CASE 1

CHAKULA ESTATE

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THE CHAKULA ESTATE IN KENYA

1. BACKGROUND AND BRIEFING

1.1 INTRODUCTION

Walimu Consultants, management consultants based in Nairobi, Kenya have been asked to carry out a study for the Wageni Agricultural Cooperative into the potential for horticultural development of the Chakula Estate.

1.2 PRELIMINARY MEETING

Your boss at Walimu Consultants, Mr. Nchinda, has attended a meeting at the Wageni management office. Those present were:

Mr. Kusoni	Chairman of the Cooperative
Mr. Pederson	General Manager of the Cooperative
Mr. Mtali	Horticultural Development Authority
Mr. Nchinda	Walimu Consultants

The Chakula Estate has been proposed as one of the horticultural centres to be developed in Kenya. The Estate is to remain in the hands of the owners, the Wageni Cooperative, which must develop the area for the benefit of its members. The Government will only provide extension services and financial assistance if it is convinced that the Cooperative has an economically viable development plan for the Estate. The Government has threatened to take over the Estate if the Cooperative cannot demonstrate that it can develop the Estate properly. The Cooperative, advised by the Horticultural Development Authority, has requested Walimu Consultants to provide them with decision-making aids for the organisation and development of the Estate.

Walimu Consultants has been asked to concentrate on the potential for fruit and vegetable farming. Coffee is also included in the study because of the very good soil and climatic conditions for coffee growing prevailing in the Ndovu area, and because the quality of Kenya coffee has a high reputation on world markets.

Various studies of the Estate have been carried out to appraise the technical and agronomic feasibility of the Estate as a horticultural production farm. Walimu Consultants is required therefore to concentrate on alternative management approaches using the available data.

1.3 DISCUSSION WITH MEMBERS OF THE COOPERATIVE

After the meeting Mr. Nchinda stayed on and had an informal discussion with some members of the Management Committee of the Cooperative and friends. It is apparent that several of the members of the Cooperative are content with the small income they get from renting parts of the existing sisal estate to the Wabenzi Fibre Company, and from the sale of coffee from the 75 hectares coffee plantation. However, other members of the Cooperative are aware of the obvious benefits they are foregoing by not developing the area. It is realised, for example, that considerable farm potential is being exhausted by overgrazing, soil erosion, old 'sucker' sisal, and poor subsistence cultivation. Cooperative members are also becoming aware that by renting big parts of the Estate to outside parties, like the Wabenzi Fibre Company, they have less and less part to play in what is their own property, and are reduced to the role of mere farm labourers.

For a big commercial farm one objective to be met can be taken to be the financial returns from the farm. However, in the case of the Wageni Cooperative, various objectives have been identified. One of these is to get as much income from the resources as possible. However, in the pursuit of maximum income, consideration is given by Cooperative members to the need for early cash incomes. It has been observed that earnings in the earlier years of the development period are preferred to earnings in later years, even if the latter are higher than the former (and allowing for the time value of money). The reason given was that the farm needs 'quick' money to pay for the heavy financial commitments in early years and that management must prove that the investment is profitable early enough to ensure cooperation between them and the owners.

The risk of different farm programs also affects the farmers' choice of the operating program. Often investment programs which promise the highest expected incomes are the most risky. It is up to the farmers, therefore, given their degree of risk aversion, to opt for either the high expected income - high risk alternative or the low income - low risk alternative. One must not get the impression, however, that the farmers always aim at minimising risk. This is only true for those who are risk-averse; the 'gambling-type' of people will go in for the risky enterprises which promise high returns.

1.4 HORTICULTURAL POLICY

Mr. Nchinda returned via the regional town, Mboyu, and visited the office of the Horticultural Development Authority for a discussion with Mr. Mtali. He provided some useful information which is summarised below.

For most developing countries the agricultural sector is still the most important contributor to Gross Domestic Product (GDP) and Kenya is no exception. Most of the growth in the agricultural sector has been realised on the plantation farms producing coffee, tea, pyrethrum, and in the livestock industry. However, since the mid-1960s, attention has also been directed towards small-scale farming, particularly in horticultural production. The Kenya Government took steps to encourage the growing of fruits and vegetable crops by individual small-holders by establishing, in 1966, a Horticultural Crops Development Authority (HCDA) which was empowered to control the purchase, transportation and marketing of horticultural crops. Furthermore, in 1970, 'The Horticultural Working Party' was set up to study horticultural production possibilities in Kenya. The Working Party made various recommendations, ranging from marketing of the produce, training of extension workers, functions of the HCDA, research requirements, development of horticultural production centres, to problems relating to a number of specific crops.

The Government has attempted to implement some of the recommendations made by the Working Party in the following ways:

1. Various areas of the country have been ear-marked for development into horticultural production centres.

2. Packing and grading stations have been set up in various areas, where producers can have their produce graded and packed ready for distribution. The HCDA provide lorries to transport the produce from the packing stations to urban centres.

3. Plans have been made for the training of horticultural instructors and supervisors at various Kenyan colleges and in Europe.

It would appear that for the foreseeable future emphasis will still be on the small-holder in agriculture. Two aspects of small-holder farming stand out. First, the majority of small-holders grow some vegetables and fruits for their home consumption, and do not enter the commercial sector; and, second, some small-holders, near urban centres, or in the areas where grading and packing stations have been set up, grow horticultural produce for sale.

Establishment of large scale estates has not been an important method of horticultural production for two reasons. Firstly, it has been Government policy to encourage small-holder farmers so as to provide them with employment

and some cash income. Secondly, for an estate of say 500 hectares, given the current level of horticultural production from small-holders, the fresh market demand is not yet big enough to absorb all the produce from such an estate. The only outlet for the excess supply would be the processing, canning and dehydrating industries, but the prices offered by these industries are often too low to cover the operating costs of a big estate.

However, there are disadvantages associated with small-scale production. For example, it is quite difficult to offer extension services to small-holders because they are spread rather widely. For this reason too there is a problem of setting up grading and packing stations where the farmers can dispose of their produce. The small farmer may also be an inefficient producer since he will often not have the know-how nor the funds to improve his production methods. Further, small farmers, like small businesses, do not have easy access to loan finance, and where they have, they tend to think of the loans, especially from the Government, as gifts or free money and they are reluctant to pay back the loan.

It is not easy to determine the expectations of a Cooperative Society. Past experience of horticultural production cooperative movements in Kenya has not been encouraging. One reason for the poor performance of horticultural cooperatives has been failure to define their purpose. A survey was carried out in one of these cooperatives asking what purpose the cooperative society served. Most of the respondents gave answers like 'to help the farmers to market their produce more cheaply' and 'to give loans to farmers'. Emphasis was placed on material or financial benefits.

1.5 SECOND VISIT TO CHAKULA

The Walimu Consultants' team returned to the Estate for a two day visit to obtain basic information about the Estate.

Mr. Kusoni gave the team an introductory talk. The Cooperative was formed in the 1960s from ex-employees of the white farmer who owned the Estate before he sold it to the Cooperative when he left the country. The Estate is now settled by about 2,000 families who are members of the Cooperative, plus a number of 'squatters' from the surrounding district. Much of the Estate is used for grazing the large number of cows and goats of the settlers. A small portion of the land is under subsistence crops, mainly beans and maize. A section is under sisal which has been on the land for about the last thirty years. Only about 75 hectares is under coffee. The Estate is located 80km from Nairobi at an altitude of about 5,000 feet above sea-level. The total size is about 11,200 hectares.

Mr. Pedersen, the manager, then took the team on a tour of the estate by Landrover and on foot. He explained that there are basically two types of soil, high potential and low potential. Only the high potential soil could, with improved irrigation, support the profitable horticultural crops, and coffee and sisal. The high potential soil is estimated to be only 1,000 hectares. Currently, only 75 hectares of this are used for coffee, 220 for grazing and about 700 for the old low-yielding sisal.

The team then saw the much larger area of low potential, black cotton soil. About 100 hectares are planted with subsistence crops, over 4,000 for grazing and about 500 for the old sisal. The remaining 4,000 hectares are farmed individually by Cooperative members. About 1,500 hectares are not currently used at all.

On return to Mr. Pedersen's office, the potential for development of the Estate was discussed. The 1,000 hectares of high potential soil could be used, with improved irrigation, to grow coffee, fruits such as avocado, oranges and passion fruit, and vegetables such as French beans, onions, aubergines, chillies and capsicum. Of the low potential soil, Mr. Pedersen considered about 1,000 hectares could be used to grow sisal, maize and seed beans. The low potential area could also be used for grazing goats, sheep and cattle. But for the cattle to thrive, there would need to be improved irrigation, and planting with Lucerne leys for high quality fodder.

Those crops recommended for the black cotton soil, if they were to be grown on the more fertile soil would not increase their yields sufficiently to be competitive. Moreover, those crops recommended for the better quality soil would not grow well on the black cotton soil because they are sensitive to soil conditions. Thus there is no direct substitutability between crops on the high and those on the low potential soil.

1.6 BRIEFING 1

Mr. Nchinda called in the team and asked them to prepare proposals for continuation of the study. He asked them to pay attention to the attitudes to future development of the Estate by the various interested parties eg. different groups in the Wageni Cooperative.

Outline notes should be prepared for a meeting in his office. He plans to use these notes and the discussion to prepare a formal proposal to put to the Cooperative.

2. STRUCTURING THE PROBLEM

2.1 COLLECTING INFORMATION

The Walimu team now carried out a series of meetings over two weeks to collect more detailed information about the potentialities for the Estate.

2.2 THE CROPS

The team met an Agricultural Extension Officer from the Ministry of Agriculture in Mboyu. He supplied the following information.

(a) COFFEE

The Ndovu area is noted for high coffee yields, ranging from 2 to 5 tons of coffee per hectare. Maturity yield of the plant can be expected in the third year after planting, and the plant is likely to continue producing coffee berries for about 10 to 15 years. Like most of the produce on the Estate, coffee is produced for export and its profitability is subject to world market prices.

(b) ORANGES

Oranges and avocadoes have similar requirements with respect to soil and weather conditions. Both have been grown successfully in Ndovu. The two begin yielding in the 4th or 5th year after planting but do not reach full maturity until the 8th year. It is often necessary in the first five years to plant a cover crop like maize so as to protect the soil against erosion and to prevent evaporation of irrigated water during the dry season.

Avocadoes have a very profitable export market in Europe because of their high quality, but oranges are grown for local consumption because their quality is not high enough to be competitive in the European market with those produced in the Mediterranean regions and South Africa. The local market for fresh fruit in Kenya is limited, consisting of the upper income brackets living in Nairobi, Mombasa and other major urban centres. The processing and canning industry is expanding but the prices offered by the canners to the farmers do not compare favourably with the 'fresh fruit' market prices. For example, up to Shs.4/- per kg. is currently paid for first class fresh oranges, whereas that offered by the canners is only 50 cents per kg. (1 Kenyan shilling = 100 cents; 1 UK £ = 16 Kenyan shillings (approx.)).

(c) PASSION FRUIT

Passion fruit is a more risky crop than the other fruit mentioned because little is known about its yield and general soil and weather requirements. Passion fruit plantations in the Ndovu area are known to yield from 24 to 32 tons of fresh fruit per hectare. Cultivation is intensive and the plant needs frequent irrigation. The productive life cycle for the plant is about 3½years, so that at least every 4 years a new crop has to be planted.

(d) VEGETABLE CROPS

Some of the crops most suited for the Estate include French beans, aubergines, capsicum, chillies and seed-beans. These can grow all the year round using irrigation. However, during the period from November to April, sufficient horticultural products are produced by small-holders for the local market. Thus it may be wise for the Estate to intensify its production during the 'off-season' or dry period using irrigation. Otherwise an excess supply may depress prices or stay unsold during the normal harvest season. It is worth noting that irrigated crops are usually higher quality products than rain-fed crops.

The majority of the vegetable crops, i.e. French beans, aubergines, capsicum, and chillies, would be produced for export as well as for the domestic market. The exportable crops would have to be produced in the European winter months, when the European importing countries are not able to produce their own. They would therefore be produced in the months of October to March, since during the summer months the EEC countries put a ban on the importation of those crops they can produce which are French beans, aubergines, and capsicums. Those not produced in Europe can be grown and exported any time of the year.

In horticultural production some kind of crop rotation is necessary to preserve soil fertility, and the soil should normally be given time to rest. There is also the need to control various kinds of weeds, such as couch grass. It is thought that a maize crop grown after other crops helps to control some of these weeds.

(e) SISAL

The sisal occupying the Estate was planted over a period of 40 years, the most recent plantings being six to ten years old. The older plantings were made in single lines but sucker and weed growth have been unchecked in recent years, increasing the problem of uprooting and clearing. Fibre produced from this sisal is of lower quality than that from new plantations, and the yield is only about 40% of a well kept and young plantation. It would be convenient if the sisal could be 'slaughter harvested' before uprooting as this would lessen the cost of clearing.

The presence of sisal on the Estate has prevented over-settlement of the area; this has been an advantage in that it is occupying the best land for development. Clearance of the sisal should, therefore, be phased such that only the amount of land to be cultivated and put under crop should be cleared each year.

2.3 MARKET OPPORTUNITIES

Information on marketing opportunities for horticultural products was collected from Walimu's marketing expert and from an official in the Kenya Export Promotion Council.

Availability of ready markets for the produce is one of the major determinants of horticultural production. Unlike other agricultural products and manufactured goods, fresh horticultural produce needs to be disposed of almost as soon as it is harvested. Otherwise it will deteriorate and lose quality. Fresh produce cannot be stored for a long period of time, and storage of fruits and vegetables for any length of time is quite costly because storage facilities have to be set up. One factor that directly affects Kenya's horticultural market opportunities is that some of the countries competing for the European market have refrigerated ships to transport their produce, which Kenya does not have available at the present time.

In the analysis of the market situation a distinction has to be made between:-

I rural market
II urban mass market
III high income city market
IV export market
  (i) fresh
  (ii) dehydrated
  (iii) processed

The rural market as an outlet for horticultural production is the least developed, followed by the inadequately organised urban mass market. The high income city market caters for limited numbers of the high income class with the ability to demand and pay for better quality produce. The longer-term market prospects within Kenya for locally produced horticultural produce appear favourable. However, there are a number of marketing limitations and economic factors which have a restrictive influence on the expansion of the local horticultural industry. The most obvious of these factors include:

(i) Lack of an efficient marketing system, especially at wholesale level, which would be capable of handling increased quantities efficiently.

(ii) Lack of small-holder production and marketing organisations capable of stimulating planned horticultural produce marketing.

(iii) Lack of production planning to secure regular supply of commodities in the desired quantities, which to a large extent is due to lack of reliable production and marketing statistics and information.

The Kenya export market for fresh fruit and vegetables, dehydrated products, and processed produce has been growing over the last years. The EEC absorbs the vast majority of Kenya's horticultural exports. Air transportation has enabled exporters to have their produce available to the consumer in a sound, attractive and fresh condition - the general criteria of quality for horticultural produce. The most important reason for Kenya to develop her export market to Europe and to regard the long-term prospects as favourable is, besides the seasonal productive advantages, the trend for horticultural production to move out of Central and Northern Europe.

The export of fresh horticulture from Kenya has in the past depended almost entirely on air cargo space availability. The rate of increase of exports by air, besides satisfactory market demand, is likely in future to depend on:

(i) the growth of passenger air services through Nairobi;

(ii) freight rates; and

(iii) interest of air charter operators to increase the available services and their dependability.

As in the domestic market, the export marketing information system is inadequate, and a lot more could be done to promote Kenya's horticultural exports. Realising this problem, the Chairman of the Kenya Export Promotion Council had this to say:

> "... It (The Kenya Export Promotion Council) has, ten years after its inception, failed to become equipped with a satisfactory complement of trained and experienced staff in specialist fields of marketing, information and trade fair operation ... As a result it has rarely been in a position to give the optimum service to Kenya's exporters, Commercial Attaches and potential customers requiring guidance and information, which is one of its primary essential functions."

The HCDA and/or The Export Promotion Council could, among other things, put in a telex system to channel marketing information from Europe and other importing countries to Kenyan producers and marketing organisations.

2.4 RESOURCES AND CONSTRAINTS

Discussions were held with members of the Cooperative management committee, with the general manager, and with the manager of the Kenya Commercial Bank in Mboyu.

(a) LAND

The Estate consists of high potential land and low quality soil area. These are broad divisions. There are many subdivisions within each of these land categories. Strictly, land should be divided up according to soils, topography, improvements existing on the land, and according to the different seasons in which it is available for use. For example, about 400 hectares of the Estate consists of steep slopes suitable for perennial crops like coffee, oranges and avocadoes, which help to prevent soil erosion. If this area were planted with vegetable crops the soil would be washed away during the heavy rains. Land planted with perennial crops is not the same as land under annual crops, since the latter is available for a new crop each year, whereas the former is not. Moreover, the amount of land that can be cleared each year using available machinery and labour resources puts a serious limitation on how much is available for farming in that year.

(b) LABOUR

Like land, labour is not to be treated as a homogenous resource in production. It was mentioned that the Estate is settled by about 2,000 families. Not all members of each of these families are 'active' labour force for the farm; some are children who are not of age to work on the farm, others are women who often stay at home and work on their own subsistence plots. It is not easy therefore to say how much labour is available. Furthermore, most of these families are members of the Wageni Cooperative, which owns the Estate, and they feel that the farm operation should be a 'family' affair with no hired labour from outside. They are reluctant to take up additional casual labour, which would be readily available from the neighbouring areas, for fear that the labourers would settle on the Estate for good.

Agricultural production labour requirements are seasonal. Thus labour needs to be stratified into different seasonal quantities. In setting up labour supply periods the extent to which critical operations must be performed in a given time span needs to be considered. Broad labour supply periods for the Estate can be identified on the basis of farm operations. These periods are planting, weeding and harvesting periods. The planting period for most annual crops is August/September and December/January; the

harvest period is December and March, since the crops occupy the field for only 3 to 4 months. One reason for these growing periods is that most of these crops are grown for export and find the best market in Europe during the winter months. During the rest of the year, only those crops for the domestic market will be grown, and demand on labour will, therefore, be low. Labour requirements for perennial crops are more evenly spread over the year, and consist mainly of weeding, pruning and harvesting. The labour demand will be high, however, in the years when the particular crop is established and when it begins yielding. These crops should therefore be grown during that part of the year when there is a low labour requirement for the annual crops, eg. in mid-year.

Labour supply available in any season is also affected by how much time the settlers devote to their own subsistence crops and the time they spend tending their livestock. Nearly all subsistence farming is concentrated in the rainy months of April and November. During these months labour supply for the farm will become short, and it may be necessary to take up additional casual labour at this time.

(c) CAPITAL

The farm will need a great deal of capital equipment to be able to develop the Estate. The farm will also need a lot of working capital for seeds, fertiliser, manure, pesticides, insecticides and labour.

The amount of money for initial outlays which may be expected to come from the Cooperative members is difficult to estimate. The farm will certainly have to look to outside financiers for loans, at least for some of the initial capital investment. The problem may not be the procurement of a loan, since bodies like the Kenya Commercial Bank, and the Industrial and Commercial Development Corporation (ICDC), would be willing to give a loan if they were satisfied that the project were viable. Rather the financial constraint will come about when the farm has to repay the loan and the interest due on it. The question is whether the profits will be high enough in the long run to cover these commitments. The current ruling rate of interest charged by these bodies is at least 12%.

In the development plan for the farm it will be necessary to take account of the different maturity periods for the various crops since financial returns from them can only be expected after crops have begun yielding. For example, it takes 3 years for coffee to reach full maturity, 8 years for oranges and avocadoes, and 3 years for sisal. In the early years therefore it may be advisable to plant relatively more of the annual crops so that 'quick' money can be earned to meet working capital requirements.

2.5 OTHER ISSUES

Other relevant information was obtained, mostly in informal discussions, which is brought together here.

Besides resource and market constraints, there are also institutional restrictions that may affect farming activities. In general these may include grazing or water rights, tenure arrangements, and marketing quotas. Two of these restrictions have been identified as directly affecting the Chakula Estate. Firstly, on the production of onions for the fresh market, there is a Government regulation controlling the growing of onions. The Government's aim is to protect and encourage small-holders to grow the crop, and it has therefore restricted the production of onions from big farms. A tentative agreement between the Government and the owners of the Estate allows the latter a maximum of 20 hectares under onions. A second factor that will have bearing on the development of the Estate concerns ownership of the land and the legal status of the Cooperative. It would not be surprising if the Government one day decided to allocate the land to individual households especially if its development is delayed. It seems that the title deeds for the land have not been concluded and passed on to the Wageni Cooperative. However, for the purposes of this project it is assumed that the question of ownership is settled, and that the members of the Cooperative can go ahead and develop the land without interference.

Successful implementation of any development plan suggested for the Estate requires a competent management team. It has been observed that most problems connected with cooperatives in Kenya consist of "numerous cases of fraud, dishonesty and favouritism in the management, lack of understanding of business principles, and inability or unwillingness on the part of the society to recruit experienced staff". This should serve as a warning for the Wageni Cooperative to hire a qualified agricultural team of managers to run the farm. The current general manager of the Estate, Mr. Pedersen, is an expatriate who plans to leave Kenya in the relatively near future. The management should be divorced from the Cooperative members as far as possible. The possibility of interference with the management by the Cooperative should be restricted to obvious cases of mismanagement.

The yields given for the various enterprises are based on the assumption that high-level management skills will be available, especially for crops like oranges, avocadoes and passion fruit. Managerial ability is one of the most important factors in the production of horticulture, and it should always be considered in assessing alternative patterns of farming. A decision must be reached as to whether the managerial skills required for a particular activity are too complex or unavailable, in which case the expected yield from the activity will be curtailed.

The attitude of the Cooperative members to the operation of the farm is another important factor in future plans. Some of the members are of the opinion that the Estate should be fragmented and shared among them so that they can grow the crops on individual plots, and only have the Cooperative market produce for them. This would, however, raise problems of management and high cost of production. But the members can only be expected to support the communal farm if their ownership is not questioned and if they expect the benefits from its operation to accrue to them. The question of ownership is tied in with the likelihood of resettlement on the area ear-marked for cultivation. This would be more likely to occur on the land planned for vegetable crops. It might be suggested therefore that the area under plantation crops should be extended to make resettlement more difficult.

2.6 BRIEFING 2

After these two intensive weeks of information collection, the Walimu team spent three days in the Nairobi office trying to make sense of what they had learnt. At this stage Mr Nchinda told the team that they should come up with a procedure for generating some alternative plans for the Cooperative's development and ideas for how these alternatives should be compared. Also the teams should list what further detailed information they needed.

3. PRELIMINARY PROPOSALS

3.1 A POSSIBLE ALLOCATION

The management of the Cooperative in conjunction with Walimu Consultants have drawn up one possible allocation of land to crops. This allocation is shown in Table 3.1 It is a first effort at a sensible choice and should not be taken to be a final selection. The phasing plan for this allocation is shown in Table 3.2.

Table 3.1 Suggested Crop Allocation

Crop	Allocation (hectares)
Coffee	400
Oranges	150
Avocadoes	150
Passion Fruit	10
Sisal	900
French Beans	30
Onions	20
Aubergines	30
Capsicum	90
Chillies	20
Seedbeans	20
Maize	180
TOTAL	2,000

Table 3.2 Phasing Plan for Suggested Allocation[1]

Crop \ Year	1	2	3	4	5	6	7	8	9	10
Coffee	100	200	300	400	400	400	400	400	400	400
Oranges	50	75	100	125	150	150	150	150	150	150
Avocadoes	50	75	100	125	150	150	150	150	150	150
Passion fruit	10	10	10	10	10	10	10	10	10	10
Sisal	200	400	600	800	900	900	900	900	900	900

1 The plans show the phasing of the perennial crops; the annual crops occupy the same areas each year (ie. the area given in the basic allocation).

3.2 DATA

A considerable quantity of data has now been collected from many sources on prices, yields, labour requirements, material costs and capital costs.

Data on prices and yields contain a spread of values from 'pessimistic' to 'optimistic'. This reflects the considerable uncertainty which exists with respect to likely future values for these data elements. No such analysis has been done for labour requirements and material input costs although these are also uncertain to some extent.

(a) ESTIMATES OF PRICES

Table 3.3 Price Estimates

		PESSIMISTIC	EXPECTED	OPTIMISTIC
1.	COFFEE (SHS/TON)	7500	8360	9280
2.	ORANGE (SHS/Kg.)	1.00	1.30	2.5
3.	AVOCADOES "	1.50	2.00	4.0
4.	PASSION FRUIT "	.35	.50	.75
5.	SISAL (SHS/TON)	500	1980	3000
6.	FRENCH BEANS (SHS/Kg.)	.50	2.15	3.00
7.	ONIONS "	.50	1.20	1.50
8.	AUBERGINES "	1.00	1.50	2.0
9.	CAPSICUMS "	.50	1.70	3.0
10.	CHILLIES "	1.00	1.20	1.70
11.	SEED BEANS "	1.75	1.80	2.00
12.	COMMERCIAL MAIZE"	.40	.50	.60

The expected price estimates are based on the farm gate or F.o.b. Nairobi airport price (for horticultural crops which are exported by air). They are a weighted average of prices over the last six or so years. For horticultural produce both the price offered by the processing industry and the 'fresh produce' market price were taken into account in

determining the range of price estimates. In most cases the "processing industry" price was taken as the pessimistic estimate (since it was so much lower than the fresh produce market price), the optimistic estimate was based on what price can be fetched on the "fresh" market.

(b) ESTIMATES OF YIELDS

Table 3.4 Yield Estimates for Perennial Crops (Tons/Ha)

	YEAR OF GROWTH							
CROP	1	2	3	4	5	6	7	8
COFFEE*	0.0	0.05	1.6	2.5	2.5	-	-	-
ORANGES: (1)								
LOW	0	0	0.58	1.65	4.84	10.24	15.53	18.23
EXPECTED	0	0	0.63	1.83	5.38	11.38	17.25	20.25
HIGH	0	0	0.69	2.01	5.92	12.52	18.97	22.77
AVOCADOES: (2)								
LOW	0	0	0	0.34	1.12	3.94	12.37	18.0
EXPECTED	0	0	0	0.38	1.25	4.38	13.73	20.0
HIGH	0	0	0	0.44	1.44	5.04	15.81	23.0
PASSION FRUIT: (3)								
LOW	19.2	25.6	25.6					
EXPECTED	24.0	32.0	32.0					
HIGH	28.8	38.4	38.4					
SISAL*	0	0	3.0	3.5	3.5			

NOTES:
* For coffee and sisal yields only one set of estimates were used because they were assumed to be more or less certain.
(1) A 10% yield variation was assumed for oranges.
(2) A 10% negative variation and 15% positive variation were assumed for avocado yields.
(3) Passion fruit being the most risky crop a 20% variation in the yield was assumed.

Table 3.5 Yield Estimates for the Annual Crops (Tons/Ha)

	ANNUAL CROP	LOW	EXPECTED	HIGH
1.	FRENCH BEANS	6.0	7.0	8.0
2.	ONIONS	12.5	16.0	25.0
3.	AUBERGINES	12.5	18.0	25.0
4.	CHILLIES	6.5	9.0	12.0
5.	CAPSICUMS	6.0	13.0	20.0
6.	SEED BEANS	1.6	2.0	2.5
7.	COMMERCIAL MAIZE	3.8	4.0	4.5

(c) LABOUR REQUIREMENTS

Table 3.6 Estimated Labour Requirements (1)

	C R O P	MANDAYS/HA	ESTIMATED AVERAGE COST/MANDAY (Shs)
1.	Coffee	510	6.00
2.	Oranges	70	4.80
3.	Avocadoes	90	4.80
4.	Passion Fruit	970	5.25
5.	French Beans	1,110	5.25
6.	Onions	245	5.25
7.	Aubergines	280	5.25
8.	Capsicum	280	5.25
9.	Chillies	165	5.25
10.	Seed Beans	51	5.25
11.	Commercial Maize	28	5.25
12.	Sisal	1,480	7.00

(1) These estimates were provided by the Extension Team in the Ministry of Agriculture. They are based on a detailed analysis of monthly requirements by the various crop enterprises.

(d) COST OF EMPLOYING LABOURERS

There are three different organising bodies which set wage rates:

1. Ministry of Labour for agricultural industry workers, who are not working in tea, sisal, coffee, or sugar plantations.
2. For the sisal workers; by the agreement between the Kenya Sisal Growers' Association and the Agricultural and Plantation Workers' Union.
3. For coffee, according to the Agreement between the Coffee Growers' Union and the Kenya Agriculture and Plantation Workers' Union.

Calculation of the daily wages for a permanent worker has been done as follows:-

Working days per year	=	270 days
Paid leave per year	=	21 days
Paid holidays per year	=	8 days
Sick days per year	=	14 days
Sundays or unpaid leave	=	52 days
		365

I. AGRICULTURAL WORKERS

1) Permanent Employees	Labour costs/day (Shs)
Male 18+ yrs.	5.25
Female 18+ yrs.	4.35
Tractor Driver	7.00
Lorry Driver	8.25
Section Foreman	12.00
Farm Foreman	18.00

2) Casual Workers	
Male 18+ yrs.	5.00
Female 18+ yrs.	4.00

II. WORKERS IN SISAL INDUSTRY

1) Permanent Employees	SHS/working day
Cutter	7.50
Employed for brushing, transportation etc.	7.00
Non specified labour -	
Male	6.00
Female	4.50

2) Casual Workers	
Cutter	6.80
Loader	6.30
Male (non-specified)	5.40
Female (non-specified)	3.50

III. COFFEE PLANTATION WORKERS

1) Permanent Workers	Shs/Working Day
Male	6.10
Female	5.50

2) Casual Workers — Shs/Working day

Male	4.80
Female	4.15

(e) MATERIAL INPUT COSTS

Table 3.7 Material Input Costs* (Shs/Ha)

	SEED(LING)	(2) FERTILIZER	SPRAY	(1) OTHER
Coffee	1,372	4,854	1,110	1,105
Oranges	2,170	2,924	636	626
Avocadoes	1,500	3,334	432	626
Passion Fruit	-	3,338	730	8,206
Sisal	733	-	1,006	-
French Beans	836	1,326	491	342
Onions	95	1,754	189	1,013
Aubergines	58	3,522	214	1,110
Capsicum	83	3,522	214	329
Chillies	78	2,436	214	329
Seedbeans	168	956	491	325
Commercial Maize	-	955	255	267

* The cost figures given in the Table are mainly annual (variable) costs; they exclude, therefore, the establishment and harvesting costs.

(1) Estimates in the column headed 'OTHER' are mostly 'capital' maintenance costs. They also include cost of irrigation, cost of nets for onions, gunnies for maize, pots for passion fruit, etc.

(2) A sample of prices assumed for fertiliser and spray are:-

- Triple Supers	Shs. 3.16 per kg.
- Urea	2.71 " "
- Single Super	2.16 " "
- Potash	2.45 " "
- Sprays	18.00 " "
- Diafolitan	4.55 " "

(f) CAPITAL COSTS

Table 3.8 Estimates of Initial Capital Outlays*

	ITEMS	ESTIMATED COST (SHS.)
1.	CATERPILLAR DC 6	440,000
2.	TRACTORS (10)	580,000
3.	DISC PLOUGHS (2)	10,000
4.	DISC HARROWS (1)	9,000
5.	TOOTH HARROWS (1)	3,800
6.	GYROMOWER (1)	6,700
7.	CULTIVATORS (2)	9,600
8.	MAIZE PLANTER (1)	20,000
9.	COMB DRILLER (1)	15,000
10.	FERTILISER SPREADER (1)	3,000
11.	PLANTATION SPRAYER (1)	20,000
12.	FIELD CROP SPRAYER (3)	13,000
13.	FIELD ROLLER (1)	3,500
14.	TRAILERS (6)	44,000
15.	25-TON LORRIES (2)	430,000
16.	9-TON SISAL TRAILER (3)	499,000
17.	SISAL CRUSHER (1)	6,000
18.	BRUSHING MACHINES (17)	102,000
19.	FACTORY REPAIR	70,000
20.	COFFEE FACTORY	302,000
21.	IRRIGATION DAM & PLANT	697,500
22.	POWER STATION REPAIR	15,000

* These items are necessary to prepare the land for any large-scale farming, particularly in uprooting the old sisal on the Estate, and also in processing some of the produce like coffee and sisal.

3.3 BRIEFING 3

The Walimu Consultants team is now required to:

(a) Evaluate the desirability of the allocation given in Table 3.1.

(b) Generate alternative allocations and evaluate them.

(c) Discuss the criteria for evaluation.

4. REPORT WRITING

4.1 BRIEFING 4

Walimu Consultants are required to report to the Management Committee of the Wageni Agricultural Cooperative on the findings and recommendations from the project. The Management Committee need information which can be used in negotiations with government agencies and banks and this material needs to be comprehensive. However, Cooperative members are also interested in the results of the project and any material written for their benefit should be relatively simple, bearing in mind their limited educational background.

Firstly, consider what form the reporting from Walimu Consultants should take. Secondly, develop and produce the necessary material.