in the scheme by the rainy season in their home areas. They have to begin their journey back before the beginning of the rainy season. This may be the main reason that some of those migratory labourers prefer to work for shorter periods in prosperous cotton areas even if wages were higher in other areas. Their intention is to make the highest possible return within the limited short period provided. So in a tenancy of bumper cotton crop a picker can maximize his output per unit time more than in a poor yielding tenancy. In a prosperous cotton field motion is reduced and time is more usefully exploited.

(2) Method of organization within the Scheme:

The movement of labour within the scheme follows a certain pattern of distribution which is more or less directly related to crop yield. The general organization of cotton pickers within any one block is provided by the rotational system of watering and picking in an alternate manner. Each block is divided into 90 feddans watering units called 'Numbers'. Each 'Number' is therefore comprising 9 tenancies of 10 feddans each in the Genira (main), and 18 tenancies of 5 feddans each in the Managil Extension. Each number is divided into two segments of 50 and 40 feddans each. During the establishment of cotton crop it takes
about seven days to water either of the two segments, i.e., it takes about a fortnight to complete watering of the whole 'number'.

The watering of the number is done in such a way as to allow the first four or five tenancies to be watered first, while the other half is left dry. This is made easier by the cutting up of each tenancy into seven irrigation furrows called 'gedwals). Each 'gedwal' is watered within a day. When watering starts in the second half of the 'number', the first half has just finished watering the seventh 'gedwal'.

During picking the watering period is a bit longer and it takes twice the time (14 days) to complete watering of any one tenancy. This gives sufficient time for land to dry and be hard enough to support the weight of pickers, and allow easy going when picking. It also helps to extend the period of picking, avoiding rush work and waste due to hasty picking. This rotation of picking and watering continues on to the end of the picking season, though some disturbances may occur towards the end of the season. Towards the end of the picking season, the density of seed cotton is reduced and it takes less time to pick a 'gedwal' so it may happen that watering may be too ahead of picking or vice versa. The rotation is disturbed. Experiments at the Gezira Research Station, however, suggest that the last
watering of cotton are unnecessary and result in very little increase in total yield.

The system of rotational picking helped to cut down the number of pickers by half since the same number of pickers could be used in two tenancies with two different times of watering and picking. The time of picking is actually dictated by the time of sowing. Tenancies being sown at the same date are usually watered and later picked at the same time. On a larger scale, half the block could be picked while the other half is being under irrigation. Although this method is not universally followed in the scheme, yet it is the most frequent one. Some tenants might have their own pickers who are free to find their own way when they finish picking and the tenancies are being watered. Others are employed in vegetable gardens when they finish with their cotton schedule, while still others prefer to remain idle for a complete week before they resume work.

(3) Rates and means over and above normal payments:

Labour payment in the Centre is a very complicated system with regards to its nature and the way it is paid off. Picking labour for instance, may be paid in cash, in kind or in both. Some wages are paid on piece rate while others are on time rate such as watering which is paid on monthly
rily provided as separate quotas from the tenants daily food. Some tenants would prefer to satisfy the daily needs of their labourers by providing them with two or three cooked meals with some tea and/or coffee. Others may even provide tobacco and cigarettes.

The present remuneration for labour in picking is considered very inadequate. Besides these cash and food payments, the tenant is also requested to build thatched houses to accommodate his labour. He is to provide a suitable grazing land for labourers who bring their animals with them. Transport from the nearest railway station to the field is the sole responsibility of the tenant, and the return journey is also met by the tenant. Such a journey may be very difficult to pay for particularly when it involves paying the prices of tickets for long distances to Kordofan and Darfur Provinces. However, labourers

29. The general way of payment is on piece-rate. Cotton picking is one of the operations which is performed on a piece rate of the (angaya). Thinning, weeding, and pulling-out are also paid for on a piece rate of the (angaya). Cotton picking is paid for on a weight rate of the 'Guffa' = 35 lbs. seed cotton. Durra, vegetables, oils, and other food materials are also offered free during picking and pulling out.
(4) Types of contracts:

Traditional labourers who used to migrate into the scheme or those who used to live in the scheme and work in it, are more willing to accept jobs for lower wages and at least cost to the tenant. There are some perquisites which are offered as a kind of incentive to the labourers. These perquisites are highly appreciated by the labourers and have got their effect in keeping the good spirit of relationship between tenants and labourers. They tend to stabilize the size of output. These relationships between tenant as employer and labourer as employee help to bridge the gap between tenants on the one hand and labourers on the other, and help to reduce bargaining power. Labourers of this kind are more willing to accept the kind of premium that is reigning in the area or even lower. Labourers are more ready to sacrifice any additional payment which they might get if they hire themselves in some other places, for the sake of securing other invisible services such as those of lasting relations.

These perquisites which are offered by some tenants have badly affected the bargaining position of poor tenants,
who could not afford paying such additional expenses. Such perquisites have stirred competition among tenants in the scheme and between tenants in the same block. On a larger scale this competition is visualised in the Hanagal Extension where the new extension known for its often expensive dura crop offers better possibilities for 'dura' payments. Although there is no direct relationship between availability of labour for picking in the Gezira and 'dura' yields in the Hanagal, yet the Hanagal tenants are more generously paying in kind than Gezira tenants. Tenants who are able and willing to pay such high perquisites for labour may put themselves in a different category of tenants. Such tenants are usually more attractive for labourers who have no specific termination. Such labourers are attracted by the higher wages and the additional kind wages.

By the development of the Hanagal Extension more of these labourers were absorbed as tenants in the scheme. To attract cotton pickers to the new area tenants have to go into competition for labour with the old established tenants of the Gezira. The competition went through several stages and came last to be entirely based on the ability of any one tenant to provide a more favourable atmosphere for work. Such atmosphere may be based on friendly relations, on higher cash wages, on kind wages, or on all. Tenants of the private Fump Schemes
being endangered by the competition from the Managil Extension have taken the same trend and it is common that labourers keep moving between the Managil and the Private Pump Schemes along the White Nile making every possible use of both animal grazing and cash earnings. Tenants in the Private Pump Schemes are now even paying higher wages than in the Genira. If this competition for labour goes on indefinitely, then tenants will be paying for their labour more than labour marginal return value. This will even be highly significant during low cotton crop yields.

As already mentioned there are some other labourers who are not paid by the tenant though largely contribute to output of the tenancy. These are usually members of the extended family or relatives who do some communal work on rotational basis for poor tenants in the same village. Such kind of work is very common and known as 'Nafir'. A Nafir is an urgent call for help commonly asked for by tenants of the same village or tribe. This system of communal help is now slowly decaying away, and as people are developing new needs and want their free services are becoming more rare. Participation in any work is now becoming one of mutual benefit rather than a help for the unable tenants. It is now conditioned by the immediate benefit one could get by offering one service for another.
Through time Western Sudan tribes gained experience in cotton picking and qualified themselves as the most energetic and most rewarding labourers. They may resume job in groups or as single individuals, but the best performance is often associated with group work. This may be due to the competition which arises in group work. Even among West Africans who have made permanent homes in the scheme, the best performance is that associated with family group work. These West Africans used to provide permanent labour used as 'tolba' by Field Inspectors when an emergency arises for fulfilling certain urgent tasks in the field, or when a tenant fails badly in performing a certain operation at the specified date. Many of these tolba labourers are allotted 'dura' plots to cultivate to encourage them make residence for this purpose of emergency labour.

In the Gedia main a family member may at one time of the year work for his/her father in his tenancy, while at another time hires himself/herself for cash employment outside the farm to supplement his/her father income. Many of the adult young men used to work in town for sometime and only work with their parents in their tenancies when they are available in the scheme for short visits or on annual holidays. Others may be school children who live in boarding houses and only contribute very
little to farm work during their long vacations. The contribution of such infrequent work could hardly provide a basis for perfect judgement of performance and labour utility. The un-stability of employment and the discontinuous supply of labour do not help to make conclusive results and logical reasoning.

Apart from the food they eat and the clothes they dress, those labourers receive no further premium for their work. It is a very cheap source of labour, and as such they contribute largely to the reduction in cost of production in many farms where such labour is available. There are no records which give an idea about the money sacrificed by not employing family members, nor the efficiency of output as compared to hired labour. The problem is that the tenant does not consider his family members as part of the labour force, which he might otherwise have hired from outside labour. They are born and raised in the farm and as such are considered as part of the farm which have no real value for use as asource, or factor of production, with such a concept of family labour it could be said that a lot of the family labour is lost to the farm through bad exploitation and unavailability for use, for social, traditional, and other associated reasons.

(ii) EFFECT OF MANAGERIAL SKILL ON PERFORMANCE:

As stated earlier, the method used to recruit, employ, or pay labour to perform certain agricultural tasks, varies widely
from one block to the other and between tenancies of the same block. Better labour organization is responsible for a greater part of the gain in efficiency of labour production. Time and motion could be reduced, for instance, by reducing the distance physically by building more rail roads or concentration of labour camps within the scheme area and hence reducing cost to the tenant, and the risk involved in moving old men and children long distances. Labour could then be shifted from places where it is abundant to places where it is scarce.

Because of the nonsequential pattern of work, it is very difficult to specify the number of hours actually spent in field work. However, work study during the picking season gives 6 hours as being time exclusively spent by the average man per day. This period of time accounts for the actual picking operation plus the movement within the tenancy boundaries spent in unloading picked cotton, weighing and acking. However this result may not be altogether conclusive, since agriculture as a whole and picking in particular, are activities which are most sensitive to environmental changes, and lend themselves very little to systematic analysis.

Other factors which influence skill and performance are those which depend on the operators and can be changed by them. A lot of the success of achieving a certain operation in farming also rests on the administrative ability of both tenant and
inspector in any one block. Most of the field staff in the
Gazina are ex-school masters who were then thought to be the
most appropriate calibre of personnel for the job. Their pre-
vious experience in handling human and involvement in social
affairs may give them the endurance and patience of making a
good start. Most of these inspectors were again faced by the
lack of agricultural background though many managed to overcome
some of these difficulties through time, and short courses in
the Faculty of Agriculture. The enrolment of graduates from
Shanbat Institute of Agriculture into this field, helped to pave
the road for even more qualified agriculturists. The fruits
of this recruitment are yet to be harvested. Apart from the
inspector's personal quality in managing his own tenants and
'moray', the tenant ability is another factor which influence
individual as well as aggregate skill. Tenants ability to contact
labourers outside and organize his own labour gang in the tenancy
is an essential prerequisite for success.

The distribution of labour over the different plots and
even over the different agricultural practices is a job which
requires a selective instinct and a good forecast in decision-
making. The timing of operations is so diversified that in ext-
remely unpredictable climates, there is very little time lag be-
tween 'kharif' harvesting and sowing or between sowing and reaping.
This makes it essential for both tenants and inspectors to be alert
and active during such seasons and not be dogmatic about the calen-
dar dates which are not specifically conclusive.
CHAPTER (IV)

FIELD INVESTIGATION OF CONDITIONS OF EMPLOYMENT IN THE GAZINA SCHEME.

This Chapter reports a series of field surveys carried out during the years 1963-4 and 1964-5.

(a) OBJECTIVES:

(1) To throw light on the total labour force actually employed in the production of the main cash crop 'cotton' and the main food crop dura (Sorghum vulgare).

(2) To investigate the proportion of total hired and family labour employed in each of the two crops and for specific crop operations.\(^{30}\)

(3) To examine the conditions of employment of both family and hired labour.

(4) To examine the likely effects of demand with changing conditions in the scheme, and outside the scheme.

(5) To probe some of the factors likely to influence supply of labour.

\(^{30}\) Some crop operations such as reseeding, thinning, A/20, A/6 and road weeding etc. are assumed to be done by the tenant himself and therefore are not recorded as jobs for family or hired labour.
(B) METHOD OF INVESTIGATION:

(1) Tenants sample:

A sample of six Blocks, four from the Gezira and two from the Managil, was chosen as a stratum for the tenants sample. The six Blocks selected for the sample were Laota, Amara Kasir, Tayba, and Hamad El Nil in the Gezira (main), and Nalan and Maturab in the Managil Extension. These Blocks represent two historical areas vis-à-vis old Gezira and the new Managil Extension. They also represent three geographical areas vis-à-vis North Western part, Central and Southern Gezira, and the extreme Western part of the Managil. The first region is represented by the two Blocks of Laota and Amara Kasir, the second region by Tayba and Hamad El Nil while the third region is represented by Nalan and Maturab. Four of these Blocks are covered by the Tenants Farming Survey now conducted by the Department of Rural Economy in conjunction with the Gezira Board and Department of Agriculture, Ministry of Agriculture. These Blocks are Laota, Amara Kasir, Tayba and Maturab. Hamad El Nil Block is being covered by the Working Party. The presence of a field investigator in each of the Blocks covered by the Tenants Farming Survey was one reason for the selection of these four Blocks. Their willingness to offer help and shelter for the author has been very much appreciated. Hamad El Nil and Maturab were chosen for their proximity to Dad Medani and 28 Ghorashi Rest House respectively. Nalan Block is taken to represent
a transitional stage between old Gezira and the newly developed Managil Extension. It is one of the Blocks in Phase (1) of the Managil Extension.

Tenants from each Block were selected at random from the 'Labour' Book of the Block Inspector. The criterion for selection was based on a cotton tenancy holding classification following three main objectives in the Gezira (main) and Managil Extension. For the Gezira (main) the classification was as follows:

a) 2 tenants holding cotton tenancies of less than 10 feddans.
b) 3 tenants holding cotton tenancies of 10 feddans.
c) 2 tenants holding cotton tenancies of more than 10 feddans.

For the Managil Extension the classification was:
a) 3 tenants holding cotton tenancies of less than 10 feddans.
b) 2 tenants holding cotton tenancies of 10 feddans.
c) 2 tenants holding cotton tenancies of more than 10 feddans.

This classification has been based on the general conception that the average size of cotton tenancy on the Gezira (main) is 10 feddans while in the Managil the average size of cotton tenancy is 2 feddans.

Seven tenants were then selected from each Block at random but essentially representing these three classes above; so the total tenants in the sample is 42 tenants. A tenant once chosen is withdrawn from the list of selection so as to avoid
sample may not be employing hired labour, and are satisfying their picking and post-picking needs from their own family members. No labourer was selected twice in any one season, though it may happen that the same labourer may be selected in both seasons. The total number of the labourers sample is 61 in each season. Where work is organized under the leadership of one head it is the head of the group who is asked, presumably that he represents the rest of the group. The head of such group may be the father, an elder son, an elder brother, or a chief of a religious caste or village. Otherwise any of the adult men may be interviewed. Questions asked are related to age, sex, home, tribe, home occupation, level of wages, mode of migration, rate of output, and other related questions.

(c) RESULTS:

(1) The contribution of family labour to seasonal work:

(a) 1965/66 (Reference is made to tables (2) and (2))

(4) Family labour as a percentage of total labour used in cotton:

Most of the family members are young men and women in the age group of 10-20 years. There are more men than women used in agricultural production in the Gennara than in the Kankal extension. The agricultural operations are (for purpose of simplification of results) limited to the operations of: pre-tiling, sowing

*31 Preparing operation refers to land levelling, harrow and small field channels making and cross-ridging.
weeding, harvesting, and post-harvesting. In the Gezira out of a total of 95.4 mandays per feddan used in these five operations about 22.6 mandays per feddan were provided by family labour. In the Managil the comparable family labour used is about half this (about 9.5 mandays per feddan), but total labour used in the Managil was higher; thus the total proportion of hired labour was higher.

In the Gezira (main) family labour represents about 24%, while in the Managil it represents only about 16% of total labour employed. Cotton picking accounts for the highest proportion of family labour used in both the Gezira (main) and the Managil. Though the total amount of family labour used in cotton picking in the Gezira (main) sample was less than the total amount used in the Managil sample (316), yet the proportion of family labour is higher in the Gezira (main) than in the Managil, because of the large total labour force in the Managil. It is about 17% in the Gezira (main), and about 13% of total labour used in cotton picking.

Post-harvest operations, in case of cotton refer to pulling out, collection of cotton stalks and debris and subsequent burning of all rubbish. In case of durra it refers to threshing, winnowing, and packing into sacks and transportation.

One manday = one man working for one day of 8 hrs. All persons of more than 7 years of age are considered as one unit of equal productivity.
So although picking uses an overall higher proportion of total family labour available yet in pre-sowing and sowing operations family labour account for a higher proportion of the labour used for these two operations.

Weeding in the Demira (main) uses 4.2 mandays per feddan of family labour out of a total of 14.4 mandays per feddan. This is equivalent to about 29% of total labour used in weeding. This is even a higher proportion than that used in picking. In the Managil family labour used in weeding accounts for a very small proportion of total labour used in weeding.

On a smaller scale of block samples as would be expected with such small numbers of tenants, variations occur. Amana Kamil gives the highest total number of family labour used in all five operations. It gives 39.9 mandays per feddan, or about 42.6% of total labour used. Next comes Hamed El Hul Block sample which gives 22.5 mandays per feddan or an equivalent of 23.1% of total labour used in the sample.

In the Managil, Nalan sample uses more family labour than Nutureb sample. The former uses 16.5 mandays per feddan, while the latter uses only 2.1 mandays per feddan. The former is equivalent to 15.3 while the latter is equivalent to about 6.7% of total labour force. Thus Nutureb Block gives the smallest total number of family labour as well as the smallest proportion of family labour used in cotton production.
The figures of family labour utilisation given above are not necessarily the total number of family members available for work. The percentage utilisation of family labour is given in figure (6).

Lacta Block sample nearly used all of its family labour available for work. About 80% of total family labour available were really used in cotton production, and dura production. Maturab Block sample although it uses an overall smaller number of family labour in cotton production yet it represents a very high percentage of available family labour. It represents 75% of total family labour available for work. Snam El Hil Block though employed a very high number of total family labour, yet it represents a smaller proportion of total family labour available for work in the Block sample. Percentage utilisation of family labour is the least for all six Block samples. It accounts for about 46% of available family labour.

Most of the family labour recorded above falls in the age group of 12-15 years. About 75% of total family labour utilised in agricultural production falls in this age group.

(ii) Family labour as a percentage of total labour used in dura:

Dura also uses family labour but to a lesser extent than cotton. In the Gezira sample about 15.2 mandays per feddan were given by family labour. This accounts for about 39.3% of total
Labour used in dura production. In the Managil sample, only 4.2 mandays were provided by family labour. This is equivalent to only 11.8% of total labour used in dura production in the sample. In the Genira (main) sample, most of this labour is employed during dura sowing and weeding. Sowing accounts for about 13% of total labour employed in dura. In the Managil the highest numbers of family labour is also used during sowing operation. It accounts for about 7% of total labour used. The two samples of Managil and Genira (main) used about the same total family and hired labour in dura production. The Genira (main) used a total of about 30.2 mandays per feddan while the Managil used 36.4 mandays per feddan. Yet they vary in the distribution of this labour force over the various crop operations.

The least amount of family labour is used in pre-sowing operations in both the Genira (main) and Managil samples. In the Genira (main) only 1.1 mandays per feddan were used, while in the Managil 0.3 mandays per feddan were used. Although this is a very small proportion of total number of family labour used in dura production yet it is quite significant with regards to labour used in pre-sowing being 84% and 79% in Genira and Managil samples respectively. Again, a very small proportion of family labour was used in harvesting of dura. In all sample population of the Genira (main) and Managil, no family labour was used in post-harvest operations of dura.
Anara Kasir gives the highest proportion of family labour used in dura during 1963/64 season (54%). Most of this family labour was used in dura harvest, (about 17.0 mandays per feddan or 43% of total family labour used in dura production). Next comes Lasta Block which used about \( \frac{1}{3} \) of total family labour used by Anara Kasir sample. About 14 mandays per feddan are provided by family labour in Lasta Block sample, or 42% of total labour used in dura. Again most of this family labour (23%) is used in dura harvest.

Naturab Block sample uses the least amount of family labour in dura. A total of only 2.0 mandays per feddan were used in this block sample. This is only representing a small proportion of total labour used. Most of this family labour is used in sewing. Tayba Block sample and Malan Block sample are no better in this respect. Tayba Block sample gives a total of 4.5 mandays per feddan while Malan Block sample gives 6.5 mandays per feddan of family labour being used. The former represents 13.1% while the latter represents 20.3% of total labour used. More than 63% of the former is used in sewing and pressing operations, while the corresponding figure for the latter is a bit over 65%.

(b) 1964/5 Season and comparison of results:

During this season the Gezira sample gives a total of 25.2 mandays per feddan being family labour used in cotton. This
is equivalent to 21.6% of total labour used in cotton. Most
of this family labour has been used in picking and post-harvest-
ing accounts for about 57% of total family labour used. The
former accounts for about 24% of total labour used in picking
and the latter accounts for about 33% of total labour used in
post-harvesting. Sowing and pressing account for the least
amount of family labour in the Gezira (main) sample, about 0.7
mandays per feddan, and 0.4 mandays per feddan respectively.
Although these are very negligible amounts as compared to total
family labour used in cotton, yet they represent quite high
proportions of total labour used in these two operations. The
former represents 5% while the latter represents 27% of total
labour used in sowing and pressing operations respectively.

In the Managil an average of 13.3 mandays per feddan of
family labour has been used in the sample. This is an equivalent
of 11.1% of total labour used in cotton. Again most of this
family labour is utilized in post-harvest and harvest operations.
These two operations together use more than 11.0 mandays per
feddan. Post-harvesting alone uses about 73% of total family
labour. This is equivalent to about 30% of total labour used in
post-harvest. Sowing and pressing operations again use the
least quantities of family labour. Both two operations account
for 0.4 mandays per feddan only of the total family labour used.
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</table>

This table represents data on certain agricultural operations for the years 1930 to 1945.
% Utilization of Family Labour in THE

FIG. 1
FIG. 4
AGE DISTRIBUTION OF HIRED LABOUR
IN COTTON PICKING

Number

70
60
50
40
30
20
10

1963/64 (median = 26.5)
1964/65 (median = 32)

9.5 10.5 20.5 30.5 40.5 50.5
Years
This is equivalent to about 3% of total family labour. Yet family labour used in pre-sowing and sowing operations is not altogether negligible as it represents quite a big proportion of the total labour used in these two operations. In pre-sowing it is equivalent to about 28% of total family labour used in pre-sowing, and about 7% of total labour used in sowing.

In dura production, for an average yield of 2.4 'urdabs' per feddan in the Gezira, about 4.2 mandays per feddan were family labour. This is a very small proportion of total labour used in dura production. It represents about 14.4% of total labour used. Most of this family labour is used in weeding and harvesting. The former used 1.6 mandays per feddan while the latter used 1.1 mandays per feddan. Harvesting of dura accounts for about 26% of total family labour while weeding accounts for about 38% of total family labour. Pre-sowing and sowing operations utilize the least quantities of family labour, 0.5 and 0.9 mandays per feddan respectively. Family labour used in pre-sowing, nevertheless represents 50% of total labour used in this operation. In sowing it represents about 36% of total labour used in sowing.

In the Hanagal dura production uses 1.5 mandays per feddan of family labour, a very small proportion of total labour used in dura production. Half this quantity of family labour is used in sowing operation (0.6 mandays per feddan). The other half is equally distributed between pre-sowing, weeding and harvesting.
of the crop. No family labour was used in post-harvesting in either the Gezira or the Managil. The amount of family labour used in sowing represents about 50% of total labour used in sowing.

These results can further be traced back for comparative study of Block samples, as provided by the figures in table (3) and table (4). Amara Hamir Block sample uses by far the highest quantity of family labour in cotton. It uses a total of 32.4 mandays per feddan out of a total of 112.7 mandays per feddan. This represents 28.6% of total labour. The Naturah Block sample gives a total of family labour equals to 4.9 mandays per feddan, which is the least proportion of family labour of all block samples (4.9%). Taya Block sample also gives a higher proportion of family labour, representing 23.0% of total labour used in the sample.

From the figure it can be seen that Taya Block sample gives the maximum utilisation of family labour, since about 90% of total available family labour were used during 1964/5 season. Mala Block sample gives the smallest extent of utilisation of family labour. About 23% only has been used in agricultural production. Lasta Block sample also shows a remarkable extent of

*34 Utilisation here refers to average of all six operations of cotton and dur-mentioned earlier in this chapter.
utilization of family labour representing 80% of total family labour available for work. Again most of those family members are in the age group of 7-15 years, and little below and above that range.

In dura production total family labour used in the six block samples ranges between 1.2 and 5.3 man-days per feddan. At the top of the scale come Losta block sample with an average of 5.3 man-days per feddan, or 22.9% of total labour used in the sample. At the bottom of the scale lies Naturab block sample with an average of 1.2 man-days per feddan or 5.2% of total labour used in this block sample. Most of the family labour in the sample is used in reaping of the land, with the exception of Makal and Naturab in Hanagil. In the former about 33% of total family labour was used in harvesting while in the latter all the family labour was used in harvesting. No family labour was used in the rest of operations. All block samples appear to be similar in that they all do not utilize family labour in dura post-harvest operation. It was only in Losta block sample and Hanad el Hil block sample that a certain quantity of family labour were being used in dura post-harvesting. These are, however, very negligible proportions.

To summarize the foregoing analysis we can state the following:

1) That generally speaking a higher percentage of family
labour is used in the Gezira than in the Managil.

2) There was a certain increase in the quantity of family labour used in cotton during 1964/65 as compared to the previous season, 1963/64.

3) There has been a certain decrease in the quantity of family labour used in sora production during 1964/65.

4) Most of the family labour used in both the Gezira and the Managil falls in the age group of 7-15 years.

5) Family labour used in the Gezira represents a higher percentage of total labour available for work.

6) Very little family labour is used in post harvest operations of both cotton and sora.

7) Tayba and Lasta Block samples give the highest percentage utilization of total available family labour. While Malan Block sample gives the least average percentage utilization of total available family labour.

8) The number of families per Block sample is very small and therefore variations between Blocks and from one year to year are very high.

(2) The contribution of hired labour to seasonal work:
(a) 1963/64 Season (Reference is made to tables (1) and (2)).

(1) Cotton:

In the Gezira sample of four Blocks, an average of 95.4
mandays per feddan were used, out of which 72.8 mandays per feddan were hired labour, or 76.3% of total labour used. Picking accounts for the greater part of this labour. More than 42 mandays were used in cotton picking i.e. about 46% of total labour and about 57% of total hired labour in the sample. Only a very small proportion of hired labour is used in presowing and sowing operations. In the former it represents about 0.5%, and in the latter about 2.0% of total hired labour used. Weeding on the other hand accounts for about 23% of total hired labour.

In the Hanagal Block samples, and for an average yield*35 of 2.46 K.P.F., a total of 108.5 mandays per feddan were used. About 91% of this labour force is hired labour. Picking accounts for the greatest amount of this hired labour. Out of the 99.1 mandays per feddan of hired labour used in cotton in the Hanagal sample, 55.6 mandays per feddan, or 56% of total hired labour are used in picking. Very little hired labour was used in either presowing or sowing operations. Both these two operations use about 3% of total hired labour used in the Hanagal sample.

All Block samples with the exception of Amara Kair sample used a proportion of hired labour ranging between 70% and

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*35 Average yields given are weighted averages of tenancies visited.
98.9% of total labour used. Nushren block sample gives the highest proportion of hired labour amounting to 98.9% of total labour used, followed by Fayha block sample (91.1%). All block samples have their maximum hired labour during harvest time.

(44) Dura:

Dura production employed less hired labour than cotton. In the Genira block sample an average of 23.0 mandays per fadden were used, while in the Hanagil an average of 32.2 mandays per fadden were used. The Genira sample average represents 60.2% of total labour used, compared with 88.2% in Hanagil. The highest proportion of hired labour in the Genira was used in weeding, accounting for about 48% of total hired labour used.

In the Hanagil the highest proportion of hired labour is also used in harvesting dura. Dura weeding in the Hanagil accounts for about 52% of total hired labour. Presowing uses very little hired labour, but nevertheless the amount of hired labour used in presowing represents a very high proportion of total labour used in that operation, (36% in Genira, 74% in Hanagil). Sowing uses a bit higher proportion of hired labour, though not representing a high percentage of total labour used in sowing, (25% in Genira, 37% in Hanagil).

Nushren block sample given by far the highest proportion of hired labour. Hired labour here represents more than 95% of
total labour. All Block samples, either in the Gezira or the
Managil give their maximum amount of hired labour during weeding.
In Natrang Block sample, sample weeding accounts for about 48%
of total hired labour; or 99% of total labour used in that operation.
All Gezira Block samples use more than 40% of their total
hired labour in weeding. Loele uses about 54%, Anara Kasir, 48%,
Tayba about 50%, and Nasred El Hil 48% of their total labour in
dura weeding. In the Managil the highest proportion of labour is
also used during weeding of dura, but they represent by far a
greater proportion of total labour used in weeding. Very little
hired labour is used in sowing and pressing operations in either
Block samples. Post-harvest operation also accounts for a very
small proportion of hired labour. Nasred El Hil Block sample uses
the least amount of hired labour in post-harvest operation, (1.7% of
total hired labour used).

The Managil sample gives a higher number of hired labour
in post-harvest operation. (3.0 mandays per feddan, compared with
1.5 mandays in Gezira). The Managil sample average represents 9.4%
and the Gezira sample average, represents 6.7% of total hired
labour used. Managil sample uses more hired labour in harvesting.
It uses 8.3 mandays per feddan while the Gezira uses 7.7 mandays
per feddan. Total family and hired labour used in the Managil
sample is lower than total family and hired labour used in the
Gezira sample for harvesting operation of dura. In the Gezira
10.2 mandays per feddan are used while in the Managil only 8.5 mandays per feddan are used in the farm harvest.

(b) 1964/65 season (Reference is made to tables 3 and 4):

(i) Cotton:

Results give an average of total hired labour of 91.7 mandays per feddan being employed in the Gezira for cotton production, compared with the Managil sample with 97.2 mandays per feddan. The Gezira total has got its maximum during harvest operation - 44.2 mandays per feddan, as also has the Managil with 55.1 mandays per feddan. Post-harvest operation is the next labour demanding operation in both the Gezira and the Managil sample. In the former post-harvest operation employs 29.1 mandays per feddan, while in the latter 30.0 mandays per feddan are used. Total hired labour used in harvesting in the Gezira represents about 50% of total hired labour as compared with 57% in the Managil sample. Presowing and sowing operations represent a very small proportion of total hired labour. They together represent about 2.5% in the Gezira and about 3.6% in the Managil. Using accounts for about 15.5% (13.9 mandays per feddan) of total hired labour in the Gezira and about 10% (9.7 mandays per feddan) in the Managil.

Further analysis of hired labour could be outlined from tables 8 and 9 in their respective block samples. The two block
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<th>Picking out</th>
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**Notes:**

- Generally wages are higher in the Managil than in the Gesira.
- There are only two occasions where average wages in the Gesira were higher than in Managil vis. 1st. weeding and 1st. sweeping operation during 1963/64 season.
- There is a general tendency for average wages to increase during 1964/65, as compared to the previous season.

*Wages are approximated to the nearestく/ma.*
samples of Managil give very comparable figures for hired labour in all agricultural operations. Hired labour in the Gezira sample ranges between a minimum of 77.9 mandays per feddan and a maximum of 127.6 mandays per feddan (Nasel El Nil).

(11) Dura:

On the whole the Gezira gives an average of 24.9 mandays per feddan, while the Managil gives an average of 19.6 mandays per feddan. These represent 85.6% and 92.5% of total labour used in the Gezira and Managil samples respectively. The peak for hired labour in both cases coincides with dura weeding, where in the Gezira this operation alone uses 11.5 mandays per feddan and in the Managil it uses 10.7 mandays per feddan. The former represents 46% and the latter 36% of total hired labour used.

In the Gezira, Tayba Block sample used the highest total hired labour (36.9 mandays per feddan), an equivalent of 92.7% of total labour used. The least hired labour is used by Lacta Block sample which gives only 17.8 mandays per feddan, only 77.1% of total labour used.

In the Managil Naserab Block sample gives the highest average of 21.7 mandays per feddan of hired labour, or 94.3% of total labour used. (See Fig. 3).

(3) Labour costs:

(a) Labour costs of cotton 1967/8 season:

(4) Cash wages: (See Table 5).

As has been stated earlier, labour is hired on a piece
### Table (6)

**Average Yields of Cotton and ‘Diba’ 1963/64 and 1964/65 Seasons**

<table>
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<tr>
<th>Block Sample</th>
<th>Cotton (a)</th>
<th>1963/64 (b)</th>
<th>1964/65 (b)</th>
<th>Bazara Ardab/Ferdan (a)</th>
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<td>AVERAGE NAGASIL</td>
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rate rather than time rates. The main operation of presowing is done on a flat rate of a land unit called the "Gadwal". Sowing and weeding are done on a piece rate of the (Angaya) which is half the area of the (Gadwal). Some contracts are also made for whole tenancy weeding. Cotton picking is done on a weight rate of the "Gutta". Post-harvest operation of cotton could be divided into two main activities, viz. cotton pulling out, and cotton sweeping. The pulling out and sweeping operations are performed on a piece rate of the "angaya". Either of these two activities, may be done by contract for the whole tenancy clean up.

From table (5) it could be seen that wages for cotton presowing per feddan average between 150-215m/ma, weighted averages, in the Gezira, and 200-250m/ma per feddan in the Managil. During this season Manan Block seems to give the highest offer per feddan for presowing and Hanad El Nil Block sample the least at 150m/ma per feddan.

Wages for sowing range between a minimum of 390m/ma and a maximum of 650m/ma per feddan. The average wages in the Managil are higher than those in the Gezira. (677m/ma are compared with 530m/ma). Wages do not vary widely between tenancy samples in the Managil as they do in the Gezira. In the Gezira wages range between 390m/ma and 576m/ma per feddan.
Weeding is one of the operations which has a wider range for wages. The offer depends on intensity of weeds, location of tenancy, soil condition when weeding and availability of labour. The costs vary between 2000m/ea and 3800m/ea per feddan. The average cost per feddan in the Gezira sample is lower than in the Managil.

Cotton picking is the most expensive crop operation. Costs for cotton picking vary widely between 2500m/ea and 7500m/ea per feddan. The variation is more significant in the Gezira sample than in the Managil sample. The averages for the two samples are not however, very different. (5759m/ea and 5867m/ea respectively).

The post harvest operations which include pulling out of cotton stalks, sweeping and collection of these stalks and debris, and the consequent burning of the collected material is one of the most important crop operations which protects the following cotton crop from disease infestation. It is also one of the operations which saps the strength and wealth of the tenant since it involves the employment of a large amount of labour when labour is a scarce commodity. This operation costs between 2420m/ea and 3219m/ea per feddan. The minimum cost was given by Tayba Block sample, while the maximum cost was given by Halan Block sample. The average for the Gezira Block sample is 2625m/ea per feddan while the Managil Block sample gives 2894m/ea
in the value of food given to the labour during cotton picking
and pulling out. This value of kind wages ranges between a
minimum of 885a/m² per feddan in Amara Kasir Block sample and
a maximum of 2616a/m² per feddan in Malan Block sample. The
average for the Managil sample was 2376a/m² per feddan while the
average in the Genira was 1509a/m² per feddan. The former (Mana-
gil average) represents 16.6% of total cost of labour, while the
latter (Genira average) represents 13.3% of total cost of labour.

It follows that total cost also varies between the two
samples and among Block samples in both the Genira and the Manag-
il. Total cost ranges between 10,320a/m² per feddan and 15,542a/m²
per feddan. The lowest figure is given by Amara Kasir Block
sample, while the highest figure is given by Malan Block sample.
Average total cost for the Genira (13,506a/m²) is lower than in
the Managil (15,470a/m²).

Labour cost per mandsay could be calculated from both
tables (1) and (7). These two tables give a total of 181a/m²
per mandsay in the Genira and 156a/m² per mandsay in the Managil.
The highest cost per mandsay is given by Amara Kasir Block sample
(196a/m² per mandsay), and the lowest cost (141a/m² per mandsay) is
given by Naturab Block sample.
(b) Dura labour costs £66/64;

(d) Cash wages: (See Table (?)).

As for dura production the same method of payment as that of cotton is followed. The only difference may be in post-harvest operations. The general trend for dura harvest is to hire for cutting dura heads of the whole tenancy contracts. Contracts are made between tenant on one hand and labourers on the other. Wages differ according to plant population and available labour supply. Post-harvest operation, which refers mainly to threshing of dura heads is done on a wage rate of the threshed grains in a unit called the arsdale.

Again preparing is the least expensive operation both in terms of average per feddan and average per labourer employed. It costs between £61/6 and £71/6 per feddan. The average cost per feddan for the Gezira (302£/6a) is a bit higher than the average for the Hanigil (305£/6a). This is, perhaps, with the exception of dura weeding, the only instance where an operation costs more on the average in the Gezira than in the Hanigil.

Sowing of dura costs between £75/6a and £85/6a per feddan. The highest figure is given by Amara Kasir Block sample (803£/6a per feddan), while the lowest cash is provided by Kasir El All Block sample (251£/6a per feddan). The Hanigil (657£/6a)

*36 Approximately 243.5 kgs.
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Note: The table above represents data for a specific period. Further details are not provided in the image.
average is bigger than the Genira average for sowing (344a/ms).

Dura weeding accounts for the highest costs in both the Genira and the Managil samples. In the Genira sample one fanned costs on the average 2639a/ms to weed. In the Managil sample weeding costs 3063a/ms per fanned. The former represents about 44% of total dura labour cost, and the latter represents about 29% of total dura labour cost. Amara Kasir gives the highest figure for dura weeding (3688a/ms per fanned), while Katural block sample gives the lowest cost for dura weeding (1204a/ms per fanned).

Dura harvest is less expensive than dura weeding. It costs between 1400a/ms per fanned in both Lota and Tayta, and 2000a/ms per fanned in Katural.

It costs even less to thresh dura and put it into sacks for transportation. It costs between 388a/ms and 1046a/ms per fanned. The average for the Genira is about 569a/ms per fanned. The highest cost for post-harvesting dura is given by Katural block sample, while the lowest is given by Tayta block sample.

Both harvesting and post-harvesting of dura could be performed by contract, but usually they are done separately.

(ii) Land wages:

The value of food consumed given in column (7) of table (7),
ranges between 181m/ha (Hamed el Nil II) and 2460m/ha per feddan (Maturab). In the former block it represents about 3.9% of total cost of dura labour, while in the latter 20.4%. The value of food is higher on the average in the Hanagil sample than in the Gezira sample (20% as compared with 8%).

Total cost of dura production is given in column (5) of the same table. The highest total is given by Amara Kazir Block sample (27342m/ha per feddan). The minimum total cost is given by Hamed el Nil Block sample (4576m/ha per feddan).

Total cost in terms of total hired labour employed, is given in the last column (8) of the same table. Here the range is not very big between the highest total cost and the lowest total cost in terms of m/ha per manday. Lakea Block sample gives the highest total cost in terms of m/ha per manday, (356m/ha per manday), Maturab Block sample gives the lowest total cost per manday. The Gezira average is not so different from the Hanagil average. The former average is 297m/ha while the latter average is 218m/ha per manday.

(a) Labour costs of cotton 1964/65 season:

(b) Cash wages: (See Table (8)).

The highest cost of pre-sowing per feddan is given by Lakea Block sample (315m/ha) and the lowest by Amara Kazir Block (147m/ha). The difference between average in the Gezira sample
and that of the Managil sample is not very big (275¢/ms compared with 279¢/ms).

Cotton sowing costs between 720¢/ms per feddan in Malan Block sample and 521¢/ms per feddan in Tayba Block sample. This is quite a big difference. The difference between the averages of Gezira and Managil samples is also great, (378¢/ms compared with 535¢/ms).

Weeding of cotton also represents quite a big proportion of cotton cost of production. One feddan costs between a minimum of 1912¢/ms in Lacta Block sample, and a maximum of 7426¢/ms in Nacurah Block sample. The difference between the average total for the Gezira and Managil is also very significant, (264¢/ms as compared with 617¢/ms).

Cost per feddan for harvesting of cotton ranges between 2895¢/ms per feddan in Amara Kasir Block sample, and 6491¢/ms per feddan in Hamad El Hil Block sample. The former is for an average yield of 5.98 K.P.F., while the latter is for an average yield of 4.65 K.P.F. On these results, in the Managil it costs about one and a half times to harvest one feddan of cotton than it costs in the Gezira sample. Average cost for the Managil sample is 7898¢/ms per feddan for an average yield of 2.63 K.P.F.
In the Gezira sample the average cost is 6284¢/ms per feddan for an average yield of 4.63 K.P.F. The variation is even more significant between block samples. Picking costs generally account
for the highest costs of all other crop operations of cotton.

Post-harvest operation of cotton in another operation which also represents a higher percentage of total labour costs (between 300¢/sq m per feddan and 616¢/sq m per feddan). In the average one feddan costs more in the Managil sample (4276¢/sq m) than in the Gemira sample for post-harvest operation (3910¢/sq m).

(ii) Kind wages:

apart from these costs of operations, there are certain other kind wages whose values are included in column (7) of table (8). The value of these kind wages vary from Block to Block and even between tenancies of the same Block. The maximum value of kind wages for cotton is given in Natural Block sample where one feddan costs 4500¢/sq m. The value of such kind wages in generally higher in the Managil sample than in the Gemira sample. It is about twice as much in the Managil sample than in the Gemira sample. These kind wages are usually given to cotton pickers, though labourers during pulling out may get some kind wages. The value of kind wages represent 15.6% of total cost in Lasta Block sample. It is the highest proportion of kind wages paid.

Total cost of all crop operations including value of kind wages vary between a minimum of 11,481¢/sq m and a maximum of 26,893¢/sq m per feddan. The former is paid by Anara Kanir Block.
sample while the latter is paid by Maturab Block sample. It costs more to produce and harvest one fadman of cotton in the Managil than in the Gezira. On the average one fadman costs a total of 15.62m/sm in the Gezira and 24.27m/sm in the Managil, or more than one and a half times.

Column (9) of table (8) gives total cost per manday. In terms of cost per hired labour, the range is given between a minimum of 132m/sm per fadman and a maximum of 239m/sm per fadman. It costs more per manday in the Managil sample than in the Gezira sample, but the difference is not so big.

(4) Durra labour cost 1966/67:

(4) Cash wages:

Presowing operation of durra costs between 68m/sm and 149m/sm per fadman in Amara Kasir and Matal Block samples respectively. It costs more in the Managil (128m/sm) than in the Gezira sample (92m/sm).

Sowing of durra costs more than presowing. It costs between 144m/sm and 256m/sm per fadman. It costs 175m/sm on the average in the Gezira than in the Managil.

Value of food apart, weeding is the most costly operation of durra. One fadman costs between 582m/sm and 2745m/sm to weed. It cost more in the Managil than in the Gezira.
sample while the latter is paid by Maturab Block sample. It costs more to produce and harvest one feddan of cotton in the Managil than in the Genira. On the average one feddan costs a total of 15,624/= per feddan in the Genira and 24,271/= per feddan in the Managil, or more than one and a half times.

Column (9) of table (8) gives total cost per manday. In terms of cost per hired labour, the range is given between a minimum of 143/= per feddan and a maximum of 283/= per feddan. It costs more per manday in the Managil sample than in the Genira sample, but the difference is not so big.

(d) Manfa labour cost 1964/65:

(1) Cash wages:

Presowing operation of dura costs between 63/= per feddan and 143/= per feddan in Amara Kasir and Mawan Block samples respectively. It costs more in the Managil (128/= per feddan) than in the Genira sample (92/= per feddan).

Sowing of dura costs more than presowing. It costs between 144/= per feddan and 256/= per feddan. It costs 175/= per feddan on the average in the Genira than in the Managil.

Value of food apart, weeding is the most costly operation of dura. One feddan costs between 588/= and 274/= to weed. It cost more in the Managil than in the Genira.
no great variation between cost per manday in the two Managil Blocks though some variation is seen between the Gemira samples, ranging from 139a/as to 301a/as per manday.

(4) Employment Conditions of Migratory Labour:

A detailed study has been carried out on conditions of employment and mode of migration and work of migratory labour. Migratory labourers interviewed in the field and asked about the different agricultural practices they perform, their mode of work, the way they are paid, rate of output, and many other questions. Questions were put in different ways to collect information about home occupation, pattern of expenditure, pattern of migration and structure of the group work. Results obtained are tabulated in tables (9) and (10), for 1963/64 and 1964/65 seasons respectively. Most of the labourers interviewed are mainly picking labourers.

(a) 1963/64 Sample:

During this season a total of 61 labourers were interviewed on the average of 10 labourers per Block sample. No special criteria were followed for the selection of those labourers apart from being adult, capable of work, and willing to answer the questions asked. The majority of those labourers interviewed were from Western Sudan, about 22, representing about 36% of total sample. 18 labourers happened to come from Western Sudan (Arabs,
Baga, and Habilas), while 11 came from Blue Nile area (Arabs, central and Eastern Nilotics), only 4 from the White Nile area (Arabs, central, Eastern and Western Nilotics), and the remaining six came from outside the country, from Chad, Nigeria, and Ethiopia.

The majority of those labourers are adults falling within the age group of 21-30 years of age. About 46% of them fall within this age group. Figure 4 illustrates the age distribution of those labourers. The median age is 26.5 years. All the foreigners with the exception of one are young men of less than 31 years of age. On the other hand, all labourers coming from the White and Blue Nile areas are men of more than 20 years of age. People from Western Sudan are of different ages, but mostly falling within the age groups of (10-20) and (21-30).

As regards occupations of those labourers, at their home areas, results give more than 50% of them being rain cultivators of certain agricultural crops. About 28% are nomads spending part of the year looking for grazing and water for their animals and moving with their animals from one place to the other according to prevalence of grazing land and water. Five of them are hired workers and only three are river-side cultivators along the White and Blue Nile. Most of the people coming from Western Sudan are rain cultivators (78%), and all those coming from the White Nile area are rain cultivators. Those coming from Eastern
Sudan are either nomads, rain cultivators or riverain cultivators. They practice dura cultivation in their home areas, or work as casual labourers in the W.O.D.S. in the Gedaref area. People coming from outside the Sudan are mainly rain-cultivators with only one who works as a hired labourer.

It we separate the reason of migration into classes of migrating for cash income and migrating for animal grazing, then only one labourer migrates for the latter reason. In column (13) we can see that only five labourers have brought animals with them to the scheme. All of these labourers came from the Blue Nile area. Only one of those five labourers has his main objective being animal grazing. The other four are equally interested in both cash and animal grazing.

Column (6) of table (9) illustrates the nature of expenditure of the gained money from cotton picking. Nearly 72% of total labourers spend their earnings on consumption goods. 14 labourers spend their money in buying more animals, while only three spend their earnings in other phases of expenditure such as paying for a dowry, buying a farm, a house or paying farm rent.

The actual time of arrival of labourers in the scheme

37 By consumption goods is meant all materials bought including food, clothes, which the labourers consume by themselves or their families and other relatives.
varies widely, though the majority of the labourers come during the period 16th December to 15th January. The time is divided into five broad periods as follows:-

1) those arriving before December, to work in dura harvest;
2) those arriving between 1st December and 15th December,
3) those arriving between 16th December and 31st December,
4) those arriving between 1st January and 15th January,
5) those arriving after 15th January.

During this season very few labourers came from after the 15th January. Most of those who came after the 15th of January are labourers from Eastern Sudan, with only one from the Blue Nile area. People from Western Sudan came earlier in the season; most of them before the 15th of January.

Most of those migratory labourers return to their homes just after the pulling out. About 60% of the total migratory labourers return after pulling out, while only 15 (about 26%) return just after cotton picking. Only 10 labourers stay for the sweeping operation. Most of those remaining for the sweeping operation are those coming from the Blue Nile area. In fact no labourer from the Blue Nile area left the scheme before pulling out, and four of them remained for the sweeping operation. The seven who returned after pulling out happened to be rain-cultivators (column 4 of table 9). Again there are 17 labourers from Western Sudan who also returned home after pulling out, and
did not attend the sweeping operation. Those who left are also rain-cultivators at their home areas (see column 4 of the same table).

The rate of cotton picking is not altogether uniform among people of different groups or even of the same group. The most frequent rate of output ranges between 1-1/4 (guffas) of seed cotton per week. This interval includes 45 labourers, 22 of them having an output range of 1-7 (guffas) of seed cotton per week, while the remaining 21 have an output range of 8-11/4 (guffas) of seed cotton per week. 18 labourers pick between 15 and 21 (guffas) per week. No labourer is recorded to have an output of more than 21 (guffas) of seed cotton per week. The high output class of 15-21 (guffas) of seed cotton per week contains 9 labourers from Western Sudan, 6 from Eastern Sudan, 2 from the White Nile area, and one from the Blue Nile area. So Western Sudan area represents 30% of total labour in this industrious class. It is the region which supplies the most experienced labourers for cotton picking. Eastern Sudan represents about 35% of total labour of this class.

The way those labourers migrate is also a subject of investigation in this study. Some of them migrate in groups of families, friends, villagers or any other gathering of people. Others may migrate as individuals taking the risk of travel by
themselves, although they may get in contact with others on the way. 50 such labourers do migrate in groups while the remaining 11 migrate individually. Most of those people coming from the Blue Nile area and all of those coming from the White Nile area do migrate in groups of families or relatives. All those coming from the White Nile area also work in groups, but only 8 of those coming from the Blue Nile area work in groups. With those coming from outside the country, those who migrate in groups do work also in groups, while those who migrate as individuals do also work as individuals.

Labourers migrating into the Genira scheme have certain response to changes in levels of wages, though not very significant response. The response is often to a decrease rather than an increase in level of wages. 31 labourers said they will not come to the scheme if wages went down by 25%, while 32 said they will not come if wages went down by 50%. With regards to labourers at home 56 of them said that their relatives at home will migrate into the scheme if wages increased by 25%. The same labourers said the same thing for 50% increase in level of wages. Only five said their parents will be indifferent to whatever increase in level of wages.

(b) 1963/65 Sample:

During this season no interviewed labourer is recorded
to have come from Eastern Sudan. Labour from Blue Nile area has increased by four. Those from the White Nile area have also increased by seven, while those from Western Sudan remained constant. Aliens have increased from 4 in 1963/4 to 13 in 1964/5 season.

During this season there was a tendency towards higher age groups. Thirty five labourers have got their ages being more than 50 years. The median has shifted to 32 years. This shift is an account of a slight increase in labourers in the two age groups of (31-40) and more than 40 years, with a corresponding decrease in the other age groups. All labourers from the White Nile area have an age of more than 20 years. Thirteen out of fifteen of the labourers from the Blue Nile area have an age of more than 20 years. Seventeen out of the twenty two of Western Sudan are men with more than 20 years of age.

Regarding their occupations, again 17 of the total sample are animal rearers, while 31 are rain-cultivators, 12 hired labourers in agricultural or non-agricultural jobs. Only one labourer is recorded to be a riverain cultivator. The riverain cultivator comes from the Blue Nile area. All those labourers coming from the White Nile area, are either nomads or rain cultivators. Fourteen of those coming from Western Sudan are rain cultivators. Five of the foreigners are rain cultivators, and eight of them are hired workers.
From column (5) of table (10) it could be seen that the number of those migrating for grazing their animals is five, (only one labourer has stated his reason for migration being animal grazing in 1963/64). Four of these five are equally divided between the Blue Nile and White Nile areas, and one from Western Sudan area. This last labourer has got the intention of residing in the scheme for good, yet he is preparing himself to find some piece of land to cultivate with dura.

There are more labourers who intend to spend their earnings on buying animals and on other commodities. Sixteen of them wanted to buy animals, and twelve of them mentioned some other phases of expenditure such as marriage, buying land, building a house and many other investments in their home areas. Thirty-three labourers wanted to spend their earnings on consumption goods. Some of them would buy some clothes and women's ornaments.

Very few labourers have come to the scheme before December and after the 15th of January. Only nine came before December, and two after the 15th of January. Most of the labourers during this season came to the scheme in the period between December 1st and December the 15th. Thirty-seven of them returned home just after pulling out, 18 after picking, and only six stayed for the swathing operation. More of the Blue Nile and White Nile
labourers stayed for sweeping. Four of the Western Sudan labourers remained for the sweeping operation, and only two of the aliens stayed for sweeping. Compared to the previous season, very little labour attended the sweeping operation, while those staying for pulling out have increased.

The high yielding groups in the 1964/5 sample fourty nine labourers have an average output per head exceeding eight (guffas) per head per week. Five of those having an average output of more than 8 (guffas) per week, produce more than 21 (guffas) per week per head. All of the five labourers in this class are from Western Sudan, and all of them happened to work in a group of relatives and families. All of them are adult men.

Thirty four labourers do migrate in groups, while 27 migrate individually. Of those migrating in groups, only 27 do work in groups. It is not necessary, however, that those who work in groups do pool their output and weigh it together as one lot. Some people adopt this procedure, others do not. The former are usually families with their heads being a father or elder brother whose common interests are to maximize the family income and save as much as possible for home requirements.

As regards changes in levels of wages and the response of people at home to such changes, the questions asked have thrown some light on the tendency of people to accept jobs outside their home areas. Fourteen of the labourers said that they
have some relatives at home who would migrate if level of wages went up by 25%. Thirty seven said that their relatives would come if level of wages increased by 50%. For those who came to the scheme, forty three said that they will stop coming if level of wages went down by a half, while only 18 said that they will stop coming if wages were reduced by a quarter.

(D) Discussion of Results:

(1) Family labour:

(a) Cotton:

Generally speaking there are more family members involved in agricultural production in the Gezira than in the Managil. During 1963/4, there were 25.7% of total labour employed in the Gezira of the family source. This number was even greater during 1964/5 (21.6%). In the Managil sample family labour represented only 8.7% and 11.1% of total labour employed in 1963/4, and 1964/5 seasons respectively. This may be due to several reasons; for instance:

(i) The average size of the tenancy in the Gezira, being big, entails the employment of more family members to reduce demand for hired labour, and minimize labour cost.

(ii) The average size of the family is bigger in the Gezira than in the Managil, and the percentage of those available for work is even higher.
(iii) Many of the family members are, by tradition and custom, used to work in agriculture even though their contribution may not be so significant, such as young children employed in putting the seeds into holes and in bird-scaring.

On the average there has been less family labour employed during 1964/5 season in the Gezira than in the Managil. There has been a decrease of 2.1 mandays per feddan. The major decrease was during the weeding operation which amounted to 2.3 mandays per feddan. A possible explanation of this may be that during 1963/4 there has been early showers of rains which caused many of the migratory labour make their journey home before the end of the season. Out of necessity, the Gezira tenants have to make up for the shortage from their own family resources. In the Managil many of the hired labourers employed have come from the White Nile area, and hence are less affected by rains, and are in a position to stay longer in the scheme inspite of the early rains.

Although the average yield of cotton in 1964/5 was high (see table 6), yet the contribution of family labour was not very high during cotton picking. In fact there has been a decrease in family labour during the picking season. This decrease was lower in the Managil (1.1 mandays per feddan) than in the Gezira (only 1.9 mandays per feddan). 1964/5 cotton season was highly estimated during early December and January. By the
end of January cotton yield was drastically reduced due to late leaf and boll-worm infestation. This infestation has depressed the morale of many tenants and their families. Many of the tenants and their families preferred to attend other crops, particularly wheat and rotation gardens, than cotton. The consequences of this policy were a decline in the effort each tenant and his family put in cotton picking, and the employment of (tolba) labour which resulted in higher costs of production.

The crop of family labour during picking was very high in the Gezira sample; nevertheless there has been an increase in the post-harvest operation during 1964/5 season. Since total plant population is not affected by a drop in yield due to leaf and boll shedding, the tenant has no choice but to exert even greater effort to pull out the plants. His choice is even narrower as more of the migratory labourers start to make their journeys home, and field inspectors urge the tenants to finish weeding their tenancies before the start of the rainy season.

(b) Dura:

There was a remarkable reduction in total family labour employed in Dura harvest between 1963/4 and 1964/5 seasons (from 15.2 man-days per feddan to 4.2 man-days per feddan in the Gezira sample, and from 4.2 man-days per feddan to 1.5 man-days per feddan
in the Managil sample). The decrease in the Managil sample in however justified by the drop in yield from 2.2 to 1.5 (ardab) per feddan in 1964/5. No obvious reason for the drop in the Genira could be found. However, the high potential yields of cotton during 1964/5 may have induced family members to exert more effort and pay devoted attention early in the season to the establishment of the cotton plots rather than dura. In fact family labour employed in dura harvest has dropped from 2.4 to 1.1 mandays per feddan.

No family labour was used in post-harvest operation in either season. The early rains which caused some damage to dura during 1963/4 was also one reason for the high number of family members being involved in its sowing (rewowing), and weeding. These two operations account for about 60% of total family labour employed in dura production during 1963/4. On the other hand early damage of birds and rats to the crop in the Managil coincided with reduced contribution of family members and almost all the tenants were unable to cover the expenses of dura production.

Looking again in table (4) we can see that the two Block samples which utilized the highest family labour during 1964/5 were Laota and Hanad El Hil Block samples. Referring to table (6), Column 7(2), these two Blocks samples are also the most high
parents' tenancies which is not paid for. This tendency is more noticed in cotton tenancies rather than durra tenancies, and in the Hanagal rather than in the Genira sample. Cotton is still erroneously considered as the 'Government crop'; and as such it receives little attention by the tenant and his family. His efforts and his family's efforts are diverted towards durra whenever they think that durra is going to be more paying.

(2) Hired labour:

(a) Cotton:

Hired labour as % of total labour used in the Genira remained more or less the same for the two seasons, (76.3% and 78.4% for 1963/4 and 1964/5 respectively). There has been a very small decrease in the Hanagal sample (from 91.3 to 85.9%). Hired labour in the Hanagal is more sensitive to yield variations than in the Genira. In the Genira there is a great inclination for the tenant and his family to exert more effort the higher the potential cotton yield, and hence the lower will be the percentage of hired labour. In the Hanagal, and since family labour does not respond highly to yield variations, the tenant is inclined to employ more hired labour the higher his yield estimates. However, the change in either cotton yield and hired labour was not so spectacular as to reflect this general tendency.
In fact the results obtained compare very much with this general concept.

The highest increase in hired labour was during post-
harvest operation. During this operation there was an increase
of 11.1 mandays per feddan in the Gezira sample and an increase
of 5.2 mandays per feddan in the Managil sample.

As has been stated earlier in this chapter, the very
dense plant population of cotton during this season (1963/4),
though not very high in terms of yield of seed cotton, due to
leaf and boll shedding, required a tremendous amount of effort
for its pulling out and sweeping. Since post-harvest operation
of cotton and particularly pulling out is a job not very much
liked by family members, a great amount of hired labour has to
be recruited for the job.

Post-harvest operation comprises the second highest
requirement for hired labour, second to harvesting. Total cotton
hired labour for both the Gezira and the Managil are given in
Figure (2). Harvest operation accounts for about 49 and 50 man-
days per feddan for 1963/4 and 1964/5 respectively. Post-harvest
operation used 21.0 and 29.5 mandays per feddan for 1963/4 and
1964/5 seasons respectively. The two averages for both seasons
are not very different inspite of the great difference in average
yields of the two seasons. Average yield for 1963/4 was 2.48 K.P.F.,
while that of 1964/5 was 2.63 K.P.F. Again the main reason here
in due to the relatively high number of hired labourers which were employed in post-harvest in 1963/4 irrespective of the relatively lower yields of that season.

During 1963/4 season Naturab Block sample gave the highest number of total hired labour in cotton. About 104.2 mandays per feddan were hired labourers. This represents 98.9% of total labour employed in cotton production during that season. On the other hand, during 1964/5 season, the highest total hired labour was employed by Amara Easir Block sample. Total hired labour employed in this sample was even higher than that of Naturab sample in 1963/64 (127.0 mandays/feddan). This represents 93.3% of total hired labour. Although it is the highest absolute figure, yet it does not give the highest percentage of hired labour employed. Naturab Block sample gives a contribution of hired labour even higher than this (98.1%). So it is always Naturab Block which employ the highest percentage of total hired labour. This may be due to the very small amount of family labour being involved in agriculture in this block sample.

Amara Easir Block sample uses the least amount of hired labour in cotton production in both seasons. During 1963/64 there were only 53.7 mandays/feddan of hired labour while in 1964/65 the figure rose to 77.9 mandays per feddan. Both figures are comparatively low. The first represents 57.4% and the
latter 78.7% of total labour employed. The higher contribution of hired labour during the latter season is due to the lower contribution of family labour during this same season. Contribution of family labour in Amara Kanir has decreased from 39.9 mandays/feddan in 1963/64 to only 18.5 mandays per feddan. The decrease in family labour is not due to any reason of a decrease in utilization of family labour. In fact 18.5 mandays per feddan represents the same percentage of total available family labour as that of 1963/64. Both represent about 71% of total available labour in either season. Tables (1) and (5) and Fig. (1) illustrate this conclusion.

Harvest of cotton (cotton picking) accounts for the highest amount of hired labour in both seasons. There has been a great increase in amount of hired labour employed in Gzira during 1964/65 (an increase of 18.6 mandays per feddan) and a very small decrease in Hanigil sample (only 1.9 mandays/feddan). This compares fairly well with the large increase in average yield of cotton in the Gzira sample of about 3 B.F. in 1964/65. In the Hanigil the increase in average yield of cotton is not big neither is the decrease in total hired labour employed.

Generally speaking the Gzira sample utilized less of hired labour and more of family labour in nearly all agricultural operation of cotton. During 1963/64, hired labour represents 76.3% of total labour employed in cotton, while in the Hanigil
it represents 91.3% of total labour employed in cotton. For 1964/65 the respective percentages are 78.4% and 88.9%. Irrespective of cotton yields there is more tendency for the tenants to employ, as far as possible, the highest amount of family labour and the least amount of hired labour in the Gezira.

(b) Hired labour in dura:

There has been a very high decrease in the amount of hired labour employed in dura in the Managil sample. Hired labour contribution has decreased from a total of 32.2 mandays per feddan in 1963/64 to a total of 19.6 mandays/feddan. In the Gezira the total amount of hired labour remained more or less the same (from 23.0 to 24.9 mandays/feddan). The decrease in the Managil was evenly distributed over all agricultural operations. Not a single operation has taken the biggest share of the decrease. In terms of dura yields, the Managil has seen the largest depression in yields during 1964/65 season. The sample shows a decrease of 0.6 arshab/feddan (from 2.2 to 1.6 arshab/feddan). The Natural Block was responsible for the greater share of the drop in yield. There has been on the other hand, a very slight increase in dura yields in Gezira sample (from 2.6 to 2.8 arshab/feddan). The slight increase in dura yields in the Gezira has induced recruitment of more hired labour, even more than the increase in family labour. Hired labour in the Gezira
represents 60.2% and 65.6% of total labour in 1963/64 and 1964/65 respectively. The low yields of dura in 1963/64 have discouraged many family members to be involved in its harvest. Many of them preferred to work in some alternative crops such as vegetable gardens and groundnuts production, and preparation for the picking of cotton which was promising at that time.

The least hired labour in dura was employed in Lacta Block sample. There has been only 16.5 mandays/feddan during 1963/64, and 17.8 mandays/feddan during 1964/65. The former represents 54.4% of total labour employed, while the latter represents 77.1% of total labour employed. This is a reasonable finding in terms of dura yield and partial substitution of hired labour by family labour. There has been a high increase in dura yield in this block sample from 1.2 to 2.8 ardat/feddan.

This increase involves more hired labour to be employed in its weeding, harvesting and post-harvest operations. During 1963/64 a very high amount of family labour has been employed in this Block sample, 15.8 mandays/feddan, which reduced the number of hired labour to only 54.4% of total labour employed. During 1964/65 the contribution of family labour in Lacta Block was reduced to only 22.5% of total labour in this Block sample. However the reduction in number of family labour was not due to any reasons of crop failure. It is presumably due to many family members being involved in the preparation for the picking season. This may be by sending family members to recruit
labour or by actual involvement in field preparation. However, the very high decrease in family labour did not affect very much the total amount of labour employed in dars. This is because there are always certain tasks, viz. those done before harvest, which are very little affected by yields and have to be done irrespective of availability of family labour. Some of these tasks are sensitive to delay such as sowing and weeding and are performed by (tolba) if the need arises.

(3) Cost of production:
(a) Cotton:

Generally speaking there has been an increase in total cost of cotton production in 1964/65. The operations selected for the survey are the most important ones including pre-sowing operations (viz. land levelling, furrow-making, and fertilisers application), sowing, weeding, harvesting and post-harvesting operations. The last includes pulling out, sweeping collection and burning of cotton stalks and debris. Costs include cash payment and value of kind wages and any other advances or gifts received by labourers. In the Gezira there has been an increase in total cost of £3.1,918 per feddan cultivated. In the Managil the increase was even highly remarkable, £3,551 per feddan. Most of this increase was attributed to the high amount of kind wages paid and advanced payment which is called (Balash), an Arabic word for free payment, or payment made for no specific work done. In the Gezira the value of these kind payments and (Balash) amounted to £3.2,423 per feddan in 1964/65, and £3,4,245 in the Managil for the same
season. These two figures represent 17.4% and 17.4% of total cost of production in these samples. During 1963/64 the value of such kind wages represented only 7.6% and 20.2% of total cost in Gazi and Managil respectively.

Competition for labour has become very acute and as a result tenants have to peramand labourers by all means to attract them to their fields. The development of the Managil Extension has a twofold implication. First it resulted in shortage of labour by absorbing many of the traditional pickers of the Gazi as tenants in the new scheme. Secondly the new extension is now competing for the remaining sources of hired labour for their own needs. The inexperience and lack of skill among the Managil tenants is even complicating the issue, in that, the tenants have to compensate for their low productivity by employing even more hired labour. To do so they have to enter into competition which is often a non-equitable one. The Managil tenants do pay more to attract more labour to their area and hence they raise the market price of labour. Supply being already running short of demand in the Gazi, the Gazi tenants have to face the defiance of their new rivals.

Not only value of kind wages which is showing some rise but also general levels of wages are increasing in both the Gazi and Managil. Apart from local variations dictated by differences in climate, in soil, in rotation and in crop and
animal husbandry, levels of wages do vary from place to place according to supply and demand and forces acting on available labour. This increase in level of wages in again more noticed in the Managil than in the Genira. In the Managil for instance the cost of weeding has risen from an average of £1.3.16/- per feddan in 1963/64 to an average of £1.6.17/- per feddan in 1964/65. Harvesting cost has also increased from £3.5.0/- to £3.8.06/- per feddan. The high cost of harvesting in 1964/65 may be due to the higher average yield of cotton during this season. But since the increase in yield in Managil was not so high as to affect total cost to that extent this possibility is a weak one. This is also illustrated by results from the Genira sample. While the sample shows a very high increase in cotton yield in 1964/65, total cost of production in the Genira was high especially for the pre-harvest operations. As for harvesting and post-harvesting there has been an increase in cost of labour of £2.58/- and £3.1.28/- per feddan respectively. So the increase in the cost of these two operations is surely a result of either more hired labour being involved per feddan or higher wages. But from the results of labour analysis discussed above, the increase in hired labour in these two operations was not so high as to affect total labour cost. So the first supposition is a weak one.

By comparing column (10) in tables (7) and (8) it is shown that the Genira has experienced a decrease in cost per munday
while the Managil has experienced an increase in cost per
munday. The former illustrates that the same labour has cost
less or alternately that more labour has cost the same for
1963/64. In the Managil it might be concluded that the same
labour costs more and that labour cost has increased. amara
Nasir and Namad Al Nil Block samples show the highest total cost
per munday. Both give a total of 26.136 per munday. This is due
to the relatively smaller number of hired labour employed in
these two Block samples during 1963/64 season. During 1964/65
it was Nairab Block which gave the highest cost per munday.
This is largely due to the high cost incurred by post-harvest
operation and the value of kind wages offered. Weeding also
accounts for the highest cost in terms of cost per feddan.

In general cost per unit area cultivated is higher in the
Managil sample than in the Genira sample, because

a) Rates of payments are higher in the Managil than the Genira.
b) Value of kind wages offered is higher in the Managil.
c) People being mostly from adjacent areas of the Blue and
White Niles stay longer and as a result get more for their
work, especially towards the end of the season.

Cost per munday also tended to be very high in the Managil
during 1964/65 season. This may be due to the very high value of
kind wages and the very high general level of wages towards the
end of the season. Cost of transport, being mainly by road, is met by the tenant and is included in column (9). It accounts for a very high proportion of total value of hired wages.

(b) Duras

In the Managil the total cost per feddan in 1963/64 was £3.6.973 which rose to £5.8.407 in 1964/65 season. In the Gazar there was a slight drop in total cost per feddan from £3.3.927 to £2.5.540. The increase in cost in the Managil is again due to the three reasons mentioned above in the case of cotton. Inspite of the drop in average yield of 'duras' during 1964/65 season in the Managil, cost per feddan was higher than in 1963/64 season. Looking on tables (7) and (8) we can see that most of the cost occur in column (4) which is weeding. Weeding accounts for £5.2.080 and £8.2.947 per feddan in 1963/64 and 1964/65 respectively. The tenants made great effort to establish their crops in the earlier stages, but failing to attain a suitable growth they paid little attention towards later stages. Nevertheless the average costs for all operations were higher than in the Gazar.

During 1963/64 Aanra Kazir Block sample gave the highest figure for total cost per feddan 'duras'. This was primarily due to the high cost of seeing and weeding per feddan. During this season most of the tenants in this Block suffered from very heavy rains in early July and August. Many dura tenancies were sown and
reason, while others completely failed to establish any durra plots. Even those which were established suffered from heavy weed infestation which resulted in increasing costs of weeding. It was only with great difficulty that the tenants were able to attain an average yield of 2.6 erakah per feddan during this season.

During 1964/65 Maturab Block sample gave the highest total cost per feddan. Cost per feddan in this Block sample is nearly twice as much as in Lacta Block sample (column 8 of table (8)). The high cost is due to the value of hired wages being very high. Cost of weeding was also high (second to Halan Block sample). This Block scored the highest average yield of 'dura' during 1963/64 season (3.2 erakah/feddan). Being enthusiastic about their past they were more optimistic to score even higher yield figures in 1964/65 season. So they spent generously in establishing their crops and in attracting labour to work with them. Most of those labourers were migratory labourers who are fed and sheltered free during their work. Many of them stayed for the picking season.

In terms of cost per manday, Lacta in 1963/64 and Halan in 1964/65 gave the highest figures. The former gives £2.336 and the latter £2.443 per manday. Both those two samples employ the least hired labour in cotton in these two seasons. Lacta Block employed only a total of 16.5 mandays per feddan representing 34.4% of total labour employed. On the other hand Halan
Block sample employed only 18.3 mandays per feddan but representing 90.2% of total labour employed. So although the cost per feddan in these block samples was low, because of the relatively smaller number of hired labour in these two samples cost per manday was very high.

In the Gezira no attempt was even made to calculate cost of labour in terms of hired labour employed. Most attempts so far made relate cost to cultivated area rather than labour input, since labour is the most limiting factor cost per unit labour is of crucial importance to the decision-maker. It also reflects the regional variation in costs of labour and the different levels of wages offered for different crop operations and for different types of labour. The Western Sudan tribes, for instance, are more industrious and as such they cost more to recruit and attract to work. People coming from outside the scheme area also cost a lot of money in terms of cost of transport, of shelter, and of food. Local labour does not cost more than the actual wages paid for the job done. This conclusion leads us to discuss certain features of migratory casual workers in the scheme.

4. Employment conditions of migratory labour:

Most of these pickers are primarily rain cultivators at their own home areas, while still others are pastoral rearing their animals during the rainy season. Very few are hired labourers, mostly hired labour in the N.C.F.S. and Nuba Mountains. This
reflects the relative lack of dependence of those people on cotton picking. It is true that their home occupations could neither take them for the whole season nor provide them with sufficient food and cash returns if they did not migrate. But if development of these areas took place to overcome this limitation, it would become necessary to make up for the shortage of labour which might ensue. The response to a change in level of wages is not so great even among those left at home. It seems that those who used to migrate do not do so out of necessity as it is out of tradition and conception. Most of them would migrate even if wages were decreased by 50%. Among those with relatives left at home, nearly all said their relatives would not migrate even if wages were raised by 50%. It seems that there is a certain kind of job allocation among those people which dictates the number and kind of people who are to migrate in any one season. There are certain minor jobs at home such as looking after the children and old men and caring for animals which are occupations for women and children who are usually left at home.

Although most of them state 'cash income' as the main reason for their migration, many of those labourers do not understand exactly what is meant by cash income. Many of those who bring their animals with them, spend more time caring for the animals than doing the job for which they have taken the trouble to come. In a way grazing must therefore be one reason for
migration. Some of these bring large numbers of animals for sale especially when they are fattened on the picked cotton tenancies and the dry 'qanab'. However, the majority still come for each irrespective of the phases of investment, be it buying more animals, paying a dowry, building a house or any other investment. However, most of the pickers spend what they earn from picking on consumption goods such as food, clothes and other items of immediate benefit and shorter life span. Very few are really enterprising.

The distribution of picking labour according to the date of migration does not follow any specific trend. But it seems that Blue Nile and White Nile areas start earlier than Western Sudan and Eastern Sudan tribes. Most of the labourers start migration between 15th of December and 25th of January. They may reach the scheme by mid January or early February. However the peak of labour accumulation in the scheme is reached by 15th of February. During 1964/65 the starting date of migration was as early as 1st of December. This was an effect of the early mission of the Permanent Committee for Picking Labour to the Western Sudan. Some of the labourers came to the scheme as early as November or even October and joined in 'turn' harvest, before they were enrolled in cotton picking.

The return journey specially of those depending onrain
cultivation is determined by the rainy season. The earlier the rainy season in any one year the earlier the pickers return to their home areas to prepare their lands for cultivation. Some pickers are less affected by the rainy season but respond very much to cotton yields during picking and density of plant population during pulling out. Both operations are performed on a piece rate. In case of picking the higher the yields of any one place the greater a picker can pick per unit time, and hence the greater the tendency for pickers to stay in such tenancies. On the other hand, the higher the plant population in one region, the greater the effort one has to exert in any one ‘angaya’ during pulling out and hence the less will be his output per unit time. People tend to leave earlier the less is the premium they get and the less is the return per unit time. During 1964/65 season, in spite of the high cotton yields most pickers left as early as late March. This was a consequence of the early rains. Very few people stayed for the sweeping operation. None of those coming from the Blue and White Nile area attended the sweeping operation.

As expected, the higher average yields of cotton during 1964/65 increased efficiency of picking. Five of the pickers (all of them from Western Sudan) have an output of more than 21 (guffas) per week. Only 12 of the pickers during 1964/65 have an average output of less than 8 (guffas) per week, most of them were pickers coming to the scheme for the first time (4 of them
are foreigners from Ethiopia). Experience has a great role to play in cotton picking. Even the slightest deviation from the normal or ideal method of picking such as using one hand to open the sack and picking by another instead of using both hands in picking, may result in great loss of efficiency of production. Work study in this connection may be essential to throw more light on time and effort lost due to lack of organisation of labour or/and field efficiency.

Most of these labourers do migrate in groups of families, friends, tribes or even religious castes. Nearly all of those coming from Blue Nile and White Nile areas during 1963/64 migrated in groups. It is not necessary that those migrating in groups do work in groups. While the total numbers of pickers migrating in groups were 50 and 54 in 1963/64 and 1964/65 seasons respectively, only 66 of the former and 27 of the latter do work as a group. They work together, collect their seed cotton together in one heap and weigh together. People of the same family pool their wages which are oftenly received by one man usually the head of the group, (father or older son).

Referring column (11) of table (9) back to column (9) of the same table, we might suggest that people working as a group are usually more productive. The five who scored the highest output per week in 1964/65 were from the ten who work as a
group in Western Sudan category. The higher efficiency in group work probably arises out of the competition among members of the group to score the highest output per day and also because of the wise leadership of the head of the group who is usually a father, an elder son or a religious old man. The willingness to work under such leadership increases tendency to stay longer in the field. Work is usually divided among the members of each group, that one or two are always free to do the food for the rest of the group. There is a certain kind of social security as provided by the presence of the whole family or friends together. There is also a kind of economic security provided by the animal milk which they usually have with them, and the stability of returns provided by milk being sold and one or two goats to provide some cash whenever the need arises. All these factors contribute to the efficiency of production and willingness to work.

Conclusions:

1) A relatively good season in the Gambia Scheme usually entails more effort to be put in agriculture. This effort may take the form of more family members being involved in agriculture, more effort in recruiting labour from outside the scheme area, and the retaining of these labourers for the longest possible time.

2) These efforts also entail higher costs. These costs are paid for recruitment, transportation, shelter, food, and cash payments.
The poorer the yield of cotton or dura, the more remote the area and the less the contribution of family labour, the more difficult it is for the tenant to meet his labour costs.

3) The Blue and White Nile areas by virtue of their proximity to the scheme and the old established contacts between them and the tenants, are more ready sources of labour. They tend to stay longer and cost relatively less. Their general high standard of performance puts them on a better scale of preference though some Eastern Sudan tribes are no less productive.

4) Eastern Sudan as a source of labour is retaining its importance. They tend to respond very little to changes in wage levels, neither do they stay once their goals are secured.

5) Most of the labourers who come from Eastern Sudan are those coming from Kassala and Gedarif area. The recent development which has taken place in this area has absorbed many of these pickers either as farmers or as highly paid hired labourers. The ever continuing development is still taking more people in construction works of buildings, bridges, dams and canals. The development in the El Girba and Gezira Schemes is further absorbing more labourers as farmers, reducing the traditional labour force for the Gezira Scheme.

5) The Managil Extension with its inexperienced tenants and the greater number of holdings per household has further intensified the dearth of labour. Those farmers used to provide labour
to the Gezira (main) Scheme. They are now competing for labour with the Gezira over and above the shortage which resulted by themselves being tenants. Total number of labourers employed per feddan in the Macgill exceeds that in the Gezira, because of the inefficiency of the former and the very small contribution of family labour in agriculture.

The results of this study are not, however, intended to be comprehensive and conclusive in the sense that they represent the whole Gezira Scheme. The sample is by no means so large as to be representative of the Scheme. But it may help to throw light on the labour problems in the Scheme and lead to further testing of hypothesis relevant to the topic.
CHAPTER (V)

THE PRESENT AND FUTURE DEMAND/SUPPLY POSITION FOR LABOUR IN THE GENIRA AND POSSIBLE MEASURES OF MITIGATING EXCESSIVE DEMAND.

(A) PREAMBLE:

In Chapter (II) I have drawn attention to the large demand for labour that the present rate of agricultural expansion is already making and will probably make in the future. In Chapter (III) and (IV), attention was focussed on the position in the Genira Scheme, concluding with a discussion of the position as seen from the point of view of both tenants and labourers. Chapter (V) will be concerned with first, a closer investigation at the factors likely to affect the demand/supply situation in the Central Sudan in the near future, and second, with an examination of a series of changes which might be introduced to ameliorate the position.

(B) EXAMINATION OF LABOUR SHORTAGE IN CENTRAL SUDAN: 38

Demand for labour varies with variation in nature of crop and cropping system involved, and the technique of production followed. Results of the sample survey in the Genira Scheme show that the highest demand for cotton picking during 1964/65 season accounts for about 50% of total cotton labour. It is equivalent to about 56 mandays per feedan.

38 The term labour shortage in a vague and relative measure of labour availability, unless it refers to a certain point in time at a certain price and for a specific plant and/or animal occupation.
This figure includes all family and hired labour. Labour require-
ment also varies greatly for different cropping systems of cotton,
dura and many other crops in one crop rotation.

Bumper cotton crops occasionally result in acute labour
shortage during the picking of the crop. It is uncommon that pre-
harvest estimates of labour requirement and estimates of cotton yields
early during the flowering of the plants are quite erroneous. Estimates
of cotton yields in the Gezira during 1961/2 season were far below
actual cotton yields, that the recruited picking labour failed to
meet actual demand.

The last four years have seen a great variation in the amount
of hired labour used in cotton picking in the Gezira Scheme. These
four years have seen a vast development in the cultivated area in the
Scheme and in other parts of the country. Nevertheless the percentage
increase in labour during picking in the Gezira is about four times
the percentage increase in cultivated area. While picking labour has
increased by about 12% per year since 1961/62 total cultivated area
has only increased by 3.1% per year. This may however be attributed
to one or both of the following reasons:–

a) That labour productivity has declined, that more labour
is required to do the same job that is previously done by fewer
labourers.

b) That there has developed a tendency for the tenants to rely
more on hired labour as their family members refrain from manual work
in agriculture.
Either of these reasons may be possible, but the former is more stronger than the latter on account of the large numbers of the experienced traditional pickers being absorbed in the newly developed agricultural schemes, and their replacement by less experienced and less efficient pickers. Low yields of the crop also tend to discourage migratory labourers especially when yields of food crops are favourable at home. As low yields usually mean lower output per unit time, and hence lower incomes, labourers tend to be attracted more by areas where cotton yields are high.

Accurate estimates of labour requirement are very difficult to make in agriculture where factors beyond the control of the decision-maker (the farmer) do prevail factors such as weather conditions, and changes which may result from alterations in cropping systems are very difficult to control before some symptoms are shown. Weather exerts a very strong influence over the time and duration which a certain plant operation may take. It is also essential to study the influence of social and economic factors at different levels of production and at different times of the year. The amount and structure of the labour force required in each case is particular and a function of the cropping system and crop operation in force. It is a function of the social ties which hold between labourers on the one hand and tenants on the other. Perhaps the classification of labour according to source may help to throw more light on the characteristics of labour and the position of supply and demand in agricultural production.
1) Family labour:

The average size of the family in the Gedira (main) is relatively larger than in the Managil Extension. The size of the family members available for work is also higher in the Gedira (main) than in the Managil Extension. People tend to marry at a very early stage and as a result the size of the family is growing at a faster rate relative to the size of the holding which is normally fixed. The returns from farming are even diminishing. Children are becoming a great burden on their parents, and it is quite normal that a child begins his independent life at a very early stage of his life, in an attempt to relieve his parents from the onerous obligations of feeding and clothing him and to subsidize their parents' income.

Some young men may go out for work in towns but still there are some young children and old men and women who live with the tenant and depend on him for their living. With the continuous decrease in returns from farming, young men continued to stay away from their homes, while sending some remittances to their parents from time to time which helps to meet some of the labour costs, and other costs incurred by the farming enterprise. This tends to decrease the tenant of a free source of labour which might have reduced demand for hired labour. It depends, however, on how much can the tenant save by employing his family members on his own farm. Are the remittances sent by the son to his father greater or less than the net benefit those young people would have made on holdings?
through their manual contribution? It may be to the advantage of the tenant if he pays for his labour to get a net return of Rs. X, if remittance is bigger. The following calculations may illustrate the profitability of these two alternatives.

A member of the family working full-time in agriculture may perform the following tasks in cotton and durra tenancies:

### a) Cotton tenancy:

<table>
<thead>
<tr>
<th>Operation performed</th>
<th>Value of work done</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weeding 1/20 and 1/6</td>
<td>150 P.T.</td>
</tr>
<tr>
<td>Weeding of road</td>
<td>0.50</td>
</tr>
<tr>
<td>Sowing (3 angayas at 39 P.T.)</td>
<td>117</td>
</tr>
<tr>
<td>Weeding (3 angayas at 72 P.T.)</td>
<td>216</td>
</tr>
<tr>
<td>Weeding (3 angayas at 60 P.T.)</td>
<td>180</td>
</tr>
<tr>
<td>Weeding (3 angayas at 43 P.T.)</td>
<td>129</td>
</tr>
<tr>
<td>Watering (12 waterings at 50 P.T.)</td>
<td>600</td>
</tr>
<tr>
<td>Picking (90 guffas at 10 P.T.)</td>
<td>900</td>
</tr>
<tr>
<td>Pulling out (3 angayas at 25 P.T.)</td>
<td>285</td>
</tr>
<tr>
<td>Sweeping (3 angayas at 33 P.T.)</td>
<td>159</td>
</tr>
<tr>
<td>Sweeping (3 angayas at 36 P.T.)</td>
<td>114</td>
</tr>
<tr>
<td>Sweeping (3 angayas at 27 P.T.)</td>
<td>681</td>
</tr>
</tbody>
</table>

**Total:** 3,281

### b) Durra tenancy:

<table>
<thead>
<tr>
<th>Operation performed</th>
<th>Value of work done</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weeding 1/20 and 1/6</td>
<td>0.75 P.T.</td>
</tr>
<tr>
<td>Weeding of road</td>
<td>0.25</td>
</tr>
<tr>
<td>Activity</td>
<td>Hours</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------</td>
</tr>
<tr>
<td>Sowing (3 angayas)</td>
<td>1.5</td>
</tr>
<tr>
<td>Weeding (5 angayas)</td>
<td>0.5</td>
</tr>
<tr>
<td>Weeding (5 angayas)</td>
<td>0.5</td>
</tr>
<tr>
<td>Watering (2 waterings)</td>
<td>1</td>
</tr>
<tr>
<td>Harvesting</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
</tr>
</tbody>
</table>

The contribution of family labour in other crops is not so regular as to evaluate with any degree of accuracy.

If the same family member is to work as a hired labourer in some other occupation on a day-to-day basis at 50 P.T. or month to month basis at 900 P.T., then his gross income will be 10800 P.T. per year. Assuming that he sends 1/2 of his earning back to his parents then his contribution to his parents will be 2700 P.T. per year. Besides this, the son will be subsidizing himself entirely from his income. So provided that the tenants get some reasonable share of their son's incomes, it may be advantageous for the tenant to send their sons for non-agricultural employment while hiring for agricultural jobs in their tenancies.

The contribution of family labour in agriculture is continuously decreasing. Family members including the tenant himself are less inclined to agricultural work. The Managil Extension, perhaps of the smaller average size of family, suffers more from shortage of family labour. The immobility involved here is one of the socio-economic factor implied by the unavailability of labour for social

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*39 It is by law that the parents can raise a claim over their adult working son for a 25% of the latter's income.*
and economic reasons. The Mungall Extension is now facing a very critical labour situation which calls for immediate action. Deployment of family labour in certain jobs such as weeding and cotton pulling out is still considered as a job unsuitable for family labour. These operations involve a very high manual effort. The family members are therefore regarded as the last resort in these operations. They represent a potential source of labour whose utilization is hindered by social and economic factors.

2) Local labour:

These are labourers usually residing within the scheme area. They may be locally living in villages separate from the tenants' villages, known as labour camps, or mixed up with the tenants in the same villages. The former are usually residents of West African origin who are traditionally different from the local inhabitants of the area. Among the local labourers there are certain groups of people who are entirely dependent on wage employment in the scheme. Many of these people provide (tola labour) and get their payment directly from the scheme field staff. Others may have some semi-permanent jobs. The inclination to hire themselves out is therefore very much dependent on the kind of job they perform besides agriculture.

Increasing or decreasing the levels of wages seem to have but a very small temporary effect on those who have some alternative occupations. On the other hand (tola labour) respond highly to
increases and decreases in level of wages. Such (tolba labourers) are always exposing themselves to boycotting by the tenants. Foreigners, who used to do this kind of work are less affected by such behaviour.

The tendency of certain groups of people to accept higher or lower wages tends to classify the tenants themselves into two broad categories:

i) those tenants who are willing and capable of paying higher wages,

ii) those tenants who can pay only the normal rates of payment.

From this classification of tenants into economically able and economically unable, it follows that the resident labour as well as the migrant labour are themselves identified accordingly. Labourers having a certain measure of skill and experience and by virtue of their acquired qualities get higher wages than other labourers. This tendency has recently been more prominent when skilled and experienced labour has become a rare commodity in recent years.

3) Migratory labour:

The utilization of migratory labour could further be improved by improvement in its distribution and mobility. Compared to some African countries such as Kenya and Uganda, a Sudanese labourer seems to pick more cotton per day during cotton picking.
In Uganda one man working for a complete 7-hours day can only pick a maximum of 18 lbs. of seed cotton under normal conditions of plant growth and an average yield of seed cotton. Compared to the Genira average picker, this figure is exceptionally low. In the Genira, a picker working for a 7-hours day, can pick an average of about 75 lbs. of seed cotton. Figures higher than this are, however, no exceptions among labourers of West African origin who tend to spend relatively longer periods of time on work. There are of course certain natural forces which tend to reduce efficiency of work in Uganda, such as higher relative humidity and the shorter cotton stands, and the consequences of these phenomena on output and efficiency of production.

A certain degree of variation does take place between different groups of migratory labour and between members of the same group working under different conditions in two or more adjacent blocks or even tenancies. This variation is the result of so many other variables under these conditions. The distance to travel between blocks or tenancies accounts for a certain amount of time being lost for work. Some blocks may at certain times of the year and particularly during cotton picking run short of labour for the sole reason of unavailability of labour at the right time to perform certain urgent tasks which are sensitive to delay. The employment of a large number of manual workers in the M.C.J.S. for weeding implies that a great source of migratory labour

40 Personal contact and discussion with M. Hall, Research Assistant, Makerere University College, Uganda, Dec. 1964.
is being lost to the Gezira Scheme during that particular time. On the other hand, the Western Sudan tribes being primarily depending on rain cultivation, are less inclined to migrate during May-October period during which they cultivate their crops and tend to their animals. Labour may be available in certain adjacent areas, but its utilization is denied for another area where costs of transport are to be met by the tenant and where the distance to travel is too big as to discourage any further movement.

The extensive nature of sharing labour in two tenancies of cotton during picking in the Gezira Scheme, has reduced labour demand by half. Two adjacent or even non-adjacent tenancies but with different times for picking may pool their labour together and perform picking in an alternate manner. The number of hired labour per feddan is the same but total number is reduced and time lost in travelling is minimized to the distance separating these two tenancies. Labourers have to move only once a week from one tenancy to the other. No time is lost in looking for job and the labourers are informed before hand by the manner in which they are to move.

In the Hanigil extension, the labourer is free to work for any tenant. His only preferences are those which give him greater financial satisfaction.

Provided a tenant is able and willing to pay for the work done his labour position will be more stabilized and more secured than poor tenants who have to compete with well established tenants.
The desire for more profitable production, and the decay of superstitions and more thoughtful plans for the future, demand more improvement in conditions of work. The new developing ambitions of the labourers tend to create more waste and greater interest in the future. Children having a certain standard of education are very reluctant to take jobs which involve exertion of manual effort or which they consider as disgraceful or degrading to their academic qualifications. They would rather prefer to work in clerical jobs or even as hired workers in town. This is becoming a feature of the peasant society in the Sudan. Many of the young men are attracted by town lights and induced by town civilization.

The level of wages do sometimes reflect the general tendency to leave agriculture. In the desert, however, the general response to an increase in the level of wages by tenants is not so great among migratory labourers (see Chapter IV), as to cause large movements in traditional supply of labour. Quite a great proportion of casual migratory labourers are not sufficiently induced by higher wages. They would rather prefer to keep to their traditional subsistence occupations rather than make a move which might involve higher risks. This tendency to leave home may be more felt among young men whose purpose is, for instance, to earn money for dowery or to buy more animals, or for those who have not seen very much of the outside world and are keen to do so.
On the other hand an increase in the level of wages entails that returns from agriculture will be lower to the tenant, as he has to meet those labour costs from his crop returns. This may force some tenants to leave agriculture as they become badly indebted to their creditors. The tendency for this to take place in the Gesira (main) is very low. The tenancy in the gesira (main) is considered as a home as well as a source of living; and as such it is invaluable to the tenant and his family. A tenant leaving his tenancy for failure to make economic returns may regret his decision for the rest of his life, and he will provide an example of weakness in his community. In the Nonagil many tenants have left their tenancies before the bad crop seasons of 1959/60 and 1960/61.

However, since the wants and needs of the migratory labourers are limited and may be expected to remain limited for the near future, the financial incentives as represented by higher wages and/or some other non-monetary incentives will not be expected to have an immediate effect on the productivity or labour supply. It is very common that an increase in wage levels beyond a certain limit may even retard the flow of labour into the agricultural industry. When people begin to have a preference for manufacturing industry rather than agricultural industry, when their response to leisure is greater than their response to money earnings, the effect of an increase in level of agricultural wages will not be so significant. Likewise the offer of non-monetary incentives as
provided by better work conditions and abundant grazing facilities for animals have but very little short-term effect.

The preceding argument of labour shortage can then be summarized in the following points:

1. There is no doubt that labour requirements in Central Sudan are seasonal and uneven.

2. Future extension of irrigated and rainfed agriculture will increase demand particularly at certain periods of the year.

3. Wage rates are already rising in most agricultural areas which indicate the future demand for labour and the possible competition which might arise.

4. More difficulties are expected to come out during heavy yield seasons.

These tendencies are made worse by:

(i) tendency to withdraw family labour or for some members of the family to migrate into urban centres;

(ii) tendency for elasticity of labour supply to be small;

(iii) tendency of efficiency of casual labourers to be uneven and in most cases low;

(iv) some inefficiencies in deployment of labour within scheme.

(c) METHODS TO IMPROVE LABOUR POSITION:

According to the half monthly reports of the S.O.S. for
cotton picking labour, there has been some 286,550 labourers employed during the picking season of 1964/65. Some 91,450 of these labourers (about 30% of total labour) are from local resources. However, with the extension in cultivated area in the Sudan, and inspite of the employment of more advanced techniques of production the need for more skilled and more trained personnel has developed. As more land is being cultivated in the country such as Khashi El Girba Scheme, Kassala, Roseires, and Rahad Projects, and through the improvement in conditions of employment, a change in labour situation is expected. Some new sources of labour have recently been drawn into agriculture. Provided those labourers are willing and able to lead a life of their own which in itself sufficient to meet their sustenance requirements, and leave them with a reasonable profit, there is very little inclination for them to migrate to the Gezira or any other scheme.

Now that the Nile waters are available for further expansion in cultivated area, and its use a bit earlier than before is possible, some new areas and new crops have been introduced. On the Eastern side of the Blue Nile development is now going on to make use of the fertile land through the use of water from the Rahad River and the Roseires Dam. The planned area approximates 3.5 million feddans (430,000 feddans) of arable land. The density of population of the scheme area though not very high, about 45,000, yet more people are expected to migrate from the North and North Eastern Nomadic areas. On an average of five members of the family,
and provided all heads of families are able and willing to take up tenancy in the scheme, the original population will only provide some 9,000 tenants. But according to the planned cropping system (3-course rotation), some 25,000 additional tenants will be required to give a total of about 34,000 tenants. This deficiency is assumed to be met from neighbouring areas of the Nomadic and Semi-nomadic Beja and Hadendawi people of Kassala Province.

However the Rahad Project is not yet fully recommended by the Government. If larger holdings and larger numbers of employed labour are decided upon, this might alter the situation. The Acula 4/42 cotton, which is the variety recommended for cultivation, will have its peak labour demand round about late December or early January. An average of 35,0 mandays per feddan during picking will be required. This peak although does not coincide with the peak in the Gezira yet it will reduce the effective time which the labourers may spend in the Gezira by delaying time of recruitment. There will be some kind of competition for labour during this particular time of the year (late December - early January). The Gezira tenants may find it inevitable to increase their bids for labour so as to persuade more labourers for work in the Gezira. The result may even be an increase in cost of production on account of the high cost of labour.

The first six years of the Rahad project are expected to be for construction works. This requires a certain amount of skilled
and unskilled labour, both Sudanese and foreigners. It is doubtful whether the scheme will be ready for production before six years. However on the assumption that production starts on the 6th year onwards the following numbers of skilled and unskilled labourers are required.

<table>
<thead>
<tr>
<th>YEARS</th>
<th>MANAGEMENT</th>
<th>FOREIGN SKILL</th>
<th>SKILLED</th>
<th>UN-SKILLED</th>
<th>DRIVERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-</td>
<td>20</td>
<td>110</td>
<td>270</td>
<td>90</td>
</tr>
<tr>
<td>2</td>
<td>-</td>
<td>235</td>
<td>1765</td>
<td>4900</td>
<td>90</td>
</tr>
<tr>
<td>3</td>
<td>-</td>
<td>245</td>
<td>1930</td>
<td>4700</td>
<td>265</td>
</tr>
<tr>
<td>4</td>
<td>60</td>
<td>050</td>
<td>1000</td>
<td>2870</td>
<td>430</td>
</tr>
<tr>
<td>5</td>
<td>120</td>
<td>-</td>
<td>950</td>
<td>3050</td>
<td>475</td>
</tr>
<tr>
<td>6</td>
<td>150</td>
<td>-</td>
<td>415</td>
<td>2160</td>
<td>670</td>
</tr>
<tr>
<td>7</td>
<td>160</td>
<td>-</td>
<td>425</td>
<td>2250</td>
<td>670</td>
</tr>
<tr>
<td>Ongoing</td>
<td>160</td>
<td>-</td>
<td>425</td>
<td>2250</td>
<td>670</td>
</tr>
</tbody>
</table>

Source: Hunting Technical Service LTD, Khartoum.

From the 6th year onward labour will be required only for agricultural production. The following table illustrates the distribution of labour on different crop operations of different crops expected to be cultivated in the Rahad Scheme. The recommended rotation is a 5-course one, of Acacia cotton, Ashford groundnut, and durra. Acacia cotton is expected to occupy about 143,000 feddans. The highest labour demand will thus be during cotton picking when
a total of 20 mandays per feddan is required. The dura area will be half that of cotton and the total labour demand is nearly half that of the Acala cotton. Labour requirement for groundnut will be higher than that for dura though not higher than Acala labour demand.

In the Gezira the peak of labour demand falls within the January-April period (30 mandays/feddan) when cotton picking is the main occupation in the scheme. On the other hand the main peak in the Sahel will be during October-January period which utilizes about 46 mandays per feddan.

<table>
<thead>
<tr>
<th>Crop operation</th>
<th>Sakal</th>
<th>G.I. Nut</th>
<th>Acala</th>
<th>Dura</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field preparation</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Sewing</td>
<td>1.50</td>
<td>1.50</td>
<td>1.50</td>
<td>1.50</td>
</tr>
<tr>
<td>Re-owing and thinning</td>
<td>2.25</td>
<td>-</td>
<td>2.25</td>
<td>0.50</td>
</tr>
<tr>
<td>Irrigation</td>
<td>6.00</td>
<td>3.50</td>
<td>4.50</td>
<td>1.00</td>
</tr>
<tr>
<td>1st. Weeding</td>
<td>3.00</td>
<td>3.00</td>
<td>3.00</td>
<td>4.00</td>
</tr>
<tr>
<td>2nd. Weeding</td>
<td>3.00</td>
<td>2.25</td>
<td>3.00</td>
<td>-</td>
</tr>
<tr>
<td>Harvesting</td>
<td>35.00</td>
<td>-</td>
<td>20.00</td>
<td>-</td>
</tr>
<tr>
<td>Bagging</td>
<td>3.50</td>
<td>2.50</td>
<td>3.50</td>
<td>1.00</td>
</tr>
<tr>
<td>Threshing</td>
<td>-</td>
<td>6.00</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Harvesting headers</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>11.00</td>
</tr>
<tr>
<td>Transport</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
</tr>
<tr>
<td>Root Pulling</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Clean-up</td>
<td>10.00</td>
<td>-</td>
<td>10.00</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>67.25</td>
<td>21.75</td>
<td>50.75</td>
<td>20.50</td>
</tr>
</tbody>
</table>

Source: Hunting Technical Service LTD, Khartoum.
Apart from the Rahad Project other agricultural projects are currently being planned for development. The Rosairas Scheme on the Blue Nile with an arable area of about 500,000 feddans, the Haruta Scheme with an area of 300,000 feddans and the Gunaid Extension with an area of 120,000 feddans will soon come under cultivation. Presumably these projects will have a slightly different cropping system than that of Khlass El Girba and Rahad, yet it is inevitable that casual labour will be one of the resources which has to receive great attention by planners.

The introduction of highly mechanized crops such as wheat in the Gezira and Khlass El Girba Schemes entails the employment of a certain category of skills and management. According to the intensified cropping system, wheat area will approximate 120,000 feddans in the Gezira by the end of 1967. This requires the employment of even more machines and more skilled and semi-skilled labour. Groundnuts is also being widely cultivated in the Gezira and other parts of the country. Its importance for the population and the land needs no further emphasis. Its immediate high demand is towards the harvesting and threshing periods. A semi-manual groundnuts stripper has been devised in the Gezira and its use on a large scale is yet to be recommended.\(^{41}\)

Methods which can be adopted and help to improve the labour position are numerous. They can best be grouped into the following three methods.

1- Methods to increase labour supply:

Two main sources of casual labour for the Gezira have already been explored viz. Kordofan and Darfur Provinces and their labour provide the main picking labour of the scheme. Labour from

\(^{41}\) Ramsay's Device for groundnuts stripping (spraying and Experiment Inspector S.G.H.).
these two sources constitute about 20% of total picking labour (1964/65 season). The farther one goes south the longer is the growing season and hence the shorter is the 'no work' season, therefore the more the tendency for costs of labour to increase on account of the high costs of transport.

The contention that, theoretically at least, there is still adequate supply of labour in different parts of the country may provide a cause for future investigation. Some of the new sources which came recently into use are the Southern Sudan Provinces and some migrants from Kasala Province. Foreigners from Chad and Ethiopia are now being attracted to the scheme during the last few years.

Since 1961/62 there has been a remarkable decrease in total number of pickers coming to the scheme from the Blue and White Nile areas. Their number is now coming down by about 25%. This indicates a relative decline in importance of these two sources. On the other hand labour from Western Sudan is showing some increase (though results of the sample survey give constant numbers for the two seasons 1963/64 and 1964/65).

The establishment of labour recruiting centres in certain parts of the country have met with great success. Offices were opened in Kordofan, Darfur and some areas in the Blue Nile Province. Since 1960/61, these offices have contributed largely to the speed and efficiency with which labour is recruited, and then transported.
Pickers are now available for work as early as January, and the efficiency of railway transportation from centres of collection to the scheme area in encouraging both tenants and labourers to maintain good contacts and relations with each others. A ready source of labour is thus made available.

Over the recent past, labour recruiting was one of the tedious and time-consuming activities. Costs were also high as most of the costs were met by the tenant. Recently the Minister of Finance and Economics has passed a resolution by which picking labour costs were put under the Joint Collective Accounts. This is applicable for both the initial costs of transport and subsequent costs of actual picking. The effect of this new decision may even complicate the issue as it may tend to discourage tenants to use their pickers less economically since half the cost is met by the Government. On the other hand it may tend to decrease the incentive of tenants to employ their family members who may go out for paid employment elsewhere.

Education, in its formal and informal sense, and the spread of knowledge, have provided the tenant and his family with a broader and wider understanding of life. The desire for reducing costs and increasing profits is becoming more stronger than before. The will to accumulate capital for investment and to safeguard against financial hazards is now becoming more understood by tenants. Some tenants have some subsidiary occupation which help to pay for
the high agricultural costs especially when returns from agriculture are insufficient to cover the costs.

(2) Methods to reduce labour demand:

Confirming a labour shortage in the sense that its distribution is not optimal, some work on the major aspects of labour saving devices have been attempted. One of these trials was directed towards improving labour distribution over the season for the different crops in the cropping system. Others were essentially devised to supplement or even substitute manual labour by machines; while still others are being conducted to improve the overall farming conditions and the organisation of the scheme through research work. Each of these trials will be dealt with below.

a) Improvement of labour distribution:

The first attempt was that conducted by N.R. Fadde 42 for specific crops and crop rotations in the Gexira and the Managil Extension. Following the intensified system of crop production now in force, some projections on labour supply and demand have been made. The formation of some basic labour hypothesis based on average labour requirement per unit output has been sought out in

different crops and crop rotations.

Padda based his results on calculations on a half monthly input of labour for various crops and crop operations over a period of time determined by the agricultural year. His results, though not based on actual field experimentation, yet they provide some useful guide for budgeting and planning. According to his results stage 4 (previously referred to) gives the best manpower distribution. If these figures were plotted in mandays against time of the year, a distribution curve sloping downward either side gives a peak of 2140 mandays in February.

These results, however, are of very limited practical application. It is assumed that data such as those collected on half-monthly basis give exactly the number of labourers used in any one crop operation. There are certain agricultural operations which have no definite beginning and end so as to coincide with the normal calendar. It is even very difficult to assign specific dates for operations such as weeding which has to be done within a certain period of time when the land is just suitable for the operation. The importance of such data, however, lies in the dispersal of labour force over a wide span of time.

b) The use of labour-saving devices:

Some measures have been taken in recent years to introduce certain labour-saving machines. With certain agricultural operations being mechanized and others improved, the need for higher
quantities of labour may be reduced. However, not all agricultural operations could be mechanized nor are those mechanized on experimental scale necessarily suited for large-scale application. There has been a number of trials on this front which were only useful as a background history for further conduction of experiments, others are highly recommended. Many practices were shared among the various crops cultivated, while some are particular of one or two crops.

1) Mechanization of cotton

Trials for seed-bed preparation have been initiated since the inception of the scheme in 1924. Little achievement has been made in the technique of seed-bed preparation apart from the replacement of the steam engine tractor by the paraffin engine tractor and later by the diesel engine tractor. Operations done on cotton at present include mechanical ploughing, ridging, kharif weeding, dinsing, 4/20 clearance, 4/6 opening and crop spraying. Recently some trials were carried out for mechanical fertilizers distribution and mechanical sowing of wheat and combine harvesting of wheat and durra. As regards sowing, it is limited by the very short period of time during which the operation is effective, and by the uncertainty of a drought period for mechanical sowing during July and August (the rainy season).

The Sudan Gerira Board with a fleet of 138 wheeled tractors and 46 crawler tractors is now achieving only a very small proportion
of the total work. Besides this fleet there are some 650-900
privately owned tractors which are supplemented by tractors from
outside the scheme area. Data collected by R.H. Scott give 1.2
tractors per tenant owner in the whole Gezira and Hamgil. 443
Practically all tractors work only for 3 months per year viz. the
months of July-September when ridging and reridding are practiced.
Apart from some few cases where tractors with trailers are used
for transport purposes, the only ancillary equipments are ridging
discs and ridging tines. Most of the owners practiced considerable
difficulties in obtaining spare parts and maintaining their
tractors. Drivers employed during the period July-September are
predominantly lorry drivers who are rendered idle during this time
of the year.

A tractor working in ridging can do 4 feddans per hour
while in cross-ridging 10 feddans per hour can be accomplished.
With a 13 disc plough a tractor can plough 2% feddan per hour, 5
feddans per hour with a 24 disc plough and only one feddan per hour
with a 5 disc plough and with a mould board plough. 444 Thus a tractor
working for 9 hours a day can ridge 36 feddans and cross-ridge 90
feddans. Provided all tractors are available for work at the time

443 Minutes of the Working Party Meeting 29.7.1954. C.H.N.
444 Private communication with R.H. Scott Mechanical Engineer
they are needed, about 81,000 faddans can be ridged by privately owned tractors per day. But there are certain limitations which retard the smooth running of the whole fleet at the same time. It is unlikely that the whole scheme will be suitable for ridging for instance within a short period of time. There is also the problem of immobility and the allocation of tractors over the whole scheme area. Some tractors might fall out of work for quite a long period and the replacement of one or more spare parts may entail complete failure of cropping in certain parts of the scheme where means of communication are very difficult.

Mr. Scott, after taking all the difficulties encountered by privately owned tractors into consideration, has concluded that it is essential to organize these isolated machines into some form of organization. His objectives were to allow some central or local organization which helps to maintain and allocate tractors evenly throughout the scheme. The establishment of a successful machinery owners cooperative is being thought about. The method by which the nucleus may be initiated was a matter of controversial views among the members of the Agricultural Sub-Committee. Nevertheless they all came to agree on the importance of such organization in effect of the diversified nature of cropping and the need for more efficient use of machines in the scheme.

Some trials on mechanical picking of cotton were carried out on American 52/52 cotton. A small scale experiment

*45 Experiment Conducted by The Agricultural Engineering Division Department of Agriculture (1961/62 Season).
covering an area of about 8 faddans was conducted in Gondal during 1961/62 season. All preharvest operations were mechanized and costs of production compared to hand picking. The machine could not pick all the cotton and some manual labour was employed.

Average yield of cotton in the block 5.72 K.P.F.
Average yield mechanically picked 1.22 K.P.F.
Difference 4.49 K.P.F.

Cost per faddan:

<table>
<thead>
<tr>
<th>Operation</th>
<th>Hand picked</th>
<th>Mechanically picked</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sowing</td>
<td>42 P.F.</td>
<td>30 P.F.</td>
</tr>
<tr>
<td>Harvesting</td>
<td>28 &quot;</td>
<td>15 &quot;</td>
</tr>
<tr>
<td>Thinning</td>
<td>42 &quot;</td>
<td>30 &quot;</td>
</tr>
<tr>
<td>Picking</td>
<td>214 &quot;</td>
<td>444 &quot;</td>
</tr>
<tr>
<td>Total cost</td>
<td>626</td>
<td>521</td>
</tr>
</tbody>
</table>

From data analyzed by the Engineering Division of the Department of Agriculture, the difference between picking by hand and mechanical picking is very highly significant even at 0.1% level of confidence. The following yields are given for 5%, 1% and 0.1% level of confidence.

Significant difference at 5% = 0.67 K.P.F.
"  " at 1% = 0.92 K.P.F.
"  " at 0.1% = 1.25 K.P.F.

The difference between mechanical picking and hand picking i.e., the waste due to mechanical picking is 2.63 K.P.F., which is significant at all levels of confidence.
Cost of picking 2.68 E.P.T. by hand = 241 P.T.

\[ \text{Total cost of mechanical picking per feddan} = \frac{321+241}{2} = 762 \text{ P.T.} \]

So mechanical picking accounting for the waste in picking costs 156 P.T. more per feddan than hand picking. Hand picking though slow and laborious, yet it is less expensive and more efficient than mechanical picking. These costs of mechanical picking do not account for initial cost of the machine and use depreciation. Provided some improvements are made in field layout and training of personnel, mechanical picking can save a lot of labour in picking of American type of cotton.

A similar trial of mechanical picking was also carried out at Barakat Block. About 3200 kgs. of seed cotton was wasted from an area of 20 feddans i.e., 160 kgs. per feddan. Upright bolls account for about 12% of the waste. Some waste may still be due to unskilled drivers and mechanics. Mechanical picking is a complex operation which embodies certain pre-harvest operations such as defoliation which may further lead to decline in grade of cotton lint. These pre-harvest operations complicate the mechanism and increase costs.

The speed with which an operation is to be performed at any one time becomes so important when it involves timeliness of operation for certain crops. It should be essential to emphasize the disadvantages of pushing mechanization too far and too fast.
There are some difficulties which stand in the way of full mechanization in the Sudan. Machines are generally costly especially when they involve paying in foreign currency. High rates of depreciation and high costs of repairs and maintenance are to be set.

Training of mechanics and machine operators and drivers is one of the important prerequisites of mechanization. These involve high capital investment in extension work, workshops, training schools and stores for spare parts fuel and ancillary equipment.

An increase in the production of Egyptian long staple cotton will eventually result in reduction in actual cotton returns, since it is very unresponsive to price changes. Some analysis suggest a price elasticity of demand for long staple cotton of only 0.2 - 0.3. The Sudan being the producer of about 30% of total world produce of long staple cotton, any change in cotton price will be highly magnified on total national income of the country.

Short staple cotton, on the other hand represents only about 2% of total world produce of short staple cotton, and as such its effect on the country’s balance of payment is very small. It is true that prices of short staple cotton are lower than those of long staple cotton, but this effect is counteracted by the higher ginning out-turn and the higher yields of American type of cotton. Trials in the Gezira proved that American Aceala 4/42 out-yields long staple cotton in terms of cotton lint per feddan. Over five years, the gain was about 3% over Bar 24/25 at Turabi Block, 39%
over XI, at Had Medani Research Station, and 25% over XI, at
Bag Abdulla Block. The prices of both seeds and list of
American cotton are lower but on account of the lower ginning
costs, though still high picking costs if machines are used,
American cotton still gives a high marginal return.

Passing over to the mechanization of cotton pulling out
and clean up trials and experiments in connection with the modi-
fication of the traditional tools and the introduction of new
methods are running side by side. The traditional pulling out
system using the existing hand chopper or puller proved to be
more efficient than the rotation and flooding system. The former
method is nonetheless, slow and labour-consuming. The latter
involves the use of large quantities of water when water starts
to become a limiting factor, and the material flooded was not
completely inactivated and must be collected and destroyed later.
The use of cotton stalks for animal fodder is again not possible
with the flooding system.

Mr. O'Sullivan of the Ministry of Overseas Development of
Britain has visited the Gazira Scheme with the objective of modi-
fying the Baby Cotton stalk puller previously used in the scheme.
He was able to simplify the Baby puller to work on four rows instead
of two rows, and recommended its trial in 1965/66 season. He also
designed two suction cleaners operating on a vacuum principle to
pick up debris and dry material. Inspite of these innovations and

--- Annual Report of Cotton Breeding Section, Gazira Research
Station, Had Medani.
techniques of production, it is inevitable that some casual labour is required to do certain unmechanizable operations.

Ofielda trials were supplemented by additional trials carried out by Mr. Pothecary, Agricultural Engineer Gezira Board at Wad El Neu and also by investigations into improvements on the existing hand method by Sayed Abdulla El Subeir in partial fulfillment of a masters degree in Agricultural Engineering. Seven different machines were tested with varying speeds and settings. Some modifications were made from time to time as the machines are tried. Results and recommendations are expected to come out soon in reports of the Agricultural Engineer S.S.E. and Sayed Abdulla dissertation. A further and more elaborate and intensive study is recommended for 1965/66 season by Mr. Scott in collaboration with the Agricultural Engineering of the Sudan Gezira Board.

11) Mechanization of Dura

Trials of mechanizing dura production run on parallel lines with those of cotton mechanization. The M.C.P.S. have already taken the lead in this respect. The most important aspect of dura mechanization is to mechanize dura harvest. Combine harvesting of dura is not, however, a practical proposition at this stage. It is not acceptable, at least to the tenant, and views of tenants and decision-makers vary a great deal. Tenants prefer to harvest their dura manually and make use of the (gassab) which they bundle in store to be used during the dry season as animal fodder. Other
iv) Groundnuts:

Groundnut has proved success in the Gezira, and groundnut yields are very much encouraging. By the use of the blade lifter for groundnut harvest an average of about 1/3 of the loss (about 100 lbs. per feddan) has been saved. The use of the picker/threshing machine was also effective in giving good results and better performance. Further modification of the picker/threshing machines are required to suit local conditions and crop irregularities. It is worth saying here that the Sudan Gezira Board is planning to buy a groundnut harvester to be used in the scheme. With groundnut cultivation in the Gezira, however, the need to save labour is not as great as with wheat for instance. Groundnut is cultivated round about September and harvested early in December. Both two periods are of no great pressure for labour in the Gezira. Remleys groundnut strippe which is already referred to, may help to save some manual labour towards harvesting and speed up the operation.

5) Reduction of labour costs:

Costs of agricultural production have, for the last few years been a great burden on the tenants. The result was that some tenants, failing to repay their creditors in time gave up the occupation. A comparative study of agricultural costs since 1940 may help to give an idea of how costs have gone up since then. The main agricultural operations of cotton are listed below with their respective costs.
indicated. The provided are estimates from Gaitakell’s Figures talk of 1949, N.M. Nur El Huda estimate of 1956, and the author’s results of a sample survey during 1964/65 season. Costs given are those paid in cash at the time of the survey. Over the seven years between 1949 and 1956 total costs of production have increased by an average of 22.9% per annum. Between 1956 and 1964, total costs have increased by an average of 9.1% per annum. Nearly all costs of operations have increased but the greatest increase was given by the post-harvest operation of pulling out and cotton clean up, and the weeding operation.

However, these increases give little guide as to the actual value of money paid by the tenants. The value of money since 1956 has fallen down, and the price index for many food and food products has increased. Total price index of all food, drinks and tobacco has increased from 83.1 in 1955/56 to 127.9 in 1964/65 (see Appendix (8)). On the other hand price index for cotton has decreased to 94.6 in 1964/65. Therefore although the rate of labour wages for cotton production has increased since the last eight years, yet the value of these increases in terms of purchasing power are not so significant. Moreover the returns from cotton are even decreasing in real value of money.

---

<table>
<thead>
<tr>
<th>Operation</th>
<th>Saitakall 1949</th>
<th>N.H. Bur El Huda 1955</th>
<th>Sam 1964</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field channel cleaning</td>
<td>100</td>
<td>200</td>
<td>1500</td>
</tr>
<tr>
<td>Crook ridging</td>
<td>130</td>
<td>400</td>
<td>220</td>
</tr>
<tr>
<td>Weeding (Kadeh)</td>
<td>950</td>
<td>1200</td>
<td>3400</td>
</tr>
<tr>
<td>Sowing</td>
<td>200</td>
<td>500</td>
<td>506</td>
</tr>
<tr>
<td>Weeding (X3)</td>
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<td>2700</td>
<td>4359</td>
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<tr>
<td>Watering</td>
<td>420</td>
<td>2500</td>
<td>5000</td>
</tr>
<tr>
<td>Thinning</td>
<td>150</td>
<td>150</td>
<td>240</td>
</tr>
<tr>
<td>Image ridging</td>
<td>100</td>
<td>200</td>
<td>250</td>
</tr>
<tr>
<td>Hand clearing</td>
<td>150</td>
<td>150</td>
<td>500</td>
</tr>
<tr>
<td>Picking (N.P.F.)</td>
<td>2000</td>
<td>4800</td>
<td>5250</td>
</tr>
<tr>
<td>Pulling out and Sweeping</td>
<td>640</td>
<td>2000</td>
<td>4393</td>
</tr>
<tr>
<td>Poisonous weeds</td>
<td>100</td>
<td>150</td>
<td>350</td>
</tr>
<tr>
<td>Batesoms</td>
<td>100</td>
<td>200</td>
<td>350</td>
</tr>
<tr>
<td>Total</td>
<td>2,670</td>
<td>15,150</td>
<td>26,246</td>
</tr>
<tr>
<td>% increase per year</td>
<td>=</td>
<td>23.9</td>
<td>9.1%</td>
</tr>
</tbody>
</table>

N.B. All costs are in £/ha. per feddan except cotton picking.

The structure of the tenant family in the Gazar is one of a composite nature, with some members living away from the tenant's home, while others share the same house. The extended family which may be residing away from the cultivated area, is still financially supported by the tenant, though not entirely depending on him. Some of these dependents come for work but not
regularly. Some of those who migrate for work are paid for their work others only accept transport expenses and get their food free during the period of their stay.

Provided a stable income is maintained from farming, the tendency of the tenant and his family to leave their farms for outside jobs is very much reduced. A tenant is not likely to leave farming if his income from agriculture is sufficient to cover his production costs and leave him with a reasonable profit. It seems that crops other than cotton are acting as a buffer in holding farmers and farm people to their holdings. The diversified cropping system now introduced may help to reduce insecurity of returns and the tenant is safeguarded against food shortage. In case cotton crop failed to give good returns, crops other than cotton may help to reduce the discouraging effect, and the tenant is protected against such sudden hazards as of crop failure or low market price for cotton. It may follow that tenants become more able and more willing to pay even higher wages than before. Thus intensifying the competition for labour.

Such security also provides the tenant with a reason to keep to farming as a business as well as a source of living. The provision of the minimum transport costs, of shelter of some free meals during picking, of some cash advances and gifts and presents, do reflect the prosperity of any one tenant. In some cases such amenities are ordained by custom and tradition, that some poor
tenants find themselves obliged to offer them even if they have to borrow money. Tenants refusing to offer such incentives are less attractive to labourers. This was largely the result of competition for labour arising out of the expansion in cultivated area. It is in full swing when dura yields are high and cotton yields are encouraging; however, labourers working for cash wages only are no exceptions and cases where labourers are traditionally contracted to work for one and the same tenant have already been referred to in Chapter (II).

Since 1950 there has been a great change in the cultivated area in this country. The development which has taken place since then has its economical and social implications on labour. It has affected people's preferences and values. The accumulated experience and knowledge have been set free by the new era of educational and political movement of the fifties and sixties. The last ten years have seen the birth of a new outlook into the future of farming in the Sudan, in attempt of curing the decreasing returns of farming and farming enterprise which resulted in a sense of dissatisfaction among the rural population. Those years have seen the birth of an organized tenants movement under the leadership of the Old Gezira Tenants Union. Not negotiations between the tenants on the one hand and the Government and the Sudan Gezira Board on the other hand, were paved for the betterment of farming conditions in the scheme. It seems that the tenants have gained quite a lot
Apart from the trials made to improve field operations and general crop production techniques, research is being carried out in the Gezira to study various organizational reforms and tenants/government relationship. The usefulness of such research is not in its direct bearing to immediate application, but in the long-term investment and reallocation of resources.

A general Tenant Farming Survey is now being undertaken by the Department of Rural Economy, Faculty of Agriculture, in collaboration with the Sudan Gezira Board and the Department of Agriculture. The survey is made possible by a generous grant from the Ford Foundation, for three years commencing 1963/64 season. The Department of Agriculture is helping in the survey by providing field investigators, while the Gezira Board provide supervision and help to direct tenants in the sample. The vital importance of this survey for the scheme arises out of the need to establish tangible and proved causes for the falling standard of living among the peasant society in general and the Gezira tenants in particular. The main objectives of this survey are very numerous but the main objectives are to investigate into the structure of farms and farm

*49 Reports of this Survey are due to come out by the end of this year.
To achieve these goals it was thought necessary to investigate into the different phases of investment and expenditure, alternative sources of income, and the likely effects on the entrepreneur. The prospects of this survey and its usefulness, though not practically applied in beyond any speculations. It remains to discover the effects of the proposed issues on the attitudes of the farming community.

On the other hand, and perhaps, complementary to the Tenants Farming Survey, a Working Party is now working on more or less similar lines to plan for optimization of production in the Gezira. This Working Party includes permanent and temporary members of the Department of Agriculture (Ministry of Agriculture), Department of Rural Economy (Faculty of Agriculture), the Sudan Gezira Board, the Ministry of Animal Resources, and the Ministry of Commerce, Industry and Supply. An interim report of the achievement of this Working Party has just been published which embodies the findings of the Party since its inception in 1963. A "note on labour in relation to development planning in the Sudan", is one of the serious studies included in this report, and which has a direct bearing to the study of this thesis.50  

with regards to labour and labour cost will provide useful guidance for research workers as well as decision-makers.

The continuation of the Tenants Farming Survey and that of the Working Party may help to illustrate and illuminate certain trends of farming with regards to use of resources in the scheme. They may provide a key answer for future development in the scheme and for other schemes run on similar lines.

A new Development and Planning Section is now taking shape in the Sudan Gezira Board. The principal duties of this section are to coordinate different phases of development which take place or expected to take place in the future, and to plan according to what the study would provide. A measure of labour as a factor of production in agriculture and its proper utilization and allocation is one of the main themes of this Section. These quantitative measures in connection with labour costs are effective determinants of labour productivity. The Development and Planning Section has already experienced the difficulties encountered in planning the new extension of the Hamagil. The responsible authorities in this Section are expected to give devoted attention to encouraging sedentary life in regions not known to be inhabited before and when new development is expected to take place. Greater care will be given to the reorganization of labour force without disrupting the pattern of land tenure system and the social framework of the population.
and marketing organization, are the main objectives of the Mission. The Mission will study and evaluate technical and economic feasibility of proposed changes in production patterns, and determine the functions including provision of credit, which must be performed, and consider how and by whom they may best be performed. The Mission will also review the operations and administrative arrangements of the Scheme with view to reducing costs of activities. In the light of the findings, the Government will be advised on any modifications deemed necessary for the development of national interest and the Genira people.

(d) CONCLUSIONS

The problems which have been outlined in this Chapter and proceeding chapters emphasize the need for further proper planning and a new approach to agricultural development in the Genira Scheme. The Government with the help of the Sudan Genira Board has already implemented many development programmes which aim at the proper allocation of resources and optimization of farm returns. The last few years have seen the establishment of a number of new schemes and the development of already existing ones. A substantial number of the latter has been modified and many innovations were introduced.
Most of the agricultural projects covered by the Ten Year Plan of Economic and Social Development are transitional, in the sense that they go through a series of developmental stages towards the ultimate goal of commercial production. Many of these plans are not yet fully operational. The Government investment plans are still determined independently of the government general policy. Consequences of such incomplete planning are serious. They tend to lose public support and appreciation, and lead to unproductive resource utilisation.

Both absolute size of population and density of population in the Sudan have significant implications for economic development from the standpoint of the size of rural population as well as effective investment. The rate of population increase both on a national scale and on regional basis is generally high.

With the implementation of the intensified and diversified crop rotation in the Gezira and the extension in cultivated area in other regions of the Sudan, the labour position will even be further intensified. People are becoming more urbanised and their willingness to accept agricultural work is being reduced. Their preferences and attitudes have undergone certain changes. The question to be asked here, should we concentrate development in Central Sudan (for instance by intensifying the Gezira cropping system further more), or should we spread development evenly over the whole country? The first proposition implies labour movement
and the latter implies taking development to the people. In either case mobility and change of status are involved; the mobility of the labour force and the change of status as a result of the new transformation of cropping system. It is therefore essential for the decision-maker to know as much as possible regarding regional variations and the capacity levels of different institutions during the course of development.

There are certain crops and crop activities which could be mechanized whereby labour could be saved for other non-mechanizable activities. The main difficulties with mechanization could be listed as follows:

1) Provision of sufficient capital for initial investment. The Sudan being predominantly agricultural, almost all agricultural machinery and equipment are imported, which have to be paid for at high cost and usually in hard currency.

2) Training of personnel necessary for the various technical and subtechnical jobs.

3) Provision of a special calibre of men suitable for managerial activities and capable of assuming responsibility of so diverse a plant.

4) The farmers themselves have to be equipped with a higher standard of education, both formal and technical to help them meet their new demands and provide them with a creative mind, a character highly needed in decision-making. This involves exten-

sion service and agricultural training.
It could be said that the present dilemma is not a labour shortage as it is lack of proper labour organization and planning of agricultural production in general. It is the deficiency of best coordination of functions in national policy with regards to optimization of production. Agricultural development must be treated as a whole and not in segments. It is on aggregate production and not individual output that final conclusions on proper resource allocations should be based; and on such the Gezira Scheme represents a step towards optimization of production in the Sudan.
<table>
<thead>
<tr>
<th></th>
<th>x1000</th>
<th>x100</th>
<th>Peak</th>
<th>Labour</th>
<th>1970/71</th>
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<tbody>
<tr>
<td>Cotton (Egyptian)</td>
<td>680.8</td>
<td>733.1</td>
<td>8.8</td>
<td>Feb-Mar</td>
<td>1,004.0</td>
</tr>
<tr>
<td>Cotton American</td>
<td>134.3</td>
<td>332.8</td>
<td>8.4</td>
<td>Jan-Feb</td>
<td>380.0</td>
</tr>
<tr>
<td>Durra (Sorghum)</td>
<td>3,821.3</td>
<td>3,676.3</td>
<td>7.6</td>
<td>Oct-Nov</td>
<td>3,516.7</td>
</tr>
<tr>
<td>Groundnut</td>
<td>470.4</td>
<td>694.4</td>
<td>23.8</td>
<td>Nov-Dec</td>
<td>845</td>
</tr>
<tr>
<td>Sesame</td>
<td>690.6</td>
<td>774.8</td>
<td>9.8</td>
<td>Nov-Dec</td>
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</tr>
<tr>
<td>Castor</td>
<td>9.5</td>
<td>11.3</td>
<td>9.6</td>
<td>June-Jul</td>
<td>30.0</td>
</tr>
<tr>
<td>Rice</td>
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<td>1.2</td>
<td>-25.7</td>
<td>Jun-Jul</td>
<td>19.0</td>
</tr>
<tr>
<td>Wheat</td>
<td>39.0</td>
<td>54.1</td>
<td>19.3</td>
<td>Dec-Jan</td>
<td>69.0</td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
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<td>6,078.0</td>
<td>-</td>
<td>-</td>
<td>7,063.7</td>
</tr>
<tr>
<td><strong>Coffee</strong></td>
<td>4.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>19.0</td>
</tr>
<tr>
<td><strong>Tea</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>Sugar</strong></td>
<td>-</td>
<td>21.0</td>
<td>-</td>
<td>-</td>
<td>75.0</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td>6,067.1</td>
<td>6,099.0</td>
<td>-</td>
<td>-</td>
<td>7,128.7</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>Seeding</th>
<th>Harvest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours</td>
<td>0.4</td>
<td>0.5</td>
</tr>
<tr>
<td>Units</td>
<td>333,600</td>
<td>692,000</td>
</tr>
<tr>
<td>Person</td>
<td>2,110,000</td>
<td>1,758,400</td>
</tr>
<tr>
<td>Person</td>
<td>542,500</td>
<td>422,500</td>
</tr>
<tr>
<td>Person</td>
<td>360,000</td>
<td>120,000</td>
</tr>
</tbody>
</table>

**M.U./Fed** = Man-Units per feddan per day.

**Source:**
 Compiled from various sources including private communications of those planning rainland development, and estimates by the Gezira Board for long staple cotton and groundnut.
<table>
<thead>
<tr>
<th>Crops</th>
<th>1000</th>
<th>1000</th>
<th>per year of Peak Labour in ed Area Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cotton (Egyptian)</td>
<td>680.1</td>
<td>739.1</td>
<td>8.8 Feb-Mar 1,604.0 4.6</td>
</tr>
<tr>
<td>Cotton American</td>
<td>124.3</td>
<td>332.3</td>
<td>8.4 Jan-Feb. 380.0 20.5</td>
</tr>
<tr>
<td>Maize (Sorghum)</td>
<td>3,021.3</td>
<td>3,476.3</td>
<td>7.6 Gav-Nov. 3,516.7 1.6</td>
</tr>
<tr>
<td>Groundnuts</td>
<td>470.4</td>
<td>694.4</td>
<td>23.8 Nov-Dec. 845 7.7</td>
</tr>
<tr>
<td>Sesame</td>
<td>690.6</td>
<td>791.8</td>
<td>9.8 Nov-Dec. 1,200.0 7.3</td>
</tr>
<tr>
<td>Castor</td>
<td>9.5</td>
<td>11.2</td>
<td>9.6 June-July 30.0 21.3</td>
</tr>
<tr>
<td>Rice</td>
<td>4.2</td>
<td>1.3</td>
<td>-35.7 June-July 19.0 35.2</td>
</tr>
<tr>
<td>Wheat</td>
<td>39.0</td>
<td>54.1</td>
<td>19.3 Dec-Jan. 69.0 7.6</td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td>5,043.1</td>
<td>6,078.0</td>
<td></td>
</tr>
<tr>
<td><strong>Coffee</strong></td>
<td>4.0</td>
<td>-</td>
<td>- 29.0  -</td>
</tr>
<tr>
<td><strong>Tea</strong></td>
<td>-</td>
<td>-</td>
<td>- 2.0  -</td>
</tr>
<tr>
<td><strong>Sugar</strong></td>
<td>-</td>
<td>21.0</td>
<td>- 75.0  -</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td>5,049.1</td>
<td>6,099.0</td>
<td></td>
</tr>
</tbody>
</table>

## APPENDIX (2)(a)

### ESTIMATES OF TOTAL LABOUR REQUIREMENTS OF CERTAIN CROPS BY 1970/71

| Operation | Cotton | | Dura | | Groundnut | | Sesame | |
|-----------|--------|---|------|---|----------|---|-------|
|           | M.U/Fed | Total | M.U/Fed | Total | M.U/Fed | Total | M.U/Fed | Total |
| Weeding   | 0.4     | 553,600 | 0.6   | 2,110,000 | 0.5 | 422,500 | 0.5 | 360,000 |
| Harvest   | 0.5     | 692,000 | 0.5   | 1,755,400 | 0.5 | 422,500 | 0.1 | 120,000 |

**H.R.**

M.U/Fed = Man-Units per feddan per day.

**Source:**

Compiled from various sources including private communications of those planning rainland development, and estimates by the Genira Board for long staple cotton and groundnut.
### APPENDIX (6)

**DIVISION OF HIRED LABOUR BY SEX**

<table>
<thead>
<tr>
<th>PERIOD</th>
<th>MEN</th>
<th>WOMEN</th>
<th>TOTAL</th>
<th>% MEN</th>
<th>% WOMEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average of whole period</td>
<td>82383</td>
<td>43529</td>
<td>125912</td>
<td>65.43</td>
<td>34.57</td>
</tr>
<tr>
<td>Average at Peak</td>
<td>121244</td>
<td>73193</td>
<td>194437</td>
<td>62.56</td>
<td>37.44</td>
</tr>
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</table>

(MANAGIL)

<table>
<thead>
<tr>
<th>PERIOD</th>
<th>MEN</th>
<th>WOMEN</th>
<th>TOTAL</th>
<th>% MEN</th>
<th>% WOMEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average of whole period</td>
<td>20286</td>
<td>11904</td>
<td>32190</td>
<td>65.03</td>
<td>34.97</td>
</tr>
<tr>
<td>Average at Peak</td>
<td>23034</td>
<td>19005</td>
<td>35039</td>
<td>64.17</td>
<td>35.83</td>
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**SOURCE:** Survey of Labour Conditions in the Gezira 1959, Department of Statistics, Ministry of Agriculture, Table VI.
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<th>12.4</th>
<th>36E</th>
<th>6.4</th>
<th>12.4</th>
<th>36E</th>
<th>6.4</th>
<th>12.4</th>
<th>36E</th>
<th>6.4</th>
<th>12.4</th>
<th>36E</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>28422</td>
<td>25217</td>
<td>31.99</td>
<td>25160</td>
<td>28409</td>
<td>31.60</td>
<td>25487</td>
<td>28420</td>
<td>31.70</td>
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<td>25160</td>
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<td>25160</td>
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**Glossary**

**Abu XX**
A minor water course running off the minor canal and serving one number (about 90 feddans).

**Abu VI**
A minor water course running off Abu XX and serving one tenancy.

**Angaya**
A strip of land running parallel to Abu XX and bounded by a furrow on one side and a ridge on the other. There are 14 such angayas per 10 feddan tenancy.

**Ardab**
A capacity measure weighing 2435 kgms. or 20 kilos of dura.

**Borgu**
An African tribe of West African origin, but mostly from Nigeria.

**Eid**
A Muslim religious occasion during which people go on holidays and celebrate the occasion. There are two such eids a year, a major one and a minor one.

**Feddan**
A unit of area equivalent to 1.053 acres or 4200 m².

**Fellata**
A tribe of West African origin, but mostly from Nigeria.

**Gedwal**
A small water channel taking water from Abu VI to the tenancy. A gedwal may also refer to the area of two angayas.

**Gosseb**
Straw of dura when harvested.

**Hausa**
A West African tribe.

**Hawasha**
A basic tenancy of 10 feddans in area.

**Kimling**
Wedding.

**Kantar**
A unit of weight for seed cotton, one kantar is equal to 100 rotha or 44.05 kgms. of ginned cotton or 315 lbs. or 141.52 kgms. of seed cotton.
Kharif: The rainy season.
Reach: Making of gudarla and tagana using a shovel.
Harbour: An area of cultivated land administered by one Block Inspector or one Field Inspector.
Hafir: An urgent call for communal help commonly from people of the same village.
Humber: Basic unit for irrigation, it is 90 feddans in area (9 tenancies).
Onda: A native representative of the Local Government in a village.
Ridding: Land furrowing after ploughing into irrigation furrows to facilitate irrigation and improve plant growth.
Robat: Small tie-up ridges for water control.
Sanaad: A native representative of the field inspector in the field to help the field inspector in agricultural matters.
Sheikh: A native chief subordinate to the Local Government and help the Government in collection of taxes and other matters.
Sweeping: Removal of cotton plants, leaves, stumps and debris after cotton pulling out and then burning all rubbish.
Taga: A clear area by the side of the cotton tenancy for the collection of picked cotton and then cotton is weighed and sacked. It is of an average area of 4 M$^2$.
Tagmat: Ridges running parallel to Abu XX for control of irrigation.
Taiba: Employment of labour by the field staff of the S.O.B. to carry out certain urgent tasks which the tenant failed to do by himself.


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