DISTRIBUTION OF NON-FARM INPUTS IN KENYA WITH SPECIAL EMPHASIS ON THE ROLE OF AGRICULTURAL COOPERATIVES

BY

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A Thesis submitted in part fulfilment for the Degree of Master of Science (Agriculture) in the University of Nairobi, Kenya.

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

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ABSTRACT

This thesis is an outcome of a field study based on administration of questionnaires, verbal interviews as well as analysis of published information and data. The main tasks were to gather information on factor marketing in Kenya, and to investigate a district cooperative union to find out how it performs the various functions in distribution of non-farm inputs. Five broad categories of non-farm inputs; fertilizer, hybrid maize seed, agricultural chemicals, manufactured animal feeds, and farm machinery, tools and equipment were investigated.

With the increase in population, good farming land has become scarce in Kenya. Most farmers are farming on what may be termed as 'a handful of soil', with no scope for horizontal expansion. Intensification of production is therefore essential and will require the improvement of farming practices and the use of proven packages of inputs.

In Kenya, due to the consequences of the colonial dual policy, agriculture has developed as a two-track system; the large scale farms, and small scale farms. The use of inputs has closely followed the development of agriculture in each sector. The large scale farmers, mostly European settlers, until 1960's have been using inputs since the pioneering days of Kenya's agriculture, but the small scale African farmers have been initiated to their use only in the last twenty years. The former sector has been conveniently served by existing private distributors, but distribution to

small scale farmers who are widely dispersed has constrained the existing system.

Factor marketing in Kenya is to a large extent concentrated in the hands of two major distributors and only in recent years have smaller distributors penetrated the market, distributing patented inputs. The private distributors use a network of branch, depots which are near railway lines, and concentrated in large scale farming areas. Their penetration in the small scale farm sector market has only been in the last few years, when they have established widely scattered branch depots at district headquarters and input stockists in local trading centres.

Multi-purpose agricultural cooperatives which are the farmers' alternative to private traders are only a phenomena of the last thirty years and many have proliferated in the post-1960 era and are still plagued by teething problems of mismanagement, misappropriation of funds and general deficiency in business foresight. Their participation in factor marketing is only as retail outlets for private distributors. They have however the necessary framework for distributing non-farm inputs, but the merchandising function is considered as secondary to the marketing function and as such in many cooperatives, is in its craddle stage.

Murang'a Farmers District Cooperative Union is a multi-commodity, multi-function secondary organization with coffee societies forming the backbone of the union's business activities.

The merchandising activity is as such geared towards the supply of essential inputs for coffee production. However due to the diversified production characteristics of farmers in the district, the union has a comprehensive shopping list to serve the farmer's other needs, to some extent.

There are three identifiable zonal distribution typologies in the district; a non-structured individual farmer procurement system in the lower large scale farm zone, the union dominated distribution system in the middle zone and a statutory authority distribution system supplying inputs for tea production in the upper zone. Stockists fill some essential market niches in both middle and upper zones especially in the supply of inputs for food crops.

The cooperative union distribution system which is dominant in the district can be conceptualized as consisting of three characteristic phases; the union level or the central ordering phase; the society level or the distribution phase, and the farmers level or the feedback phase. The procurement of inputs is through tenders and private arrangements with distributors. Central storage is done at the union's stores at Thika and Murang'a towns. The distribution framework is based on sixteen coffee societies which own 72 factories.

Member farmers are basically small scale producers with a diversified farming system. Apart from growing coffee they keep grade animals and grow a miscellany of food crops. Due to the small scale of operation the farmer's needs for inputs is small and dominated by preferences for small package sizes, and a need for an informational and advisory system.

It was found that the cooperative distribution system suffers from weaknesses at all the three phases. Farmers fail to indicate their seasonal requirements and factory managers under-estimate the demand. This is due to their lack of training in input marketing and lack of coordination with agricultural extension staff. Lack of transport and late delivery of supplies are the other weaknesses. These are aggravated to a critical point by the poor state of feeder roads in the district, especially during the rainy seasons. At the union level the problems are comparatively few and the dominant problem is under-estimation which is a consequence of under-estimation at the lower levels. This results in an adequacy and rationing of inputs to affiliated societies

The possible pre-requisites for a successful non-farm input distribution system are timely bulking of estimates, and timely procurement of adequate quantities supported by provision of adequate storage and transport facilities and a reasonable credit and pricing policy.

The thesis which is mainly exploratory and descriptive has two parts. The first four chapters cover various aspects of factor marketing at national level and the next four chapters cover the cooperative distribution system in Murang'a district.

1 INTRODUCTION.

1.1 AGRICULTURE IN KENYA'S ECONOMY.

1.1.1 The Contribution of the Agricultural Sector to Kenya's Economy.

Kenya is basically an agricultural country, and the agricultural sector which has contributed significantly to economic development in the past will continue as one of the pillars of Kenya's economy.

The sector contributed between 33% and 40% of the total Gross Domestic Product (GDP) in the period 1964-1973[1] (29, p. 44). Agricultural exports contribute over 70% of the total exports, and the agricultural sector employs over one third of wage employment and over 75% of total employment. (29, p. 247 - 249, and 7 Vol. I. p. 12).

(a) Gross Domestic Product.

According to the Kenya Development Plan 1974-1978 the contribution of the agricultural sector to Gross Domestic Product and Gross Value of Marketed Production is expected to increase as shown in table 1.

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[1] The contribution by the monetary, non-monetary sectors, and agricultural services to gross domestic product was 39.9% in 1964, 36.9% in 1967, 35.5% in 1970 and 33.9% in 1973.

TABLE 1: PROJECTED CONTRIBUTION AND GROWTH RATE OF AGRICULTURE TO GROSS DOMESTIC PRODUCT AND GROSS MARKETED PRODUCTION IN 1972 and 1978

	1972	1978	Rate of Growth
	K£ million in 1972 prices		%
Gross Domestic Product	202.2	273.4	5.2
Monetary Sector	90.8	134.0	6.7
Subsistence Sector	111.4	139.4	3.8
Gross Value of Marketed Production	104.9	155.1	6.7
Crops	70.2	106.5	7.2
Livestock	30.6	43.1	5.9
Unrecorded	4.1	5.5	5.0

Source: Kenya Development Plan 1974 - 1978 Part I page 201

(b) Agricultural exports.

The percentage contribution of individual commodities for exports are shown in table 2. Coffee and tea have remained as the major export commodities, contributing 43% of the total value of exports in 1973. With sisal, pyrethrum and wattle extract, they contributed, 50.9% of total exports in 1973. The other agricultural commodities of importance include maize, livestock byproducts, and horticultural products.

TABLE 2: CONTRIBUTION OF PRINCIPLE EXPORT COMMODITIES IN KENYA IN SOME SELECTED YEARS

Commodity	1963	1965	1967	1969	1971	1973
	Percentage of total value					
Coffee, not roasted	25.1	29.9	29.3	26.6.	26.8	29.2
Tea	12.9	12.9	13.8	17.8	16.2	13.8
Petroleum products	0.1	9.9	13.8	12.0	14.5	7.7
Sisal fibre and tow	17.2	8.2	3.9	2.7	2.1	3.9
Meat and Meat preparations	5.9	5.2	5.3	4.1	5.0	3.1
Pyrethrum extract and flowers	6.9	5.2	4.9	4.4	4.6	3.0
Hides, skins, furskins, undressed	2.7	3.7	3.3	3.0	3.3	4.2
Cement	1.1	2.0	1.9	2.3	2.1	2.1
Copper and alloys, unwrought	0.8	1.9	-	-	-	-
Wattle bark and extract	1.8	1.8	1.7	1.9	1.6	1.0
Sodium bicarbonate	2.8	0.7	1.9	1.4	2.5	2.3
Pineapples tinned	1.9	1.6	1.0	1.1	1.3	1.2
Cotton, raw	1.0	1.6	1.2	1.2	1.6	1.1
Wool, raw	1.3	1.2	0.9	0.9	0.4	0.2
Cashew nuts	0.5	1.2	1.0	1.1	1.0	0.5
Beans, peas, lentils	1.6	1.1	0.6	0.8	0.6	1.0
Oil seeds, nuts and kernels	1.5	1.0	0.7	0.5	0.6	0.4
Scrap metal	0.6	0.9	0.7	0.6	0.6	0.4
Butter, Ghee	1.9	0.6	0.5	0.4	0.1	0.6
Maize, unmilled	3.6	-	2.6	4.4	-	-
Other	8.5	9.1	10.5	12.8	15.1	19.2
Total	99.9	100.7	99.5	100	100	100.2

Total percentages don't add to 100 due to rounding

Source: Kenya Statistical Abstract 1974, Page 63

(c) Employment

Agriculture and forestry employed 265,356 people in both the private and public sectors of the economy in 1973. The total wage employment in the year was 761,685 people and thus agriculture and forestry engaged 34.8% of total wage employment. (29, p. 247 - 249). Apart from permanent wage employment there are more people employed during peak planting and harvesting seasons. The number has been estimated to range from 450,000 to 500,000. (8, p. 38). The number of people in self-employment and contributing family labour in smallholdings is estimated at over 3.7 million. (7. Vol. I, p. 12). As such, estimates of employment in agriculture are only indicative because of the many functions going on in the sector. An estimate of employment in agriculture and other sectors is shown in table 3.

TABLE 3: ESTIMATED EMPLOYMENT IN AGRICULTURE AND OTHER SECTORS IN KENYA 1972.

Sector	Wage employment	Self-employment and family labour	Total	Relative frequency
		Million		%
Urban	0.3	0.2	0.5	10
Rural				
Agriculture	0.6	3.7	4.3	84
Other	0.2	0.1	0.3	6
Total	1.1	4.0	5.1	100

Source: (7, Volume I. Page 12).

1.1.2 The Structure of Kenya's Agricultural Production.

In the colonial days agriculture was developed in the lines of a dual economy. Land was de-limited into 'white highlands' and 'African reserves'. This structure has continued to the present day with the former white highlands forming the large scale farm sector, except where they have been divided into settlement schemes. The African reserves have developed into areas of small scale farming.

(a) The large scale farm sector.

This sector originally consisted of 14,000 sq. miles reserved for about 2000 white settlers. (3, p. 5). Since 1960 many of the farms have been bought by the government to settle the landless, notably ' the million acres schome'. Others have been bought by cooperatives and individual African farmers.

In 1972 this sector consisted of 1540 large scale mixed farms which covered just over one million hectares. Of these, 1,234 farms covering 500,000 hectares were owned by Africans either individually, or through companies, partnerships and cooperatives. Of the rest, 295 farms covering 400,000 hectares, were owned by non-Africans, and the rest were owned by the state. In addition there were some 1,500 large tea, coffee, and sugar estates, as well as large ranches owned by private companies (8. p. 34-35).

For a long time this sector was the major contributor to the gross marketed production but its percentage share has declined. It stood at 58.3% in 1965, 49% in 1967 47.5% in 1972 and 48.7% in 1973 (27, p. 84). However some of the enterprises, like wheat, sisal, and large scale beef ranching are still a predominant feature of this sector. For other crops like coffee, tea, pyrethrum the small scale farmers grow a higher percentage.

(b) The small scale farm sector.

It is estimated that there are approximately 1.2 million smallholdings in Kenya, of which 25% are under one hectare and 50% under two hectares (8, p. 33). These support the 11 million people living in the rural areas.

For a long time, farming in this sector was mainly at subsistence level, but since the 'Swynnerton Plan of 1955' (10) there has been a tremendous transformation from subsistence to commercialized farming. This 'blue print of agrarian reform' called on government to allow Africans to grow cash crops and keep grade animals as well as consolidating the fragmented pieces of land. (3, p.40)

The contribution from this sector to the gross marketed production has increased from 41.7% in 1965 to 52.5% in 1972 and 50.9% in 1973 (27,p.89). Contribution in the production of the major export commodities has shown a very remarkable increase. In 1972 the sector had 54,000 ha. under coffee grown by 270,000 growers, and processed in 506 factories owned by

57 cooperatives. Of the 71,200 metric tons of coffee produced in 1973, the smallholders produced 36,100 metric tons. (27, p. 97).

Smallholder tea growing has been very successful. In 1972/73, 30,895 hectares were under tea grown by 79,134 growers in comparison to 23,000 hectares in large scale farms. (27,p.98) About 87% of Kenya's pyrethrum production is grown by smallholders, who grow on average 0.3 hectare each, and market it through 151 cooperative societies.(27, p. 94) Maize is the major staple food in Kenya, and 90% of the total maize production is produced by smallholders owning less than 5 hectares of land. (7, Vol. I, Annex 4, p. 2) In 1972 the area under improved maize in small scale farms was 212,922 hectares while in large scale farms it was only 92,208 hectares. (see table 11) Apart from cash crops the sector produces all the other food crops.

This sector has also shown an increase in the number of livestock. Over 60% of the total dairy herd, and a gradually increasing percentage of the beef animals are kept in small farms. (7, Vol. I Annex 5 p. 2) African producers and co-operatives produced 51.5% of all pigs processed at Uplands Bacon Factory in 1973. (30, p. 24)

1.2 LITERATURE REVIEW

1.2.1 Non-farm Inputs as Essential Pre-requisites for Sustaining Agricultural Productivity.

The availability of good agricultural land is limited. As there is no scope for horizontal expansion, production can only be increased by augmenting output per unit area. This can be done by improving agricultural practices and using proven 'packages of non-farm inputs'.

W.A Lewis supports this view when he states, (3,p.62)

> " The secret of rapid agricultural progress is to be found much more in agricultural extension, in fertilizers, in new seeds, in pesticides and in water supplies."

Lewis's point of view has been taken up by the 'I.L.O. Report' in its proposal for improving farming methods in Kenya which states: (8. p. 152)

> Most small scale farmers lack at least some of the requirements for productive intensive farming. However, given the relevant technology coupled with training, credit, access to the necessary inputs (including water), appropriate pricing policies for purchased inputs and agricultural commodities, and assured access to markets, there are a wide variety of farming systems by which one hectare or less could provide a family with sufficient food and also supply a cash income for purchasing at least the necessities of life.

Whereas, a lot has been achieved in Kenya in increasing agricultural productivity especially in the small scale farming areas, some doubts have been expressed on whether the upward trend will continue, because of "insufficient use of appropriate agricultural inputs". (20, p. 2)

To get agriculture moving and sustain this movement in the direction of higher levels of productivity, Mosher (12) identifies five essential requirements, which form 'a wheel for agricultural development' (12, p. 182) These are, markets for farm products, new farm technology local availability of farm supplies and equipment, adequate incentives for farmers and transportation facilities.

With the advance of modern farming techniques the farmer becomes increasingly dependent on these outside supplies, and it is important that the farmer should have at his disposal an efficient and economic supply system which meets this growing demand. Agricultural development requires that these supplies be available at many local points, in sufficient quantities and at reasonable prices to meet the needs of every farmer who may want to use them.

1.2.2 Some Views on the Present Structure of the Distribution System for Non-farm Inputs in Kenya.

As a result of the dual economy the distribution of non-farm inputs has closely followed the two sectors of agriculture. The large scale farm sector has been conveniently served by the main distributors of non-farm inputs. On the other hand the small scale farm sector was not considered as 'a potential market'.

With the implementation of the Swynnerton Plan of 1955, the market in the sector has been gradually realized.

The 'Melville Report' (18) noted the potentialities of small scale farmers as major users of fertilizers and called for a distribution system to serve this sector. It states: (18, p. 17)

> "As the main significant increase in the colony's consumption of fertilizer will arise from an increase of its use by peasant farmers, there was a need for the development of a low cost distribution system to cater for this market".

The report further noted that the present system "was geared primarily to meet the needs of large scale farmers". A 1969 government report (19) also noted that there was still lack of an efficient distribution system, with the present system weakened by logistic problems of storage and transportation, as well as lack of credit facilities and knowledge on inputs' use.

The 1971 report on non-farm inputs; the 'Havelock Report' (20),looked into problems in the use of fertilizer, agricultural machinery, and chemicals. On increasing fertilizer use this report noted that there was lack of knowledge on their use, transportation and storage problems, irregularities in delivery and packaging in large bags.

The 'Report of the Select Committee on the Maize Industry ('Wabuge Report) (21) made various complaints on distribution of seeds, fertilizer and chemicals.

It noted that a lot of effort is made in convincing farmers of the worthiness of their use, "only to find that the difficulties involved in obtaining the inputs are enough to stop otherwise willing farmers from using them" (paragraph 15). It also noted that farmers in many areas have to travel great distances to purchase inputs, (paragraph 15) On stockists, it noted that "they are few and many run out of supplies, after only a small proportion of farmers have purchased their requirements" (paragraph 16). The report went on to note that the problem of packaging and recommended packaging fertilizer in quantities commensurate with small scale utilization. (21, p. 4) Similar recommendations had been made earlier in the 'Melville Report' (Recommendation 2) and in the 'Havelock Report' (Recommendation 44) The 'Wabuge Report' also noted that the distributors don't give enough technical advice, and voiced their concern that farmers were only getting 'institutions written on input packages' even though they are technically illiterate. (21, p. 4)

1.2.3 The Call for Cooperatives to Participate and Improve the Factor Market.

In its call for development of a low cost distribution system for fertilizer the 'Melville Report' recommended the maximum use of cooperatives as channels for distribution, and dissemination of information to farmers. (18, p. 8). At the same time it recommended the recognition of the petty traders as the potential suppliers of the numerous farmers who are not members of cooperatives. Maini (10, p. 26) has also noted that cooperatives can make a great contribution in improving the bargaining power of the rural sector through inter alia cutting out middlemen and providing easy and readily available modern non-farm inputs. (10, p. 26)

In Sessional Paper No. 8 (22) the government policy concerning the participation of cooperatives in distribution of inputs is laid out where it states that "every encouragement will be given to the movement, to enable it to play an extensive role in the agricultural sector" (paragraph 6). The district cooperative unions are expected to perform bulk purchasing of inputs while at society level the development of viable primaries on multi-commodity, multi-purpose pattern is the strategy.

It also calls for the development of a built-in service within the marketing cooperatives for distribution of farm supplies and other stores for resale to farmers. (paragraph 22). Kenya Farmers Association, the countryside distributor is expected to work intimately with cooperative unions at district level.

The 'Havelock Report' (20, p. 11) cited strengthening of cooperatives as one of the ways in which the constraints of the distribution system can be removed. (20, p. 12) However the report cited many cases where many district cooperative unions were not functioning, and called for the re-organization of the whole movement, as well as that of Kenya Farmers Association which acts as an umbrella cooperative.

In response to these challenges the Cooperative Department released a merchandise manual, in which it stated that although the movement has been participating in distribution of inputs, its purchasing power has not been properly utilized, mainly due to the fact that orders are never adequately bulked at district, provincial and national level. (25) This is also coupled with the problem of poor, and ununiformed recording and stock control systems. However it recognized that although merchandising is secondary to the well developed function of produce marketing it is important in promoting the members to utilize better and modern farming methods.

1.3 OBJECTIVES, OUTLINE, METHODOLOGY AND LIMITATIONS OF THE STUDY

1.3.1 Objectives

The study was undertaken with two broad objectives in mind:

(1) To gather information on various aspects of factor marketing in Kenya. Within this broad objective the following specific objectives were highlighted:-

  (a) An assessment of the need, and economics of use of non-farm inputs in Kenya.

  (b) An examination of the present market structures for non-farm inputs and their distributional constraints.

(2) To investigate Murang'a Farmers District Cooperative Union, as a distribution channel geared at serving small scale farmers in the district. Within the investigation of cooperatives as a distribution channel the following are highlighted:-

  (a) As assessment of the cooperative movement in Kenya, and its structure as it relates to providing a framework for distributing non-farm inputs.

  (b) An investigation of a district cooparative union and its affliated societies to find out the present performance of the functions of centralized ordering, storage, distribution and pricing and to record weaknesses in the system and put forward suggestions for improvement.

(c) An investigation of member farmers' production characteristics and participation in the cooperative societies, to enumerate the problems they experience in purchasing non-farm inputs, and find out how these provide a feedback which can be used for improving the cooperative distribution system.

There are two questions which the case study on Muranga Farmers District Cooperative Union is aimed at answering;

(1) What are the limitations and problems of the present cooperative merchandising activity?

(2) How can these be improved to make the Cooperative Union function effectively as a multipurpose business?

1.3.2 Outline

To meet the requirement of the first objective various aspects were investigated:-

(1) The structure of Kenya's agriculture and the need to increase production.

(2) The economic importance of non-farm inputs.

(3) The present structure of non-farm inputs' markets in Kenya. For the case study on Muranga Farmers District Cooperative Union the following aspects were covered:-

(4) The need for a low cost distribution system and the suitability of agricultural cooperatives as a channel for distribution.

(5) A review of agricultural production and marketing in the district, to pinpoint the market for non-farm inputs.

(6) An investigation of the structure and organisation of the cooperative movement in the district aimed on finding out how it is performing the distribution functions.

(7) Analysis of responses from a sample of farmers regarding their production characteristics, participation in the cooperative activities and the problems they face in procuring non-farm inputs.

(8) Recording of weaknesses experienced by the cooperative movement in the district and putting forward suggestions for improvement.

1.3.3 Methodology

In the exploratory section on factor marketing in Kenya the author mostly depended on secondary information, from published government reports, Verbal interviews were also conducted on the following:

(1) Private firms

(1) General Manager, Produce Executive, Trading Officer, Fertilizer Distribution Officer and other Department Heads of Kenya Farmers Association (Coop.) Ltd.

(2) Marketing Manager, Unga Ltd.

(3) Agricultural Manager, B.A.S.F. (.E.A) Ltd.

(4) Sales Manager, Murphy Chemicals (.E.A.) Ltd.

(5) Marketing Manager, Shell Chemicals (.E.A.) Ltd.

(6) Agricultural Manager, Pfizer Chemicals Ltd.

(7) Agricultural Manager, Mackenzie Dalgety Ltd.

(8) Sales Manager, Kenya Seed Company, Kitale.

(2) Government Ministries

(1) Crop Development Officer (Farm Inputs), Ministry of Agriculture

(2) Merchandising Expert, Ministry of Cooperative Development.

(3) Cooperative Movement

(1) General Secretary, Kenya National Federation of Cooperative Unions.

(2) Administrative Officer, Kenya Planters Cooperative Union.

For the case study, secondary data was collected from Muranga District Annual Reports (Ministry of Agriculture, and Ministry of Cooperative Development) and from the records of Muranga Farmers District Cooperative Union.

Primary data was collected from interviews with the District Agricultural Officer, District Cooperative Officer and Management staff of Murang'a Farmers District Cooperative Union. Two structured non-disguised questionnaires were also used to collect information from two groups of people: (see Annexes I and II)

(a) Coffee Factory Managers.

35 managers out of the 72 factory managers were interviewed. From the managers the author aimed at finding out the organization, and distribution problems of cooperative societies at grass roots' level.

(b) Farmers

A sample of 106 farmers was interviewed. Selection was on a divisional basis, 27 farmers were interviewed from each of the three divisions of Kandara, Kangema, and Kigumo and 25 farmers were interviewed from Kiharu division. The society headquarters in each division were visited and farmers' names were selected from the membership register, one in every 350 names. The names were then grouped according to the factories from which the farmers get their non-farm inputs. During the interviews' period the author visited the factories and with the help of the factory managers the selected farmers were identified and their farms visited.

Interviewing was conducted from August 1973 to January 1974. A preliminary survey and pre-testing of questionnaires was done in early August with the help of three sixth form students. The rest of the interviewing was done by the author. The language used was Kikuyu.

1.3.4 Limitations

Factor marketing is not a widely studied aspect in Kenya and as such only isolated, and in most cases out-dated reports are available. As such the lack of up to-date and pertinent data was acutely felt. Since all aspects of the market are dealt with by private firms, these were reluctant to release figures and only gave approximations.

To tackle all the aspects of factors marketing in Kenya proved a formidable task because of the large number of firms concerned. There was also a financial and time limitation.

Only 106 farmers were interviewed but this was considered a manageable sample considering the heavy travel expenditure and extensive walking in areas where there are no vehicles. The lack of interviewers to help in the field was a critical limitation. Due to this limitation the author managed to cover only one district cooperative union. Whereas any district could be selected, Muranga District was selected for it exhibits various characteristics which are reflective of small scale farming and cooperative activity. The major characteristics are as listed below:-

(a) Agricultural production and marketing is done by small scale farmers.

(b) The district has a graduation of ecological zones starting with the dry eastern zone, the farming activities are as such varied and a miscellany of crops is grown.

(c) Due to the topography, transportation is a major problem, and many of the roads are earth roads.

(d) The cooperative movement is dominated by one commodity, in this case coffee and supply of inputs is distributed through the dominant societies.

These characteristics are representative of small scale farming districts of Central Province, Eastern Province (Embu, Meru), Rift Valley Province (Kericho, Nandi) Western Province and Nyanza Province especially Kisii district.

2 THE ECONOMICS OF USE OF NON-FARM INPUTS

2.1 CHARACTERISTICS OF NON-FARM INPUTS.

Agricultural inputs are all items put into the agricultural production process. These include the traditional inputs; land, labour, and management, and the non-traditional new forms of capital inputs which include; fertilizer, agricultural chemicals, improved seeds, manufactured animal feeds and farm tools and machinery

These new forms of capital inputs which are characteristic of modern agriculture are usually introduced simultaneously in what is termed as 'a package of improved inputs' because they have various common characteristics:- (11, p. 289)

(a) They tend to be purchased off the farm which pulls the farmer into the market economy and thus increases his risk problems, costs, and credit needs and provide pressure for increased marketing of his produce.

(b) They are products of research and embody technological changes; they have to be supported by an informational programme to diffuse the innovation to farmers.

(c) They are represented by variable costs and are highly divisible which means they can be used at low levels of intensity, or on only a part of the farm. They tend to be used for a relatively short production span.

(d) Most of them increase production and efficiency through a direct effect on livestock and crop yields.

(e) There is a close complementary relationship between more than one new form of inputs and various new farming practices. The case of hybrid maize is very illustrative, where to get maximum yields, hybrid seeds, improved cultural practices, right application of fertilizer and pest control measures, must all be a part of the improved programme.

Except for farm tools and machinery which are not divisible, and have a longer production span and improve production indirectly, all the other four non-farm inputs meet the above characteristics.

2.2 YIELD RESPONSE IN CROP AND LIVESTOCK PRODUCTION DUE TO NON-FARM INPUTS.

Non-farm inputs have been proved to increase yields in both crops and livestock. Experiments done in research stations and repeated in farms under natural conditions have shown that the use of fertilizer, hybrid maize seed and animal feeds has a direct increase in yield, while the use of agricultural chemicals reduces the loss due to rampages of diseases, insects and weeds and thus increases the yields.

In the case of farm tools and machinery the indirect increase in yield results from timeliness and quality in performance of farm operations.

The yield increases have to bring attractive returns when valued at current market prices so as to stimulate farmers to use optimal treatments. Calculations of returns and value cost ratio (VCR) have been worked out to find the most economic treatments. A net return of at least 100% above the cost on inputs or a VCR value of at least two is taken as reasonable. (4,p.3). The economic justification for using various non-farm inputs in Kenya is exemplified by data from experiments and demonstrations.

2.2.1 Fertilizer

Fertilizer has been used effectively on cash crops especially coffee resulting in high increases. Yield. For the food crops, it has been shown that similar yields result. Data from the FAO Fertilizer Programme which has been in operation in Kenya since 1969, illustrate this increase. The responses on maize due to various fertilizer combinations, and the resulting net returns and VCR are shown in table 4.

TABLE 4: EFFECT OF FERTILIZER ON MAIZE YIELD FROM DEMONSTRATIONS IN 12 DISTRICTS OF KENYA 1972

District	No. of Demonstrations	Average Yield		Increase in Yield	Value of increase	Cost of Fertilizer	Net Return	VCR
		Control	Treated					
		Kg. per hectare			shillings			
Kakamega	38	3779	6099	2320	902	197	765	4.6
Bungoma	45	3159	4976	1817	767	197	510	3.9
Homa Bay	50	2532	4538	2006	780	197	583	4.0
Siaya	29	3158	4929	1771	689	197	492	3.5
Murang'a	54	2672	4659	1987	773	150	623	5.2
Nyeri	51	3635	5721	2086	811	150	661	5.4
Embu	20	2586	4312	1726	671	150	521	4.5
Machakos	6	1524	2247	723	281	150	131	1.9
Kericho	25	220	4798	1878	731	197	534	3.7
Baringo	8	3765	5506	1741	677	197	480	3.4
Narok	8	3167	4827	1660	646	197	449	3.4
Taita	29	3478	5498	2020	786	150	636	5.2

1. This is calculated using the 1972 price of maize which was K/sh. 35.00 per 90 kg. bag.
2. The fertilizer used was 60-60-0 and 40-40-0 costed at K/sh. 197.00 and K/sh. 150.00 respectively.

Source: Compiled from FAO Fertilizer Programme (Kenya) Report No. 4, 1972.

2.2.2 Hybrid maize seed.

In Kenya the eight hybrid varieties used by farmers have yields varying from 30% to 80% above local varieties. However high yields are a function of complementary effects of factors such as early planting, right fertilizer application, use of recommended varieties, proper weed, pest and disease control and good husbandry.

Maize yields can be very high in farms as demonstrated by a maize yield contest organized by Kenya Seed Company in 1971/72 in Kitale District. In the contest thirteen farmers took part. each planting two hectares. The yields ranged from 5,243 kg. to 10,342 kg. per hectare with a mean yield of 7,479 kg. per hectare. Although fertilizer, planters, insecticides and herbicides were provided free by commercial sponsors, the contest demonstrated that there is still plenty of potential for improvement in maize yields if farmers use the recommended complementary inputs. (35).

At the 1972 maize price of Shs. 35.00 per 90 kg. bag the mean gross return was K£145 per hectare. All other costs which included costs of ploughing, harrowing, planting cultivating and costs of fertilizer and chemicals were calculated at K£ 87.50 per hectare. The net profit is therefore K£ 57.5 per hectare. Although many farmers cannot afford such optimal use of non-farm inputs due to the prohibitive costs there is still a suitable profit margin from application of small quantities of inputs if good crop husbandry is practiced.

2.2.3 Manufactured Animal Feeds.

Supplementary feeding results in increased yields of meat and milk, pork and mutton. In commercial pig, dairy, chicken and beef production, animal feeds form 60-75% of total costs. As such the profitability of using them has to be determined. The FAO Lanet Feedlot Project at Nakuru has illustrated profitability in fattening Boran animals from the drier North Eastern Province of Kenya prior to slaughter by Kenya Meat Commission. The costs and margins involved in feeding a Boran animal for 70 days from 240 kg. to 340 kg. liveweight are illustrated in table 5.

TABLE 5: COSTS AND MARGINS INVOLVED IN FEEDING A BORAN ANIMAL FOR 70 DAYS AT LANET FEEDLOT 1973

	PER HEAD	VALUE ADDED	COSTS	MARGIN
		PER DAY		
	SHILLINGS			
Sale Value[1]	884.00	-	-	-
Purchase price	580.00	-	-	-
Value added in 70 days	304.00	4.34	-	-
Feed[2]	-	-	2.48	-
Overheads	-	-	0.60	-
Interest at 10% p.a	-	-	0.16	-
Mortality allowance at 1%	-	-	0.08	-
Total Costs			3.32	
Margin	71.40			1.02

1. The producer price is Shs. 5.00 per kg. cold dressed weight (50% - 60% of liveweight).

2. The ration used consisted of Maize silage 50%, maize germ and bran 40% and urea molasses. The mixture was valued at Shs. 0.31 per kg.

SOURCE: Lanet Beef Research Station;

Economic Aspects of Beef Feedlot Production, January, 1974. Page 2.

In general a feedlot margin of Shs. 1.00 per animal per day is considered profitable. This depends on feed costs which in the above case form 74.7% of the total cost, on conversion ratio, and value added per day. Returns to capital of at least 20% per annum are obtained.

Animals from feedlots are better finished and graded higher than animals purchased directly from grazing areas. About 83% of KMC annual slaughter fall in grades below FAQ (Fair Average Quality). It is estimated that 70% of these animals could be graded higher if they could be finished in feedlots.

2.2.4 Agricultural Chemicals.

Experiments done in Kenya and East African Community research stations on the use of herbicides, insecticides and fungicides have shown that there is some increase in crop yields.

Herbicides have not been used greatly in Kenya farms except for some isolated large farms. However results from experiments have shown that the costs may be less than hand weeding, and there is a noticeable increase in yield as illustrated in table 6.

TABLE 6: EFFECT OF WEED CONTROL TREATMENTS ON YIELD OF COFFEE OVER A THREE YEAR PERIOD AND MEAN ANNUAL COSTS FOR THE EIGHT CONTROL METHODS.

	1968/70	1970/71	1971/72	Mean	Mean annual costs/ha
	Yield of clean coffee per hectare				Shillings
Hand Cultivation	1080	2414	1261	1585	550
Paraquat at low rate	1684	1930	1796	1803	374
Paraquat at high rate	1406	2065	1665	1712	408
Paraquat and slashing	1463	2050	1935	1816	412
Diuron and Paraquat	1426	2145	1677	1749	556
Simazine and Paraquat	1767	1775	2056	1867	530
Diuron and Amitrole	1702	2037	1996	1912	715
Simazine and Amitrole	1302	1871	2107	1760	708
Mean annual yield /ha	1479	2036	1812	1776	

Source: Kenya Coffee, March 1974. Page 56.

Insecticides unlike herbicides are used in large quantities by both large and small scale farmers, their use to a large extent is concentrated mainly on cash crops, but they can nevertheless be used profitably on food crops. An experiment on the use of various chemicals to control the bean fly (Melanogromyza phaseoli) in Northern Tanzania, where the fly causes losses from 50% to 100% is illustrated in table 7. There is yield increase over the control plot which was not treated with chemicals.

TABLE 7: COMPARISON OF THE WEIGHT OF CLEAN BEAN SEEDS FROM PLOTS TREATED WITH CHEMICALS, AND THE UNTREATED CONTROL PLOTS.

TYPE OF INSECTICIDE	REPLICATE PLOTS					Total	Mean
	1	2	3	4	5		
	GRAMS PER PLOT						
Pyrethrum[1]	617	406	490	323	744	2580	516
Diptrex	930	1004	1058	1034	816	4842	968.4
PP511	847	528	1168	995	770	4308	861.6
Dicrotophos	1264	650	676	975	694	4259	851.8
Control	447	797	576	955	826	3601	720.2

1. Lack of effectiveness in pyrethrum treated plots is considered to be due to lack of a suitable solvent for pyrethrum.

Source: East African Community; Tropical Pesticide Research Institute, 1972 Annual Report, P. 18. Arusha Tanzania.

Fungicides have become extremely important in coffee production for the control of coffee berry disease (CBD) (Colletotrichum coffeanum), which has been a serious threat to the coffee industry since the epidemic of 1967-68. Various fungicides have been used for its control as shown in table 8. In the experiment all the fungicides were significantly better than the control.

TABLE 8: COMPARISON OF THE YIELD OF RIPE COFFEE CHERRIES FROM FUNGICIDE TREATED COFFEE PLOTS AND THOSE NOT TREATED

TYPE OF FUNGICIDE	REPLICATES				TOTAL	MEAN
	I	II	III	IV		
	KILOGRAMS PER PLOT					
Topsin	29.5	34.0	27.7	50.6	141.8	35.4
Bas 3460f	63.0	62.0	44.7	41.0	210.7	52.5
Tecto - 40	39.0	51.0	47.0	60.0	197.0	49.2
Basfungin	44.0	30.5	55.4	38.7	168.6	42.1
Quinolate	36.0	45.0	42.0	42.0	165.0	41.2
Perenox-Benelate	20.5	30.0	85.0	63.0	199.0	49.7
Perenox	39.0	64.0	29.7	70.0	202.7	50.6
Control	19.0	13.8	23.0	19.6	75.4	18.8

Source: East African Community, Tropical Pesticides Research Institute, 1972 Annual Report. Page 55, Arusha Tanzania

These results are from small scale experiments, but nevertheless the yield increases due to the use of agricultural chemicals have been proven in farms, under natural conditions.

2.2.5 Farm Machinery, Tools and Equipment

The yield response due to machinery, tools and equipment is indirect. Yields may be increased in various ways by appropriate mechanization;

(i) Timely land preparation and planting.

(ii) Removal of labour bottlenecks in weeding, and harvesting.

(iii) Pumping water for irrigation.

(iv) Timely application of pesticides

It is estimated that losses in maize yields due to late planting, a bottleneck which can be removed by using mechanical planters, range from 55 to 110 kg/ha per day in Rift Valley Province, and are as high as 170 kg/ha per day in Central and Eastern Provinces. (2, p. 128).

Hand operated tools and equipments are of great value to the small scale farmer. In coffee production, sprayers play a critical role in control of insects and diseases.

3 THE MARKET STRUCTURE FOR NON-FARM INPUTS IN KENYA

3.1 THE FERTILIZER MARKET.

3.1.1 National Fertilizer Consumption.

(a) Past trend in consumption.

Kenya is a relatively large consumer of fertilizer amongst African countries. In consumption per hectare arable land, per hectare agricultural land, and per capital, it ranks very near the top. (see appendix table 1). But consumption is low in comparison to developed countries.

The quantities of imported fertilizer have increased by about 168% in the last nine years. Taking 1964 as a base, the average annual increase has been 18.6%. Total fertilizer consumption has increased from 55,630 metric tons in 1964 to 148,900 metric tons in 1972 (See appendix table II). Regarding different types of fertilizer, the importation of nitrogen has increased by 7% annually, that of phosphate fertilizer by 5% and that of compound fertilizer by 22%.

This increase has resulted mainly from increase in use by small scale farmers. However not all sectors of agricultural industry, and farming districts share proportionately in the increased usage. The bulk of fertilizer are applied in maize, wheat, coffee and tea. In 1969 the estimated utilization of pure N, and P_2O_5 nutrients was 14,740 metric tons and 23,407 metric tons respectively.

Tea utilised 26.8% of N and 4.3% of P_2O_5, coffee utilised 17.3% of N and 3.5% of P_2O_5, maize 22.4% of N and 40% of P_2O_5 and wheat 15.5% of N and 39.4% of P_2O_5 (20, p. 5)

(b) Estimated future consumption.

Estimation of future demand of fertilizer will have to take account of various determinants namely:-

(i) Economic outlook of crops showing a profitable response to fertilizer and having an export and domestic market potential.

(ii) Level of technology employed in farm management especially in following officially recommended application rates and extension advice.

(iii) Government or FAO programs in demonstrating to farmers the potential benefits of using fertiliser.

(iv) Fertilizer prices

(v) Credit availability.

Estimates have been made on fertilizer consumption in 1975 or 1980. (8, p. 11) In 1969 the Working Party on Fertilizer Recommendations estimated the demand for 1975 at 50,000t of N and 30,000t of P_2O_5. The Report of the Working Party on Agricultural Inputs forecast a demand of 185,000t of fertilizer by 1975.

But by 1972 the total consumption had reached 150,000t . The most likely guess of consumption by 1980 is between 350,000t and 450,000t. The Ministry of Agriculture's projections up to 1978 are shown in table 9. These show a 172% increase in bulk fertilizer material usage in seven years, and an increase of 167% pure nutrients, and an increase in individual pure nutrients. of 181.5% N, 155.7% P_2O_5 and 166.9% K_2O.

TABLE 9: ESTIMATED FERTILIZER REQUIREMENTS FOR MAJOR CROPS BASED ON 1972 RECOMMENDATION: 1972-1978

Type of Nutrient \ Year	1972	1973	1974	1975	1976	1977	1978
	Metric tons						
N (Pure)	24,195	28,674	36,430	44,397	51,402	57,733	68,112
Material	96,780	114,696	145,720	177,720	205,608	230,932	272,448
P_2O_5 Pure	26,966	33,115	39,774	46,514	53,036	59,288	68,964
Material	53,923	66,230	79,548	93,208	106,072	118,576	137,923
K_2O Pure	3,402	3,720	4,314	4,761	6,031	8,262	9,079
Material	6,804	7,440	8,623	9,522	12,062	16,624	18,158
Pure Total Nutrients	54,563	65,509	80,518	85,672	110,469	125,283	146,155
Total Material	157,516	188,366	233,896	280,138	323,742	366,032	428,534

Source: Zelenka A.T.: Evaluation of the national fertilizer marketing system. Page. 4

3.1.2 National Fertilizer Marketing System.

(a) Sources of fertilizer.

All fertilizer consumed in Kenya is imported, either in bulk form for local mixing or in bagged form for direct distribution. The major overseas suppliers are West Germany, Netherlands, Italy and other members of the Nitrex cartel which fixes common f.o.b. prices for all nitrogenous fertilizers. Kenya also imports some fertilizers from Uganda and Tanzania. From Uganda it imports about 20,000t annually of single superphosphate from the Tororo factory. Importation from Tanzania has only been in the last two years. The Tanga Factory began operating in 1972, manufacturing sulphate of ammonia (21%N), triple superphosphate (46% P_2O_5), diammonium phosphate and other compounds. In 1973, output reached about 30,000t of which approximately one third was exported to Kenya. In 1974 the planned production was 85,000t of which 30,000t was earmarked for the Kenya market (39).

In Kenya there is a mixing plant at Nakuru (Windmill E.A.Ltd.) which produces mixtures from imported bulk fertilizer. About 10,000t are produced annually of which about 30% is re-exported to neighbouring countries. The setting of a fertilizer factory has been considered since 1967, when Triangle Fertilizer Ltd. was launched with a capital outlay of K£5 million, with Albatros of Holland, and Imperial Chemical Company contributing each 40% of the total, and Development Finance Company of Kenya 20%.

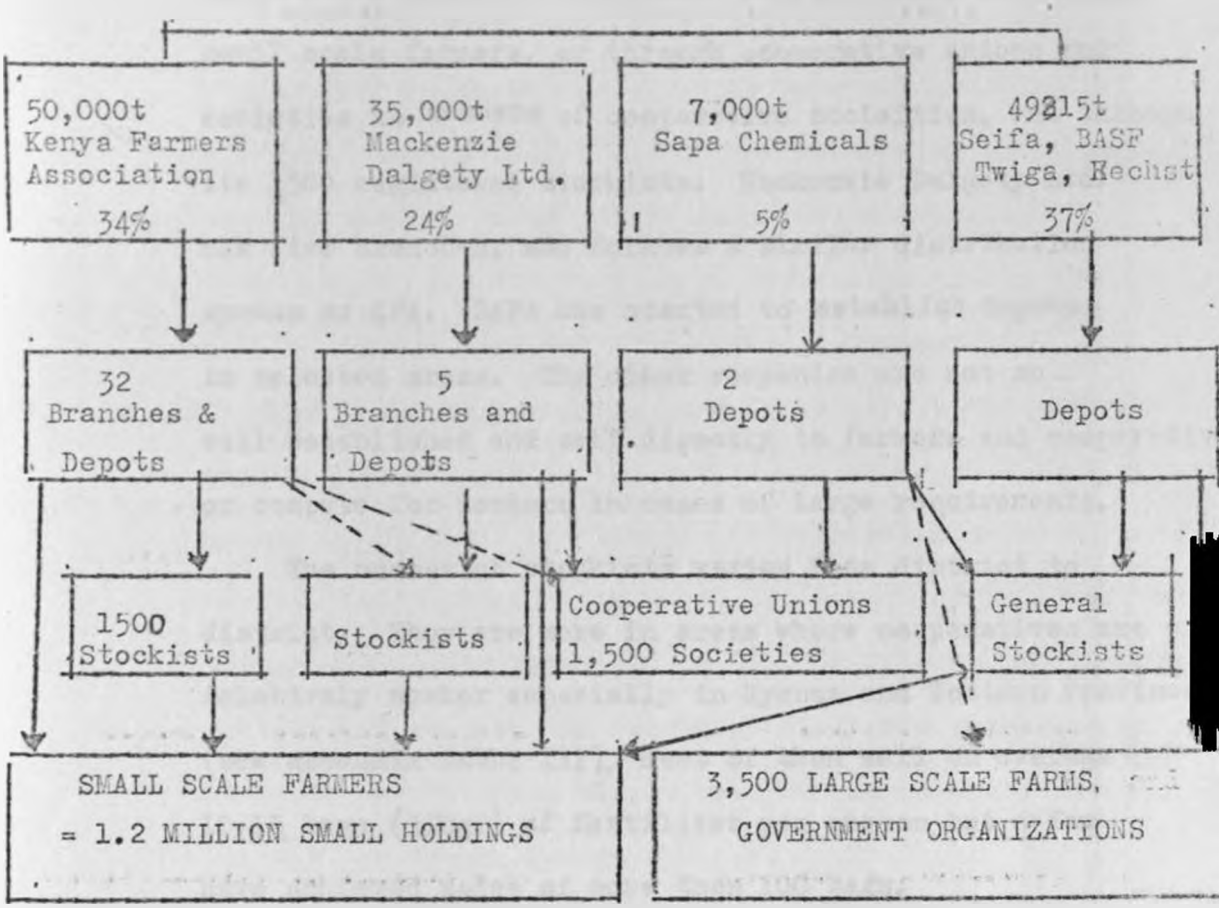
The project never got underway because it is claimed that seious errors were made in the feasibility study. Kenya is however considering building a fertilizer factory with a production capacity of 240,000 metric tons before the end of 1977 (36)

(b) Market structure, and channels.

The distribution of fertilizer in Kenya is mainly done by two major local importing companies, and local subsidiaries of overseas manufacturers. In 1970, KFA which represents Albatros - Holland and Ruhrstickstoff-Germany. distributed 34% of the total fertilizer, Mackenzie Dalgety Ltd. representing Windmill E.A. Ltd. distributed 24%, Sapa Chemicals representing Seifa-Italy 5% while other companies Hoechst and BASF of Germany, Twiga, distributed 37% of the total fertilizer consumed. (15, p. 1).
The distribution channels are shown in figure 1.

FIGURE 1: THE FERTILIZER MARKETING SYSTEM IN KENYA, 1970

TOTAL IMPORTS 1970. 141215 METRIC TONS*



* This figure has been fitted into the framework to illustrate the percentage distribution in each channel.

- - - - - - → Mostly large orders and tenders

——————→ Small orders and direct sales

Source: Compiled from field interviews, with marketing managers of the Agro-Chemical firms, and staff of the Ministry of Cooperatives.

KFA distributes fertilizer through its 32 branches. From these branches sales are either made directly to large scale farmers, Government organizations and nearby small scale farmers, or through cooperative unions and societies to members of cooperative socieities, and through its 1,500 registered stockists. Mackenzie Dalgety Ltd. has five branches, and follows a similar distribution system as KFA. SAPA has started to establish depots in selected areas. The other companies are not so well established and sell directly to farmers and cooperative or compete for tenders in cases of large requirements.

The number of stockists varies from district to district. They are more in areas where cooperatives are relatively weaker especially in Nyanza and Western Province (see appendix table III). Most of them sell on average 10-15 bags (50kg.) of fertilizer per season but a few have achieved sales of more than 100 bags.

3.1.3 The Pricing Policy and Transport Costs.

(a) Prices and subsidies.

In the last three years there has been an escalation in fertilizer prices. This is mainly due to the energy crisis which has caused an increase in the cost of the materials, and an increase in freight rates. The escalation in prices is reflected in the rapid change in retail fertilizer prices in Kenya (See appendix table IV) Taking 1972 as a base, it is found that prices of the most common fertilizer have increased by over a 100%.

Sulphate of Ammonia has increased by 134.4%, ASN/CAN by 102%, Triple Superphosphate by 140%, and 10 x 30 x 0 by 107.6%.

The prices of fertilizer, and the determination of profit margins on subsquent channel-levels are fixed by the government and distributors. The development of prices from Mombasa to an upcountry farmer at Eldoret is illustrated. for two fertilizer types distributed by KFA. (See appendix table V). Due to these price changes the profit margins have to be kept under constant review. From appendix table V it can be learned that relativ shares of the retailer's margin or retailer's price decreased as fertilizer prices increased, but the absolute amount the retailer gets increased by 83% for triple superphosphate and 17% for sulphate of ammonia. Similarly the absolute increase in wholesale margin was 52% for sulphate of ammonia and 95% for triple superphosphate.

Since 1963 the government has been subsidizing fertilizer in an effort to stimulate farmers to use more fertilizer. However in recent years the amount of subsidy has been decreased. It has been found that 80% of the subsidy accrues to large scale farmers, and small scale farmers only get 20% (8, p. 433).

In September. 1972 the subsidy on fertilizer was cut by 40% and a further decrease is expected in the future (see also table 10).

TABLE 10: FERTILIZER SUBSIDIES RATES AND TOTAL COSTS 1964 - 1973

Year	Type of Nutrient		Total Costs
	P_2O_5	N	
	Shillings per long ton		K£ '000
1963-64(July 1963)	375	-	166
1964-65	375	-	189
1965-66 (March 1965)	410	-	325
1966-67	410	-	350
1967-68	410	-	350
1968-69(July 1968)	387.5	-)	
(January 1969)		200)	
1969-70	500	200	809
1970-71	500	200	778
1971-72	500	200	973
1972-73(Sept. 1973)	300	120	750

Source: Ministry of Agriculture.
(7, Volume II. Annex 18, p. 12)

(b) Transport costs.

Transport costs, both railway and road, can form a large percentage of the retail price of fertilizer to farmers. In appendix table V it is clear that in 1973 railway tranpsort costs formed 6.8% and 4% of the retail price of sulphate of ammonia and triple superphosphate respectively.

The costs depend on distances from Mombasa, and distances from depots to the farms.

Rail rates for fertilizer transportation are fixed for minimum shipments of 13 tons, (see also appendix table VI). Road transport costs vary from place to place. The range is from Shs. 0.75 to Shs. 1.00 per ton/mile. However for single bags the costs are higher.

3.1.4 Constraints in the Distribution of Fertilizer and Possible Improvements.

The major constraints in distribution of fertilizer include:-

(a) Untimely supply by the overseas manufacturers.

(b) Escalating import and local prices.

(c) Inadequate storage especially at Mombasa and upcountry depots.

(d) An over-burdened railway system.

(e) Impassable earth roads, during the rainy season.

(f) Lack of consumption data in most areas.

(g) Low profit margins for distributors.

(h) Very few distribution points in small scale farming areas.

For the first two constraints, very little can be done. Importers can be made to arrange for fertilizer to be in the country at least two months before the planting season.

Storage capacity is to be increased for eight cooperative unions (Nyeri, Meru, Murang'a, Machakos, Bungoma, Kisii, Kericho) and for 400 stockists all over the country. (33)

The logistic problem of transport can only be solved in the long-run when the majority of rural earth roads are butimized. Lack of consumption data is a critical constraint. In many areas inavailability of fertilizer occurs because of under-estimation by suppliers.

3.2 THE MARKET FOR HYBRID MAIZE SEED

3.2.1 The Need for Improving Maize Production in Kenya.

(a) The importance of maize in Kenya.

Several important factors necessate increasing maize yields. These include:-

(i) Human consumption: Maize is the most important staple food and is grown by over 90% of small-holders. (7, Vol. I, Annex 4,p. 2). The estimated consumption in 1972/73 was 1.4 million tons and this is expected to rise to over 1.7 million tons by 1977/78. (7)

(ii) Livestock feed: Maize constitutes the major livestock feedstuff and with the expected expansion in poultry, dairy, pig and beef production it will be needed in large amounts.

(iii) Industrial uses: Maize can be processed into starch, cornflakes, and glucose. The projected starch factory at Eldoret is expected to use 165,000 bags and 2000 bags (90kg.) for the above items respectively. (21, p. 11)

(iv) Release of land for other uses. It is estimated that over one million hectares are under maize all over the country. The area under maize can be reduced if yields are increased from the national average of about 1200 kg per hectare. (7, Vol. I, Annex 4, p. 4)

(v) Cash crop: Although only 10 - 30% of the total maize production reaches the national market, there is a considerable export potential especially in the neighbouring countries. (21, p. 1).

(b) Maize Improvement in Kenya.

In the last ten years great advances have been made in research and breeding of high yielding varieties of maize. for particular ecological zones, altitudes and rainfall patterns. Various synthetic varieties, hybrid and composites have been released at Katumani, Embu and Kitale research stations.

Katumani composites are early maturing and drought escaping, and are suitable for areas of erratic and unreliable rainfall. These varieties are most common in Machakos, Kitui and drier areas of other districts. Kitale hybrids are for areas with a long wet season, unreliable rainfall and a long growing season. The common hybrid are HB 611C, HB 612, HB 632 and HB 613C. The areas suitable for these hybrids include Trans-Nzoia, Uasin Gishu, Bungoma, Kakamega, Kisii, Kericho and higher areas of Central Province.

Embu hybrids are a cross of early maturity Katumani composites and late maturity Kitale hybrids. These mature in about five months and are common in Central Province. The common hybrids are HB 511 and HB 512.

With this breakthrough in producing hybrids with yield potential of over 60% above local maize it was necessary to introduce them to farmers as quickly as possible. This was done through the 'package deal programme' whose components included: a breeding programme to release new hybrids, and field agronomic research to overcome the poor husbandry practices. It also included field extension and advisory service to educate farmers on the right cultural practices. The last two components of the programme include perfection of the distribution system of the seeds to the farmers and good prices of harvested maize to act as an incentive to farmers to plant more maize.

3.2.2 Trend in the Use of Hybrid Maize Seed

(a) Past, and present structure of the area under hybrid maize.

No accurate survey has been done on the area planted with hybrid maize seed. The figures are imputed from field estimates by the extension agents, and from sales figures by distributors. Nevertheless the area is, about 300,000 ha. to 350,000 ha. This comprises about one third of total area under maize (21, p. 1)

Since the introduction of hybrid maize in 1964 the areas planted with it has increased in both sectors; the smallholder and large scale farming areas as shown in table 11.

TABLE II. ESTIMATE OF AREA PLANTED WITH IMPROVED MAIZE[1] IN KENYA 1964 - 72

Year	Large-Scale Farms	Small-Scale Farms	Total
	Hectares		
1964	11,908	929	12,837
1965	21,029	8,350	29,379
1966	26,625	15,921	42,546
1967	59,142	48,021	107,163
1968	39,581	52,950	92,531
1969	40,669	66,188	106,857
1970	40,254	99,990	149,244
1971	66,112	154,298	220,410
1972	92,208	212,922	305,130

[1] Includes both hybrids and Katumani synthetic varieties.

Source: Kenya Seed Company, Kitale.
(7, Volume II. Annex 4, p. 57)

Large scale farms contain about 10% of total maize hectarage and about 30% of total area under improved maize. Production is concentrated in the area around Kitale, Nakuru and Eldoret in the Rift Valley Province. They produce mainly for marketing and on-the farm feeding of animals.

Smallholders grow about 90% of the total area under maize, and about 70% of area under improved maize. The main areas are Western and Nyanza Province, Central and Eastern Provinces especially Meru and Embu districts. In Machakos, Kitui and other drier areas, Katumani synthetic varieties are more common. Maize produced is consumed locally and only a small amount enters the market.

(b) Future demand of improved maize seed.

It is estimated that at present all the maize in large scale farms is improved maize so this sector is not expected to be an expanding market for improved maize seed. Farmers are influenced by changes in price and change to more profitable enterprises, from year to year.

The smallholder sector is the major market for improved maize seed. The present rapid rate of uptake of 50,000 to 60,000 ha. annually planted with improved maize is expected to reduce to 35,000 ha. annually by 1978 and level off at 25,000 ha. by 1982 - 83. (7, Vol. I Annex 4., p. 5). From these assumptions the projection for the next ten years is shown in table 12.

TABLE 12: PROJECTED AREA TO BE UNDER IMPROVED AND LOCAL MAIZE IN KENYA 1972/73, 1977/78 and 1982/83

	1972/73	1977/78	1982/83
	Thousand hectares		
Small scale local maize	727	552	427
Improved maize	213	388	513
Large scale (area declining at 5% annually	92	79	50

Source: Kenya Agricultural Sector Survey
Volume I, Annex 4, page 5.

3.2.3 National Hybrid Maize Seed Marketing System

(a) The functions of Kenya Seed Company, as a source of all improved maize seed in Kenya.

All improved maize seed comes from Kenya Seed Company (KSC) based at Kitale. The company performs various functions before seed is ready for marketing. These include production, processing, packaging and arranging for distribution with appointed agents.

Production of commercial seed is done in the KSC farm, and on contract with 80 large farms around Kitale to facilitate inspection by the company staff and Kenya Seed Inspection Service Staff. Inspection is carried at all stages from planting to harvesting.

After harvesting the seed is fumigated, cleaned and graded. Dressing with a fungicide/insecticide mixture is done to control insects and seedborne diseases.

The processed seed is packed in hessian or paper sacks. Two sizes are employed. It is either packed in 10kg.packages which is mainly for distribution in smallholder areas, or in 25 kg.packages for distribution in large scale farming areas. Annual production is approximately 70,000 packages (25 kg.) and 800,000 packages (10 kg.). The company produces between 8,000 and 10,000 tons of hybrid maize seed annually. KSC also provides a cadre of field representatives to advise farmers and to look after marketing operations.

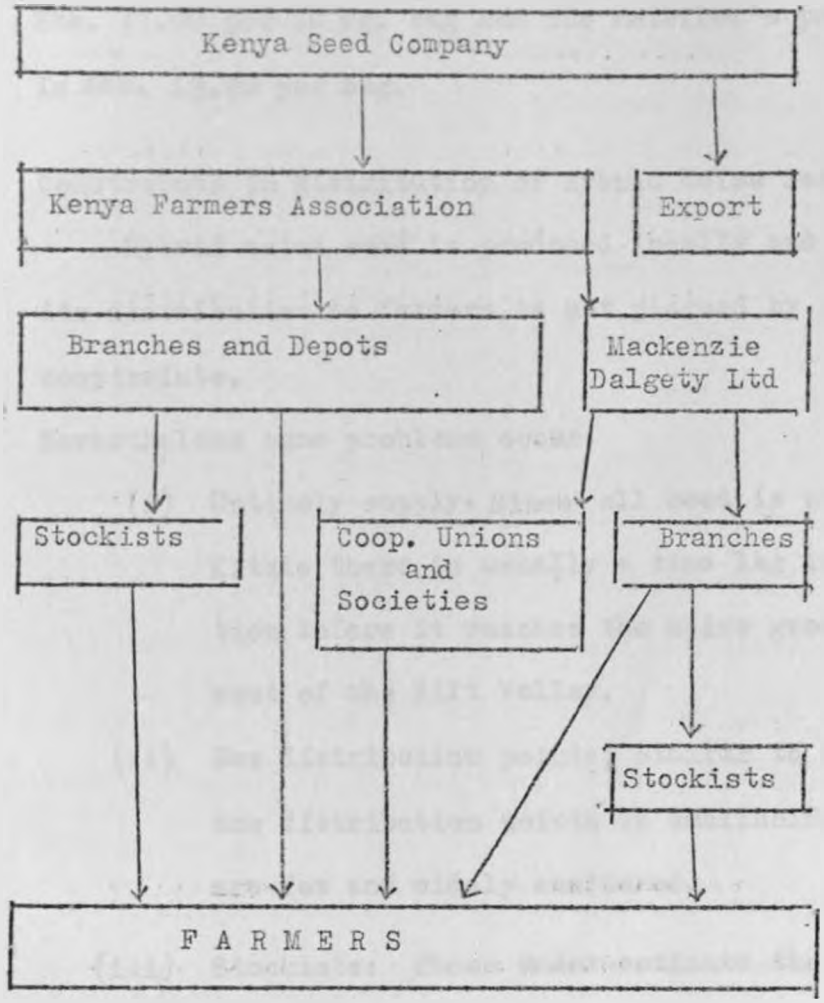
(b) Market Structure.

The main distributor for Kenya Seed Company is KFA based at Nakuru. Except for a small amount of seed which is exported to neighbouring countries all the other seed is sold locally within Kenya.

The largest percentage of hybrid maize seed is distributed from KFA branches (See appendix table VII) from which farmers can buy directly, or from these branches to KFA registered stockists. Large quantities are also supplied to cooperative unions for distribution to members thrcugh the affiliated societies.

Mackenzie Dalgety Ltd. also participates in distribution through its branches and stockists. The distribution channels for hybrid maize seed are shown in figure 2.

FIGURE 2: DISTRIBUTION CHANNELS FOR HYBRID MAIZE SEED IN KENYA 1973



Source: Compiled by the author from interviews with KFA Produce Manager.

(c) Prices

Prices of hybrid maize have not increased unlike the prices of other non-farm inputs. The price of a 10 kg. bag of hybrid maize seed is Shs. 17.75 at KFA branches, for registered stockists.

The stockist margin is Shs. 2.25, and the farmer pays Shs.20.00 for the package. When sales are made direct to farmers from branches the price is Shs. 20.00 per 10 kg. bag. For Katumani varieties the branch price is Shs. 17.00 per 10 kg. bag and the retailer's price is shs. 19.00 per bag.

3.2.4 Constraints in Distribution of Hybrid Maize Seed.

Hybrid maize seed is produced locally and as such its distribution to farmers is not plagued by many constraints.

Nevertheless some problems occur:

(i) Untimely supply: Since all seed is processed at Kitale there is usually a time lag in distribution before it reaches the maize growing areas east of the Rift Valley.

(ii) Few distribution points; Similar to fertilizer the distribution points in smallholder areas are few and widely scattered.

(iii) Stockists: These under-estimate the farmers demand and many farmers have to plant local maize or travel to far-off branches to get their requirements.

(iv) Packaging: Many farmers grow less than one hectare of maize. and as such they find it difficulty to buy their actual requirements, since packages are not sold in smaller quantities than 10 kg.

(v) Storage: Storage facilities are poor in smallholder farms and maize seed gets spoilt by rats, weevils and water. This becomes critical when the package is open and leftovers are stored to await the next season.

3.3 THE MARKET FOR AGRICULTURAL CHEMICALS.

3.3.1 Crop and Liverstock Losses Due to Pests, Diseases and Weeds, and the Need for Increased use of Agricultural Chemicals in Kenya.

Pests, diseases, and weeds destroy over one third of world's total crops during growth. and storage. The loss in animal production is of similar magnitude. In Latin American countries it has been estimated that 33% of potential crop yield is lost annually, with insect damage accounting for 10%, plant diseases 15%, and weeds 8%. (5, p. 1)

In Kenya, due to lack of proper surveys; correct estimates of losses caused by pests and diseases are not available. Nevertheless the losses can be assumed to be considerable. Crop diseases may account for 15 - 20% with pests and weeds accounting for a similar percentage. In specific crops losses may reach a very high magnitude. Of particular importance in Kenya are the rampages of the epiphytotics of coffee berry disease, rusts of wheat, wilt of Irish potatoes, and devastations of cotton by insect pests. In livestock production, diseases, and internal parasites are of a particular concern to farmers.

The loss due to coffee berry diseases in the epidemic period 1966 - 1968 was estimated at over K£ 3 million. (5,p.21). Annual losses in maize due to diseases amount to 7 - 10% of total production. Loss during storage is high as evidenced by loss in Maize and Produce Board stores being as high as 24,000 bags (90 kg. bags) in 1972/73. (21, p. 11). In smallholder farms where storage facilities are crude, losses are even higher. In cotton production, the combined effect of pests and diseases causes low yields or no yields at all in some farms. Internal parasites in cattle, pigs, sheep and goats result in undergrading and condemnation of many carcases.

Chemicals are important in all stages from seed dressing, spraying and dusting of growing plants, application of post and pre-emergence weedkillers, and fumigation and dusting of stored produce. In animal production, vaccination, dipping and dosing are essential for maintaining animals' health and thus getting a higher grade carcas.

Except for cash crops and improved animals the use of chemicals amongst the majority of smallholders is non-existent. Losses in this sector, combined with pathetically low yields result in food shortage. To improve the food situation there is a great need to apply agricultural chemicals.

3.3.2 Trends in the use of Agricultural Chemicals.

(a) Past trend in consumption of agricultural chemicals.

There has been a sharp increase in the use of agricultural chemicals for the last ten years. The estimated increase in value terms for the period 1963 - 1968 was 95% for insecticides. 14% for fungicides and 34% for herbicides. (See also table 13).

Although. there are no figures to indicate the amount used in either the smallholder and large scale farm sector it can be said with certainity that the large scale farm sector has been the major user, and prior to 1963 it may have been using about 90% of all chemicals. With the rapid intensification of farming in smallholder areas since 1955 the use of particular chemicals especially fungicides and insecticides is now about 50% of the total. In the case of herbicides the use among smallholders is negligible. since hand weeding is the predominant method of weed control.

Since 1967 there has been an increased use of fungicides and insecticides, which has been influenced by events in coffee production. Disease outbreaks especially coffee berry disease (CBD) (Colletotrichum coffeanum), leaf rust (Hemilea vastatrix) have forced farmers to use more fungicides especially copper based fungicides like Captafol.

Similarly insecticide use especially Malathion. and Sumithion. has increased in the control of coffee leaf miners, (Leucoptera meyricki), Anestisia bugs, thrips and scales. In cotton production the control is for various bollworms, stainers and aphids. In maize growing dusting with DDT is common to control maize stalk borers (Busseola fusca). Among crops, coffee is the major user of agricultural, chemicals.

TABLE 13: THE MONETARY VALUE OF AGRICULTURAL CHEMICALS USED IN KENYA 1969 - 1973.

Category	1969	1970	1971	1972	1973
	Thousand Kenya Pounds (£)				
Fungicides	435	531	588	773	1620
Insecticides	991	1275	703	1609	786
Herbicides	367	430	349	540	716
Plant hormones	-	-	-	14	2
Total	1793	2236	1640	2936	3124

Source: Kenya Economic Survey, 1975, p. 91

On livestock production there has been a tremendous increase in the use of dips and spray fluids especially acaricides in control of ticks. Dips built on "narambee" basis have increased all over the countryside and the amount of acaricides used is voluminous. The values for these are shown in table 14.

TABLE 14: VALUE OF LIVESTOCK DRUGS USED IN KENYA 1969 - 1973

Category	1969	1970	1971	1972	1973
	Thousand Kenya Pounds				
Dips and Spray Fluid.	615	707	666	703	765
Vaccines	146	422	263	628	400
Other Livestock drugs	148	192	223	352	263
Total	909	1321	1152	1683	1428

Source: Kenya Economic Survey, 1975 p. 91

(b) Future trend in the use of agricultural chemicals.

The demand for agricultural chemicals is influenced by unfavourable disease and pest infestation conditions and as such fluctuates from season to season.

However it can be said that the upward trend in use will continue.

Among individual chemical categories, fungicides and insecticides show a favourable future demand. This can result from use by smallscale farmers especially in food crops like Irish potatoes, maize and beans and using the recommended rates in coffee spraying. The use of herbicides is on the increase in large scale farms but in small scale farms it has made no impact. As family and hired labour becomes scarce and costly for weeding a favourable change towards herbicides may occur.

In the livestock sector, there is certainly going to be an increase in use of drugs and vaccines. Smallholders who keep costly improved animals which are more susceptible to diseases are realizing the importance of dips and drugs and are more open to their use.

3.3.3 National Marketing System for Agricultural Chemicals in Kenya.

(a) Sources of agricultural chemicals.

Virtually all agricultural chemicals are imported. Most are imported in finished and packed form for direct distribution while others are formulated locally from imported raw materials. The major sources of agricultural chemicals are West Germany, U.S.A., Japan, and United Kingdom, as illustrated in table 15.

TABLE 15: SOURCES OF AGRICULTURAL CHEMICALS IMPORTED INTO KENYA BY AMOUNT AND TYPE FROM EACH COUNTRY 1973

Country of origin	Fungicides	Insecticides	Herbicides
	Quintals [1]		
Belgium	100	421	50
Canada	3	-	-
France	100	92	69
West Germany	1595	4393	447
Israel	90	718	426
Italy	10	1675	45
Japan	891	3282	45
Netherlands	212	773	172
Switzerland	1	192	270
United Kingdom	464	1409	430
U.S.A.	4776	8842	509
Denmark	-	457	170
Others	-	81	364

The figures do not include imports made by foreign governments as aid.

[1] 1 quintal = 100 kg.

Source: Annual Trade Reports. E.A. Community. 1973

(b) Market structure.

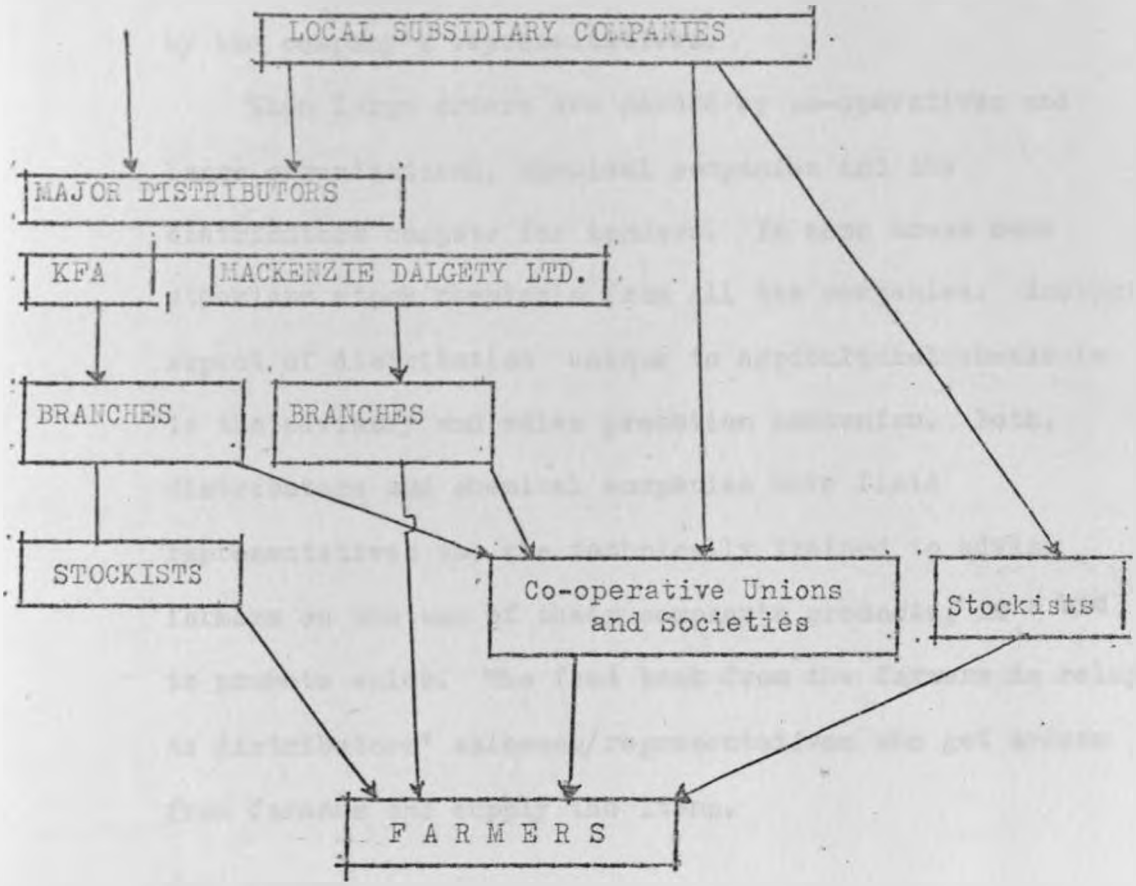
Several of the world's large agricultural chemicals' manufacturing companies are represented in Kenya by local subsidiary companies. These include BASF and Hoechst of Germany, Pfizer of U.S.A., Shell Chemicals representing Imperial Chemicals Ltd. (I.C.L.), Fisons, SAPA Chemicals and Cooper Kenya Ltd.

These local companies perform various functions as outlined below:-

(i) Ordering and financing imports from parent companies.
(ii) Local formulations of new products.
(iii) Testing new chemicals under local conditions.
(iv) Sales promotion and field advisory work.

Distribution of agricultural chemicals is done, to a large extent by the two major distributors, KFA and Mackenzie Dalgety Ltd. These also import some of their chemicals. Some of the chemical companies also distribute on their own. There is an agreement between the two distributors and some local companies which makes sure that the latter cannot import directly and the former cannot distribute directly to farmers. However, with the newly established chemical companies this agreement does not hold. The distribution channels are shown in figure 3.

FIGURE 3: DISTRIBUTION CHANNELS FOR AGRICULTURAL CHEMICALS 1973 IN KENYA. 1973.



KFA sells most of its agricultural chemicals through its network of branches. From these it supplies co-operative unions, stockists and farmers. In the case of stockists the supply is mainly for DDT used in maize dusting. Mackenzie Dalgety Ltd. distributes to farmers through its five branches. This company distributes for Shell Chemicals (E.A.) Ltd., Fisons (E.A) Ltd., Murphy Chemicals, Twiga Chemicals Industries and Cooper (Kenya) Ltd. It has some agreements with Machakos, Kirinyaga, Embu, Murang'a and Meru Co-operative Unions. whereby stocks are held by the Unions on what is called "on consignment stock policy".

The company supplies goods to Unions without invoicing them directly. The Unions sell the goods and invoicing is done through K.P.C.U. after monthly stock taking by the company's representatives.

When large orders are needed by co-operatives and large organizations, chemical companies and the distributors compete for tenders. In some areas same stockists stock chemicals from all the companies. Another aspect of distribution unique to agricultural chemicals is the advisory and sales promotion mechanism. Both, distributors and chemical companies have field representatives who are technically trained to advise farmers on the use of their company's products, in a bid to promote sales. The feed back from the farmers is relayed to distributors' salesmen/representatives who get orders from farmers and supply the items.

(c) Prices

Different chemical companies have in the market identical products under different brand names. In pricing they quote identical prices for comparable products to assure that one company or importer is not favoured over another.

Prices fall into three categories, wholesale, retail and consumer price. Wholesalers are mainly the local distributors and co-operative unions, while retailers include stockists and societies.

Wholesalers can get both the wholesale and retail profit margin if they sell directly to the farmers, especially through branches and co-operative union shops.

Similar to other non-farm inputs the prices of agricultural chemicals have gone up rapidly. In 1974 there were two price increases one in January and the other in June. Prices to the farmer increased by as much as 5 - 33% in the six months period. This is illustrated in table 16.

TABLE 16: PRICE INCREASES ON SIX COMMONLY USED AGRICULTURAL CHEMICALS IN KENYA IN JANUARY AND JUNE 1974

Type of	Unit	January 1974			June 1974			Increase in consumer price in 6 months
		Shillings						
		W	R	C	W	R	C	%
1% Lindane	24x200 gm	12.75	13.70	16.35	16.35	17.30	20.40	24.8
Stalk borer Dust (DDT)	5 x 5 kg.	36.90	39.55	45.75	41.75	44.25	50.50	10.4
Agron-Dust	24x400 gm.	38.50	41.25	48.00	55.30	58.05	64.80	35.0
Blilox	12.x1 kg.	256.90	277.75	317.40	311.50	332.55	372.00	17.2
Sevin	32x45 gm	49.00	53.00	62.40	52.20	56.20	65.60	5.1
Sumithion	12x200 ml	87.85	93.85	108.00	135.85	141.85	156.00	44.4

W. = Wholesale price

R = Retail price

C = Consumer price

Source: Fisons (.E.A.) Ltd. Price List, January and June 1974

3.3.4 Constraints in the Distribution of Agricultural Chemicals.

Agricultural chemicals are not bulky like the other non-farm inputs and as such present few logistic problems in distribution. However some contraints exist:-

(a) Prices are on the increase and farmers find it a constraint to buy enough chemicals.

(b) Distribution points are not enough especially stockists. Where co-operative societies operate, they usually stock only chemicals for the particular crop they market.

(c) Some chemical products are packed in very large containers and small scale farmers cannot get "reasonable packet sizes" for their needs.

(d) There are various technical problems. which include:-

(i) Many identical products under different brand names which confuse farmers.

(ii) Inadequacy of technical advice on the use of chemicals.

(iii) Toxicity and poisonus nature of some chemicals which deter farmers from using them.

(iv) Lack of application equipment.

3.4 THE MARKET FOR MANUFACTURED ANIMAL FEEDS.

3.4.1 Categories of Animal Feeds.

Animal feeds can be classfied into three categories; primary, intermediate and compound feeds.

The primary feeds which are mainly cereals, and which can be utilized in original or slightly processed form include maize, wheat, oats, barley and sorghum. Intermediate feeds are by-products of cereal, oilseed and meat processing. These include bran, pollard, oilseed cakes, fishmeal and meatmeals, pyrethrum marc, and maize germ meal.

Compounded feeds are various mixtures of cereals, intermediate feeds and protein-mineral-vitamin supplements. These are marketed under brand names of manufacturers, or suppliers of concentrate supplements.

3.4.2 Trends in Consumption of Animal Feeds.

(a) Past and present trend in consumption of animal feeds.

Consumption of animal feeds by various classes of livestock has shown a rapid increase in the last decade. Poultry feeds have formed a large percentage of the total quantity with cattle and pig feeds showing a steady increase.

In terms of monetary value the total value for manufactured animal feeds has increased from K£ 845,000 in 1965 to K£2.842mi. in 1973. This is a percentage increase in monetary value of 237%. The breakdown in value for particular feeds is shown for the period 1969-1973. in table 17.

Whereas some increase in monetary value is due to price increases, it can be nevertheless be said that consumption is increasing. More farmers are spending money to purchase manufactured feeds.

TABLE 17: VALUE OF VARIOUS CATEGORIES OF MANUFACTUREL FEEDS USED IN KENYA 1969 - 1973

Type of feed	1969	1970	1971	1972	1973
	K£ '000				
Pig feeds	63	82	149	188	324
Poultry feeds	792	1057	913	1219	1590
Cattle feeds	146	118	352	637	844
Other feeds	187	97	73	80	84
Total	1188	1354	1487	2124	2842

Source: Republic of Kenya, Economic Survey 1975, p.91

Quantitive figures on consumption are usually misleading because of the various classifications of feeds and multi-purpose uses of some feeds especially bran and pollard for cattle and pigs.

However the available figures show the trend in consumption among various groups of animals as shown in table 18.

TABLE 18: QUANTITIES OF COMPOUND FEEDS CONSUMED BY MAIN LIVESTOCK GROUPS, 1964 - 1969, AND 1971, AND ESTIMATED CONSUMPTION IN 1975

Year	Poultry	Cattle	Pigs	Others	Total
	Thousand metric tons				
1964	16.6	4.9	4.7	1.9	28.1
1965	16.6	5.0	5.4	1.9	28.1
1966	16.9	5.2	4.9	2.3	29.3
1967	18.1	5.9	3.3	2.0	29.3
1968	19.1	5.4	3.6	2.6	30.7
1969	22.3	6.3	5.2	2.4	36.2
1971*	33.1	6.1	8.5	2.0	49.7
1975*	34.0	13.0	10.0	2.5	59.5

* From Kenya Agricultural Sector Survey Volume II 1973, Annex 19, p. 2.

Source: Animal Feeds Industry in Kenya; A Preliminary Survey 1970, page 37 and 53

(b) Future trend in consumption of animal feeds.

Demand for animal feeds will continue to increase as a result of intensification of the livestock industry.

In dairy animal production, the numbers are expected to increase from 400,000 to 625,000 animals during the Development Plan period 1974-78. (6, p. 248). In the case of beef production the establishment of feedlots will increase demand for feeds. The number of animals in feedlots is expected to increase to 165,000 animals by 1978. (26, p. 247).

In 1975 the estimated production of pigs was 56,000. These are expected to consume 25.2 mi. kg. (25,200 tons) of concentrate feeds, consisting of 12.6 mi kg. of maize (12,600 tons) and the rest will be manufactured feeds. (31, p. 38)

Commercial poultry keeping, which is an indoor activity is the major consumer of feeds. With the increased smallholder participation in this activity with the provision of IDA Credit 105 loans, consumption is expected to increase.

With these expected increases in various groups of animals it can be said that the demand for animal feeds by 1980 will be high. Poultry may be expected to consume 35,000 - 45,000, cattle 15,000 - 20,000, 18,000 - 20,000, and others, 3,000 - 5,000 metric tons. Thus the total demand will range from 70,000 to 95,000 tons.

3.4.3 Sources and Distribution of Animal Feeds

(a) Primary feeds.

Cereal grains form the major ingredients in animal feeds. These include maize, wheat, barley, oats and sorghum. Maize is the main feed ingredient making up about half of the pig and poultry rations. The bulk of maize for feed mixing comes from the Maize and Produce Board, but a very large amount is fed to animals in farms where produced. Consumption of maize as stockfeed has risen from 270 tons in 1962/63 to 36,000 tons in 1972/73 as calculated from figures in table 19.

From Maize and Produce Board depots maize is distributed to millers and compounders for production of compounded feeds. Unmilled maize is also sold directly to large scale farmers, or through KFA to farmers. In the Rift Valley Province, KFA can sell maize to farmers with the consent of Maize and Produce Board. Direct sales to farmers have however to be approved by District Agricultural Boards to stop stockfeed maize leaking into human consumption.

TABLE 19: SALES OF MAIZE FOR STOCKFEED FROM MAIZE AND PRODUCE BOARD IN KENYA 1962/63 to 1972/73

Year	1962/63	1963/64	1964/65	1965/66	1966/67	1967/68	1968/69	1969/70	1970/71	1971/72	1972/73
	Thousand bags (90 kg)										
Number of bags	3	81	22	12	147*	86	118	212	236	257	400
	* Include maize distributed for famine relief										

Source: Report of Select Committee on the Maize Industry, 1973, page 11

About 3500 - 5000 tons of low grade and reject wheat is used for animal feeds each year. (7, Vol. II Annex 19, p. 1). This is sold by KFA which is an agent of the Wheat Board. Barley for stockfeed comes from the reject malting barley in the brewing industry. About 1500 tons of brewer's grains and 4000 - 5000 tons of reject malting barley are available annually. (7, Vol. II. Annex 19, p. 1). Oats, sorghums and millets are of minor importance as stockfeed since production is still very low.

Prices of stockfeed maize have varied between Shs. 24.00 and Shs. 28.00 per 90 kg. bags while that for human consumption is at present Shs. 65.00 per bag. In the case of wheat, prices for reject wheat vary between Shs. 12.00 and Shs. 25.00 per bag and those for 'feed wheat' vary from Shs. 26.50 to Shs. 29.00 per bag. Prices of reject malting barley are determined by maltsters at the beginning of the barley buying season and as such vary from season to season.

(b) Intermediate feeds.

1. Mill feeds.

Included in this category are by-products of cereal milling; bran, pollard and maize germ meal, oilseed cakes; soyabean, cotton seed, groundnut, and sunflower, pyrethrum marc from pyrethrum flower processing, and by-products of meat processing.

Bran and pollard are produced by Unga Ltd. with mills at Nairobi, Nakuru, and Eldoret, Maida Ltd. with a mill at Nakuru and Atta Ltd. with a mill at Mombasa. Other small mills operate at Eldoret and Rongai. The Nyeri Cooperative Union has a feed mixing plant at Karatina. These millfeeds are in joint supply and so their supply depends on production of wheat flour. Annual production varies between 15,000 - 20,000 tons for wheat bran and 10,000 - 15,000 tons for pollard. (1, p. 24).

KFA distributes most of Unga feeds through its branches while Maida feeds are distributed by agents scattered in the farming areas.

(ii) Oilseed cakes.

The major oilseed crushing firms are Nakuru Oil mills, Rift Valley Products, Voi Industries, and Kibos Industries. A sunflower seed crushing factory is under construction at Nakuru. (38).

Cotton seed is supplied by Cotton Lint and Seed Marketing Board (CLSMB) or imported from Uganda. Sunflower seed is supplied by Maize and Produce Board (MPB) Groundnuts and soya beans are similarly supplied by (MPB) or imported from Uganda.

The oilseed cakes with their varying protein content are used for inclusion in compounded rations and for on-farm mixing.

Nakuru Oil Mills supplies farmers and compounders directly while Rift Valley Products supply farmers through KFA. In 1971 consumption of oilseed cakes was about 1004 tons of sunflower cakes, 129 tons of soya beans meal, 2233 tons of cottonseed meal and 2500 tons of copra meal. Total consumption is about 4000 - 5000 tons annually. (7. Vol. II, Annex 19, p. 2.)

(iii) Animal protein meals.

These include bone, hoof, liver, meat and fish meals. Kenya Meat Commission (KMC) is the major supplier of these meals from its processing factories at Mombasa and Athi River. Fishmeal is imported from Uganda or from overseas by concentrate manufacturers. The supply of meat meals is influenced by numbers of animals slaughtered and number of condemned carcasses.

KMC distributes its feeds to compounders. and concentrate feed manufacturers. Distribution to farmers is through KFA branches.

(c) Compound feeds and concentrate supplements.

Concentrate supplements are supplied in premix form for inclusion in farm mixed rations and in proprietary compound rations. The concentrate supplements suppliers include Vitamins (E.A.) Ltd., Glaxo-Allenbury Ltd., Pfizer Ltd., and Aesia Ltd.. These are associated with millers and compounders as shown in table 20.

TABLE 20: ASSOCIATION BETWEEN CONCENTRATE SUPPLEMENT SUPPLIERS AND COMPOUNDERS.

Millers and Compounders	Concentrate Supplement Suppliers	Proprietary Brand of Final Rations
Unga Ltd	Vitamins (E.A) Ltd.	'Unga Feeds' containing 'Vitamealo'
Maida Ltd.	Glaxo-Allenbury Ltd.	'New Farm Feeds' Containing Vitablend.
ABC Feed Ltd.	Pfizer Laboratories Ltd. Watkins Ltd (Minerals)	'ABC Livestock feeds'
Lea Bros. and Blakeman Ltd.	Pfizer Laboratories Ltd Assia Ltd. (Antibiotics) Co-operative Ltd. (Trace elements)	with Pfizer Vitamins 'Lea feeds'

Source: The Animal Feeds Industry in Kenya, 1970, Page 31.

Apart from these established compounders, there are other newly established feed mixing enterprises. Muus Kenya Ltd., a subsidiary of a Danish company has started producing animal feeds, 'Muus brands' at Thika. Two mobile feed mills owned by the government operate in Rift Valley and Central Province. mixing farm by-products with minerals. urea and molasses.

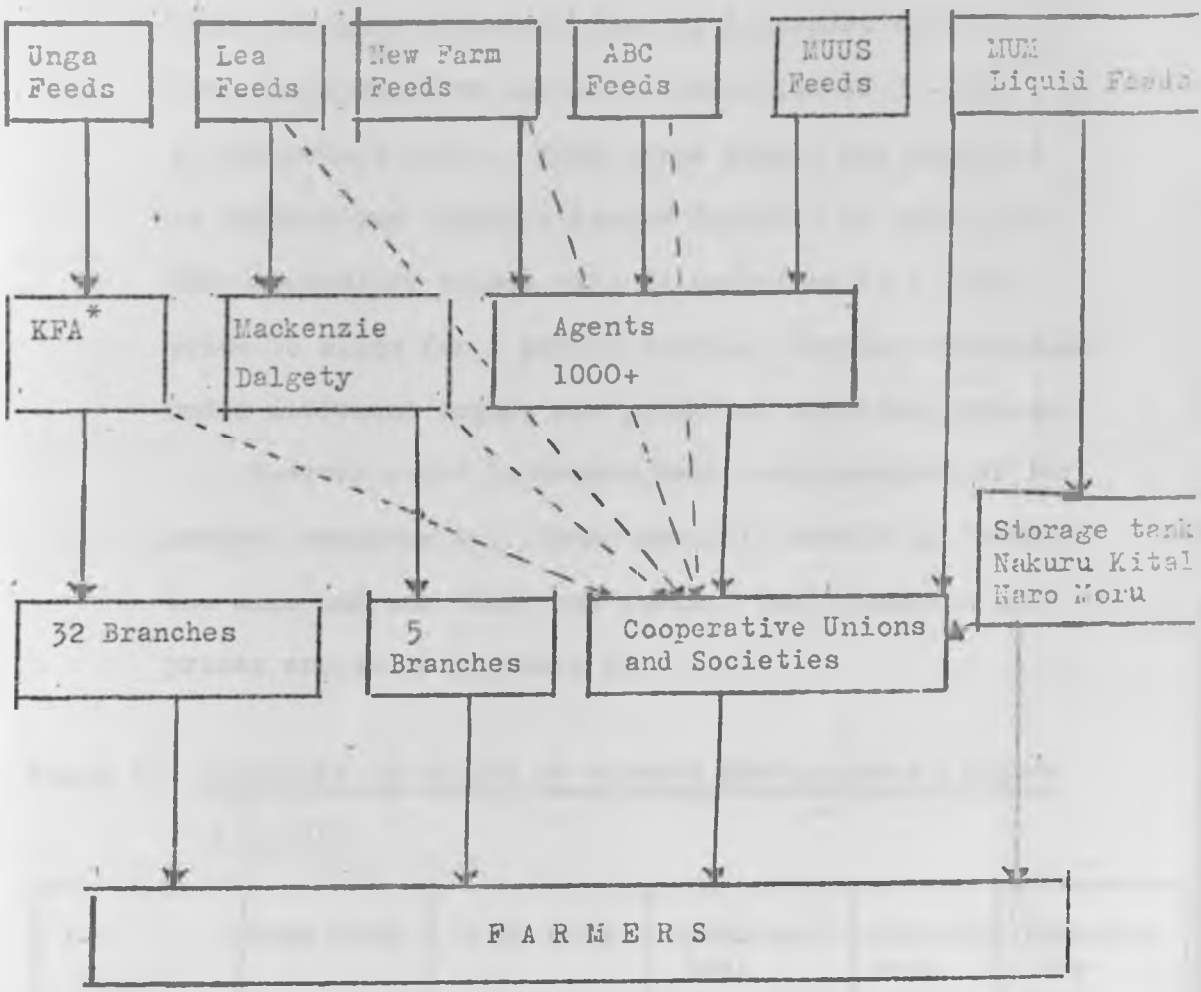
Shell Chemicals Ltd. have sponsored 'MUM' a company to distribute molasses-urea-minerals-phosphoric acid liquid feeds. A mixing plant is being set at Chemilil to utilize molasses from the sugar factory. 'Feed tankers' distribute the liquid feed to storage tanks at Nakuru, Kitale and Naro Moru and to Co-operative Unions if they have storage tanks.

Distribution of final compound rations follows various channels. 'Unga feeds' are mainly distributed by KFA through its countrywide network, and through agents. 'New farm feeds' and ABC livestock feeds are distributed by agents who get a commission of 3%. These agents sell different brands of feeds from various companies.

Direct sales are also made at the factories and godowns. 'Lea feeds' are distributed by Mackenzie Dalgety Ltd. Companies also supply large orders to Cooperative Unions directly.

The various channels are shown in figure 4.

FIGURE 4: DISTRIBUTION CHANNELS FOR VARIOUS BRANDS OF COMPOUND FEEDS IN KENYA 1973



* KFA stocks various brands of feeds from different companies at its branches.

- - - - - - Large orders to cooperative unions

_____ Normal distribution channels.

Source: Compiled by the author from field interviews and published data.

3.4.4 Prices

Prices of mixed feeds have been controlled since 1970, but vary regionally due to transport costs. The suppliers allow agents a commission of 3 - 5% of the retail price. When large orders are supplied to cooperative unions a larger discount is given, and the cooperative unions sell to societies at a lower price to allow for a profit margin. Similar feeds sold under different brands are priced at identical prices.

However price increases have been substantial for protein supplements. These are felt mostly by farmers who mill and mix their own feeds. The increases in prices are shown in table 21.

TABLE 21: INCREASES IN PRICES OF PROTEIN SUPPLEMENTS' 1960-69 AND 1972

Time Period	Soya bean	Fish Meal	Groundnut Meal	Cotton-seed Meal	Meat and Bone Meal
	Shillings per metric ton				
1960-69	413-464	732-1292	651-735	-	630
Oct.1971	574	1162	644	428	806
July 1972	894	1414	833	560	840
Oct. 1972	1022	2660	1001	-	-

Source: Report and Recommendations on the Future Prospects of the Pig Industry in Kenya, Page 14.

Ministry of Agriculture, August, 1973

3.4.5 Constraints in the Distribution of Animal Feeds.

(a) Prices

Although these have been controlled since 1970 there have been several increases and it can be said that prices of animal feeds are too high especially for small scale farmers.

(b) Irregularities in the supply of feeds.

This is of particular importance in the case of cereal grains especially maize. Supply from the Maize and Produce Board is irregular and this affects the whole animal feeds industry.

(c) Bagging.

Many feeds are bagged in 45 , 70, and 100 kg. bags. These are too bulky for smallholders who have to transport them for long distances from depots.

(d) Transport costs.

From depots to farms transport costs vary from Shs. 3.00 to Shs. 5.00 per bag for distances of 20 km. These discourage farmers from purchasing feeds from far-off depots.

(e) Distribution points.

(i) These are few and situated only in large shopping centres.

ii) KFA stockists who are nearer to farmers don't usually stock animal feeds.

iii) Cooperative societies usually have a limited amount of animal feeds.

(f) Proprietary brands

i) There are too many identical brands in the market and farmers are confused on what particular brand to use.

ii) Instruction on feeding is lacking, and instructions are usually written on pamphlets in English which many farmers don't understand.

3.5 THE MARKET FOR FARM MACHINERY, IMPLEMENTS AND TOOLS.

3.5.1. Use and Demand for Farm Machinery Implements and Tools.

(a) Heavy farm machinery.

Heavy agricultural mechanization is an expensive operation and is outside the scope of smallholder farmers. High initial cost of machinery, small size of farms, topographical limitations, high cost of fuel and maintenance all militate against the use of heavy farm machinery by smallholders.

However in large scale farms the use of tractors and associated implements, combine harvesters, and other farmyard machinery is overspread and dates back to the pioneering days of farming in Kenya. Unlike the small scale farms the use of heavy farm machinery results in economies of scale, timeliness and speed of operation and better quality of work.

In 1973 there were 7,855 wheeled tractors and 269 crawler tractors. The numbers have shown no significant increase in the last few years.

In 1969 it was estimated that there were 7,000 tractors of which 5000 - 5500 were in large farms, 500 in use by local councils and 1000 - 1500 in commercial and smallholder use. (20.p. 24).

The annual importation averaged at 900 wheeled tractors and 44 crawler tractors in 1966 - 1971.

Demand for tractors is therefore only for replacement in large scale farms, and for government operated tractor hire service. In the smallholder areas demand is not likely to rise. The number of tractors and combined harvesters in Kenya is shown in table 22.

The number of tractors has not increased. In case of combined harvesters the numbers have even decreased.

TABLE 22. NUMBER OF TRACTORS AND COMBINED HARVESTERS IN KENYA 1963 - 1972

Year / Type	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
Wheeled Tractors	5167	4976	4886	5345	5894	4255	5283	6602	5336	5501
Crawler Tractors	944	867	843	800	123	649	710	645	555	527
Combined Harvesters										
Self-Propelled	529	483	502	575	596	420	563	462	405	407
Tractor-drawn	407	444	403	455	446	201	213	177	153	141

Source: Kenya Statistical Abstract, 1973, Page 118.

(b) Light machinery, equipment and tools

Small scale farmers use a large variety of implements and tools. Included in this category are various types of sprayers, especially for use in coffee farms, dairy equipment, wheelbarrows, 'jembes and pangas' pruning saws, sprinkler irrigation equipment and various hardware. There is scope for use of small tractors especially the Bolshoff, Tinkabi and the Landmaster. About 300 Landmaster tractors were sold to smallholders in 1972 by Singer Sewing Machines Ltd.

The demand for crop spraying equipment is likely to show a great increase. Farmers are increasingly using agricultural chemicals on crops and animals and this will create a complementary demand for sprayers. Sprayers are also of particular advantage to farmers in that they are multi-purpose. Demand for dairy equipment will also increase as more farmers keep dairy animals. For other hardware demand is for replacement purposes, and is not likely to be spectacular.

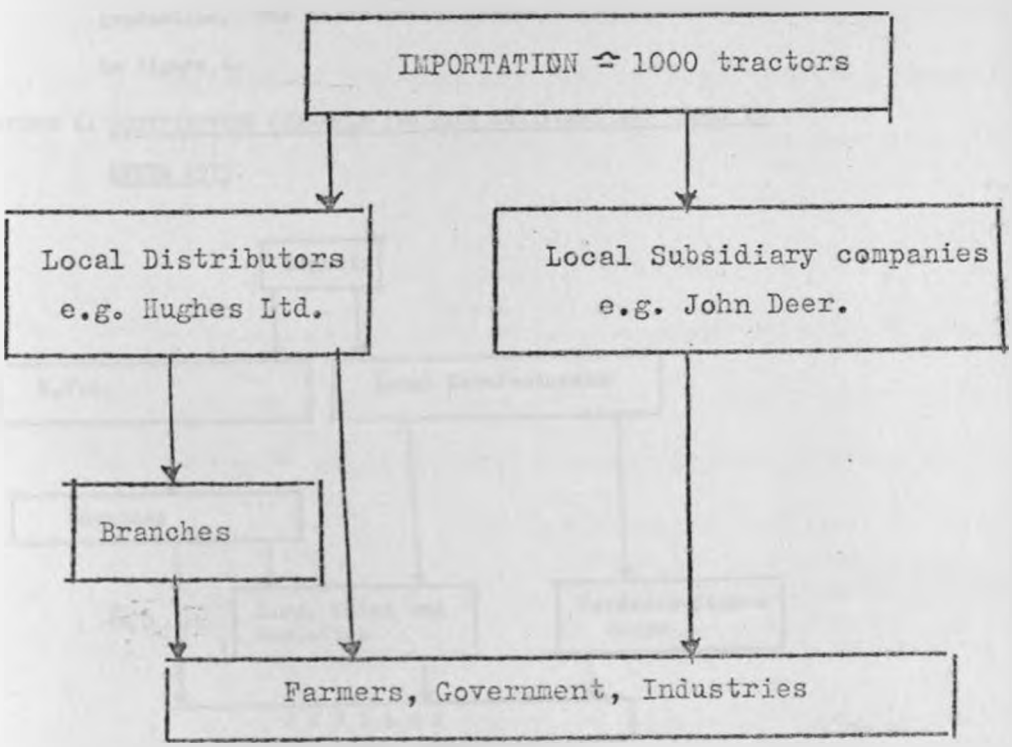
3.5.2 Distribution of Heavy Machinery Equipment and Tools.

(a) Tractors and other heavy machinery.

All tractors used in Kenya are imported from Europe or North America. There are twelve different makes available in the market.

Distribution is entirely in private hands. Local firms negotiate with manufacturers for a franchise on exclusive distributional rights. They then distribute through their branches in large scale farming areas. Parent companies may also have local subsidiary companies which act as distribution agents as well as enfranchising local firms. With an annual importation of about 1000 tractors, most distributors sell between 100 - 150 tractors annually. The distribution channels are illustrated below.

FIGURE:5: DISTRIBUTION OF TRACTORS AND OTHER HEAVY MACHINERY IN KENYA 1975.



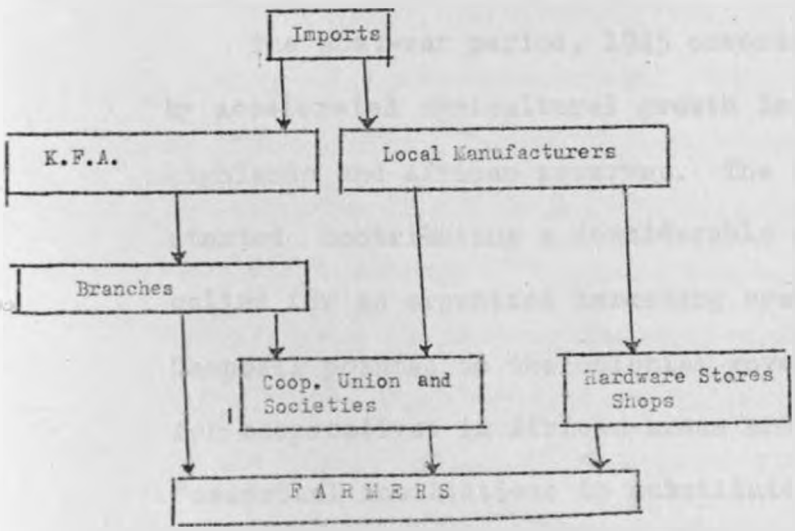
Source: Compiled by the author from published data.

(b) Farm tools and equipment.

These are either manufactured locally or imported from overseas or neighbouring countries. Kenya imports over half a million 'jembes and pangas' of which 50,000 - 60,000 come from Uganda annually. There is increasing local manufacture of various hardware.

K.F.A which is a major importer of tools and equipment distributes through its branches, and also supplies cooperative unions and societies. Local manufacturers also import some items. They market through K.F.A branches, hardware stores, cooperative unions and societies and ordinary shops. Cooperative unions and societies store items for particular enterprises; sprayers, pruning saws, secateurs for coffee production, and milking equipment for dairy production. The distribution channels are illustrated in figure 6.

FIGURE 6: DISTRIBUTION CHANNELS FOR FARM EQUIPMENT AND TOOLS IN KENYA 1973.



4 THE COOPERATIVE MOVEMENT IN KENYA

4.1 HISTORY AND DEVELOPMENT OF COOPERATIVES IN KENYA

4.1.1 The Pre-independence Period.

The formative phase of cooperatives in Kenya which ends with independence in 1963 can be categorized into two developmental periods; the period before 1945, and the period from 1945 to 1963.

In the pre-1945 period the white settlers were consolidating their farming and only a rudimentary marketing system existed. African farmers were still at low levels of subsistence farming. During this period early settler organizations were formed. These included Kenya Planters Cooperative Union (1903), Kenya Farmers Association (1923), and Kenya Cooperative Creameries (1925). These organizations were originally registered as companies, and only became registered as cooperatives in 1931 when the Cooperative Ordinance was promulgated. This Ordinance only allowed for white settlers to form cooperatives.

The post-war period, 1945 onwards, was characterized by accelerated agricultural growth in both the white highlands and African reserves. The latter sector started contributing a considerable surplus which called for an organized marketing system. In 1944 Campbell pointed to the colonial government the need for cooperatives in African areas and called them "essential institutions to substitute for an existing rudimentary marketing system" (17)

In 1946 the Cooperative Societies Ordinance was enacted and a Department of Cooperatives started. Unlike the 1931 Ordinance, this new Ordinance allowed Africans to form cooperatives. However there was only little African participation because the growing of cash crops and keeping of improved animals was still restricted to European farmers. In 1955 the Swynnerton Plan called on the government to allow Africans to grow cash crops, and for formation of more cooperatives to weld the very large number of small producers into a corporate body, and to collect their produce into a bulk and quantity which would command the interest of buyers and markets. (16, p. 45). This was an important milestone in African agriculture and from this time there was a considerable increase in the number of African cooperatives.

4.1.2 The Post-independence Period and the Present Distribution of Cooperatives in Kenya.

This period can be described as the proliferation phase of African cocperatives. The increase in numbers was mainly in the former African reserves, farm purchase cooperatives in the former white highlands and in settlement schemes. This mushrooming of African cooperatives has been criticized on various grounds. Hyden argues that the haphazard formation was only in the spirit of political freedom and there was no economic viability to support many of them. (13, p. 7)

After this mushrooming phase many newly formed societies faced a period of mismanagement epidemics and the government had to step in with control measures.

In 1966 the Cooperative Societies Act was enacted which introduced control measures to counteract mismanagement and misappropriation of funds. (23). This was followed by the 1969 Cooperative Societies Rules which gave cooperative officers more powers in the control of cooperatives (24). From 1966 to the present time the main emphasis on cooperatives has been qualitative. Numbers have only increased gradually but the number of active cooperatives have been improving in performance.

The present distribution of cooperatives is a result of the agricultural activity and the degree of small-scale farming in each province. Central Province which is almost purely an area of small scale farming has the largest number of cooperatives. The majority are coffee, pyrethrum and dairy cooperative societies. Rift Valley Province which is an area of large scale farming has a large number of farm purchase cooperative societies. In Nyanza Province, sugar and cotton cooperatives are important in Kisumu, and Siaya Districts while coffee, pyrethrum and dairy cooperative societies are important in Kisii district.

Cereal marketing cooperatives are numerous in Western Province, but these are relatively weak because of competition with private traders. In Meru and Embu districts of Eastern Province, the cooperative activity is similar to Central Province, while Machakos and Kitui districts which are drier concentrate on ranching cooperatives. In the Nairobi area consumer cooperatives are dominant. Other provinces, Coast and North Eastern are relatively weak in cooperative activity. Distribution of cooperatives by province is shown in table 23. (see also appendix I table IX)

TABLE 23: NUMBER OF REGISTERED AND LIQUIDATED COOPERATIVE SOCIETIES IN KENYA 31st DECEMBER, 1973

	Total Registration	Liquidations	Balance in Register
Central	524	124	400
Rift Valley	451	42	409
Nyanza	351	63	288
Western	249	99	150
Eastern	249	45	204
Nairobi	206	90	116
Coast	144	32	112
North Eastern	3	1	2
Country-wide[1]	7	-	7

[1] Of the 1688 cooperative societies in the register only 1032 are active. The rest are either dormant or under investigation awaiting liquidation.

Source: Kenya Economic Survey, 1974, Page 76

4.2 ENVIRONMENT FOR AGRICULTURAL COOPERATIVES IN KENYA

4.2.1 Environmental conditions Favourable to Effective Non-farm inputs Marketing by Agricultural Cooperatives.

Favourable conditions for non-farm inputs marketing can only exist if there is an integrated effort to organize distribution of inputs at the union and society level, and in implementation of government policy geared to supervising and controlling the movement at national level.

At the grass roots level of the movement three groups are involved; the farmer, the primary society and the district cooperative union. Each has to contribute in the smooth functioning of the distribution system. The necessary conditions can be categorized as follows:-

(a) The farmer has to indicate his seasonal requirements for inputs before the season starts.

(b) The primary society has to bulk orders from the farmers and prepare an estimate for the location. At the same time they must have adequate storage facilities, and be in a position to give farmers the technical advice on use of inputs.

(c) The union has to bulk orders from affiliated societies, organize bulk purchasing from suppliers, and have adequate central storage facilities, as well as transport facilities.

(d) A network of feeder roads and railways is also necessary for effective distribution of inputs.

There are however many shortcomings to these conditions and distribution is greatly handicapped. Farmers hardly ever give their requirements for the next season and as such the societies only make crude estimates. In many cases there is gross under-estimation. The employed staff of societies do not give the farmers the relevant advice on use of inputs. The "under-estimation syndrome" continues to the district unions and in the final run the whole district is faced with a shortage of non-farm inputs.

In many areas of Kenya, there are very few all-weather roads, and the feeder road system becomes a hindrance to distribution during the wet season. When supplier come late, farmers cannot get them from the central stores and do without them. Many primary societies don't have their own vehicles and depend on union or hired private vehicles just before the rains start. As a whole there is a need to organize an integrated system involving estimation of orders, transport and storage facilities and demand for each society.

4.2.2. Government Policy, and Control of Cooperatives.

The government is actively engaged in the development and regulation of cooperatives. The important role played by cooperatives in rural areas has been recognized, but it has been noted that the

movement has not been an unqualified success and is faced with many problems. Noting the weaknesses of cooperatives the government hopes to:-

(a) Create a strong cooperative movement which can maximize the incomes of Kenya peasant farmers.

(b) Improve the performance of the movement to compete unhindered on an equal basis with other state and private business organizations.

To implement the two points stated above the government policy has outlined the functions at various levels of the organization. District cooperative unions are to be developed as focal points of cooperative activity, with all societies in district being affiliated members. Centralized functions like book-keeping, accounting, bulk purchasing of non-farm inputs, and stationery have to be performed by the union. At the society level the intention is to pursue the development of multi-commodity, multi-purpose primary societies. At national level the apex organization, the Kenya National Federation of Cooperative Unions is expected to play a full part in educating and training the cooperative personnel on the principles of the movement. Kenya Farmers Association is expected to be reorganized and modified to work intimately with unions.

Although the distribution of non-farm inputs is considered a secondary function to marketing of produce the government intends to have in each marketing cooperative, a system for distribution of farm supplies and other stores for resale to farmers. At the same time, the provision of credit through the Cooperative Bank is expected to facilitate the transactions of members in purchasing of inputs.

To make these policies effective the government feels that there is an urgent need to keep the movement under constant review, and to discipline cooperatives by making them operate more efficiently in accordance with sound business principles. These control powers in guiding and supervising the movement are invested in the Department of Cooperative Development, and legalized by the Cooperative Societies Act of 1966 and the Cooperative Societies Rules of 1969.

The 1966 Act gave the Commissioner for Cooperative Development powers over registration of new societies, power to make primary societies to be affiliated to district cooperative unions, ammendment of by-laws of societies, rights and liabilities of members, amalgamation and division of societies, provision of loans, direction of inquiry of the affairs of the society and removal and appointment of the committee, if necessary, and dissolution of societies.

This total "top-down control" was strengthened farther by the Cooperative Societies Rules of 1969 which gave the department powers to; decide on eligibility of members of the committee, convene annual general meetings and specify their duties, authorize the society expenditure and approve loans, and powers to have societies submit monthly trial balances.

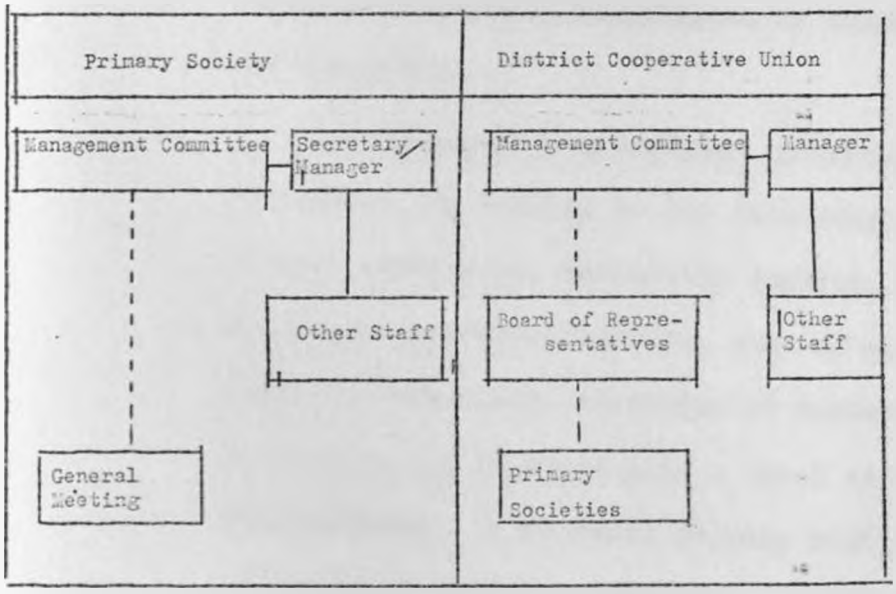
Although these control measures would suggest that the cooperatives are functioning at a high level of management efficiency, they have only reduced the most conspicuous cases of mismanagement while petty frauds remain. The implementation of the powers within the Cooperative Department is constrained by various problems especially conflicts between field officers and cooperative members, thus lowering the committment of members and reducing the organizational autonomy of the cooperatives. Bureaucracy inflexibility and "red-tape procedures" have made members to view cooperative societies as another arm of government administration.

4.3 STRUCTURE AND MANAGEMENT OF COOPERATIVE UNIONS AND SOCIETIES

4.3.1 Structure and Organization of District Unions and Primary Societies.

There are three types of primary societies. The most numerous are marketing and processing societies which are involved in collecting and processing of farm produce as well as distribution of farm inputs. The second type include production cooperative societies which operate large scale farms. The third type is the supply cooperative society which are confined to urban areas. The multi-purpose marketing cooperative societies are more common in smallholder areas and their structure is shown in figure 7.

FIGURE 7: MANAGEMENT STRUCTURE OF COOPERATIVE SOCIETIES AND UNIONS IN KENYA



The supreme authority is vested in the annual general meeting of members, at which each member can attend and vote and confirm and approve any matters arising in the society. The management committee, composed of 5 - 9 members from the various "cooperative constituencies" is responsible for governing the society. They enter into contracts, borrow money, enter into legal proceedings and "keep into safe custody money belonging to the society".

The secretary manager and his staff perform the day-to-day duties of the society like book-keeping, ordering and distribution of non-farm inputs and marketing of farm produce. At union level each primary society is represented in the board of representatives by an appointed member.

4.3.2 Management Problems Experienced by Cooperative Unions and Societies.

The fundamental principles governing cooperative management are similar to the Rochdalian principles; of open membership, democratic control, limited interest on shares, patronage rebates, sale of pure unadulterated goods and continuous education of members. When these principles are imported into a rural environment their effectiveness is weakened by many problems. The principle of business efficiency is only understood by a few "rural elites" and these tend to exploit the ignorance of the rural masses.

Cooperatives have been plagued by corruption, misapplication and misappropriation of funds, excessive overheads, apathy and lack of committment by members. Various reasons have been quoted as contributing to this state of affairs:-

(a) Conflicts between "cooperative constituency representatives" who only hope to secure benefits for their particular areas, and are thus engaged in factional warfare over control.

(b) Use of cooperatives by leaders who are usually "the rural elites" to better themselves economically and politically.

(c) Lack of qualified staff since decisions to employ are based on personal relationships rather than qualification.

(d) Lack of clarity in duties to be performed by committee members and employed staff.

These problems have a hindrance effect on distribution of non-farm inputs. Since in many societies there are shortages of inputs, the tendency is for committee members and erployed staff to allocate to themselves the amounts available. If any remains the information on availability is only passed to close friends. The major problem in many societies is that only a small amount of inputs especially fertiliser and hybrid maize is available at the start

of the rains. This is used by "the influentials" and the majority of farmers have to wait for up to two weeks before they can get their requirements.

4.4 THE COMPETITIVE SITUATION OF COOPERATIVES.

4.4.1 Marketing of Agricultural Produce.

The primary role of most of the rural cooperative is the marketing of agricultural produce. Out of the 1060 active societies in 1972, 600 societies were involved in marketing. Cooperatives are especially strong in coffee, pyrethrum, milk and cereals. In the 1970/71 period 90% of pyrethrum, 48% of coffee, 28% of milk, 65% of cotton and 25% of sugar were marketed through smallholder cooperatives. (7, Vol. II, Annex 16, p. 15).

The compulsory marketing provision of the 1966 Cooperative Societies Act, empowers the society to sell all produce in an area if it sells more than 60% of the produce. In Sessional Paper No. 8 the government has further indicated that it is prepared to give cooperatives monopoly of marketing particular crops so long as this does not affect the efficiency of the industry. This monopoly has only been operational in smallholder coffee, and pyrethrum growing areas. Elsewhere especially in Western and Nyanza Provinces cooperatives face steep competition from Maize and Produce Board in handling maize.

In 1968/69 cooperatives in Kakamega district only handled 12% of the total maize marketed (6, p. 129).

The cooperative sector turnover has shown a tremendous increase from a mere K£ 110,000 in 1952, to K£ 4.5 million in 1962 and to K£ 27 million in 1973. The 1971/72 value represented 5% of total Gross Domestic Product and 28.5% of the total value of marketed agricultural produce. (37)

4.4.2 Participation in the Merchandising Activity

Cooperatives have been participating in the distribution of agricultural non-farm inputs only on a small scale. The major reasons why this important role has not taken any spontaneity are:-

(a) Most cooperatives have developed, laying a lot of emphasis on produce processing and marketing. Distribution of non-farm inputs has been considered a minor and secondary activity.

(b) Cooperatives face steep competition from established private distributors, who have a cadre of qualified technical staff, and knowledge of requirements for particular areas, and crops.

(c) Where cooperatives are strong, and distribute a large percentage of non-farm inputs they face problems because orders are not properly bulked from individual farmers and societies.

(d) There has never been any intiative by the apex organization. to control the merchandising activity.

However a considerable amount of non-farm inputs is distributed through Kenya Farmers Association which has been operating and distributing non-farm inputs since 1923. With its countrywide distribution network, especially in large scale farming areas it has managed to retain a major percentage of the non-farm inputs marketed in Kenya. In 1970 it distributed 34% of the total fertilizer consumed in Kenya (15, p. 1). The association can form the backbone of a countrywide non-farm inputs distribution network if it is associated with the district cooperative unions.

The actual value of non-farm inputs handled by cooperative unions and societies, exluding K.F.A is very insignificant. In the 1971/72 period cooperatives handled only K£ 1.75 mi. of the total value of K£ 14.53 million. Fertilizers contributed 40%, agricultural chemicals 30%, animal feeds 20% and improved seeds and other materials 10%. Of this value cooperatives in Central Province handled 40%, those in Eastern Province handled 30%, and the rest of the country 30%. (25, p. 3)

The key to increase participation in the marchandising activity lies in reorganization of Kenya National Federation of Cooperatives which can have all unions bulking their orders to have a national estimate.

From this K.N.F.C. can have considerable negotiating power with importers. With such an estimate. K.N.F.C. can also start its own import. At union and society level, data on consumption, demand trends and storage facilities has to be collected for accurate forecasting of demand. In areas where cooperatives are strong especially in Central and Eastern Provinces they can be given a complete monopoly in distribution, so that private suppliers only sell in bulk to district cooperative unions.

5 THE STRUCTURE OF AGRICULTURAL PRODUCTION IN MURANG'A DISTRICT.

5.1. MURANG'A DISTRICT: GENERAL CHARACTERISTICS.

5.1.1 Physical Characteristics.

The district is in Central Province of Kenya in the highlands east of the Rift Valley. On the north it borders Nyeri, on the east are Kirinyaga and Machakos, on the south is Kiambu and on the west is Nyandarua Ridges. (Aberdares) (See Map I)

The total area is 2529 km^2, and the total population was 445310 in 1969 with a mean density of 176 persons per km^2. Administratively the district is divided into five divisions namely: Kandara, 416 km^2, Kigumo 721 km^2, Kiharu 406 km^2, Kangema 355 km^2, and Makuyu 626 km^2, (28). The first four divisions are further divided into twenty administrative locations which are numbered from one to twenty (See Map I). These four divisions constitute the smallholder farming areas. In Makuyu division, large scale farming and ranching is practised.

Topographically, the area rises on an east-west direction from 1300 metres to 2466 metres on the slopes of Nyandarua Ridges.(4373 metres). (34). The terrain consists of deeply weathered lava flows and agglomerates of the eastern flanks of Nyandarua Ridges. This is deeply dissected by swift flowing rivers and streams like the Chania, Maragwa and Mathioya.

MAP 1. MURANG'A DISTRICT: ADMINISTRATIVE DIVISIONS AND LOCATIONS.

5.1.2 Climatic Characteristics.

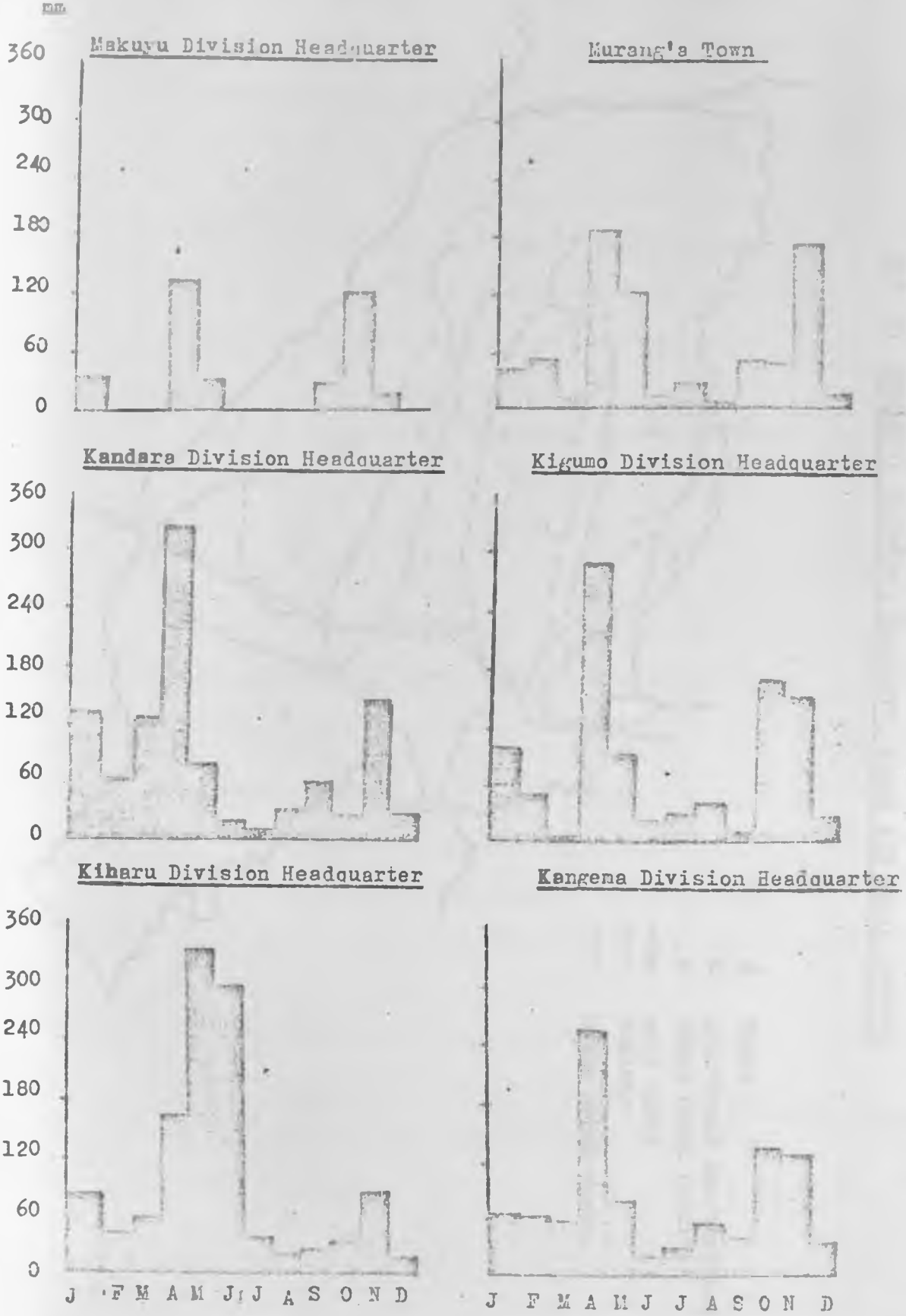
Precipitation is caused by convergence of air masses and the amount is influenced by oro-graphical factors. Two rainy seasons result with the long rains in March, April, May and June and short rains in October and November. The rainfall figures for 1973 taken at the five divisional headquarters and 'Murang'a town are shown in figure 8. Makuyu division is comparatively drier and receives less than 1000 mm annually. The rest of the district receives 1000 mm to 1800 mm annually. The slopes of Nyandarua idges have rainfall of over 2000 mm annually. (24. p. 2 - 3).

5.1.3 Infrastructural Development.

The transport system consists of the railway line and a network of roads as shown in Map 2. As a whole, the development of communication is greatly influenced by topography. The parallel ridges separated by deep valleys running on an east-west direction limit the construction of roads on a north-south direction.

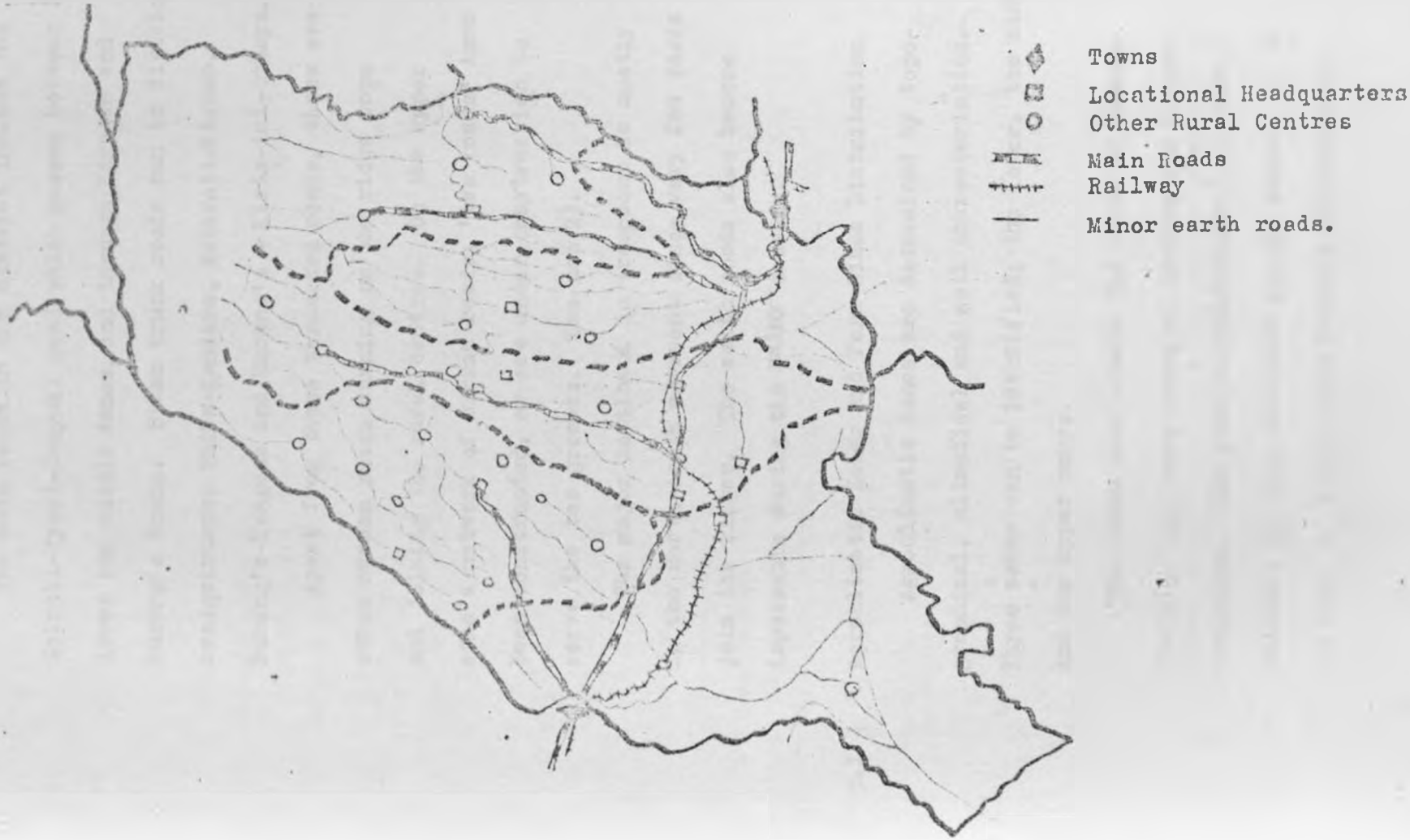
The Nairobi-Nanyuki railway line passes in the lower zone of the district and there are stations at Maragwa, Mitubiri, Makuyu and smaller stations along the line. The nearest station to Murang'a town is 3.2 kilometres but it is in an area which is almost inaccesible by road. As such goods for Murang'a town are either delivered to Thika. 43 km away or at Sagana 11.2 km.

FIGURE 8: RAINFALL FIGURES FOR MURANG'A TOWN AND FIVE DIVISIONAL HEADQUARTERS 1973.



Source: Murang'a District Agricultural Annual Report 1973.

MAP 2: MURANG'A DISTRICT: RAILWAYS, ROADS AND RURAL CENTRES



The main roads in the district include the Nairobi-Nyeri-Nanyuki road which passes between the lower and middle zones, and through Maragwa and Murang'a towns. Other trunk roads run to divisional headquarters; Thika-Kandara, Kaharati-Kigumo, Murang'a-Kangema and Murang'a - Kiria-ini-Othaya.

Apart from these tarmacked roads, there are other murram roads running on the ridge tops and joining the rural centres. On the upper zone a network of murram roads; 'tea roads' have been constructed, or are under construction to serve the tea growers.(See map 2).

The major bottlneck in tranpsort is mostly in the north-south movement since very few roads join the ridges. The earth roads also become impassable during the rainy seasons.

5.1.4 Agroclimatic Zones and Farm Sizes Distribution.

Agroclimatic zones are determined by topographical, climatical and soil characteristics. Three zones can be identified; the lower, the middle, and the upper zones.

The lower zone covers the whole of Makuyu division and lower areas of Kandara and Kigumo divisions. The area is relatively flat with a rainfall of less than 1000 mm per annum. It is an area of large scale farming and ranching.

Sisal, pineapple, coffee and beef production are the major enterprises.

The middle zone covers the area from 1,500 metres to 2000 metres. The major enterprises are coffee and dairy cattle production. A miscellany of food crops including maize, beans, Irish potatoes, bananas, sweet potatoes are also grown.

The upper zone covers the area over 2000 metres with a high rainfall. The major enterprises are tea, wattle and dairy cattle production.

Land adjudication was completed in 1969 and all farmers in the smallholder divisions farm in the allocated plots. The distribution of farms by sizes is shown in table 24.

TABLE 24: DISTRIBUTION OF FARMS BY SIZES IN MURANG'A DISTRICT 1970

Size group in hectares	No. of holdings	Total hectares	Relative frequency (No. of holdings)%
0-0.49	24864	9068	25.0
0.5-0.99	21355	16790	21.5
1.-1.9	31694	46904	31.9
2--2.9	11672	29232	11.7
3 -4.9	6670	26277	6.7
5 - 9.9	2495	17626	2.5
10 +	666	8833	0.7
Total	99416	154730	100
District Mean (DX) = 1.56 hectares			
Source: Kenya Statistical Abstract 1970 p. 81			

5.2 CROP PRODUCTION AND MARKETING IN THE DISTRICT [1]

5.2.1 Cash Crops.

The crops grown purely for cash income include, coffee, tea, wattle, pyrethrum, castor and passion fruit. Surplus of maize, beans and potatoes, are sold in the local markets or to the Maize and Produce Board depot at Sagana.

Coffee: This is the major crop grown in the district. In 1973 the large scale farms produced 4071 metric tons from 3780 ha, while the small holders produced 7161 tons from 8536 ha. The mean yield per hectare was 0.839 ton, for small scale farmers and 1.07 tons per hectare for large scale farms. All coffee produced by small scale farmers is marketed through 16 coffee societies and the district union, while that produced by large scale farms is marketed directly to Kenya Planters Cooperative Union. (See also appendix table X).

Tea: Tea growing among small scale farmers was introduced recently under Kenya Tea Development Authority (KTDA). KTDA provides planting material, fertilizer, transportation and processing facilities. KTDA buys all the green leaves produced and as such farmers don't engage in marketing. In 1973 the total area under tea in the four divisions was 4718 ha. grown by 10868 farmers with a mean size of holding under tea of 0.43 ha. (See also appendix XI).

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[1] The district ... production and marketing statistics were compiled from Murang'a District Agricultural Annual Report, 1973

Pyrethrum: This crop has not been firmly established in the district, and in 1973, only about 60 hectares were under the crop. Marketing is being organized under 3 co-operative societies; Kihoya, Kariara and Kigumo and via individual farmers. In 1972/73 the total amount of dried flowers marketed was 1,623.5 kg of which 559 kg. was marketed by Kihoya Society, 157 kg. by Kariara Society, 509 kg. by Kigumo Society and 298.5 kg. by individual farmers.

Cotton: Another minor cash crop in the lower areas of the district with an estimated 632.8 ha. under the crop grown by 1,324 growers in the settlement schemes at Ithanga in Makuyu Division. Marketing of the crop is done through Murang'a Cotton Cooperative Society.

Sisal: Sisal is grown in the lower areas (Makuyu Division) by two large enterprises, Samar and Kakuzi Ltd. owning several estates. In 1973, 6,570 tonnes were produced. The hectarage under sisal has been on the decrease in recent years. due to low prices, but from 1972 prices increased and hectarages are increasing.

Pineapples: The Delmonte Company owns large estates around Thika from which it supplies Kenya Canners Ltd. at Thika. In 1973 the total area planted was 1,800 hectares in various stages of maturity. The mean yield is 63 tons per hectare and total production was 114,510 tons. Smallholders in the lower areas of Kandara division also grow pineapples which are usually sold in the local markets.

Wattle: About 6000 farmers grow wattle trees in the middle and upper zones of the district. Wattle bark is dried and then sold. In 1973, 7,157.9 metric tons of various grades were sold to the tanning factory at Thika.

Passion Fruit:: The crop is being introduced in areas around Thika, by the Horticultural Crops Development Authority (HCDA). HCDA supplies farmers with credit and other material inputs. In 1973, 2668 hectares were planted with the crop.

Other Crops: Some other minor crops and surplus of subsistence crops are also sold for cash. In 1973, 1,629 (90 kg.) bags of castor, 20,037 (90 kg.) of maize were sold to Maize and Produce Board.

5.2.2 Food Crops

The district produces various crops which include. maize, beans, bananas, potatoes, yams, colcasia, and sugar-cane. Maize, beans, potatoes and bananas form the major staple food and are grown in all small scale farms where climate is suitable. The area under these crops is hard to calculate because they are planted in uneven sporadic patches, and are mostly interplanted with each other. Various fruits, vegetables and other horticultural crops are also grown.

Maize: In recent years, the extension staff have been introducing hybrid maize to farmers, in the hope of increasing yields. The estimated area under hybrid and local maize is shown in table 25.

TABLE 25: ESTIMATED AREA UNDER HYBRID AND LOCAL MAIZE IN MURANG'A DISTRICT, 1972 and 1973.

Area	1972		1973		
	Hybrid	Katumani	Local	Katumani	Local
	ha	ha	ha	ha	ha
Kandara	2435	-	1550	-	5409
Kagumo	1400	-	14006	-	9385
Kiharu	1520	-	5331	-	2613
Kangema	2100	-	6869	-	5282
Makuyu	-	270	141	2619	873
Maragua Ridge	1.2	6.0	1300	46	551
Total	7456.2	276	43497	2665	24113

Source: Ministry of Agriculture, District Annual Reports 1972, page 30, and 1973, page 14.

Calculations based on the figures given in the table show that between 1972 and 1973 there was a 12.8% decrease in total area under maize, a decrease of 45% in area under local maize, an increase of 140% in area under hybrid maize and an increase of 849% of area under Katumani. In 1972 both Katumani and hybrid maize occupied 15.1% of the total areas, but in 1973 this trebled to 46% of the total area.

5.3 ANIMAL PRODUCTION AND MARKETING IN THE DISTRICT.

The animal production enterprise in the district consists of dairy production as the major enterprise, beef production mostly in large scale farms, pig production, sheep, goats, rabbits and poultry production. The estimated area under grass is 29800 hectares with about 450 hectares under fodder crops especially napier grass, sweet potatoes, giant setaria and and guatemala grass. There are 180 dips all over the district for the control of tick-borne diseases.

Dairy production is the major enterprise with 5092 animals in large scale farms, 234 in settlement schemes and 58,974 in smallholders area. Marketing of milk in large scale farming areas is direct to Kenya Creameries Co-operative collecting centre at Kabati, but in the small scale farming areas it is through three co-operative societies. These are Kiriti, Gika and Irera (Kariua). Kiriti Society collects milk from Kangema and Kiharu divisions and has coolers at Murang'a town and Kangema. Gika Society covers Kandara and parts of

Kigumo division. These two societies are purely dairy co-operative societies while the third society. Kariua Society is attached to Irera Coffee Co-operative Society. It operates in Kandara and Kiharu divisions. Most of the milk is consumed locally and only a small percentage is marketed through the three societies. The dairy co-operative societies are poorly managed, and payment to farmers is almost always in arrears. This explains why the number of farmers participating is low. The situation in the three societies is illustrated in table 26.

TABLE 26: DAIRY PRODUCTION STATISTICS FOR 3 CO-OPERATIVE SOCIETIES IN MURANG'A DISTRICT 1973.

	Kiriti dairy co-op. soc.	Gika dairy co-op. soc.	Kariua dairy Co-op. Society
No. of Members	2308	967	40
Estimated No. of grade cows	2800	1000	500
Total amount of milk sold to society in kg.	540,391	229,374	46,600
Milk sold by society in rural areas (kg)	417,808	150,944	13,927
Milk sold from society to KCC kg.	101,239	52,257	32,039
Total amount of money received by society in Shs	523,970.70	69,337.53	30,379.83
Amount paid to farmers Shs	295,082.60	54,236.53	19,204.30
Payment to farmers per kg. of milk (cents)	.50	.42	.50

Source: Ministry of Agriculture. Murang'a District Annual Report 1973, Page 57.

Beef production is concentrated in large scale farming areas of Nakuyu, where beef animals are sold to Kenya Meat Commission (KMC). In 1972 and 1973 the numbers sold to KMC were 921 and 612 respectively. In the smallholder areas. beef animals are not usually kept. Animals for slaughter are mainly steers, culled dairy cows and local zebu animals. Indigeneous sheep and goats are kept for sale in local markets and for slaughter. Pig production is being encouraged especially by Uplands Bacon Factory at Limuru which mostly operates under-capacity. It has a feeds depot at Naragua. There were 6,517 pigs in the district in 1973 and the number is on the increase. Poultry types consist of both indigeneous and exotic chickens. and ducks. Rabbits are only kept in a few farms.

6 THE COOPERATIVE MOVEMENT IN MURANG'A DISTRICT

6.1 STRUCTURE, ORGANIZATION AND TURNOVER

Murang'a Farmers District Co-operative Union (MFDCU) is the secondary organization in the district, with 22 societies affiliated to it. Apart from performing the normal functions of the Union; bulk ordering and purchasing of non-farm inputs, centralized saving and credit facilities, the Union conducts other business as a sideline. It operates a petrol station and has a 96 hectare farm where it has a pig unit, selling pigs to farmers and to the Uplands Bacon Factory. The long term plan of the Union is to develop the farm as a demostration farm for members and to build a training institute. The union has two shops, one at Thika and at Murang'a where it sells non-farm inputs to members and non-members.

The affiliated societies include 16 coffee societies, 2 dairy societies, one fruits and vegetables marketing society, one pig breeding society and three pyrethrum societies. Thus the bulk of the Union activity is in coffee, and to a lesser extent on dairy. Coffee contributes 98.4% of the societies' turnover, while other societies contribute only 1.6%. The turnover by each society is shown in table 27.

The majority of farmers are members of coffee societies. Some farmers belong to both dairy and coffee societies. Membership of pyrethrum and pig societies is not given.

TABLE: 27: [illegible] MEMBERSHIP, NUMBER OF VEHICLES AND TURNOVER IN 1973.

Type of Society	Type of Activity	Membership	No. of vehicles	Turnover in Shs. 1973
Murang'a Union /1	Multi-purpose	22 Societies	2 lorries 2 pickups 1 [illegible]	11,721,603
Gatanga	Coffee	5,300	1 L. Rover	9,141,895
Kandara	"	3,625	-	4,626,286
Irera	"	776	1 L. Rover	2,006,693
Muruka	"	1,386	-	3,197,722
Ruchu	"	940	-	2,070,939
Kagunduini	"	1,850	1 lorry	3,484,137
Irati	"	1,793	-	3,117,829
Kiangoma	"	1,015	-	957,978
Thangaini	"	1,911	1 lorry	2,387,191
Nginda	"	811	-	437,245
Njora	"	1,678	-	2,110,710
Iyego	"	3,579	1 lorry	5,612,432
Kagima	"	5,774	1 L. Rover	10,541,353
Weithaga	"	1,743	1 Lorry	3,830,024
Kahuhia	"	2,191	-	3,652,523
Mugoiri	"	3,857	1 Lorry	9,959,772
Gika	Dairy	900	2 L. Rovers	10,541,353
Kiriti	"	2,036	1 Lorry 4 L.Rovers	577,129
Murang'a	Cotton	-	-	355,805
Kariara	Pyrethrum /2	-	-	-
Kiguno	Pyrethrum	-	-	-
Kihoya	"	-	-	-
Tuthu	fruit & Vegetables	-	-	2,586
Kiria	Pig Marketing	-	-	8,876

Remarks: /1 The union turnover is from the sidelines businesses.

/2 The pyrethrum societies marketed very little in 1973.

Source: Information received by the author from the District Co-operative Officer Murang'a 29th May, 1974.

Transport consists of two lorries and two pick-ups and one volkswagen car owned by the Union, six lorries and nine landrovers owned by societies. Only half of the coffee societies have some means of transport while the dairy societies have adequate transport.

6.2 THE STRUCTURE OF THE CO-OPERATIVE SUPPLY SYSTEM IN THE DISTRICT.

6.2.1 Centralized Ordering and Distribution system.

The purchase and sales section of the Union performs various functions in the merchandising activities of the Union. There are two stores at Murang'a and a smaller one at Thika. The centralized functions include assortment of non-farm inputs, bulk purchasing from supply sources, central storage, distribution and determination of prices and margins.

(a) Assortment of non-farm inputs:

The agricultural activities in the district influence the demand of non-farm inputs. Coffee, tea, maize, are the major users of fertilizer, dairy cattle, pigs and poultry are major users of animal feeds. The ecologival zones in the district determine the type of hybrid maize variety to be grown in a particular zone. Agricultural chemicals consumed will depend on disease outbreaks.

Fertilizer: Coffee fertilizers ASN/CAN contributed 86.1% of the Union's 1973 fertilizer sales. This reflects the important role of coffee as a major cash crop and the strength of coffee societies which are the backbone of the Union. Diamonium phosphate is also used for coffee by farmers although it is mainly recommended for Irish potatoes. Maize compounds, 23 x 23 x 0 and 20 x 20 x 0 are also stocked in large amounts.

The Union sells a small amount of double and single super-phosphate for maize, but the bulk of this is channelled through stockists (9, p. 17). The assortment of fertilizer available and sold through three channels in the district is shown in table 28.

TABLE 28: FERTILIZER TYPES SOLD THROUGH THREE CHANNELS IN MURANG'A DISTRICT 1973.

Type of Fertilizer	Unit	KFA Sagana	KFA Thika	Union	Total	Main Crop
C.A.N	50 kg	286	129	38140	38555	Coffee
A.S.N.	" "	65	22	960	1047	"
S.A.	" "	5	26	Nil	31	Vegetable
Diamonium Ph.	" "	117	343	26250	26710	E. Potatoes
Double Super-Phosphate	" "	553	446	60	1059	Maize
11 x 55 x 0	33⅓	119	816	Nil	935	Irish Potatoes
10 x 30 x 0	50 kg	305	Nil	Nil	305	"
17 x 17 x 17	" "	384	50	360	794	"
23 x 23 x 0	40 "	532	261	12825	13618	Maize
20 x 20 x 0	" "	15	6	480	501	"

Remarks: The amount sold from KFA branches is mainly to stockists and individual farmers.

Source: District Annual Report 1973. Page 69

Agricultural chemicals: The Union supplies a large assortment of agricultural chemicals and acaricides. Fungicides and Insecticides for control of coffee diseases and pests top the list, while DDT for maize dusting in the field is extensively used. The sale of major Pesticides from the coffee society stores is shown in table 29.

TABLE 29: SALES OF MAJOR PESTICIDES USED ON COFFEE THROUGH 16 SOCIETY STORES 1973.

SOCIETY	50% Copper	80% Captafol	Sumithion	Gramoxone	Dieldrin
	Kilograms		LITRES		
Iyego	17,213	636	1,838	-	-
Gatanga	17,152	8,805	3,645	-	-
Kagima	23,891	528	1,460	-	15
Gacharage	7,807	-	432	-	
Kuruka	4,233	1	588	-	22
Kagunduini	1,866	-	2,191	-	-
Irera	5,274	-	409	-	17
Kandara	5,839	-	540	30	3
Kugoiri	166,180	19	3,929	-	7
Irati	11,164	-	243	-	126
Kahuhia	20,062	-	852	-	9
Keithaga	27,011	-	2,384	-	51
Kjora	1,693	18	312	2	37
Thangaini	2,358	147	172	24	35
Kiangoma.	868	38	112	-	59
Nginda	642	18	94	-	32
Total	313,253	10,210	19,201	56	413

Source: Ministry of Agriculture, District Annual Report 1973, p. 27.

Hardware, equipment and tools: The Union supplies a wide range of equipment and tools covering all aspects of small scale production. These are categorized into five groups as shown below:

Coffee production:	Sprayers and spare-parts, pruning saws and secateurs, pliers.
Building equipment:	Hammers, nails, roofing materials, cement, timber, paint.
Simple farming tools:	Pangas, jembes , shovels, forks, wheelbarrows
Dairy equipment:	Milking cans and buckets.
Other items:	Adding machines, brushes and brooms, padlocks, empty drums, files, barbed wire.

Hybrid maize seeds: The assortment of the varieties is determined by ecological zones. In the lower drier Makuyu and Maragua areas, there is demand for Katumani maize, while in the coffee zones HB 511 and 512 are grown. In the higher altitudes HB 613 and 632 are grown. The sales from Murang'a store are shown in table 30. A large amount of seed is sold by stockists.

TABLE 30: SALES OF HYBRID MAIZE SEED FROM MURANG'A UNION STORE 1971/72 , 1972/73.

Year	VARIETIES				
	HB 511	HB 512	HB 613	HB 632	Katumani Composite B
	Bags (10 Kilograms)				
1971/72	2635	595	1350	655	109
1972/73	3192	1379	1600	72	195

Source: Compiled from MFDCU sales records

Animal Feeds: The demand is mainly for dairy cattle, pigs, poultry and dogs. The types available for each group is as shown below:

Cattle feeds: Pollard, bran, dairy meal, dairy cubes, trilk, calf early pencils, (or rearing meal).

Pig Feeds: Pig creep pellets, sow and weaner, pig finishing meal.

Poultry Feeds: Chick, broilers, growers and layers mash, and duck fattening mash.

The sales from the Thika and Murang'a stores of the Union are shown in table 31. The feed manufacturing firms have their own distribution channels, mostly through agents and the Union is only an agent.

TABLE 31: SALES OF ANIMAL FEEDS FROM THE MURANG'A AND THIKA STORES 1971/72 AND 1972/73

Type of Feed	Unit WT. in Kg.	1971/1972		1972/1973**
		Thika	Murang'a	Murang'a
Pollard	50	32	67	20
Bran	45	110	262	9
Dairy Meal	15	-	-	19
"	20	14	124	22
Dairy Cubes	70	33	189	92
Trilk	4½	14	-	215
	20	-	-	14
Calf Rearing Pellets	15	-	1	17
Sow and Weaner	70	-	-	1320
Pig Creep Pellets	70	-	-	10
Pig Finishing Meal	70	-	-	633
Chick Mash	15	-	-	18
	20	3	90	35
	70	10	27	31
Layers Mash	15	-	-	33
	20	41	261	20
	70	142	194	61
Boilers Mash	15	-	-	20
	70	-	-	5
Growers Mash	20	20	160	26
	70	47	94	31
Duck Fattening Mash	70	-	-5	5
Dog Meal	10	36	-	4
	20	-	10	-

Remarks: * The 1972/73 Murang'a sales are for 5 months, September 1972 to January, 1973.

** Thika store sales for 1972/73 were not available

Source: Compiled from MFDCU sales records

(b) Sources of Supply.

To purchase economically, the Union must be aware of the various suppliers, their price and delivery terms. The suppliers of various inputs are shown below:-

Fertilizers:	The Union asks for tenders from various distributors for a season's or a year's supply. The main suppliers are Mackenzie Dalgety Ltd., Sapa Chemicals and KFA. (See appendix exhibit 1 for a sample tender request).
Chemicals:	Similar to fertilizers, chemicals are supplied by the distributors by tender. All chemical companies are represented by their various brands.
Animal Feeds:	The main supplier is Lea Brothers Ltd. with Unga Ltd.; and Maida Ltd. coming second. Muus Ltd. at Thika has started supplying the union with its feeds.
Hybrid Maize:	This is supplied by the sole distributor Kenya Farmers Association.
Hardware, Tools and Equipment:	These come from various sources, with Kenya Engineering Industries supplying most of the simple tools.

(c) Storage.

When the inputs are brought by suppliers the Union stores them in its central store. Until 1973 storage was a problem, but since the completion of the Shs. 2.5 million Union headquarters, there is enough storage in the basement floor. It has also a branch store at Thika.

(d) Distribution.

From its two central stores, the Union supplies the societies. The Thika store serves the Kandara area. From these branches the societies collect their orders using their own means of transport, but the smaller ones have to depend on the Union vehicles, (see table 7). The capacity of vehicles owned by the Union is as shown below:-

Vehicles owned by the MFDCU

Type	Capacity
2 lorries	7 tons and 3 tons
Pick-up Datsun	2½ tons
Toyota	3 tons.

The Toyota is for the Thika branch while the others are at the Union headquarters at Murang'a. As stated by the management, transport problems are only critical during the peak demand seasons, long and short rain seasons.

(c) The pricing policy:

The union acts as a wholesaler to its societies. However it sells at retail price at its shops at Murang'a and Thika, where two categories of goods are on display:

i) Union owned goods and,

ii) Suppliers stock or the 'On consignment stock'

The 'On consignment stock policy' is practised by Mackenzie Dalgety/Kenya Merchants Supply Ltd. They deliver goods to Union shops without invoicing them directly. Stocks are sold by the Union and the supplier takes a monthly stock. Then the monthly invoicing is done and passed through Kenya Planters Co-operative Union which invoices the respective Unions. The Unions utilize this policy because of lack of capital. This policy has disadvantages because prices are higher and the Union has no decision on items to be kept. However, Union capital is not tied down and stock taking is done by suppliers.

The Union is responsible for the pricing policy within the district. Since the objective of the Union is to supply members at the lowest possible price it means that the Union and societies only cover their operating expenditures for this activity through their commission. The pricing formula operating in the Union and Societies is shown below:

Goods Delivered via the Union and Society Stores
Buying Price + Transport costs and other external expenses
= Cost Price to the Union + Union's ordering expenses + Handling expenses + Storage expenses + Interest on capital applied
= Unions selling price to societies + Transport expenses from the Union's store to the society.
= Cost price to the society + Society's ordering expenses + Handling expenses + Storage expenses + Interest on capital applied.
= Society's selling price to members

For goods ordered by the Union and delivered directly to societies the components of the final price include buying price, transport and other external expenses to the society and Union's ordering expenses. which will equal the cost price to the society when the other society's expenses are added the final price is lower than in goods delivered via the Union and then to society stores.

With the above pricing formula prices would be lower at the Union retail shop than the societies' stores and there would be a tendency for members to shop in the Union retail shop. The Union discourages this by selling goods at the same price as in societies' stores. The prices for various non-farm inputs are shown in table 32 and 33.

TABLE 32: PRICE AND MARGIN AT [illegible] SOCIETY STORES FOR FERTILIZER, HYBRID MAIZE SEED AND AGRICULTURAL CHEMICALS: February, 1973.

Type of Inputs	Unit	Union selling price to*		Margin**	Margin
		Society	Farmer		
		S H I L L I N G S			%
ASN/CAN 26%	50 kg	36.00	38.00	2.00	5.6
DAP	50 kg	63.00	65.00	2.00	3.2
20:20:0	50 kg	44.00	46.00	2.00	4.5
CHEMICALS					
Captafol 80%	25 kg	643.00	660.00	17.00	2.6
Copper	25 kg	590.00	600.00	10.00	1.7
DDT 5%	5 kg	7.00	8.25	1.25	17.8
Sumithion	20 litre	310.00	320.00	10.00	3.2
HYBRID MAIZE					
HB 511	10 kg	17.75	20.00	2.25	12.6
HB 512	10 kg	17.75	20.00	2.25	12.6
HB 613	10 kg	17.75	20.00	2.25	12.6
Katumani	10 kg	17.00	19.00	2.00	11.7

Remarks: * The prices quoted were for February 1973 but since then there have been several price increase, except for hybrid maize.

** The margin is the difference between selling price to societies and farmer's purchase price.

Source: Compiled from the MFDCU Sales Records.

TABLE 55: PURCHASE AND SALE PRICES* AT UNION AND SOCIETIES' STORES FOR ANIMAL FEEDS, TOOLS & EQUIPMENT In 1973

Type of Inputs	Unit	UNION			Price Margin	
		Purchase Price	Selling Price			
			Society	Farmers		
		SHILLINGS			Shs.[1]	%[2]
Animal Feeds:						
Bran	45 kg	13.10	14.00	15.00	1.90	14.5
Dairy meal	70 kg.	34.20	37.00	38.00	3.80	11.1
Growers mash	70 kg	41.25	43.00	43.50	3.75	9.1
P/finishing	70 kg	35.00	38.00	39.00	4.00	11.4
P/creep pellets	70 kg	44.60	46.60	48.00	3.40	7.6
Sprayer Types						
Agro-super		175.00	180.00	190.00	15.00	8.6
Knapsack		280.00	290.00	300.00	20.00	7.1
Saval		280.00	290.00	295.00	15.00	5.4
Other Items:						
Prunning Saws	14 kg	4.00	4.50	4.50	.50	12.5
Secateers		10.50	11.50	12.50	1.00	9.5
Milking can	1 gal	-	16.50	16.50	-	-
Pliers	6 gal	-	4.50	4.50	-	-
W/barrow steel			120.00	130.00	10.00	-

Remarks: * The prices are for September 1973.

[1] The price margin is calculated as the difference between purchase price and farmers' price.

[2] The percentage margin is between Union's purchase price and farmers price.

Source: Compiled from MPCCU sales Records.

6.2.2 Distribution at Society level.

(a) Coffee factory stores as terminal distribution points.

Murang'a district has 72 coffee factories. These factories form important terminal distribution points. Unlike other collecting centres, coffee factories have permanent houses and staff, and as such can form 'a farmer's shopping centre' for inputs. In Murang'a district, they are widely dispersed and cover a wide area of the district. However, to be effective they must have transport and storage facilities to be able to supply inputs in adequate amounts and as early as possible. These various aspects are discussed below as regarding 35 coffee factories visited in Murang'a district.

(i) Transport:

Supplies come from the Union stores at Murang'a and Thika. The distances from the Union headquarters at Murang'a to societies headquarters are shown in the table 34 .

TABLE 34: DISTANCES FROM MFDCU HEADQUARTER TO SOCIETIES' HEADQUARTERS AND FACTORIES

Society Headquarter	Distance from Union HQ in Km	No. of branch Factories	Mean distances from society Headquarter to Factories	Standard deviation
			KM	
Kandara	48	6	6.93	2.56
Gatanga	67.2	11	10.2	2.75
Mugoiri	22.4	6	4.27	3.12
Kagundu-ini	36.8	4	8.6	2.85
Thanga-ini	36.8	1	48	-
Kiangoma	20.8	1	8	-
Kagima	40	10	13.76	6.16
Nginda	16	-	-	-
Weithaga	40	3	3.2	1.31
Iyego	27.2	4	7.6	3.27
Njora	32	2	20	4
Ruchu	54.4	1	-	-
Irati	26.8	1	-	-
Irera	51.2	1	-	-
Kahuhia	20.8	4	5.8	1.3
Muruka	41.6	2	4.4	0.4

Source: Authors field interviews

In considering the transport aspect, these distances, the state of roads and availability of vehicles have to be considered. Out of the 35 managers interviewed, 31 managers stated that the roads to their factories are nearly impassable during the wet season. Only 4 managers stated that the roads were all-weather roads. The distances from Union headquarters to societies' headquarters ranged from 16 km. to 67.2 km. The factories are scattered around their societies' headquarters on distances ranging from 3.2 km. to 16 km.

In the study, 21 factories used their society's vehicles to transport their input supplies while 14 factories depended on Union or hired vehicles. In the study, 8 factories transported dried coffee to Nairobi every 3 months, 20 factories every 6 months and 7 factories had no regular times. On the question of return loads, only 8 factories utilized vehicles on the return journey to carry miscellaneous items demanded by farmers.

The costs of transporting fertilizer varied with distances from the Union headquarter to the society factories. Hiring of a five ton lorry cost Shs. 260.00 to Gatanga which is 67.2 km. away from Murang'a town.

(ii) Estimation and timeliness of supply.

Estimating the requirements in a particular area is essential to give the feedback needed to organize economic purchasing and ordering at all levels of the distribution chain. In the sample of 35 factory managers it was found that 23 managers estimate their requirements in consultation with Agricultural Assistants (AA), 3 estimate in consultation with Co-operative Officials, 6 estimate entirely on their own, and 3 use both Agricultural Assistants and Co-operative Officials. However, the major problem is under-estimation which is escalated further by the Union getting inadequate supplies from distributors. In Kagima Co-operative Society with 11 factories the managers have been trying to ask the farmers to estimate their next season's requirements, so that the managers can book their orders before the season. The figures for 'farmers demand' and 'amounts supplied' show the problem of buying inadequate supplies as shown in table 35.

TABLE 35: THE DEFICITS IN THE SUPPLY OF INPUTS:

KAGI'A COPPER COOPERATIVE SOCIETY 1972:

Type of inputs	Amounts supplied	Farmers' demand	Unsatisfied demand	Unsatisfied demand
	kg	kg	kg	%
CAN	280,000	392,000	112,000	40
Diamonium phosphate	10,150	13,500	2,350	23.15
Hybrid Maize	15,400	17,400	2,000	13
Copper	3,500	3,500	-	-
Sumithion	1,800 litres	2,000 lt	200 lt	11.1

Source: Compiled from Kagima Society sales and purchases records 1972

Timeliness of supplies can be worked from the consideration of when farmers start buying and when supplies are available. In the sample, 106 farmers, and 35 factory Managers gave their answers as when they prefer buying and when supplies ought to be available in stores respectively in a normal year as shown in table 36.

TABLE 36: TIME WHEN FARMERS AND FACTORY MANAGERS WOULD LIKE SUPPLIES TO BE AVAILABLE IN FACTORY STORES

Time	Farmers		Managers stating when supplies ought to be available	
	No.	%	No.	%
4 weeks before rain	67	63.2	25	71.4
2 weeks	21	19.8	4	11.4
1 week	18	17.0	-	-
As rains start	-	-	6	17.1
Total	106	100	35	99.9

Source: Author's field interviews.

The farmers prefer to buy early and store in their farms waiting for rains to start. The suppliers ought to bring the supplies errly but this happens only in a normal year. The usual case is to supply when rains start.

(iii) Storage:

The ordinary store in a coffee factory is earth built, corrugated iron roofed, and in some cases with a cement floor. In the store wooden racks are fixed so that bags are not in contact with the floor.

The problems faced in this type of storage is mainly from rats and termites spoiling bags of fertilizer and seeds. Damp floors and leaking roofs cause lumping of fertilizer and germination of seed.

In the factories visited, 33 factories had a different store for inputs and coffee, 2 factories used the same store for inputs and coffee produce. The estimated storage capacities in the 35 factories averaged at 500 bags of fertilizer and 450 bags of hybrid maize seed. If the annual sale is divided by two, the seasonal sale of 686 bags of fertilizer and 142 bags of hybrid maize is obtained. The figures seem to suggest that there is enough storage for inputs during the two seasons when there is peak demand by farmers.

(b) Major problems faced by co-operative societies in distribution of non-farm inputs.

Factory managers were asked to state the major problems the societies face in distribution. These were identified as late delivery, high storage costs, inadequate quantities, poor roads and lack of transport.

Whereas all the managers mentioned more than one problem as affecting distribution they were asked to state what they considered as the most serious problem in their particular case. The ranking of the seriousness of the problem is shown in table 37.

TABLE 37: RANKING OF MAJOR PROBLEMS FACED BY COOPERATIVE SOCIETIES IN DISTRIBUTION OF NON-FARM INPUTS.

Type of problem	No. of managers stating the problem	Relative frequency
		%
Late delivery	15	42.9
Inadequate supplies	7	20.0
High prices	6	17.0
Poor roads	3	8.6
Lack of transport	3	2.9
Storage	1	2.9
Total	35	100.0

Source: Author's field interview

From the table it can be learnt that the three most serious problems are late delivery, inadequate supplies and high prices. These are exogenous to the primary societies and result at higher levels of distribution namely, the district and national levels. The other three problems do not cause a very serious hinderance since if the previous problems are eased. these can be solved locally.

7 CHARACTERISTICS OF THE SAMPLE FARMERS.

7.1 PRODUCTION CHARACTERISTICS

7.1.1 Farm Sizes.

Except for Makuyu Division where large scale farming is practised, the other four divisions are smallholder areas. The sample farmers gave the sizes of their farms as ranging from 0.40 hectare to 17.60 hectares. There is a high degree of subdivision which may not be recorded in the land office. The distribution of farm sizes in the sample is shown in table 38.

TABLE 38: FARM SIZE DISTRIBUTION FOR 106 FARMERS INTERVIEWED IN MURANG'A DISTRICT 1973.

Farm size Hectares	No. of farms	Relative frequency %
0.1-1.0	10	9.4
1.1-2.0	32	30.2
2.1-3.0	16	15.1
3.1-4.0	25	23.6
4.1-5.0	7	6.6
5.1-6.0	6	5.7
6.1-7.0	1	0.9
7.1-8.0	4	3.8
8.1 & over	5	4.7
Total	106	100

$\bar{x} = 3.14$

$s = 2.5$

' The district mean was calculated at 1.56 ha. The author thinks farmers gave rounded figures and in some cases gave sizes which are greater than the actual sizes and as such, the mean is high.

Source: Author's field interviews.

From the table it can be learnt that 78.3% of the farms are less than four hectares. As such there is an urgent need to use non-farm inputs to increase productivity per unit area.

7.1.2 Area Under Cash Crops.

All the farmers in the sample grew coffee as the major cash crop. The number of trees planted varied from 100 trees in a farm of 1.3 ha. to 5000 trees in a farm of 5.6 ha. (0.08 ha to 3.8 ha under coffee). Under the International Coffee Organization's diversification programme, the growing of macadamia nuts is being encouraged in the coffee area, and the macadamia trees are interplanted with coffee trees. The area under coffee in the sample farms is shown in table 39.

TABLE 39: AREA UNDER COFFEE IN 106 FARMS IN MURANG'A DISTRICT 1973.

Area under coffee Hectares[1]	No. of farms	Relative frequency %
0.1 - 1.0	91	85.8
1.1 - 2.0	12	11.4
2.1 - 3.0	1	0.9
3.1 and over	2	1.9
Total	106	100.0

Sample mean $\bar{X}$ = 0.68 ha.[2]

District smallholder $\bar{X}$ = 0.24 ha.

[1] Most farmers didn't know the actual area under coffee and gave the number of trees. The area had to be computed using a conversion figure of 1330 trees per ha.

[2] The author believes that the mean of 0.68 ha. is higher than the district mean because farmers have more trees than the number registered, and some farmers over-estimated the number and the area.

Most farmers grow less than one hectare of coffee but this occupies a considerable percentage of the farm due to their small sizes. Of the farmers interviewed, 50 grow macadamia nuts. 70% grow less than 20 trees, 24% grow from 21 - 50 trees and only 6% grow over 50 trees. This crop has only been introduced in the last seven years and it is expected that more farmers will grow it especially when proper markets are organized and a processing factory is built.

7.1.3 Area Under Food Crops.

The farmers grow several different crops for food. These include maize, beans, bananas, sweet potatoes, arrowroots, yams, vegetables crops and Irish potatoes. Inter cropping is a major practise and only in very few cases do farmers plant in pure stands. It is thus very difficulty to find the area under each crop. The estimated area planted with maize is shown in table 40. Only in 94 cases could estimates be made.

TABLE 40. FARMERS' ESTIMATE OF THE AREA UNDER MAIZE IN 94 FARMS IN MURANG'A DISTRICT 1977.

Area under maize Hectares	No. of farms	Relative frequency %
0.1 - 0.2	21	22.3
0.21 - 0.4	30	31.9
0.41 - 0.6	7	7.4
0.61 - 0.8	27	28.7
0.81 - 1.0	4	4.3
1.1 and over	5	5.4
Total	94	100.0
$\bar{X}$ = 0.6 ha.		

Source: Author's field interviews.

It is shown in the table that 94.6% of the farmers grow less than one hectare of maize. When it is taken into consideration that yields are low due to poor cultural practices, use of local maize seed for planting and insufficient use of fertilizer and chemicals it can be concluded that many farmers don't even get enough maize for domestic use. There is thus a likelihood of the farmer running short of food before the next harvest, and getting forced to buy at high prices from the local markets.

The area under beans which is the second most important crop in the area was similar to that of maize since in most cases they are interplanted. In the sample 103 farmers grew beans. The remaining three farmers were in the upper zone where beans do not grow well.

The estimated area under beans in each farm is shown in table 41.

TABLE 41: AREA UNDER BEANS IN 103 FARMS IN KUHANG'A DISTRICT 1973

Area under beans	No. of farms	Relative frequency
Hectares		%
0.1	26	25.2
0.11 - 0.3	36	35
0.31 - 0.5	32	31.1
0.51 - 0.8	9	8.7
Total	103	100.0
x = 0.26 ha.		
Source: Author's field interviews.		

7.1.4 Animal Production Characteristics.

Of the total sample of 106 farmers, 97 kept various types of livestock; cattle, pigs, sheep, goats, poultry and rabbits. Out of the 97, 85 farmers kept improved and pure breed dairy cattle, and 9 farmers kept pigs while 60 farmers kept poultry. The number of improved cattle kept ranged from one to ten animals. This is illustrated in table 42.

TABLE 42: NUMBER OF IMPROVED DAIRY CATTLE[1] KEPT BY 85 FARMERS IN MURANG'A DISTRICT 1977.

No. of improved dairy cattle	No. of farmers	Relative frequency %
1	24	28.2
2	23	27.0
3	15	17.6
4	10	11.7
5	6	7.1
6	3	3.5
7	1	1.2
8	2	2.4
9	-	-
10	1	1.2
Total	85	100

[1] The popular breeds are Jerseys, Guernseys, and Friesians.

Source: Author's field interviews.

72.9% of the farmers keep 1 - 3 animals. If a stocking rate of one animal per 0.4 hectare is assumed it is then found that in most cases there is over-stocking and animals are likely to miss forage especially during the dry season. This situation is aggravated further by the fact that pastures are generally poor, and the standard of pasture management and maintenance is poor.

Fodder crops are hardly grown except for sweet potatoes which serve a dual purpose, as an animal feed as well as a food crop. The common pasture grass is Kikuyu grass, 'Pennisetum clandestimum' which is widely spread in the area.

There are thus two alternatives open to the farmer in keeping his animals well fed. He can improve the pasture by growing improved grass leys, leguminous crops and fodder crops, or he can supplement the poor pastures by buying animal feeds.

7.2 SAMPLE FARMERS PARTICIPATION IN THE COOPERATIVE MOVEMENT

7.2.1 Membership

All the 106 farmers interviewed were members of the coffee cooperatives, 27 farmers were also members of the dairy cooperatives. Membership of coffee cooperatives is consistent while in dairy cooperatives the dropout rate is high because of poor management and low payment rates. Most farmers sell milk locally at higher prices. The years farmers have been members of the coffee cooperative societies are shown in table 43.

TABLE 43: NUMBER OF YEARS[1] THAT FARMERS HAVE BEEN MEMBERS OF COFFEE COOPERATIVE SOCIETIES.

Years as members of cooperative societies	No. of farmers	Relative frequency %
1 - 5	2	1.9
6 - 10	34	32.1
11 - 15	37	34.9
16 - 20	28	26.4
21 - 25	5	4.7
Total	106	100

[1] The years are dated from 1973

Source: Author's field interviews.

As shown in the table 68.9% of the farmers have joined coffee cooperatives in the last 15 years. This period starts from 1959 when the state of emergency ended. Before 1959 only a few farmers grew coffee due to the stringent restrictions imposed by the colonial government. In the last five years the number joining cooperatives is small because planting of coffee is restricted. Farmers who do not grow coffee cannot be members of the coffee cooperative societies.

7.2.2 Distances to the Factories and the Means of Transporting Coffee to Factories, and Associated Transport Costs.

Farmers have to carry coffee to factories and carry back non-farm inputs. The factories are built according to the production pattern, and to some extent on the 'political influence' of committee members. Of the 106 farmers interviewed, the farthest from the factory was 7.2 km. away and the nearest was 0.1km. The distances to the factories are shown in table 44.

TABLE 44: DISTANCES THAT FARMERS HAVE TO TRAVEL TO A COFFEE FACTORY.

Distance to the factory	No. of farmers	Relative frequency
Kilometres		%
Up to 0.8	24	22.6
0.8 - 1.6	34	32.0
1.6 - 3.2	30	28.3
3.2 and over	18	17.0
Total	106	99.9

Source: Author's field interviews.

Farmers use various means to transport coffee to the factory. In most cases. a combination of means is used as shown in the sets below:-

A = (All farmers who hire people to carry their coffee and also use other means)

B = (All farmers who carry coffee with the other members of the family, and also use other means)

C = (Farmers who have some form of transport)

From the sample various combinations are found:-

$A\bar{B}\bar{C}$ = (Farmers who hire people only)

$AB\,\bar{C}$ = (farmers who pay people and also carry their coffee.)

$AC\,\bar{B}$ = (Farmers who pay people and also hire transport.)

ABC = (Farmers who use all three means.)

$B\,\bar{A}\bar{C}$ = (Farmers who carry their own coffee.)

$BC\,\bar{A}$ = (Farmers who carry coffee and hire transport.)

$C\bar{A}\bar{B}$ = (Farmers who used hired transport only.)

The ranking of the importance of each means of transport is illustrated in table 45.

TABLE 45: VARIOUS MEANS OF TRANSPORT USED BY SAMPLE FARMERS TO TRANSPORT COFFEE TO FACTORIES.

Means of transport	No. of farmers	Relative frequency %
AB $\bar{C}$	45	42.5
A $\bar{B}\bar{C}$	20	18.9
AC $\bar{B}$	17	16.0
C $\bar{A}\bar{B}$	10	9.4
B $\bar{A}\bar{C}$	7	6.6
BC $\bar{A}$	4	3.8
ABC	3	2.8
Total	106	100.0

Source: Author's field interviews.

From the table it can be learnt that only 6.6% of the farmers don't use some paid means of transport. The most popular combination is for the farmer and his family to carry the quantity of coffee they can manage and hire people to carry the surplus. This combination represents 42.5% of all farmers.

The costs of transporting coffee to factories by hired people ranged from Shs. 0.20 per 'debe' (15kg) for a distance of 0.8 km, to Shs. 1.00 for a distance of 7.2 km. The cost of using vehicles was inconsistent and depended mostly on bargaining between owners and farmers.

7.3 THE CONDITIONS OF NON-FARM INPUTS SUPPLY.

7.3.1 Farmers use of Non-farm inputs and Advisory Services in the District, and Costs of Transporting Non-Farm Inputs to Farms.

(a) Period of adoption of fertilizer chemicals and hybrid maize seed.

The use of non-farm inputs in the district has only been accelerated in the last ten years. Before that there were only sporadic cases especially in coffee production. With the mushrooming of cooperatives in the post-independence era, there was expansion in use, as farmers could get the non-farm inputs easily. The use of animal feeds has been on an 'on and off' basis and the years of use could not be fixed. Table 46 illustrates the years of membership and the years of adoption of fertilizer, agricultural chemicals and hybrid maize seed.

TABLE 46: [illegible]

Years[1]	Membership of Coop. Societies		Farmers Adopting Inputs					
			Fertilizer		Chemicals		Hybrid Maize	
	No.	Cumulative %	No.	Cumulative %	No.	Cumulative %	No.	Cumulative %
19+	16	51.1	2	1.9	5	4.7	-	-
17-19	10	24.53	2	3.8	3	7.6	-	-
15-17	14	37.74	7	10.4	12	18.9	-	-
13-14	16	52.83	4	14.2	6	24.5	-	-
11-12	14	66	3	17	7	31.1	-	-
9-10	27	91.51	18	34	35	64.1	95	8.5
7-8	4	95.3	31	63.2	17	80.2	22	29.3
5-6	4	99	23	85	11	90.6	36	63
3-4	1	100	11	95	7	97	23	85
1-2	-	-	5	100	3	100	9	93.4
	106	100	106	100	106	100	99	93.4

[1] From December 1973

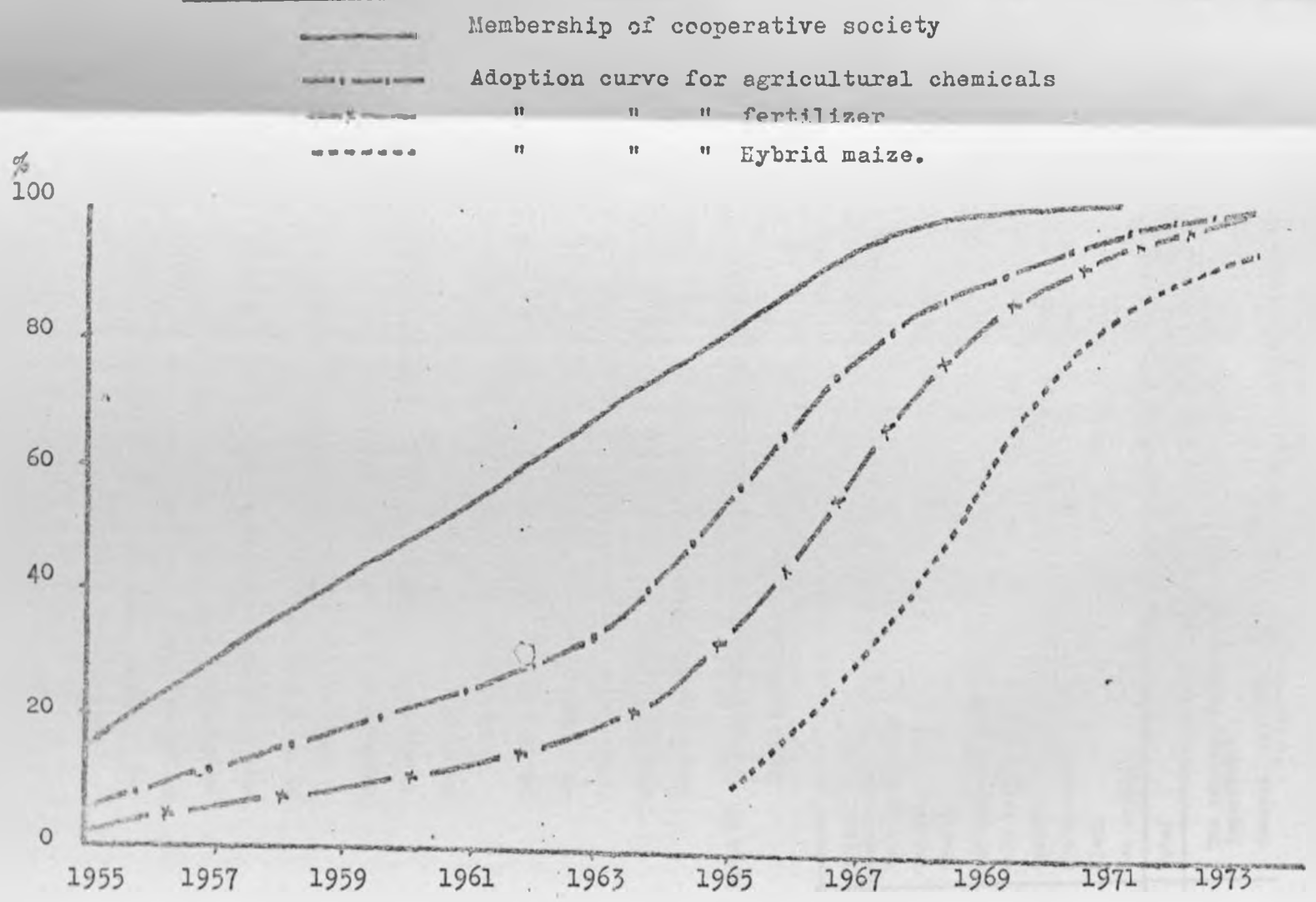
Source: Author's field interviews.

From the table it can be learnt that prior to 1960 (14 years ago) only 37.7% of the farmers were members of cooperatives, and only 10.4% and 18.9% of the farmers had adopted fertilizers and agricultural chemicals respectively. The main reason for the low adoption rate was that the inputs were considered by the colonial government to be 'too sophisticated for African farmers'. The few farmers who had planted coffee were limited to using farm yard manure. From 1960 onwards. there was rapid adoption and by 1973 all farmers interviewed had adopted them. Hybrid maize is a later innovation, and in ten years after introduction in 1964, 93.4% of the sample farmers were growing it. The dramatic adoption rate of fertilizer, agricultural chemicals and hybrid maize seed and the corresponding membership of cooperatives by sample farmers in the post-1960 period is further illustrated in the 'S' cumulative per cent curves shown in figure 9.

(b) The informational and advisory services available to the farmer on the use of non-farm inputs.

The informational services include agricultural extension agents, cooperative staff and private dealers. Farmers can also get information from their attendance of courses organised in Farmers' Training Centres (FTC) and meetings organised by extension staff.

FIGURE 9: CUMULATIVE PERCENT CURVES FOR SAMPLE FARMERS' MEMBERSHIP OF A COOPERATIVE SOCIETY AND THEIR ADOPTION OF FERTILIZER, AGRICULTURAL CHEMICALS AND HYBRID MAIZE SEEDS



Farmers in the sample were asked to state the agents who introduced them to the use of non-farm inputs. In the case of fertilizer 100 farmers said it was the agricultural assistants (AA's), while six farmers were introduced by the cooperative staff and friends. In the case of hybrid maize seed all farmers growing it cited the AA's as the introducing agents. For agricultural chemicals 75 farmers cited AA's and 25 cited AA's and cooperative staff. Six farmers cited stockists and private traders.

The agricultural extension agents play the major role in advising and introducing innovations whereas the cooperative staff and stockists seem to act as 'tradesmen'. This may be due to the fact that the two latter agents lack the necessary agricultural training as illustrated in table 47.

TABLE 47: PREVIOUS JOBS HELD BY 35 COFFEE FACTORY MANAGERS PRIOR TO BECOMING FACTORY MANAGERS.

Type of employment	No. of managers	% of the total
Working in coffee factories	20	57.1
Teachers	3	8.6
Traders	3	8.6
Agricultural Assistants	3	8.6
Farm managers	2	5.7
Farmers	1	2.85
Photographer	1	2.85
Clerk	1	2.85
Not employed	1	2.85
Total	35	100.0

[1] The category includes Assistant Managers, Clerks and Supervisors.

Source: Author's field interviews.

With such a varied [illegible] background most of these managers are technically helpless in advising farmers, and as such they need some in-service training. Only 25 managers had attended courses at FTC's and the Cooperative College.

85 farmers in the sample had been visited by 'AA's at least once in the year. The number of visits ranged from one to six times. However 64.2% of the total number of farmers stated that they had been visited only once or twice in the year while 19.8% were not visited at all.

In the sample 66 farmers stated they had attended courses in FTC's, with the number of times ranging from one to seven. 52.9% of the total number of farmers had attended for one or three times and 37.7% of the farmers had never attended a course in FTC. 92 farmers from the sample had attended 'barazas' (meetings) organised by extension staff, 63.3% of the total number of farmers had attended for one to three times and 13.2% didn't attend any baraza in the year.

The utilisation of the sources of agricultural information and advice by sample farmers is illustrated in table 48.

TABLE 48: [illegible] INFORMATION AND ADVICE.

No. of times[1]	Visits by AA's[2]		Attendance of FTC		Attendance of 'barazas'	
	No. of farmers	%	No. of farmers	%	No. of farmers	%
0	21	19.8	40	37.7	14	13.2
1	29	27.4	24	22.7	24	22.7
2	39	36.8	22	20.8	26	24.5
3	11	10.4	10	9.4	17	16.0
4	4	3.8	6	5.7	14	13.2
5	1	0.9	2	1.9	6	5.7
6	1	0.9	1	0.9	5	4.7
7	-	-	1	0.9	-	-
	106	100	106	100	106	100

[1] In the case of attendance of courses in a FTC it is for all years while in the case of visits by AA's and attendance of 'barazas' it was for 1973'.

[2] These include agricultural assistants dealing in general agricultural extension, and agricultural assistants specialized in advising coffee farmers.

Source: Author's field interviews.

The knowledge and advice on use of inputs is essential, especially when it is remembered that the literacy standard in rural areas is low, and as such, farmers find it a problem to read and comprehend the instructions on input packages and on advisory leaflets which are distributed.

The sample farmers' ability to read instructions written on chemical packets is shown in table 49.

TABLE 49: SAMPLE FARMERS' ABILITY TO READ INSTRUCTIONS ON INPUT PACKETS.

Ability to read in Swahili or English	No. of farmers	Relative frequency %
English and Swahili	50	47.1
Swahili only	43	40.6
Cannot read	11	10.4
English only	2	1.9
Total	106	100

Source: Author's field interviews

From the table it is learnt that 89.4% of the total number of farmers can read in either English of Swahili or both. 40.6% of the farmers can only read in Swahili, while 10.4% cannot read at all. As such there is a need to print instructions on the packages in both languages and avoid technical jargon.

(c) Sources of non-farm inputs, seasonality of demand and farmers' preference.

The farmers included in the sample were all members of cooperatives and as such their main supply source is the cooperative store.

However, cooperatives may not be able to meet the demand, may not stock the type of inputs the farmers want, may supply late and so the farmer is compelled to purchase from other sources.

In the sample 61 farmers were using animal feeds. Out of this 31, farmers (50.8%) bought the feeds from Thika or Murang'a town, 19 farmers (31.1%) bought from shops nearest to their homes and only 11 farmers(18%) bought from cooperative stores. This seems to imply that cooperatives are not meeting the farmers' demand in regards to this commodity. Out of the 35 factories visited only 4 were supplying animal feeds. The managers stated that demand from farmers is inconsistent and as such factory managers cannot estimate the right amounts.

In the sample, 56 farmers bought cattle feeds. The number of bags bought per month ranged from one to six. with 75% of buyers buying 1 to 2 bags and 25% buying three bags and over. All the 9 farmers who kept pigs purchased pig feeds while only 21 of the 60 farmers who kept poultry purchased poultry feeds, as shown in table 50.

TABLE 50: SAMPLE FARMERS PURCHASING PATTERN FOR DIFFERENT TYPES OF ANIMAL FEEDS.[1]

	No. of farmers	As a % of farmers keeping particular type of livestock	As a % of total sample farmers
All feeds	61	62.9	57.6
Cattle feeds	56	65.9	52.8
Pig feeds	9	100	8.5
Poultry feeds	21	35	19.8

[1] 97 farmers were keeping all types of livestock,
85 were keeping cattle
9 were keeping pigs
60 were keeping poultry

Source: Author's field interviews

The situation was not similar in the case of agricultural chemicals where 85 farmers bought from cooperative stores, six bought from stockists and traders and 19 bought from both cooperatives and private traders. Cooperatives mainly supplied coffee fungicides and insecticdies while stockists supplied DDT for maize dusting.

Farm tools and equipment are obtained from three sources; cooperative stores, hardware stores, and ordinary non-specialised shops. Cooperative stores mostly stock items which are in demand for the particular production enterprise they are engaged in. The sources of various items found in the farms are shown in table 51.

TABLE 51: SOURCES OF SOME TOOLS AND EQUIPMENT OWNED BY SAMPLE FARMERS.

Type of Item	Number of farmers owning items.	SOURCE OF ITEMS			
		Hardware stores shops		Cocperative stores	
		No.	%	No.	%
Sprayers	79	5	6.3	74	93.7
Fencing wire	76	19	25	57	75
Milking equipment	55	12	21.8	43	78.2
Pruning saws	80	38	47.5	42	52.5
Wheelbarrows	25	3	12	22	88
Jembes/Pangas	106	92	86.8	14	13.2

Source: Author's field interviews.

From the table it can be learnt that cooperative stores are the major suppliers of the recently introduced tools and equipment especially sprayers, fencing wire, wheelbarrows and milking equipment. In the case of pruning saws, hardware stores and shops are actively competing with cooperative stores. The traditional suppliers of jembes and pangas are the rural retail shops where 86.8% of these are bought. The purchasing situation differed in the case of fertilizer and hybrid maize seed. All farmers interviewed bought their supplies from the cooperative stores, with the exception of two farmers who indicated that they also bought from stockists.

Demand for fertilizer and hybrid maize is at its peak in the two rainy seasons; the long rains in March to May, and the short rains in October and November. The highest demand is in the long rains. The amounts used during the 1973 long rains' season are shown in table 52.

TABLE 52: AMOUNT OF FERTILIZER AND HYBRID MAIZE SEED USED BY SAMPLE FARMERS DURING THE 1973 LONG RAINS' SEASON

FERTILIZER			HYBRID MAIZE SEED		
Bags (50 kg)	No. of Farmers	%	Bags (10 kg)	No. of Farmers	%
0.5 - 2.0	44	41.5	0.5	7	7.1
2.5 - 5	34	32.1	1	56	56.6
5.5 - 7	10	9.4	1.5	2	2.0
7.5 - 9	9	8.5	2	30	30.3
9.5+	9	8.5	3	2	2.0
			4	2	2.0
Total	106	100		99	100.0
	$\bar{X}$ = 5bags mode= 2			$\bar{X}$ = 1.4 bags mode = 1	

Source: Author's field interviews

The number of fertilizer bags used in the season ranged from 0.5 to 40 bags. The mean in the case of fertilizer is therefore greatly influenced by extreme figures and the mode is a better measure. In the case of hybrid maize seed the range was from 0.5-4 bags.

73.6% of 11 farmers used less than 5 bags of fertilizer in the season, 41.5% used less than 2 bags. In the case of hybrid maize seed 96% of all farmers who grew hybrid maize used 0.5 to 2 bags. The fractions result from the fact that some farmers, one in the case of fertilizer and nine in the case of hybrid maize did not use all the fertilizer and seeds they purchased, but stored some for the next season.

There was a great indication that farmers would prefer smaller package weights and some traders open packages of fertilizer and hybrid maize seed and sell in kilograms. In the sample 87 farmers were in favour of smaller packages and the weight preferences for both fertilizer and hybrid maize seed are analysed using sets and presented in table 53.

A = (Farmers in favour of 25 kg and 5 kg fertilizer and hybrid maize seed respectively)

B = (Farmers in favour 10 kg. and 1kg. of fertilizer and hybrid maize seed respectively.)

$A \cup B$ = (Farmers in favour of smaller sizes)

$A \bar{B}$ = (farmers in favour of 25 kg. or 5 kg only)

$(A \cup B)'$ = (Farmers in favour of present package sizes.

$\bar{A} B$ = (farmers in favour of 10 kg. or 1 kg. only.)

$A \cap B$ = (Farmers in favour of both smaller sizes.)

TABLE 55: FARMERS' REASONS OF FERTILIZER & HYBRID MAIZE SEED PREFERRED BY SAMPLE FARMERS.

Package size combinations	FERTILIZER		HYBRID MAIZE SEED	
	No. of farmers	%	No. of farmers	%
$A \cdot \bar{B}$	62	58.5	66	66.6
$\bar{A} \cdot B$	6	5.7	13	13.1
$A \cap B$	19	17.9	8	8.1
$(A \cup B)'$	19	17.9	12	12.2
Total	106	100.0	99	100.0

Source: Author's interviews

From the table it can be learnt that 82.5% and 87.9% of farmers using fertilizer and hybrid maize seed respectively prefer smaller package sizes, 58.5% and 66.6% of the farmers prefer half the present package sizes of fertilizer and hybrid maize respectively. Some farmers would prefer even smaller package sizes of 10 kg. bag of fertilizer and 1 kg. of hybrid maize seed.

The reasons given by farmers for favouring the smaller package sizes included:-

(i) ease in transporting especially in the case of fertilizer.

(ii) economical in smaller areas.

(iii) 'cheaper' to buy. This was interpreted to mean that the farmers did not tie their capital on large packets which they could not use in one season.

(d) Means and costs of transporting fertilizer and hybrid maize seed from factories to farms. The means of transporting fertilizer and hybrid maize seed are to some extent similar to those of transporting coffee to factories. When the inputs are available during the coffee picking season they are taken as a backload. In the sample six farmers used their own vehicles, 36 farmers paid people to carry for them, 58 farmers carried the inputs themselves and six farmers hired people as well as carrying themselves. As shown in table 44 the distances to the factories ranged from 0.8 km. to 7.2 km. The cost structure over these distances are shown in table 54. It appears that the costs for transporting fertilizer and hybrid maize seed are higher then the costs of transporting similar weights of coffee.

TABLE 54: COSTS OF TRANSPORTING FERTILIZER AND HYBRID MAIZE SEED FROM COFFEE FACTORIES TO FARMS.

Distances from coffee factories to farms	FERTILIZER 50 kg. bag	HYBRID MAIZE SEED 10 kg. bag
Kilometres	Kenya Shillings	
0.8	0.50 - 0.80	0.20 - 0.30
0.8 - 1.6	0.50 - 1.00	0.25 - 0.40
1.6 - 3.2	1.00 - 2.40	0.35 - 0.65
3.2 - 4.8	2.00 - 3.00	0.50 - 0.80
4.8 - 6.4	3.00 - 4.50	0.50 - 1.00
6.4 - 7.2	4.00 - 5.00	0.60 - 1.50

Source: Author's field interviews

There was no fixed per kilometre cost and from calculations it appeared that the 'negotiable cost per kilometre' was K.shs. 0.50 - 0.60 for a 50 kg. bag of fertilizer and K.sh 0.20 - 0.30 for a 10 kg bag of hybrid maize seed.

(e) Use of fertilizer and agricultural chemicals on crops.

Fertilizer use on crops varies from a 100% application on coffee to none on bananas, sweet potatoes and other food crops. Hand application is the method employed. The use of fertilizer and agricultural chemicals on different crops is illustrated in table 55.

[illegible] USING FERTILIZERS AND [illegible] OF DIFFERENT CROPS.

Crop	No. of farmers using fertilizer	Agricultural chemicals
Coffee	106	106
Maize	100	103
Irish potatoes	97	26
Beans	8	-
Tea[1]	7	-
Vegetables	6	-

[1] The compound 25.5.5. is applied on tea and it is supplied by KTDA.

Source: Author's field interviews.

The application of agricultural chemicals follows the same pattern as that of fertilizer as shown in the table. The emphasis is however on copper based fungicides. and insecticides on coffee, and DDT on maize for control of stalk borers. Some fungicides are also applied on Irish potatoes.

7.3.2 Problems expricnced by Farmers in Purchasing Non-farm Inputs.

Whereas most of the problems are of a general nature there are some which are specific to particular inputs. In the case of fertilizer and hybrid maize seed the main problems cited by sample farmers are ranked in table 56.

TABLE 56: RANKING OF MAJOR PROBLEMS FACING FARMERS IN THEIR PURCHASE OF FERTILIZER AND HYBRID MAIZE SEED.

Type of problem	Ranking by number of farmers*
Non-availability	88
High prices**	80
Big packages	40
Transport	38

* The total number of farmers was 106, but farmers experienced more than one problem and so figures shown do not add to 106.

** The high prices are mainly on fertilizer.

Source: Author's field interviews.

The ranking of problems in the case of agricultural chemicals was similar to that of fertilizer except for technical problems as illustrated in table 57.

TABLE 57: RANKING OF FARM PROBLEMS FACING FARMERS IN THE PURCHASE OF AGRICULTURAL CHEMICALS.

Type of problem	No. of farmers experiencing problem.
High prices	87
Non-availability in society stores	46
Not sure of the type to use	29
Fear of poisoning/ toxicity	15

Source: Author's field interviews.

In the case of farm equipment and tools the main problems were non-availability at society stores, and in this particular case society stores were considered to be as good as shops and, farmers bought from shops which were nearer to farms. The important thing noted in this section is that for all non-farm inputs, the logistic problems of non-availability, transportation and high prices are ranked high.

7.3.3 Farmers' Attitudes to Co-operatives as Suppliers of Non-farm Inputs.

Farmers' acceptance of co-operatives as suppliers of non-farm inputs varied with different inputs.

They have been able to supply essential inputs for coffee production; fertilizer, fungicides, insecticides, sprayers, pruning saws, but for other non-farm inputs they have not attained a big share of the demand. The dairy societies have not been able to supply the milking equipment and animal feeds and farmers have to depend on the 'overloaded coffee societies'.

The farmers interviewed were of the opinion that co-operatives were superior than other distribution systems especially in supplying non-farm inputs on credit against crop deliveries. However, the Co-operatives fail especially in delivering inputs on time, and supply inadequate quantities as a result of under-estimation of farmers' demand. In the case of fertilizer and hybrid maize seed all farmers cited cooperatives as the best channel. Only 7 farmers thought that the Co-operatives/private traders combination was a better alternative. The reasons for favouring co-operatives are illustrated in table 58.

TABLE 58: REASONS GIVEN BY FARMERS FOR FAVOURING CO-OPERATIVES AS SUPPLIERS OF FERTILIZER AND HYBRID MAIZE SEED.

Reasons	No. of farmers	% of total No. of farmers.
Sell on credit	106	100
Stock all farmers needs	48	45.3
Sell at lower prices	39	36.8
Inputs always available	30	28.3
Near farms	3	2.8
Source: Author's field interviews.		

In the case of farm equipment and tools. where cooperatives have not managed to get a high percentage of the business farmers felt that co-operatives should stock more of the items. The reasons given are shown in table 59. Only 4 farmers didn't favour co-operatives as sole suppliers because they felt that all farmers were not members.

TABLE 59: REASONS GIVEN FOR FAVOURING CO-OPERATIVES AS SUPPLIERS OF FARM EQUIPMENT AND TOOLS.

Reasons	No. of farmers	% of the total
Can sell on credit	102	96.2
Near farms	67	63.2
Cheaper than other sources	42	39.6
Reliable	28	26.4

Source: Author's field interviews.

Farmers are in favour of co-operatives as the main suppliers of non-farm inputs so long as they can supply them in time and in adequate quantities. Where one type of co-operative is stronger than the others, its facilities can be utilised for supplying other inputs not related to its immediate field of operation. This has been the case with coffee co-operatives which have permanent storage facilities at the coffee factories.

8 RECORDED WEAKNESSES OF THE CO-OPERATIVE DISTRIBUTION SYSTEM AND POSSIBLE PRE-REQUISITES FOR IMPROVING THE SYSTEM.

8.1 WEAKNESSES AT SOCIETY AND UNION LEVELS.

8.1.1 Weaknesses at Society Level.

This study concentrated mainly on coffee societies as they are the major societies both in marketing and in consumption of non-farm inputs. At the same time the activities of other societies like dairy, pyrethrum and pig breeding societies were looked into. These have not 'taken-off' in their supply activities and their members have to rely on coffee societies for their supplies. In such a situation, unless a district has a strong co-operative society with permanent buildings which can be used for storage the supply of non-farm inputs, it cannot succeed. From the interviews in Murang'a district several weaknesses have been identified even when we consider that the coffee societies are very strong and well managed.

(a) Lack of training in input marketing:

Managers at co-operative stores are not trained in input marketing, which unlike produce marketing needs an informed and advisory service, as the majority of the farmers are 'illiterate' in the use of the new farm technologies. The function is mainly left to agricultural extension agents, but it has been shown that the frequency of their visits to farmers is low.

(b) Under-estimation of seasonal requirements:

This is the major weakness of co-operatives in the rural areas. Although some forms of estimates are made it appears that every season there are shortages. Factory managers and store-keepers don't add up the seasonal sales to get a fair idea of demand. Under-estimation at the factories leads to under-estimation at society and Union levels and results in inadequate supplies being delivered to farmers. This is a vicious circle of under-estimation, which can only be broken at factory level.

(c) Members' failure to indicate their requirements:

A factory serves about 500 members, and they attend meetings, and communal labour days at the factory. During such meetings the members can indicate the number of bags of fertilizer and hybrid maize, they would like to purchase for the next season. This could give a working estimate of farmers' demand but this is never done in most societies.

(d) Late delivery of inputs.

This weakness results from the road transport system, lack of vehicles and problems at Union level. It can be solved by a co-ordinated approach early ordering and use of vehicles.

3.1.2 Weaknesses at Union level.

The Union has comparatively few problems on its supply side. The store's staff are sure of the sources and can order directly by telephone or through distributors' representatives. The problem arises when distributors cannot supply all the requirements, which may be a result of inadequate imports. The Union has its supplies delivered to Sagana or Thika by railway. From these stations the Uninon vehicles deliver the supplies to Union stores. Transport problems only arise when large consignments are brought late and have to be stored and distributed immediately. This may put a constraint on the vehicles and storage space.

The Union has however one weakness in that the problem of under-estimation from societies is brought forward to the Union level. Since there is under-estimation at society level the Union falls into the same problem, and inadequacy results, resulting in rationing of inputs to affiliated societies. Distribution to societies which don't have their own vehicles becomes a problem in the week when rains start and all farmers are clamouring for supplies.

6.2 [illegible]

6.2.1 Timely Bulking, and Estimation of Requirements.

The roots of the problems in the merchandising activities of the cooperatives lie at the society-farmers level, where orders are hardly bulked and estimation of seasonal requirements is rudimentary. Suggestions on how this problem can be solved, taking a coffee society as an example is put forward below.

A coffee factory serves about 500 members on average and 100 - 200 non-members. The members attend communal days at least once per month. So to determine their requirements the factory manager with the help of the agricultural assistant can do the following:-

(a) Calculate the previous years' purchases from the sales books, noting the amounts sold to members on credit, and amounts sold to non-members on cash.

(b) Calculate the annual percentage increase in demand, taking several years into consideration.

(c) Ask members about their seasonal requirements at least 3 months before the season starts.

To calculate the total requirement for members and non-members, the equation for a single factory is:-

Ma + K = total amount required by members and non-members.

L = number of members.

a = Stated requirement for the next season.

K = Estimated and purchases, by non-members.

The amount (Ma) for a particular input has to be equal or more than the previous seasons requirements since demand is on the increase. To get the total amounts for the factories in a society the individual factory totals are added.

$(Ma + K)_1 + (Ma + K)_2 \ldots + (Ma + K)_n$ = Total society requirement. This can be done easily for society members who usually visit coffee factories. However, factories sell on a cash basis to non-members, and since the purchases from this group is inconsistent the factory manager can only estimate a certain quantity each year based on previous years' purchases.

To be successful, bulking and estimation have to be done every year and at least 3 months before the peak demand seasons. Orders from the societies have to be at the Union headquarters to facilitate bulk purchasing.

8.2.2. Timely Purchasing of Adequate Quantities.

Timely purchasing can only result if orders are brought early from societies, so that the union can have time for finding out the cheapest sources of various inputs demanded, the amounts to be purchased, the time of purchasing, and prices to be paid. The union can purchase the stocks taking into account the previous years' demand.

Table 60 and figure 10 illustrate the monthly sales of fertilizer from Murang'a Co-operative Union. The year 1970/71 was favourable in terms of availability of fertilizer, with an average monthly sale of 288.4 metric tons, while 1971/72 was characterized by country-wide shortages, and the average monthly sale was only 219.3 metric tons. By constructing such graphs annually the union can get information on the sales, especially:-

(a) Peak demand months; which correspond to the two rainfall seasons (March/April/May and October/November).

(b) Monthly demand for a particular fertilizer type, as shown in the table.

(c) Calculate the safety stock which is the difference between the highest demand and average demand.

(d) Time of purchase, taking into account the delivery time. This can be in times of lowest demand and when the weather is dry (December/January and July/August/September).

TABLE 60: MONTHLY AND ANNUAL PERCENT SALES OF FIVE DIFFERENT TYPES OF FERTILIZER BY LMFDCU 1970/71 and 1971/72.

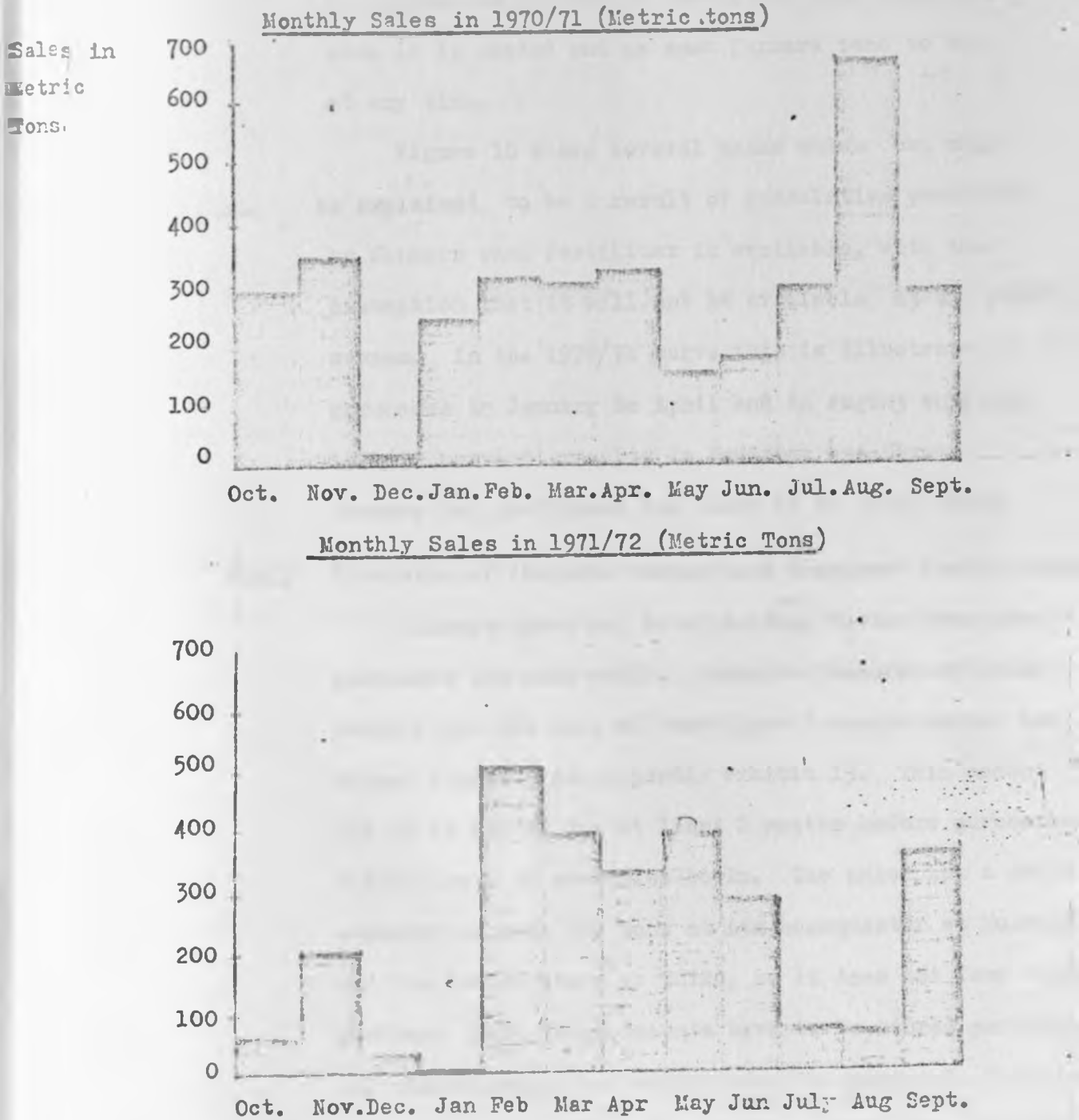
Month	1970/71						1971/72					
	CAN	ASN	DAP	C	MIX	Total	CAN	ASN	DAP	C	MIX	Total
	%						%					
October	36.7	29.4	25.7	7.5	0.8	100.1	0.05	42.7	57.3	-	-	100
November	35.6	48	0.4	16	-	100	57.3	41.9	0.2	-	.7	100.1
December	99.6	.04	-	-	-	100	67.3	29.9	2.83	-	-	100.1
January	0.04	94.5	00.6	3.5	1.3	99.9	46.2	2.6	51.3	-	-	100.1
February	0.3	63.4	31.5	4.7	-	99.9	0.02	9.6	90.4	-	-	100
March	7.6	43.8	47	1	0.5	99.9	29.9	16.3	51.1	-	.7	100
April	85.2	10.3	4	0.5	-	100	24.1	16.1	59.8	-	-	100
May	10.5	85.8	0.06	-	3.7	100	11.7	88	0.3	-	-	100
June	2.7	53	43.1	-	1.2	100	0.03	83.5	16.4	-	-	99.9
July	19.8	12.6	67.5	-	0.1	99.9	1.1	9.4	89.5	-	-	100
August	2.2	-	97.2	-	0.02	100	-	-	99.9	0.1	-	100
September	2.8	60.3	36.9	-	0.03	100	-	0.4	99.4	-	..	100
X	25.3	41.8	29.5	2.8	0.64	100	19.8	28.4	51.5	0.01	0.3	100

CAN - Calcium Ammonium Nitrate (26%N)
ASN - Ammonium Sulphate Nitrate (26%N)
DAP - Diammonium Phosphate.
C - Compounds
MIX - Mixtures

Source: LMFDCU Sales Records

For the two years, CAN and ASN, accounted for a mean percent sale of 57.7% while DAP accounted for 40.5% and compounds and mixtures accounted for 1.8%. DAP is used as multi-purpose fertilizer and this fact explains the high percent sale.

FIGURE 10: MONTHLY FERTILIZER SALES BY MURANG'A FARMERS DISTRICT COOPERATIVE UNION IN 1970/71 AND 1971/72



Source: Compiled from MFDCU Sales Records. 1970/71 and 1971/72.

With no orders available the union can purchase an initial amount which is equal to, or largerthan the previous years' sales. The problem at union level is aggravated by lack of fertilizer from suppliers when it is needed and as such farmers tend to buy at any time.

Figure 10 shows several peaks which can only be explained to be a result of speculative purchases by farmers when fertilizer is available, with the assumption that it will not be available at the planting season. In the 1970/71 curve this is illustrated by the purchases in January to April and in August while in 1971/72 curve it results in November and May. Farmers buy fertilizer and store it in their farms.

8.2.3 Provision of Adequate storage and Transport Facilities.

Storage space can be a limiting factor even when purchases are made early. Murang'a Cooperative Union tenders for 200 tons of fertilizer 5 months before the season starts (see appendix exhibit 1). This amount has to be stored for at least 2 months before purchases and delivery to societies begin. The union has a storage capacity of over 200 tons at its headquarter at Murang'a and its branch store at Thika, so it does not face this problem. Such large amounts have to be stored perfectly and store-keeping and supervision is essential. Technical store-keeping problems like dryness, humidity, temperature have to be looked into to stop deterioration of store inputs.

Availability of transport is another critical factor. Two aspects are essential at the union level: (i) transport from the nearest railway station to the union stores, (ii) distribution from the stores to societies' stores especially where societies don't have their own vehicles.

8.2.4 Provision of Credit and Maintenance of Reasonable Prices

Cooperatives are a suitable channel to members in that they provide inputs on credit and deduct the amount later from the members' produce sales. If prices are high the deductions will be high and farmers will get very little from the sale of their produce and as such they may fail to buy inputs in the next season.

The Union can buy in bulk so that it can realize price deductions and discounts. It can also purchase directly from manufacturers especially in the case of animal feeds, tools and equipment and hybrid maize seed. In such cases it can enjoy the distributors' prices instead of buying from distributors at wholesale prices. The two alternatives will lower the prices and deductions will be lower.

9 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

9.1 SUMMARY

9.1.1 Agriculture in Kenya's Economy.

(1) Agriculture is the most important pillar of Kenya's economy. Agricultural exports which account for 60-70% of the total exports bring in the needed foreign exchange, and raw materials keep the manufacturing sector which is based on processing of agricultural products running. In terms of employment, agriculture engages over one third of all wage employment and over 75% of total employment. The most important aspect of agriculture is that it supplies food to a rapidly expanding population, estimated at 3.5% per year with a demand for food estimated at 5% and 10% per annum in rural and urban areas respectively.

(2) Agricultural production in Kenya has undergone tremendous transformation. For the period 1900 to 1960 the large scale farmers, mostly Europeans contributed to virtually all the exports. However in the last twenty years and especially the post - 1960 period small-scale African farmers have awakened from the slumbers of subsistence farming and now contribute over 50% of the total gross marketed production. Small scale farming has been most impressive in coffee, tea, pyrethrum and in dairy production.

(3) With the rapid increase in population, the availability of good agricultural land has become limited and it has been estimated that over half of the estimated 1.2 million smallholdings are less than two hectares. As such there is a need to intensify agricultural production per unit area. Intensification can result from improving farming practices and using 'proven packages of non-farm inputs'.

9.1.2 The economics of non-farm inputs use:

(1) It has been proved from agronomic demonstrations that the use of fertilizers, agricultural chemicals, animal feeds, improved planting seeds and farm tools and machinery, brings large economic benefits.

(2) The returns in the use of fertilizers as demonstrated by FAO Fertilizer Programs has shown VCR's ranging from 1.9 - 5.2 in maize. Since a VCR of two is considered reasonable the results are encouraging.

(3) In hybrid maize production, when all complementary inputs are used to optimal levels, yields ranging from 5000 kilograms to over 10,000 kilograms per hectare have been obtained. Even with escalating inputs prices the net profits to growers is reasonable.

(4) Supplementary feeding of livestock gives increased yield in milk and improves meat quality. In the FAO Lanet Feedlot the dairy profit margin in feeding a Boran cattle is K.sh. 1.00 per day with returns of over 20% per annum.

A profit of K.shs 1.00 per day is considered reasonable. Apart from this fact animals from feed-lots are better finished and graded higher than animals from grazing areas.

(5) Economic benefits from using agricultural chemicals result from yield increases due to lessened loss by pests. Small scale farmers are increasingly using insecticides, and fungicides especially in coffee production. Herbicides which are used extensively in large farms have been proved to be labour and time saving.

(6) The use of farm tools and machinery causes indirect yield response due to timely land preparation, and removal of labour bottlenecks.

9.1.3 The present distribution system for non-farm inputs in Kenya.

(1) Distribution of non-farm inputs in Kenya is concentrated into the hands of two large distributors, one a private company and the other which is registered as a company as well as a cooperative, namely Kenya Farmers Association. In competition with these distributors there are subsidiary companies representing overseas manufacturers.

(2) Kenya Farmers Association which was originally a white farmers' controlled organization has since the pioneering days of Kenya's agriculture been distributing non-farm inputs to large scale farms, through its network of 32 branches.

In recent years it has widened its network by registering over 1500 stockists to supply the smallholder areas.

(3) Consumption of fertilizer has shown an upward increase with an annual increase of over 16% with nitrogenous fertilizers increasing by 7%, phosphatic fertilizers by 5% and compounds by 22%. The estimated utilization by crops in 1973 was 34% by maize, 23% by coffee and tea, 14% by wheat, barley and other cereals, 10% by sugar and rice and 14% by other crops.

Virtually all the fertilizer consumed in Kenya is imported from Europe, and from Uganda and Tanzania. Distribution of fertilizer follows the general channels of distribution through the two major distributors and five subsidiary companies. At the retail level it is distributed through cooperative societies, distributors' depots and stockists.

(4) Maize is the most important food crop in Kenya. Improvement of maize production is thus very important to feed the growing population, for livestock feed and for industrial processing. Kenya has had a successful breeding program which has released hybrid maize with a yield potential of 60 - 80 % over the local maize.

The area under hybrid maize has increased from 12,857 hectares in 1964 when hybrids were first released to over 305,130 hectares in 1972. Adoption of hybrid maize seed is almost 100% in large scale farms but in small farms it is only over 30% varying with areas. The uptake rate is 50,000 - 60,000 hectares annually.

Kenya Seed Company perfoms the functions of production, processing and packaging and arranges for distribution through K.F.A and Delgety Ltd. Cooperatives participate only at retail levels.

(5) The total bill for agricultural chemicals has risen by 296% from 1964 to 1972. The largest component is that of insecticides and fungicides used in coffee production. Most of the chemicals are imported in packed form for direct distribution but others are formulated locally by subsidiary companies. Distribution follows similar channels to those of fertilizers.

(6) Consumption of animal feeds has shown a gradual increase but with the intensification in livestock production the demand will increase. Poultry feeds constituted 67% of the total 1971 animal feeds. The animal feeds industry is intricately tied with the cereal processing industries especially maize, wheat and barley, and with oilseeds, sugar and meat processing industries.

Distribution of animal feeds is organized by four established compounders who distribute their proprietary brands through the two established distributors and agents. Two distributors have recently been established with one specializing in liquid feeds from the sugar processing industry.

(7) Unlike the other inputs, most of the heavy farm machinery is destined for large farms and is distributed through enfranchised local firms and subsidiary companies. However, light farm machinery tools and equipment are distributed through KFA, cooperative societies and hardware stores.

(8) As a whole the major constraints in non-farm inputs distribution include escalating prices, irregularity in supply, high transport costs, few distribution points and large package problems in smallholder areas.

9.1.4 Cooperatives and their participation in the merchandising activity.

(1) For a long time the inputs distribution system was geared to serving large scale farms, and potentials of the smallholder areas as a vast market for inputs has only been realized in the last ten years. As such distribution is poor and there have been repeated calls to utilize cooperatives.

(2) In Kenya the cooperative phenomena among the smallholders is only thirty years old, and in fact the number only proliferated in the last ten years. As such many of the teething problems still prevail. Mismanagement, misappropriation of funds and lack of trained personnel still hinder business in cooperatives. The Kenya Government in realisation of the importance of cooperatives has increased its control on them to uplift performance.

(3) Cooperatives are widely distributed in the rural areas, with varying degrees of strength and activity. Those in the cash crop enclave areas especially coffee, pyrethrum and some extent dairy are stronger than cereal and vegetables marketing cooperatives.

As a whole the marketing function in cooperatives is more developed than the merchandising function. Cooperatives deal with 90% of pyrethrum, 50% of coffee, 28% of milk, 65% of cotton and 25% of sugar but in merchandising they only operate at retail level and deal with 12% of total value of inputs, comprising of 40% fertilizer 30% agricultural chemicals, 20% animal feeds and 10% miscellaneous items. Out of this 40% is handled by cooperatives in Central Province, 30% by those in Eastern Province and only 10% by the other four provinces..

(d) Cooperatives have the framework and mechanism for effective operation of an integrated distribution system. Apart from being able to operate a credit-tied input system they have the necessary storage and to some extent, the transport facilities. However, the advisory mechanism which is a key variable in an integrated distribution system is rudimentary in cooperatives.

Efficiency in distribution of inputs revolves around three institutions, the district union, the primary society and the farming community. Farmers have to give their estimated seasonal requirements well in advance of the planting time. Primary societies have to bulk orders from the farmers and send their orders to the union. At the same time primary societies must have adequate storage capacity for the inputs as well as transport. The district union has to bulk orders from all societies and order from the various suppliers. It also ought to have enough central storage facilities and vehicles for delivering orders to societies. The whole process hinges on estimation of requirements, timeliness in ordering, transport and adequate storage.

9.1.5 Murang'a Farmers' District Cooperative Union.

(1) Murang'a district is in Central Province of Kenya. The economy is basically based on smallholder farming with some large scale farming in the drier eastern area. The major cash enterprises include coffee tea, pyrethrum, dairy with cotton and wattle as minor enterprises.

The total area of the district is 2529 km^2, and the mean density of population is 175 persons per km^2. It ranks fifth in population density in Kenya. The mean farm is 1.56 hectares.

(2) Murang'a Farmers District Cooperative Union is the main marketing institution handling agricultural produce and distribution of non-farm inputs in the district. The Union comprises of 23 active affiliated societies of which sixteen are coffee, two are dairy, three pyrethrum, one pig marketing and one fruits and vegetables. Coffee societies are however the backbone of the union's business and contribute 93.4% of the total turnover. The whole supply function therefore is geared towards the supply of essential inputs for coffee production. Nitrogenous fertilizers for coffee composed 86% of the total union fertilizer sales in 1973. Similarly copper based fungicides, and insecticides for pest and disease control in coffee dominate the agricultural chemicals.

However the union does not neglect the other sectors and supplies animal feeds, hybrid maize seed, equipment, household goods, macadamia seedling and even consumer items.

(3) On overall basis, the distribution of non-farm inputs in Murang'a district exhibits two distnict characteristics; zonal distribution types, and a dominance on the distribution system by cash crop-tied non-farm inputs. The first characteristic embraces three distribution typologies:-

(i) a non-structured distribution system in the lower zone where each farmer has to procure his requirements on individual basis.

(ii) a cooperative dominated distribution system in the middle zone, with stockists filling some niches in the market.

(iii) a transitional supply system in the upper zone where KTDA supplies tea inputs, and the cooperatives supply the transitional zone, and only a few stockists exist.

The second characteristic applies to the middle and the upper zones. Coffee inputs dominate the cooperative supplied inputs in the middle zone while in the upper zone the extreme occurs where KTDA operates a supply system based on the supply of inputs to one crop.

(4) The KFDCU distribution system comprises of three phases; the 'central ordering phase' or the union level, the 'distribution phase' or the society level and the 'feedback phase' or the farm level.

The functions in the central ordering phase include, the procurement of the right assortments for farmers, central storage and transportation facilities. On assortment of particular inputs it can be said that the union has managed to stock a wide range of inputs. It stocks eleven different types of fertilizer but lays a lot of emphasis on coffee production fertilizers.

The stock on hybrids includes all the releases from Kitale. This is necessitated by the wide variation in ecological and topographical conditions in the district. The case of agricultural chemicals is similar to that of fertilizer with emphasis on pesticides for coffee production. The union however stocks large amounts of DDT for control of stalk borers in maize.

In the supply of animal feeds the union is at a weak bargaining position. It does not have a comprehensive list as the competing agents and farmers are forced to buy on cash basis from agents. This explains the fact why the use of feeds is inconsistent among the farmers. The case of tools and equipment is different in that there is active competition between cooperatives and private traders and the farmer has a wide range to choose from.

Procurement of inputs is through tenders and private arrangements with suppliers. The union exploits all possible sources to get the cheapest supplies. The union has two central stores at Murang'a and at Thika and the storage capacity is just about enough, but this will have to depend on the turnover rate or the rate of dispersal to society stores. The union has a total transportation capacity of 12.5 tons. During the period of peak demand this is a constraint in distribution.

(5) The union distribution framework is based on coffee societies. The funnel of distribution widens from the union central stores to 16 society headquarters and finally to 72 coffee factory stores. At the terminal end this channel has a lower distribution ratio than that of stockists and private traders. The distribution phase is a transitional phase and the functions embrace those of the central ordering as well as those in the feedback phase. These functions include, estimation, transportation, storage, and dissemination of knowledge to farmers.

In considering the transport aspect, three factors have to be considered; distances from the central stores; state of roads and the availability of vehicles. The distances from the central store society headquarters ranged from 16 km. to 67.2 km. and the distances from society headquarters to factories ranged from 3.2 km to 16 km. Only four factories were served by an all-weather roads and all other factories experienced transport problems. The transport situation is aggravated further by the fact that societies do not own enough transport. Only five societies own lorries, and three own landrovers.

(4) Although the factory managers consult with agricultural extension staff in estimating the requirements in a particular area the problem of under-estimation recurs in all factories. This is also influenced by shortages at the district and the national levels. The ability to estimate the input

requirements is closely related to the understanding of the production technicalities in agriculture. The cooperative staff have very little agricultural production knowledge. Out of the 35 managers interviewed only three had an agricultural background as agricultural assistants. As such their ability to disseminate information on the use of inputs is greatly hampered by this fact.

(7) Storage is the only function in the distribution phase which is adequate. Only in one factory was storage considered a constraint in distribution. The stores had a mean storage capacity of 500 bags (50 kg) of fertilizer and 450 bags (10 kg) of hybrid maize seed. The mean seasonal sales for 1972 were 686 bags of fertilizer and 284 bags of hybrid maize seed per store. The turnover rate is however very high and stores are never filled to capacity.

(8) In the feedback phase of distribution, the awareness of the production characteristics of farmers is the essential criteria since this will determine the demand characteristics. In the sample, 53.7% of the farms were less than three hectares, and 85.8% of the farmers grew less than one hectare of coffee, 94.6% of the farmers grew less than one hectare of maize and 72.9% owned less than three grade animals. As such their demand for inputs is very small. In the case of fertilizer,

73.9% purchased less than 5 bags, while 96.0% purchased less than two bags of hybrid maize seed in the 1975 long rains season. There was a great indication that smaller package sizes would be more suitable in the area. 62% of all farmers using fertilizer and 66% of the 99 farmers who grew hybrid maize stated they would prefer a 25 kg. bag and a 5 kg. bag of fertilizer and hybrid maize, respectively.

(9) The advisory channels for farmers in the district include FTC's, agricultural extension agents, cooperative staff, private traders, meetings and instruction leaflets. The cooperative staff and private traders are technically handicapped in the advisory work because they lack the necessary agricultural background. So the only channels available to the farmer are FTC's, extension agents and for those who can read, the instruction leaflets. In the sample 64.8% of the farmers had been visited at least twice in the year by AA's. Only 66 farmers had attended courses in the FTC, and 43.5% of all farmers had attended for less than two times. Only 92 farmers had attended meetings organized by AA's in the year, in the sample, 54 farmers could not read instructions in English and even those who could read, feund it difficult to understand the technical jargon.

In general the problems affecting farmers in the purchase of inputs include, the 'uncontrolable problems' and the localized problems. The uncontrolable problems are the escalating prices and the shortages due to lack of inputs at the national level. The localized problems include transportation from factories to farms, which increases costs considerably and the minor problems of package sizes, fear of poisoning especially in the case of agricultural chemicals and favouritism in the supply from cooperative stores.

Farmers indicated that they would favour cooperatives as the major suppliers of inputs as they can supply on credit, usually have more comprehensive shopping lists of the farmers requirements, sell at comparatively lower prices, and are nearer to farms than the other competing suppliers.

9,2 AUTHOR'S RECOMMENDATIONS

The following recommendations refer to the cooperative movement as a whole in regard the merchandising activity.

(1) The cooperative movement has the basic framework for merchandising, funnelling downwards from the apex organization to district cooperative unions and finally to cooperative societies, and as such in the long term the movement ought to start importing inputs.

In the short run, the apex organization can start importing from Uganda and Tanzania which produce some fertilizers.

(2) In districts where the cooperative unions have a large share of the inputs' market, especially in Central and Eastern provinces, the union can be given a complete monopoly in distribution at retail level.

(3) In distribution of inputs the cooperative movement can gain a lot of ideas from the established distributors like KFA. They can send their staff for in-service training with KFA.

(4) In the smallholder areas cooperatives play a major role in the economic activities of the rural people and as such cooperatives ought to diversify their activities to embrace all the spheres of production. In the supply of inputs they ought not to lay too much emphasis on inputs for the particular crop they market, but should aim at meeting the farmer's requirements for all his agricultural production activities.

(5) Since most of the rural cooperatives are basically agricultural orientated it should be the aim of the cooperative movement to engage more agriculturally qualified staff at all levels of the movement. This would facilitate the advisory and the estimation functions of the movement.

The following recommendations apply to Murang'a Farmers District Cooperative Union.

(1) Due to the agroclimatic zones in the district the upper 'tea' zone is neglected. To improve the situation there are three alternatives:-

(i) The dairy cooperatives which operate in the zone, and which are affiliated to MFDCU can be organized to stock the necessary inputs for the area.

(ii) This is a potential market for stockists since there is little competition from cooperatives in the zone and more stockists can be established.

(iii) Since tea is the major cash crop, KTDA which supplies it with inputs can diversify its activities and supply the other agricultural enterprises in the area on similar basis to the middle zone.

(2) MFDCU ought to stock more fertilizer for food crop production especially for maize.

(3) The transport capacity of the union and the affiliated societies is low and it ought to be programmed so that when union vehicles are transporting inputs to societies they can carry a full load to supply all the societies in one area. When societies transport the dried coffee to Nairobi using their own or hired vehicles they ought to utilize the vehicles to carry a back load of inputs and other requirements.

(4) At the society level it is essential to employ as managers, people who have some agricultural knowledge. For the staff already in employment, they can be sent for in-service courses, in the FTC's where they can be given some knowledge on the use of inputs.

(5) In areas where there are no factories the union can rent premises and distribute inputs on a cash basis on similar lines to other private suppliers.

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LIST OF APPENDIX TABLES AND EXHIBITS

X. Coffee production characteristics in Murang'a District; smallholders and large scale farms 1973.

XI. Tea production characteristics and amount of fertilizer used on tea in Murang'a District 1973.

EXHIBIT I. Tender advertisement for the supply of chemicals and fertilizers to Murang'a Farmers District Cooperative Union.

TABLE 1: COMPARISONS OF FERTILIZER CONSUMPTION IN 17 AFRICAN COUNTRIES, AND CONTINENTAL AND WORLD AVERAGE CONSUMPTION 1972.

Country/ Region	CONSUMPTION						
	Per ha. Arable land			Per ha. Agricultural Land			Per Capita
	Kilograms per hectare						
	N	P	K	N	P	K	NPK
Algeria	5.9	7.8	8.8	0.9	1.2	0.6	8.6
Egypt	10.5	15.8	0.5	105.5	15.8	0.5	10.4
Ghana	0.3	0.2	0.2	0.1	-	0.3	0.2
Kenya	13.2	17.3	1.9	3.9	5.1	0.6	5.0
Lybia	1.8	3.0	0.2	1.2	2.1	0.1	6.3
Malagasy	2.5	1.2	1.4	0.2	0.1	0.1	2.1
Malawi	3.7	0.5	0.3	3.1	6.4	0.3	3.0
Mozambique	3.0	0.8	0.5	0.2	-	-	1.5
Rhodesia	26.1	16.3	13.6	7.2	4.5	3.7	19.5
S/Africa	15.0	22.6	8.0	1.8	2.7	0.9	27.3
Tanzania	0.9	0.3	0.3	0.2	0.1	0.1	1.3
Uganda	0.8	0.4	0.2	0.4	0.2	0.1	0.8
Zaire	0.1	0.3	0.2	-	-	-	0.4
Zambia	2.5	1.2	0.8	0.3	0.2	0.1	5.0
Sudan	9.3	3.1	2.1	-	-	-	4.3
Ivory Coast	0.9	0.3	1.6	0.5	0.1	0.8	5.0
Nigeria	0.9	0.3	-	.001	0.1	-	0.2
AFRICA	4.1	2.8	1.2	0.8	0.5	0.2	4.7
EUROPE	65.8	52.9	50.9	40.3	32.4	31.1	54.0
N/C/America	32.0	19.3	16.7	13.2	7.8	6.8	54.6
S. America	7.1	7.8	5.1	1.2	1.3	0.9	8.8
Asia	12.7	5.7	3.6	6.6	3.0	1.9	6.0
Oceania	3.5	22.7	4.2	0.3	2.1	0.4	78.8
World	22.1	13.8	11.5	5.3	3.3	2.8	18.2

SOURCE: FAO Annual Fertilizer Review: 1972.

TABLE II: Recorded Imports of Fertilizers, Kenya 1964 to 1972 (in Metric tons)

	1964	1965	1966	1967	1968	1969	1970	1971	1972
Sulphate of Ammonia	12360	20921	9169	8800	6359	9544	12097	12121	16250
ASN	(Classified under other N-Fertilizers)				8237	10069	17356	19265	25134
Other N-Fertilizer	19814	26982	20873	20473	22652	11481	20670	9541	12894
Urea 45%	-	[illegible]	-	-	T 81	15	47	98	420
Basic Slag	56	179	102	254	-	-	195	-	1
Superphosphate (more than 40% P_2O_5	12324	11586	19286	14746	15963	16428	14824	15335	9626
Single Superphosphate (21-22% P_2O_5 ex-Tororo	268	15154	25057	16624	12187	19106	22847	18565	19230
Other P-Fertilizers	46	124	1617	650	3389	1437	4507	7352	5794
Potassic Fertilizers	159	280	841	771	2165	2543	4766	3080	7380
Fertilizers N.E.S. (Compounds)	10603	10492	18044	18793	11096	31952	43935	44530	52290
Total	55630	86718	94988	81111	82129	102575	141248	129887	148990

Source: Compiled from Annual Trade Reports 1964 - 1972
(East African Community)

TABLE III: DISTRIBUTION OF KPA REGISTERED STOCKISTS IN KENYA 1972.

PROVINCES	DISTRICTS	NO. OF STOCKISTS
Eastern	Meru	45
	Embu	38
	Kitui	57
	Machakos	100
Central	Kirinyaga	17
	Nyandarua	53
	Nyeri	76
	Murang'a	56
Nyanza	Siaya	36
	Kisumu	42
	S. Nyanza	53
	Kisii	190
Western	Busia	22
	Kakamega	215
	Bungoma	141
Rift Valley	Kericho	126
	Nandi	49
	Baringo	40
	E. Marakwet	4
	Nakuru	8
	Trans Nzoia	70
	Uasin Gishu	6
Coast	Taita	40
	Kwale	5
	Kilifi	13
	Tana River	1
	Lamu	1

TABLE IV: RETAIL FERTILIZER PRICES. (F.O.R MOMBASA) 1972-1974

Type of Fertilizer	1972/73	April 1973	November 1973	March 1974
	K.shs. per metric ton.			
N. Fertilizers				
Sulphate of Ammonia	450.-	489.-	618.-	788.-
Calcium Ammonia Nitrate	607.-	660.-	766.-	978.-
Ammonia Sulphate Nitrate	607.-	660.-	766.-	978.-
Urea	776.-	847.-	1010.-	1260.-
P_2O_5 - Fertilizers				
Single super phosphate[1]	317.50	324.50	362.50	
Triple Superphosphate	789.-	686.-	1103.-	1518.-
Di-Ammonium Phosphate (D.A.P	1053.-	1157.-	1473.-	
Double Superphosphate	-	-	-	-
Compound Fertilizers				
6 x 30 x 0	830.-	909.-	1146.-	1467.-
10 x 30 x 0	892.-	976.-	1232.-	1559.-
17 x 17 x 17	883.-	964.-	1203.-	1449.-
15 x 45 x 0	1007.-	1106.-	1406.-	1861.-
11 x 55 x 0	1060.-	1167.-	1486.-	2005.-
23 x 23 x 0			1283.-	1588.-
25 x 5 x 5	735.-	842.-	1050.-	1231.-

[1] ex Tororo

* kg. bag.

Source: Ministry of Finance and Planning.

	1971/72 (until 1972)				1973/74 (November 1973)				CHANGE 72-74	
	T.S.P.		Amnon Sulphate		T.S.P.		Amnon Sulphate		Y.S.P	A.S.
	Price/ Ton	Share of Retail Price	Price/ Ton	Share of Retail Price	Price/ Ton	Share of Retail Price	Price/ Ton	Share of Retail Price		
	K.shs.	%	K.shs.	%	K.shs.	%	K.shs.	%	%	%
Price CIF	600.00	110	256.70	73.1	1050.82	90.0	531.36	77.6	75	107
+ cost of labour charges	25.00	4.6	21.50	6.1	40.00	3.43	40.00	5.8	60	86
Price at port gate Mombasa	625.00	114.7	273.20	79.3	1090.82	93.43	571.36	[illegible]	75	105
Less subsidy	215.00	-39.5	42.00	-12.0	129.00	-11.0	25.50	-3.7	-40	-40
f.o.b Mombasa (ex.Importer	410.00	75.2	236.20	67.3	961.82	82.3	545.86	79.7	135	131
Transport costs rail - 800 km	46.00	8.4	46.00	13.1	46.50	4.0	46.50	6.8	1	1
Price delivered to Railway Station	456.00	83.7	282.20	80.4	1008.32	86.3	592.36	86.5	121	110
Wholesale margin	44.00	8.1	24.50	7.0	85.65	7.3	37.14	5.4	95	52
Price ex-wholesalers store	500.00	91.8	306.70	97.4	1093.97	93.6	629.50	92.0	119	105
Transport, average 20 miles	15.00	2.8	15.00	4.3	20.00	1.7	20.00	2.9	33	33
Price delivered to retailer's store	515.00	94.5	321.00	91.5	1113.97	95.3.	649.50	94.9	116	102
Retail Margin:	30.00	5.5	30.00	8.5	55.00	4.7	35.00	5.1	83	17
Price ex-retailer's store = Sales price to farmers	545.00	100	351.00	100	1168.97	100	684.50	100	115	95

[1] Triple Superphosphate. 43% P_2O_5.

1972/73 values reflect the fertilizer in Eldoret district for supplies from Albotros Co.

1974 values reflect a more general position at Eldoret - not necessarily a case of specific company.

Source: Price Controller. Ministry of Finance & Planning.

TABLE VI: RAILWAY RATES PER TON FOR FERTILIZER IN UNITS OF 13 TONS 1973/74.

	Source of Fertlizer		
	Kilindini	Nairobi	Tororo
Destination	K.sh. per metric ton		
Athi River	30.00	12.00	33.00
Webuye	50.00	27.50	13.00
Bungoma	51.00	29.50	12.00
Eldoret	46.50	25.50	17.50
Gilgil	37.00	15.50	26.50
Moi's Bridge	49.00	27.50	17.50
Karatina	38.00	15.50	38.50
Kisumu	46.50	25.50	26.50
Kitale	50.00	27.50	18.50
Londiani	42.50	19.50	27.50
Lugari	49.00	27.50	14.00
Kipkeilion	43.50	22.00	28.50
Molo	41.00	18.50	26.50
Nairobi	31.50	-	32.00
Naivasha	35.50	14.00	27.50
Nakuru	39.00	16.50	25.50
Nanyuki	41.00	18.50	42.00
Naro Moru	39.00	17.50	40.50
Njoro	39.00	17.50	25.50
Njeri	39.00	16.50	38.50
Sagana	37.00	15.50	37.50
Thika	33.50	12200	34.00

Source: KFA Head Office December 1973.

TABLE VII: SALES OF HYBRID MAIZE SEED FROM KFA BRANCH DEPOTS 1967-1973 WITH ESTIMATED HECTARAGE FOR SMALL AND LARGE SCALE FARMERS.

Depot	1967/68	1968/69	1969/70	1970/71	1971/72	1972/73
	10 kg bags					
Kitale	13103	8337	14958	22023	37207	49666
Eldoret	23859	22499	30339	31224	53349	68851
Moi's Bridge	605	1362	1350	3550	3827	9254
Lugari	754	1967	2365	4200	3588	8495
Turbo	-	6594	1300	2600	4252	10021
Webuye	5762	13543	17608	27904	31423	60432
Bungoma	12924	20781	33636	46830	52332	48546
Kisumu	32498	40370	51478	89123	88625	116627
Lubwa	12122	13595	24525	34574	58213	69272
Nakuru	3289	15692	12010	21791	56245	62210
Nyahururu	66	376	1375	3300	5297	7886
Nayuki	1395	6	-	660	3257	3896
Karatina	6294	5455	11071	23100	28898	49797
Nairobi	2770	7729	16720	20998	27387	20712
Thika	-	-	-	1050	8512	8334
Mombasa	-	-	-	3712	153	612
Total bags	111309	144422	218735	336651	464558	594611
Equivalent ha. Small scale	50736	63545.6	96243.2	148126.4	204405.2	261629.2
Equivalent ha. Large scale	36078	39042	45363	63045.2	73087.2	52751
Total Ha. Kenya	86814	102588	141607	211172	277492	314380

Source: KFA Seeds Office August 1973

TABLE VIII VALUE OF MATERIAL AGRICULTURAL INPUTS USED IN KENYA 1965-1973 K£'000

Material Inputs	1965	1966	1967	1968	1969	1970	1971	1972	1973
Fertilizers	2708	3212	3292	2602	2922	3607	3711	4224	58913
Other Agric. Chemicals	918	1171	1248	1536	1793	2236	1640	2936	3124
Livestock drugs and medicines	558	616	661	704	909	1321	1152	1683	1488
Fuel	1655	2018	2030	2103	2441	2372	2720	3028	3337
Power	214	243	253	258	313	358	370	430	445
Spares and maintenance	848	905	953	788	929	1042	919	946	921
Bags	455	587	677	701	815	512	1057	1465	1780
Manufactured feeds	843	998	752	880	1088	1354	1487	2124	2841
Seeds	434	461	695	584	405	340	800	736	1206
Office expenses	154	152	150	148	152	159	157	158	158
Small implements	247	276	188	235	248	236	318	302	1201
Other	71	84	100	119	141	168	200	238	283
Total	9105	10723	10099	10658	12156	13705	14531	18270	100
As a % of Total inputs	78.8	78.6	78.5	81.5	82.9	83.3	83.3	83.2	

Source: Kenya Economic Survey 1975. Page 91

Table IX: THE BREAKDOWN OF AGRICULTURAL COOPERATIVES ON THE BASIS OF PRODUCE TYPE IN SIX PROVINCES OF KENYA, AS AT 31st DECEMBER, 1970.

Produce type	Central Prov.	Coast Prov.	Eastern Prov.	Nyanza Prov.	Rift-Valley Province	Western Prov.	Total
Cereal & grain	7	14	34	16	5	82	158
Coffee	39	1	46	39	5	26	156
Cotton	2	2	1	17	0	17	37
Fruits & Vegetables	9	6	1	0	0	0	16
Pyrethrum	14	0	1	24	5	1	45
Sisal	1	1	2	0	1	0	5
Sugar Cane	0	1	0	28	2	1	32
Dairies	27	9	12	31	21	5	105
Eggs & Poultry	13	2	9	1	1	5	31
Pigs	20	0	0	0	0	0	20
Ranching & Livestock	2	4	17	1	8	1	33
Multi-produce	55	4	19	13	63	5	159
Farm-Produce	141	0	2	4	157	3	307
Unions	6	4	6	11	4	6	37

Source: Department of Coooperative Development. 1970

TABLE X: COFFEE PRODUCTION CHARACTERISTICS IN MURANG'A DISTRICT; SMALLHOLDERS AND LARGE SCALE FARMS 1973.

Society	No. of growers	PRODUCTION			No. of factories
		Total area	Metric tons		
		ha	Total	per ha.	
Wathaga	1533	399.82	395	0.988	4
Kahuhia	2134	261.022	399	1.529	4
Mugoiri	3619	801.278	909	1.134	7
Kagima	5375	1156.593	1092	0.944	11
Iyego	3489	656.805	580	0.683	5
Gatanga	5141	1604.580	1032	0.643	12
Kagundaini	1757	567.370	360	0.635	5
Kandara	3464	756.763	686	0.906	7
Muruka	1227	352.482	334	0.946	3
Irera	713	255.762	206	0.805	2
Gacharage	903	252.119	217	0.861	2
Irati	1597	353.291	330	0.934	2
Thangaini	1970	441.711	249	0.564	2
Nginda	772	96.315	48	0.498	1
Kiangoma	833	188.584	102	0.541	2
Njora	1596	390.927	222	0.568	3
Total smallholders	36123	8535.422	7161	0.839	72
Total Large Scale farms	Estates (same Kakuzi	3780	4071	1.07	
District Total		12315.422	12232	0.99	

Source: Compiled from District Annual Report, 1973

TABLE XI: TEA PRODUCTION CHARACTERISTIS AND AMOUNT OF FERTILIZER USED ON TEA IN MURANG'A DISTRICT 1973.

Division	Hectares planted*	No. of growers	Average size of holdings	Green leaves production	Fertilizer** used
			Ha.	Million kg.	bags (50 kg.)
Kangema	1789.20	4696	0.38	3.397	3620
Kiharu	615.13	1473	0.42	1.454	1171
Kigumo	1144	2451	0.47	1.881	2272
Kandara	1170	2251	0.52	1.982	1940
District	4718.13	10868	0.43	8.164	9003

* Some of the tea is immature.

** The fertilizer used is 25:5:5:. It is supplied by KTDA on credit.

Source: Ministry of Agriculture Murang'a District Annual Report, 1973

EXHIBIT I: TENDER ADVERTISEMENT FOR THE SUPPLY OF CHEMICALS AND FERTILISERS TO MURANG'A FARMERS DISTRICT COOPERATIVE UNION.

MURANG'A FARMERS DISTRICT CO-OPERATIVE UNION LTD.

TENDERS

FOR SUPPLY OF CHEMICALS AND FERTILISERS

TENDERS are here invited for supply of chemicals and fertilisers for 1973/74 years or part thereof as follows:

CHEMICALS: 50% Copper oxychloride 25 kg. package 150 tons.
80% Captafol (Difolatan) 25 kg. package 20 tons
Bentale 25 kg. package 10 tons
Insecticides 20 litres 1.000 drums

FERTILISERS: C.A.N. 26%N. 25 or 50 kg packages 500 tons
A.S N. 26%N. 25 or 50 kg. packages 500 tons
D.A.P. 25 or 50 kg. packages 500 tons
Single or Double Superphosphate 50kg 25 tons

Prices quoted should include railage or transport to Thika and Murang'a Stations respectively.

Deliveries will commence as soon as the tenders are awarded, possibly from February, 1974.

Tenders must be submitted in plain closed and double sealed envelopes marked "Tender for Chemical and Fertilisers" and addressed to:

The General Manager,
MURANG'A FARMERS' DISTRICT CO-OPERATIVE UNION LTD.,
P.O. Box 14,
MURANG'A.

to reach him **not later than January 12, 1974.**

A tenderer can also bring the tender in person and put it in slotted tender box provided in the Union office Murang'a.

Tenderers should not show their marks or names and address on any part of outer envelopes.

The Co-operative Union here is not bound to accept the lowest or any tender.

Source: Daily Nation (Nairobi) October 1973.

ANNEX I:

UNIVERSITY OF NAIROBI.

DEPARTMENT OF AGRICULTUREAL ECONOMICS

FARMERS (MEMBERS OF CO-OPERATIVE SOCIETIES)

Date..... Location.....

Name or Registration of Factory .....

Farm .....

District.....

Division.....

Introduction.

I am Postgraduate student from the University of Nairobi, engaged in a research project on the distribution of fertilizers, hybrid maize seed,animal feeds, farm tools and implements and agricultural chemicals. I am trying to find out the problems you experience in buying and transporting of these items. This study will help in the improvement of the distribution system to the farmers and I would be most grateful if you could answer the following questions accurately:-

1. Farming Activity

1.1. What is the size of your farm? .....acres

1.2. What cash crops do you grow? .....

Name	Acres or Number of trees
Coffee	.....
Tea	.....
Pyrethrum	.....
Macadamia	.....
Others	.....

1.3 What other crops do you grow on your farm?

Name	Acres
Maize	.....
Beans	.....
Bananas	.....
Others	.....

1.4. Do you keep animals in your farm? Yes:..... No.....

1.5 If you keep animals, what types and numbers?

Type	Numbers
Grade	.....
Local cattle	.....
Pigs	.....
Goats	.....
Sheep	.....
Poultry	.....
Other	.....

2. Co-operatives

1. Are you a member of a co-operative society? Yes/no
2. If yes, how long have you been a member?.....years.
3. Which cooperative society do.you.belong to?
   a) Coffee cooperative society ..... Yes/No.
   b) Dairy cooperative society ..... Yes/No.
   c) Both of them ..... Yes/No.
   d) Others .....
4. How far is the nearest cooperative factory from your farm?
   ¼ mile
   ½ mile
   1 mile
   2 miles
   Other distances.....
5. How do you transport your coffee to the factory?
   a) Hire transport Yes/No.
   b) Carry it , with other members of the family Yes/No.
   c) Pay people to carry it Yes/No.
   d) Other means .....
6. If you hire transport, or pay people, how much do you pay for
   a) one debe to the factory.....
   b) hired vehicle .....

3. Supply of inputs.

3.1 Do you use fertilizers/hybrid maize? Yes/No.

3.2 If yes, for how long have you used each?
a) Fertilizers .....years.
b) Hybrid maize.....years

3.3. Who introduced you to their use?
a) Agricultural officer
b) Neighbour/Friend
c) Others .....

3.4 On which crops do you use fertilizer?
a) Coffee
b) Tea
c) Maize
d) Pyrethrum
e) Potatoes
f) Others.

3.5 Where do you buy your fertilizer and hybrid maize?
a) KFA store (Thika/Sagana)
b) Co-operative store
c) Stockist/Shopkeeper
d) Others .....

3.6 When do you buy your fertilizers/hybrid maize?
a) One month before rains
b) 2 weeks before rains
c) 1 week before rains

3.7 How do you transport you fertilizer/hybrid maize to your farm?
a) Use own vehicle
b) Hire transport
c) Use buses
d) Others .....

3.8 What is the state of the road to your farm?

a) all tarmac

b) Murram

c) earth road

3.9 How much do you pay for fertilizer/hybrid maize to your farm?

a) one bag (50 kg) of fertilizer Shs.....

b) one bag (10 kg) of hybrid maize shs. .....

3.10 How many bags did you buy in the last planting season? (amount used in 1973 long rains season)

a) fertilizer .....bag/season

b) hybrid maize .....bag/season.

3.11 Would you like fertilizers/hybrid maize to be packed and sold in small bags? Yes/No.

3.12 If yes, which size would you prefer?

a) Fertilizers in 25 kg. bags Yes/No.

10 kg. bags Yes/No.

b) Hybrid maize in 5 kg. bags Yes/No.

1 kg. bags Yes/No.

3.13 Why would you like them in such small bags?

a) Easier to carry Yes/No.

b) Can be used on a small area Yes/No.

c) Cheaper to buy Yes/No.

d) Other reasons.....

3.14 What are the major problems in the supply of fertilizers/hybrid maize?

a) Not available when farmers need them Yes/No.

b) Transport problems Yes/No.

c) Prices are high Yes/No.

d) Sold in big bags Yes/No.

e) Others .....

3.15 How do you pay for your fertilizers/hybrid maize?

a) cash

b) get them on credit from co-operative factory. Yes/No.

c) Other means .....

3.16 In your opinion who ought to sell fertilizer/hybrid maize?

a) Cooperatives

b) Private traders

c) others .....

3.17 If your answer to 3.17 (a) is yes give reasons why you think cooperatives are better than the others.

a) Co-operatives sell at a cheaper price.

b) Co-operatives have supplies available in time

c) Co-operatives can sell on credit

d) Co-operatives can stock all the farmer needs

e) Other reasons.....

3.18 Does the agricultural assistant visit your farm to advise you on the use of fertilizers and hybrid maize? Yes/No.

3.19 How many times has he visited your farm this year? ..... times.

3.20 Do you ever attend barazas organized by the Agricultural Assistant? Yes/No.

3.21 If yes, how many have you attended this year ?

.....

3.22 Have you ever attended courses in a Farmers' Training Centre? Yes/No.

3.23 If yes, how many times? ..... times.

3.24 Do you ever miss fertilizer/hybrid maize from where you buy them? Yes/No.

3.25 If yes, what reasons does the seller give for them being out of stock?

a) That they have not yet arrived
b) That very little was brought
c) That he has no money to buy many bags
d) Other reasons .....

4. Simple Tools and Equipment.

4.1 Do you have the following items?

Item	Where bought
1. Sprayer	.....
2. Fencing wire	.....
3. Milking cans	.....
4. Saws	.....
5. Wheelbarrows	.....
6. Jembes/Pangas	.....
7. Others	.....

4.2 If you did not buy any of the above mentioned items from the cooperative factory, what are your reasons for buying them elsewhere?

a) Co-operative society did not have it/them
b) Society store was too far
c) They were available in shops at the same price as in the cooperative store.
d) Other reasons.....

4.3 If you bought the items at the cooperative store how did you pay?

a) Cash
b) bought on credit

4.4 If you are asked, do you think it would be good idea if the co-operative store supplied all the farmer needs? Yes/No.

4.5 What are your reasons ? .....
.....

5. Agricultural Chemicals

5.1 Do you ever use chemicals? Yes/No.

5.2 How long have you been using them ? ..... Years.

5.3 What chemicals do you use?
a) Coffee sprays
b) For spraying cattle
c) DDT dust on maize
d) Others .....

5.4 Where do you buy your chemicals?
a) Murang'a town
b) From shops
c) Other sources.....

5.5 Has anybody advised you on how chemicals are used? Yes/No.

5.6 If yes, who has advised you on their use?
a) Agricultural Assistant
b) Cooperative Manager
c) Shopkeeper
d) Neighbour
e Others .....

5.7 Can you understand the instructions written on the chemical packets?
a) Yes/No if it is written in English.
b) Yes/No if it is written in Swahili.

5.8 Which problems do you experience in buying and using chemicals?

a) Chemicals are not available in cooperative stores
b) Not sure which chemical to buy
c) Chemicals are very costly
d) Fear to buy some chemicals because they are said to be poisonous.
e) Other reasons.....

6. Animal Feeds

6.1 Do you buy any animal feeds? Yes/No.

6.2 If yes, where do you buy your feeds?

1. Murang'a Town Yes/No.
2. Coffee Factory Yes/No.
3. From nearest shops Yes/No.
4. Others .....

6.3 What feeds do you usually buy?

	Name of Feed	Bags/Month
1.	Cattle feeds	.....
2.	Pig feeds	.....
3.	Chicken feeds	.....
4.	Others	.....

6.4 How much do you pay to transport these feeds to your farm? Shs. ..... per bag.

ANNEX II

UNIVERSITY OF NAIROBI

FACULTY OF AGRICULTURE

FACTORY MANAGERS

Date of interview .....

Person interviewed.....

Name of Factory .....

Name of Co-operative Society .....

District .....Division .....

Location .....

INTRODUCTION

I am a Postgraduate Student from the University of Nairobi, engaged on a research project on the distribution of agricultural inputs. I am trying to find out the problems you face in selling and distributing inputs. The results of this study will be of use to the Co-operative Societies, and I would be most grateful if you would answer the following questions accurately:-

1. General Information

1.1 When was this factory opened ..... Year

1.2 How many members are registered in this society? (those who bring coffee to the factory) .....
..... members.

1.3 What is the acreage under coffee ..... trees.

1.4 What is the total number of trees ..... trees.

1.5 How far is the factory from

a) Murang'a Town ..... miles

b) Society headquarters ..... miles

c) The main road ..... miles

1.6 What is the state of the major road to the factory?

a) good all the year round

b) impassable during rainy seasons.

1.7 Do you have a factory vehicle? Yes/No.

1.8 What do you use to transport coffee to Nairobi?

a) Society lorry

b) Hired lorries

c) Other .....

1.9 How many times do you transport your produce to Nairobi?

a) Every month

b) Every three months

c) Every six months

d) Other .....

1.9 (b) When you transport coffee to Nairobi, what do you carry in the lorry on the return journey? .....

1.10 Do you ever miss transport? Yes/No.

2. MANAGEMENT

2.1 How long have you been a manager in this factory?
Years ..... Months .....

2.2 Before you joined this factory, where were you working? .....

2.3 Have you ever attended courses at :-

a) Co-operative College

b) Farmers' Training Centre

c) Other .....

2.4 If yes, how many times have you attended courses at:-

a) Co-operative College

b) Farmers' Training Centre.

2.5 How many people are employed in the factory?

.....

2.6 Who else has attended courses at the Co-operative College or Farmers' Training Centre?

.....

2. Distribution of Inputs.

Fertilizers and Hybrid maize.

3.1 Do you sell fertilizers and hybrid maize in this factory. Yes/No.

3.2 If yes, where do you get your fertilizer/hybrid maize?

a) Murang'a Town

b) Society headquarters

c) Shopkeeper/stockist

d) Other .....

3.3 How do you transport your fertilizer/hybrid maize to the factory?

a) use society vehicle

b) use hired vehicles

c) Other means

3.4 How much do you pay per bag Shs. .....cts....

per lorry load Shs. .....cts....

3.5 What types of fertilizers do you use?

ASN/CAN
Double superphosphate
Single superphosphate
Others.....

3.6 Can you give me the amount sold last year (1972)

a) Fertilizers (50 kg) .....bags
b) hybrid maize (10 kg) ..... bags.

3.7 When do you bring fertilizer/hybrid maize to the store?

a) One month before rains
b) two weeks
c) 1 week
d) as rains start

3.8 When do farmers start buying hybrid maize/fertilizers?

a) one month before rains
b) two weeks
c) 1 weeks
d) during rains

3.9 Many farmers complain that fertilizers and hybrid maize are not available when they want them. Why do you think these shortages occur?

a) the distributors bring them late
b) they do not bring as much as required
c) we are never sure of the demand until the planting season starts.
d) we do not have a big store
e) others .....

3.10 Who estimates for you the amount you need per planting season?

a) location agricultural assistant
b) Co-operative Officer
c) do not estimate

3.11 Where do you store your fertilizer/hybrid maize?

a) Same store as other produce
b) Different store
c) Others .....

3.12 How much fertilizer/hybrid maize can you put in your store?

a) fertilizer ..... bags (50 kg bags)
b) hybrid maize..... bags (10 kg bags)

3.13 What are the main problems with storage of fertilizer?

a) coffee not bought when we want to store fertilizer
b) small store
c) other problems .....

3.14 If all farmers in this area decided to grow hybrid maize, do you think your store will be enough to store all the fertilizer and seeds required? Yes/No.

3.15 Are you hoping to build a new store? Yes/No.

3.16 Do you advise farmers on how to use fertilizers and hybrid maize? Yes/No.

3.17 Do you supply animal feeds? Yes/No.

3.18 What do you supply?

a) cattle feeds
b) pig feeds
c) poultry feeds
d) Others .....

3.19 Do you sell agricultural chemicals? Yes/No.

3.20 Which ones?

a) copper 50% ..... litre in 1972
b) captafol .....
c) sumithion .....
d) others.....

3.21 Do you advise farmers on the use of chemicals?
Yes/No.

3.22 Does the Agricultural Assistant visit the factory?
Yes/No.

3.23 Where do you store your chemicals?

a) same store as others
b) different stores

3.24 Some chemicals come in debes, how do you sell to farmers who want them in small quantities?

a) in bottles
b) others

3.25 Do you mention to farmers that some chemicals are poisonous? Yes/No.

3.26 If yes, how do you advise them on their use?

a) store them from food
b) be very careful when using them
c) wash throughly after use.

OTHER ITEMS.

4.1 What other items do you supply to the farmers? (list as many as possible) .....
.....

4.2 Of the items you have listed, which are mostly demanded by farmers all the times?.....
.....

4.3 Do you have them in stock when the farmers want them? Yes/No.

4.4 Do you ever organise meetings to tell farmers what you have in store? Yes/No.

4.5 If yes, how many meetings do you organise?

Per month ..... No. of meetings
Per 2 months ..... No. of meetings
Per 6 months ..... No. of meetings
Per year ..... No. of meetings