

AN ECONOMIC ANALYSIS OF MAIZE MARKETING IN KENYA : A CASE
STUDY OF NANDI DISTRICT

BY

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Partial Fulfilment of the requirements for the degree of
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DEDICATION

To my wife and son,

Mary Njeri and Robert Ndirangu Njiri

DECLARATION

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

Sign  Date 9/8/93
Samuel Njiri Ndirangu

This Thesis has been submitted with my approval as University Supervisor.

University Supervisor

Sign  Date 9th Aug. 1993.
Dr. W. A. Oluoch-Kosura

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ABBREVIATIONS

1. AEZ - Agro-Ecological Zones
2. Cif - Cost of Insurance and Freight
3. CSRP - Cereal Sector Reform Programme
4. CO-OP - Cooperatives Societies
5. ESA - East and Southern Africa
6. Fob - Free on Board.
7. GDP - Gross Domestic Product.
8. GMB - Grain Marketing Board.
9. GMS - Grain Marketing Study.
10. I-O Matrix - Input-Output Matrix.
11. K £ - Kenya Pounds (= ksh. 20.00).
12. Ksh - Kenya Shillings.
13. LBAs - Licensed Buying Agents.
14. LH - Low Highland Zone.
15. LM - Low Midland Zone
16. MDA - Ministry of Agriculture
17. NCPB - National Cereals and Produce Board.
20. PAM - Policy Analysis Matrix.
21. PMC - Primary Marketing Centres.
22. UH - Upper Highland Zone.
23. UM - Upper Midland Zone.
24. USAID - United States Agency for International
Development.
25. US dollar - United States Dollar.

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ABSTRACT

The main objective of government intervention in the maize industry is to ensure self sufficiency in maize production. However, indicators of the government's inability to meet this objective have been observed in the past. The memories of national maize crises of 1961, 1971, 1979 and 1984 are still fresh in Kenyans' minds. Moreover, Kenya is currently (1992) facing a shortfall in domestic maize supply forcing it to import the commodity which is the dominant staple food of its people. These setbacks have made the government to embark on a liberalization programme of this vital industry. Liberalization of the maize industry involves reduction in government control of maize marketing, thereby increasing the activities of private maize traders.

This study analyzed the efficiency of private maize trade in Nandi District. Nandi District has a high potential for maize production and remarkable activities of private maize traders. A Policy Analysis Matrix (PAM) framework was used in the study. The deviation from efficiency is given by the difference between the profits prevailing in the controlled maize market and the profits that would emerge on liberalization of the market.

This study found that in the period between July 1990 and March 1991, the prevailing profits in private maize trade ranged between Ksh. 2.70 and Ksh. 77.85 per bag¹ of maize. If the maize market was liberalized the private traders would have made profits of between Ksh 232.00 and

¹ 1 Bag = 90 kg.

Ksh. 284.10 per bag. This excess profit would in the longrun be passed to maize farmers in form of higher producer prices. Thus, government policy reduced returns to participants in private maize trade by between 264 and 2203 percent.

The study concluded that private traders can handle maize marketing efficiently. The role of the government in maize trade should be provision of infrastructure like roads and storage facilities, which would enhance technical efficiency and reduce losses in private maize trade. The government should offer credit facilities to private maize traders in order to assist them to cover purchasing, marketing and storage costs. If the government is to set maize prices, then the ceiling consumer price should reflect or approach the cif price in periods when importation is necessary. The floor producer price should reflect the price likely to achieve the food security objective being pursued by the government. If NCPB is to engage in maize trade, then it should be allowed to compete with other traders.

CHAPTER 1

1. INTRODUCTION AND BACKGROUND INFORMATION

This chapter outlines the important role of agriculture in the Kenyan economy and the problems that the sector has faced in the last three decades since 1960s. The general agricultural policy, its objectives and measures being pursued to achieve the objectives are discussed. The importance of maize in the Kenyan society, the government policy towards maize production and marketing and the major changes that has occurred in maize industry are given in this chapter. A detailed description of maize marketing system in Kenya is also given in this chapter. Finally a statement of the problem is given and the hypotheses to be tested are outlined.

1.1 General Agricultural Policy in Kenya

The Agricultural Sector occupies a central place in the Kenyan economy. Agriculture accounts for about 30 percent of Gross Domestic Product (GDP) and about 70 percent of merchandise exports are agricultural. More than 80 percent of the labour force is engaged in agriculture and one-third or more of manufacturing sector output is based on agricultural products (Pearson, 1990). Table 1.1 shows the percentage contribution of agricultural sector to GDP as reported in the 5-year National Development Plans since 1970.

Table 1.1 : Contribution of Agricultural Sector to GDP as Reported in the Five-year Development Plans since 1970.

DEVELOPMENT PLAN	PERCENTAGE SHARE OF GDP
1970 - 1974	34.0
1974 - 1978	34.0
1979 - 1983	31.6
1984 - 1988	29.4
1989 - 1993	28.3
(PROJECTED)	

Source: Five-Year National Development Plans (1970-1993)

From Table 1.1, there is evidence that the contribution of agricultural sector to GDP has been on the decline. The rise in the share of industry is a movement in the right direction in view of government's commitment to making industrial sector a leading sector (Kenya, 1989). However, agriculture continues to play a major role in the economy, relative to industrial sector, whose share has been 17.6 percent and projected at 18.3 percent by 1993.

Agricultural sector has not been without problems, particularly in recent years. Growth rates of agricultural output have slowed markedly, from nearly five percent per

year in the 1960s and 1970s to less than three percent in 1980s. This rate has been substantially less than the rate of population growth and so food production per capita declined by fifteen percent in the 1980s (Pearson et al., 1990). As a result, food security and per capita income growth have become dual concerns in the planning and implementation of agricultural policy.

The current development plan (1989-1993) gives two components of the incentive structure that would be pursued during the plan period, to meet the food security and high income growth objectives. These are:

i) pricing incentives which will be used as the key to stimulating agricultural production. Prices will be set at levels that give correct signals to the farmers and provide sufficient remuneration.

ii) marketing incentives are expected to complement the pricing system. Since 1980, it has become clear that too much official involvement in marketing and pricing may induce pricing and operational inefficiency.

1.2 Maize Marketing Policy in Kenya

The importance of maize in our economy cannot be over-emphasized. Maize is one of the most important crops in Kenya in terms of cropped area and human consumption. Available estimates indicates that per capita consumption

was about 80kg per year in 1970, rose moderately to about 94kg in 1980 (Ackello-Ogutu and Odhiambo, 1986), and currently about 120 kg per year (Kenya, 1989). The total demand for maize is expected to rise from 32 million bags (1992) to 49 million bags by the year 2000 (Kenya, 1986). To meet this projected demand, maize production must grow at a rate of 4.7 percent per year and this growth rate would have to be higher if the country is to meet the strategic reserve of 10 million bags. Besides being a major staple food in Kenya, maize is a major income earner to farmers. Maize and beans accounted for about 23 percent of the 5.2 million hectares devoted to farming in 1983/84 crop season (Kenya, 1986). Maize accounted for 13.3 percent of total value of farm produce at farmgate prices.

The importance of this crop in Kenya has made it necessary for the government to intervene in its production and marketing. The two main objectives in maize industry are to promote efficiency in maize production so as to meet the increasing demand for maize and maize products, and to improve farm incomes of maize farmers. The policy measures being pursued to achieve these above objectives have changed overtime. Prior to initiation of liberalization Programme under Cereal Sector Reform Programme, (CSRP) in 1987, the government gave marketing and price incentives by ensuring that producers and consumers have access to

cereals and produce market at prices which would serve as an incentive to producers and which would be reasonable to consumers. Various types of administrative controls were put in place to achieve these objectives (NCPB, 1990).

These controls included the following:

- i) establishment of a nationwide network of NCPB depots and satellite buying centres to ensure the farmers' access to maize market.
- ii) fixing of NCPB ex-depot prices to ensure reasonable prices to consumers.
- iii) establishment of controls on maize movement to ensure that NCPB has access to purchases which it could itself move to major deficit consumption areas.
- iv) restriction of private sector activity to prevent exploitation of producers and consumers and as a further means to controlling cereals flow.

Liberalization involves reduced government intervention and increased private sector activity in primary marketing of maize, increased miller access to private sector sources of maize, and reduction in restrictions of maize movements. Reduction of government intervention in primary marketing of maize involves closure of buying centres. Table 1.2 shows the number of buying centres operated by NCPB during the period 1985/86 to

1989/90 (NCPB, 1990). The table shows that NCPB has reduced its network of buying centres from 681 to 228 (or by 66 percent) over a period of three years. The buying centres are being replaced with Licensed Buying Agents (LBAs) and Co-operatives. Table 1.3 shows the number of cooperatives and LBA's operating in key areas of maize marketing in the period between 1985/86 and 1989/90. The table shows that the number of LBA's have increased from 134 to 1814 and the number of Cooperatives have increased from 13 to 115 in a period of three years. This increase in number of LBA's and cooperatives indicates the government's withdrawal from primary marketing of maize since 1985/86.

The first attempt to increase miller access to private sources of maize was made in 1985, when the millers were allowed to have unlimited purchases direct from producers as recommended by Grain Marketing Study (GMS) done in 1983 by Booker Agriculture International et al (Cooper and Lybrand Associates, 1987). The Milling sector adapted rapidly to this new situation and were able to meet their requirements through networks of agents, by-passing the NCPB. The millers preferred to purchase directly from

Table 1.2 Number of Buying Centres Operated by NCPB
in Kenya (1985/86-1989/90)

PROVINCE	1985/86	1988/89	1989/90
North Rift	260	118	60
Central Rift	241	178	105
Western	116	15	46
East/Central	34	7	17
Coast	30	7	0
Nyanza	0	0	0
TOTAL	681	325	228

SOURCE: NCPB, 1990

the market for two reasons according to Coopers and Lybrand Associates, 1987: first their marketing costs were less than that incurred by the NCPB, and secondly, they had more direct control over the quality of their purchases.

In 1987, the 1985 liberal measures affecting millers were rescinded abruptly and millers were once more required to purchase all their maize from NCPB. This abrupt measure came about because of the following as pointed out by Coopers and Lybrand report of 1987.

Table 1.3 : Number of Cooperatives and Licenced Buying Agents (LBAs) Operating in Key Grain Markets in Kenya (1985/86-1989/90)

AREA	1985/86		1988/89		1989/90	
	LBAs	CO-OPs	LBAs	CO-OPs	LBAs	CO-OPs
Busia	0	0	0	3	7	0
Bungoma	134	4	152	10	149	8
Kakamega	0	9	3	10	5	15
Nakuru	0	0	0	5	105	25
North Rift	0	0	0	0	105	60
Loitoktok	0	0	0	0	2	2
Coast	0	0	0	0	50	5
Nyanza	0	0	269	0	515	0
East/ Central	0	0	810	0	876	0
Total	134	13	1234	28	1814	115

Source: NCPB, 1990.

(i) There were numerous allegations that Millers' agents undermined the producer price of maize following the good harvest in 1986/87 crop season.

(ii) NCPB found itself in a situation where stocks remained very high from the combined effect of carried over stocks of emergency yellow maize in 1984/85, large crop in 1985/86 crop season, and abnormally low sales in 1986.

In 1989, the controls to miller purchases were again relaxed and quota system was introduced which allowed the millers to take up to 20 percent of their total purchases from the private sector (NCPB, 1990)). Table 1.4 shows distribution of mill purchases from the private sector and NCPB for the period July 1989 to June 1990. The table shows that during this period the government was successful in implementing the quota system. The millers purchased 77 per cent of their total purchases from NCPB and 23 per cent from private sector, which is very close to the stipulated quota.

Table 1.4 Distribution of Mill Purchases of Maize from the Private Sector and NCPB in Kenya for the Period July 1989 to June 1990

	Total purchases of maize from NCPB	Total purchases of maize from Private sector	Total Mill Purchases of maize
Number of Bags	3,240,063	967,811	4,207,875
Percentage of Total Purchases	77	23	100

Source : NCPB, 1990

Two types of reforms have been introduced which have led to a relaxation of controls on maize movements. Firstly, the legal maximum number of bags² that can be moved without a permit was increased from two to ten in 1987, to 44 bags in 1991 and to 88 bags in 1992. Secondly, the movement permits required in order

² One bag of maize weighs 90 Kg.

to transport more than the legal maximum number of bags, are being granted more freely.

1.3 Maize Marketing Systems in Kenya

There are two maize marketing systems in Kenya, which operate side by side. The systems are often complementary but sometimes they are competitive. The two maize marketing systems are:

- i) "Formal" or official maize marketing system which consists of NCPB depots, buying centres, Licensed Buying Agents (LBAs), Cooperatives and consumers.
- ii) "Informal" maize marketing system consisting of open-air rural and urban markets, private traders and consumers.

The legal framework governing the official maize marketing system is contained in the Agricultural Produce Marketing Act (cap. 320, 1967), which permits the Minister for Agriculture, when it is deemed necessary in the interest of producers, to establish marketing boards for different kinds of agricultural produce or for agricultural produce for different areas. NCPB was empowered by the Government to handle all the marketed surplus and to import or export maize depending on the level of its stock and the projected seasonal supply.

NCPB purchases maize directly from farmers or indirectly through LBAs, Primary Marketing Centres (PMC) and Cooperatives. NCPB sells part of its annual purchase to large mills for production of sifted flour, to wholesalers or directly to consumers in urban and deficit rural areas. Prices in the formal marketing system are fixed at every stage in the marketing chain. The gazetted official prices for maize as it moves through the formal marketing system apply within one July-June crop year. The Prices are neither differentiated seasonally nor spatially and are based on cost of production, local market conditions and world market prices. The official producer prices are set below import parity prices but above the export parity prices. The official pricing system in Kenya has the following weaknesses which have been identified by other authors among them Heyer (1976), Kakuba (1986) and Ackello-Ogutu and Odhiambo (1986):

- (i) the system does not offer any incentives to either farmers or traders to hold stocks to be sold later in the year. Thus, the farmers sell maize at very low prices during the harvesting season, while consumers in deficit areas buy maize at very high prices in periods of shortage.
- (ii) the system distorts the pattern of maize production in Kenya so that the country produces maize less efficiently than she might have if specialization in areas of comparative advantage was encouraged. This is especially so when the difference between producer and

consumer prices is too high, because production decisions in areas of maize deficit are governed by the high consumer prices, while the production decisions in maize surplus areas are governed by the low producer prices.

(iii) since the producer price is set above export parity price and below import parity price, the country can only export or import maize at a loss.

(iv) In some years, consumer price is officially set so low that the NCPB has been unable to cover its marketing costs, and this has made the board to face serious financial constraints.

The informal maize marketing system consists of open air rural and urban markets, each with a catchment area of scattered producers, traders and consumers who assemble regularly on specified days of the week, to carry out maize trade. The informal maize marketing is legitimate if restricted within the district boundaries. Sometimes illegal trade tends to thrive rather freely across districts especially where NCPB is unable to cope with shortages (Ackello-Ogutu and Odhiambo, 1986).

Informal maize marketing plays a major role in small holder maize production. Ackello-Ogutu and Odhiambo reported that 60-70 percent of marketed maize from smallholders and 16 percent from

Large scale farms are handled by the informal sector. Thus, the official channel handles only 30-40 percent of marketed maize from smallholder farms. The World Bank (1982) attributed this low proportion of maize handled by NCPB to its failure to reach the small scale farmers. The Bank reported that 30-50 percent of small holders have no access to NCPB. Various groups of traders, who have been identified by analysts among them Schmidt (1979) and Booker Agriculture International et al (1983), are involved in the informal maize trade. These traders are:

- i) **Sedentary Market traders** : These are mostly women, often single, landless and dependent largely or wholly on their trading for a livelihood. Sedentary traders usually remain in large markets that are opened daily. Their sources of maize are local farmers or traders, itinerant traders and "pick-up" traders.

- ii) **Itinerant traders** : These are mostly women who buy maize from farmers in maize surplus areas through their own agents or from traders in local markets in maize surplus areas. They carry the maize in small amounts and sell it in markets in deficit areas to regular buyers or to sedentary traders. Itinerant trading involves larger overhead costs than sedentary trading. The overhead costs involved are:
 - a) passenger fares.

b) various kinds of inducement to government officials.

c) food and accommodation while away from home.

iii) **Informal trading companies** : These companies consist of groups of maize traders who conduct their business as a kind of partnership, with each individual trading on his or her own behalf, has his or her own stock and manages his or her own finances. But they cooperate in such matters as joint storage facilities, transport, purchasing and sales. These informal trading companies trade in relatively higher volumes than itinerant traders and they are able to save on passenger fares, food and accommodation while on a buying trip.

iv) **"Pick-up" traders** : This term was coined by Schmidt 1979 to distinguish this group of traders from Large traders, the later whom he named "Lorry " traders. These traders use a small good's vehicle to convey up to about a tonne of maize. Such traders are predominantly but not exclusively men, and usually have a variety of local business interests such as hotels, restaurants, garages and shops. "Pick-up" trading is a risky business for it involves moving more

maize across the district borders, than that legally allowed. They evade police by various kinds of inducements and travelling at night on rural roads that are little used. These traders are thus, difficult to come across in the field and even more difficult to extract information from, where they are available. "Pick-up" traders sell maize to sedentary traders or consumers in markets located in deficit areas, and since they trade in relatively larger volumes than itinerant traders, they are able to supply schools and other institutions directly and more cheaply than NCPB.

v) "Lorry" traders: These traders operate with heavier vehicles over longer distances than "pick-up" traders. They are least concerned with primary markets for smallholder produced maize, but are concerned with informal outlets for commercially traded maize produced in large scale farms. "Lorry" traders sell maize to millers or smuggle maize across the national borders. The size of the lorries and the bulk of their loads obliges them to keep to the main roads and hence police roadblocks cannot be avoided. There is evidence that many "Lorry" traders are men of considerable national influence and so the police are reluctant to impede them.

(vi) **Posho millers :** They own small posho mills in rural areas and they often accept maize in payment for the services they offer. The maize collected is subsequently traded in the informal sector.

(vii) **Licensed Buying Agents (LBAs):** There is evidence that the LBAs of NCPB sell a high proportion of maize bought, through informal trade. Booker Agriculture International et al (1983) reported that only 57 percent of the appointed agents delivered maize to the depot in Thika in 1982/83 crop season. Since NCPB appoints agents in consultation with district officials and politicians, it is difficult for NCPB to dismiss a LBA on purely technical grounds, such as failing to deliver any maize.

Maize prices in the informal marketing system fluctuates freely in response to prevailing demand and supply conditions. A number of analysts have reported that the informal market prices, before liberalization (1985/86), were higher than those offered by NCPB (Heyer, 1976; Schmidt, 1978; Booker Agriculture International and Githongo Associates, 1983; and Ackello-Ogutu and Odhiambo, 1986). However, the Forward Planning Unit of NCPB (1990) reported that since 1985/86 the market prices of maize

have tended to move into a band between the official producer and consumer prices. So, with liberalization NCPB has been able to defend a floor producer price and a ceiling consumer price, and hence the two maize marketing systems have become rather complementary. The formal sector ensure competitiveness in the informal sector in case of a bumper harvest.

1.4 Problem Statement

Market liberalization involves the removal of administrative controls from the marketing system and increased reliance on market forces and private sector. The current Development Plan (Kenya, 1989) with the theme of "Participation For Progress", outlines the government's plan to limit the functions of NCPB to maintenance of strategic reserve leaving 75 percent of grain marketing to private traders, millers and cooperative societies. Analysis done in the field of maize marketing by among others Schmidt (1978), Booker Agriculture International et al (1983) and Coopers and Lybrand Associates (1987), form the blueprint to liberalization in Kenya.

However, these empirical studies have failed to carry out a thorough analysis of efficiency of private grain trade in Kenya. Their recommendation on liberalization is thus not conclusive and it is based on theoretical expectations and not practice. The studies have also failed to recognize that the major role of NCPB is to defend a "floor" price for producers and a "ceiling" price

for consumers. Therefore, economic efficiency is not a good measure of assessing the performance of the NCPB, but rather the market effectiveness is the best measure of assessing the Board's performance. Market effectiveness is a measure of how much an institution has been able to achieve its stipulated objective. This study aims at estimating the private profitability and efficiency of private grain marketing in Nandi District.

1.5 Objectives of the study:

The broad objective of the study is to carry out an economic analysis of maize marketing in Nandi District. The study involves a descriptive analysis of formal and informal maize marketing systems in the district.

The specific objectives of the study are:

- i) to identify the main marketing channels in both formal and informal marketing systems in Nandi District.
- ii) to estimate the private profitability, of each marketing channel within the informal maize marketing system.
- iii) to estimate the percentage divergences from economic efficiency of each marketing channel in the informal marketing system.

1.6 Hypotheses of the study

the following hypotheses are tested:

- i) with the current government intervention the informal

maize marketing system in Nandi District, is profitable enough to handle a larger market share of maize marketing in the district.

ii) the current government intervention in maize marketing has caused a significant divergence from efficient resource use in the informal maize marketing in Nandi district.

CHAPTER 2

2. AREA OF STUDY AND EXISTING MARKETING CHANNELS

Nandi district in Kenya was chosen as the area of study. The district was chosen because its informal maize marketing has been a well established trade, particularly in the period after the onset of liberalization (i.e. 1986/87). NCPB (1990) reported that the boards annual purchases in the district have been falling since 1985/86 and greater private sector activity has emerged. This remarkable emergence of private grain trade in Nandi district has been attributed to two main reasons.

Firstly, the district is dominated by smallholder farmers. Jaetzold and Schmidt (1983) reported that average agricultural land available per person is only 0.65 hectares. The district farm size are reported to range from 5.4 hectares in Upper Midland (UM 1) zone to 11.5 hectares in Lower Highland 1 (LH 1) zone. These Agricultural Zones for the district are shown in Figure 2.1. As reported in Chapter 1, of this study, the smallholder maize farming comprises the farmers who are likely to look for alternatives outlets in the informal markets.

Secondly, the district borders major maize deficit areas and it is served by good roads that offers easier access to these deficit areas. Nandi district borders Vihiga and Kakamega district where the population density is high and the agricultural land is scarce. According to the 1979 census population densities of 692 and 612 persons per square kilometre

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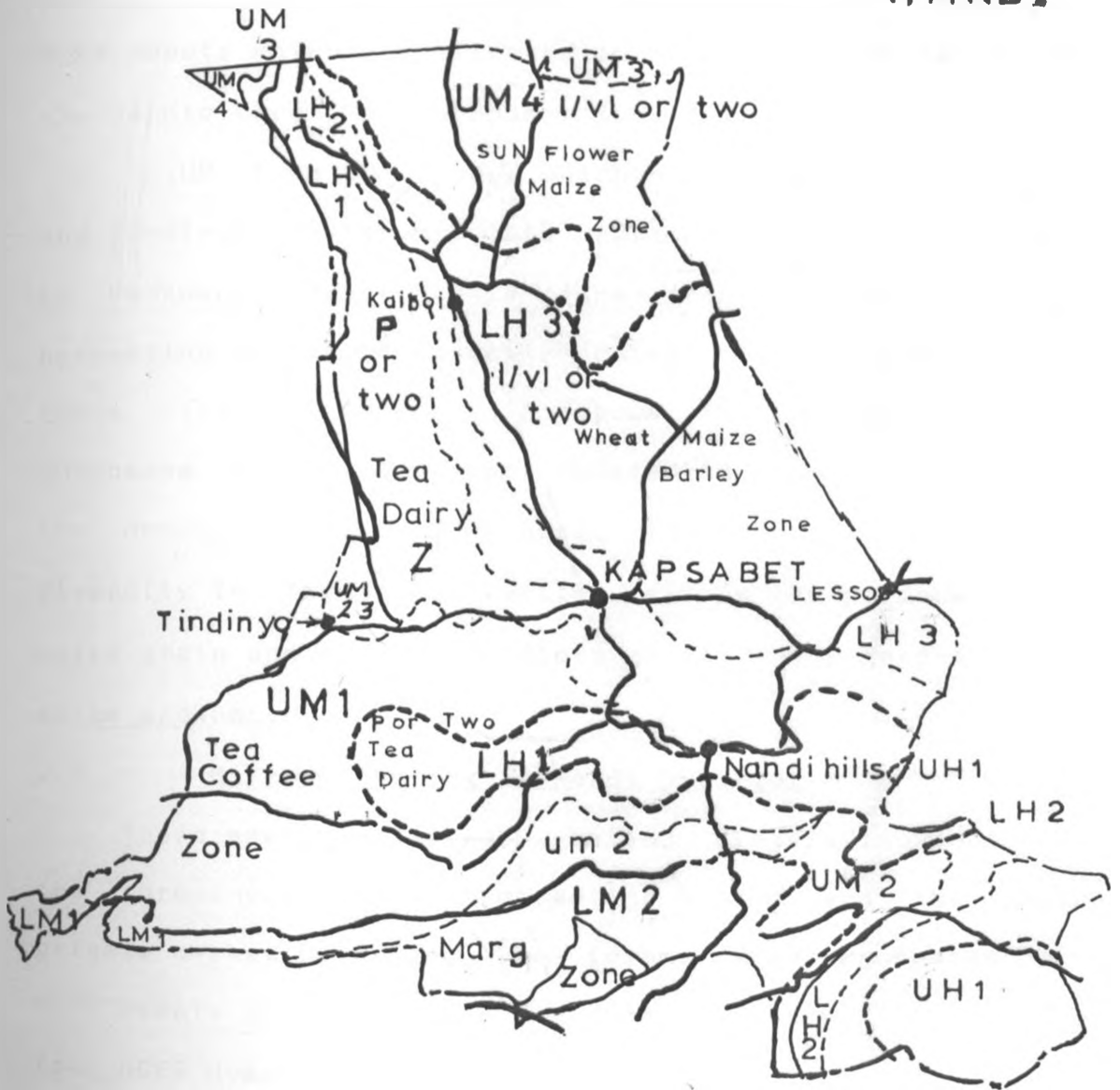
were recorded in Vihiga and Hamisi of Vihiga divisions of Vihiga respectively. Jaetzold and Schmidt (1983) reported that the available agricultural land in these two divisions is less than 0.26 hectares per person. Nandi district has access to large maize deficit urban markets in Kisumu, Kakamega, Kisii and Nairobi.

2.1 Maize Farming in Nandi District .

Nandi District is a major maize growing region in Kenya; about 90 percent of the annual crop area in the district is planted with maize and maize interplanted with beans (Jaetzold and Schmidt, 1983). Jaetzold and Schmidt reported that about 60% of the crop harvested in LH 1 zone is marketed, suggesting that the region is a major exporter of maize grain. In UM 1 zone the maize harvested is probably consumed within that region. The district has one of the highest maize yield in the country with an average of 37 bags/ha of purestand maize, and 44 bags/ha where maize is interplanted with beans. This is higher than the National average maize yield which is about 25bags/ha (Jaetzold and Schmidt, 1983).

Due to diversity of Agro-Ecological Zones (AEZ) in the district, the main farming activities in Nandi district differ from one region to another. In Lower Highland 1-3 (LH 1-3) and Upper Midland 4 (UM4) which covers parts of Mosop, Kilibwoni and Tindiret divisions, land preparations starts from January and ends in March with the peak period in Mid-February. Planting is

NANDI



- - - - - Broken zone boundaries
 are uncertain or
 - - - - - Mean transitional strips
 ———— Roads



2:1 : Agro-Ecological Zones in Nandi District

done in Mid-February to April with the peak period in Mid-March. Harvesting is done in October to Mid-January (MOA, Kapsabet, 1990). Tables (i), (iii) and (iv) in the Appendix A shows the distribution of maize purchases in Mosoriot, Lessos and Kipkarren NCPB depots which are situated in this AEZ. The tables show that the depots have peak purchases in February and March.

In UM 1 to LM 1 zones which covers parts of Aldai, Kapsabet and Tindiret divisions, land preparations is done from November to February. Planting is done from February to March, and harvesting starts in August reaching the peak period in October. Table (ii) in Appendix A shows the distribution of maize purchases by Meteitei depot located in this AEZ. The table shows the depot has peak purchases in November to January. This diversity in farming activities allows the regions to exchange maize grain and allows the district to enjoy self-sufficiency in maize production.

2.2 Maize Marketing in Nandi District

There are two maize marketing systems in Nandi district: the formal or official marketing system and the informal or private marketing system. The formal marketing system comprises NCPB depots and its Primary Marketing Centres (PMC). There are four NCPB depots in the district: Mosoriot, Lessos, Kipkaren and Meteitei depots. Mosoriot depot, situated along Eldoret-Kapsabet Road, is the largest in terms of volume of maize handled. Table 2.1 shows the volume of maize handled by each depot as a percentage of total purchases by NCPB in the years 1980/81 to

1989/90 in the district. The table shows that since 1987/88 Mosoriot depot has been handling more than 50 percent of maize purchases by the board in Nandi district. This could be explained by the reduction of PMC in the district since 1988.

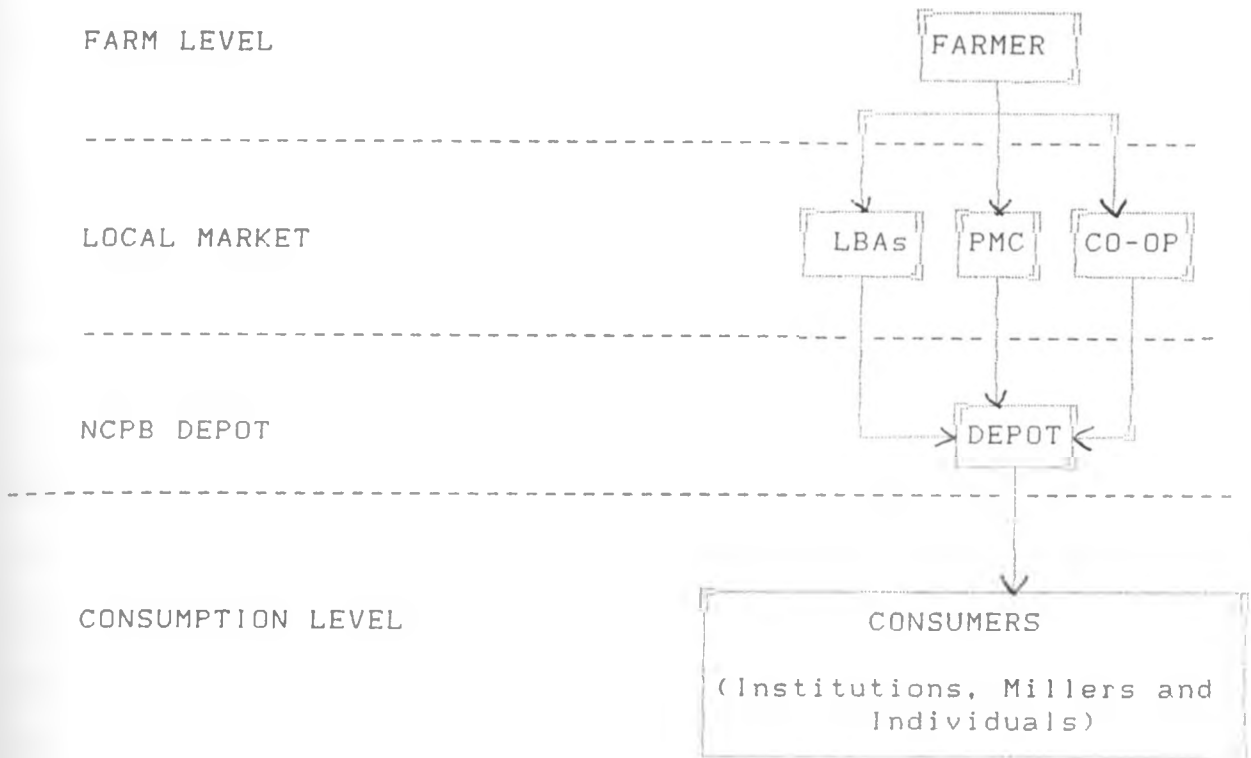
The NCPB's depots purchase maize through LBAs, cooperatives or directly from farmers. Figure 2.2 shows a schematic diagram of the main formal maize marketing channels in the district. Of the 234,907 bags of maize purchased by NCPB from February to December 1990, 177,441 bags (75.6%) was delivered directly by farmers, 15321 bags (6.5%) by LBAs, 13685 bags (5.8%) by cooperatives and 28460 bags (12.1%) by PMC (NCPB Kapsabet, 1990). This shows that direct deliveries by farmers play a major role in official maize marketing in the district. In the crop season that began in July 1990, none of the cooperatives in the district was able to purchase maize. The reason given by officials in the Ministry of Agriculture was that the farmers had lost confidence in cooperatives due to the mismanagement by the officials.

Following recommendations by the Grain Marketing study of 1983 by Booker Agriculture International et al., the Government has reduced the number of PMC in the district since 1988. Table 2.2 shows number of PMC, total purchases and percentage purchases of PMC in the period between 1980/81 and 1989/90. The table shows that during this period the annual purchase of maize by PMC in Nandi district was reduced from 66 per cent to 8.5 per cent of the total purchases by NCPB.

Table 2.1 : Volume of Maize Handled by each Depot
as a Percentage of Total Purchases by
NCPB in Nandi District (1980/81-1989/90)

Year	Mosoriot	Meteitei	Kipkaren	Lesso	Percentage handled by depots
1980/81	11.81	3.67	6.74	12.17	34.39
1981/82	23.84	3.06	4.80	0.01	31.71
1982/83	40.31	3.62	3.27	-	47.20
1983/84	37.00	3.41	2.61	-	43.02
1984/85	3.26	0.26	2.91	-	6.43
1985/86	7.87	2.22	2.66	2.65	15.40
1986/87	17.12	1.54	1.47	2.20	22.33
1987/88	55.88	0.26	3.60	3.81	63.55
1988/89	63.18	0.73	2.72	2.90	69.53
1989/90	59.36	4.54	20.73	6.89	91.52

Source : Adapted from table (v) in the Appendix A



Note:

- LBA = Lincenced Buying Agents
- PMC = Primary Marketing Centres
- CO-OP = Cooperatives

Figure 2.2: Formal Maize Marketing System in Nandi District

Table 2.2: The Numbers and Total Purchases (in Bags) by PMC in Nandi District (1980/81 - 1989/90).

Year	No. of PMC	Total Purchase PMC	% of Total Purchases by NCPB
1980/81	49	279,516	65.61
1981/82	51	376,832	68.29
1982/83	81	276,655	52.80
1983/84	85	221,384	57.02
1984/85	92	346,010	93.57
1985/86	102	534,997	84.60
1986/87	105	523,850	77.67
1987/88	28	108,149	36.45
1988/89	34	107,718	30.46
1989/90	7	23,663	8.50

PMC = Permanent Marketing Centres

Source : NCPB, Kapsabet, 1990.

The sale of maize to the marketing Board is only significant in AEZs LH1 and UM4 where the farms are larger and the population lower than the rest of the district. Table 2.3 shows the disposal of maize grain in the various AEZs in the district. The table shows that while 58 per cent of maize grown in LH 1 and UM 4 is marketed through NCPB none of maize grown in UM 1-3 and LM 1-2 is marketed through NCPB upto 76 percent of maize grown in UM 1-3 and

Table 2.3 Disposal of Maize Produced in Various Agro-Ecological Zones In Nandi District as a Percentage of Total Production in the AEZs.

Market	LH 1 and UM 4	UM 1-3 and LM 1-2
Marketing Board	58	0
Local Market	6	24
Home Consumption	36	76
Total	100	100

LH = Lower Highlands Zone

UM = Upper Midland Zone

LM = Lower Midland Zone

Source : Jeatzold and Schmidt, 1983.

LM 1-2 is retained for consumption and 24 percent is marketed through informal trade.

Informal maize trade in Nandi District comprises three main market channel levels (Farm, Local Market, terminal market). The degree of vertical integration in these market channel levels is significant but the degree of horizontal integration is negligible. Vertical integration occurs in a situation where activities in two or more market channel levels are under one management or are carried out by the same trader e.g. production and sale in the rural markets. Horizontal integration occurs in a situation where activities within the same market channel level

are brought under one management e.g. co-operative societies for farmers or traders. Horizontal integration in private maize trade is negligible except in a few cases where traders form informal trading companies.

The informal maize marketing system in Nandi district consists of the following market channel levels:

- i) **Farm:** This is the site where maize is produced and sold to either traders at the farmgate or at the local market.
- ii) **Local markets :** These are open-air rural markets, each with a catchment area of scattered producers, rural traders and consumers who assemble on unspecified days of the week to carry out maize trade. Local markets are located in small rural towns or shopping centres within the producing areas. Local markets could be well established markets under the management of the Local Government, or could be just a site along rural access road where maize trade takes place.
- iii) **Terminal Markets :** These are large markets in deficit areas in rural or urban centres. The main terminal markets in Nandi district are located along Kisumu-Kapsabet Road, and in Kisumu, Kakamega, Kapsabet and Nandi Hills urban centres. The traders and consumers assemble regularly on specified days of the week to carry out maize

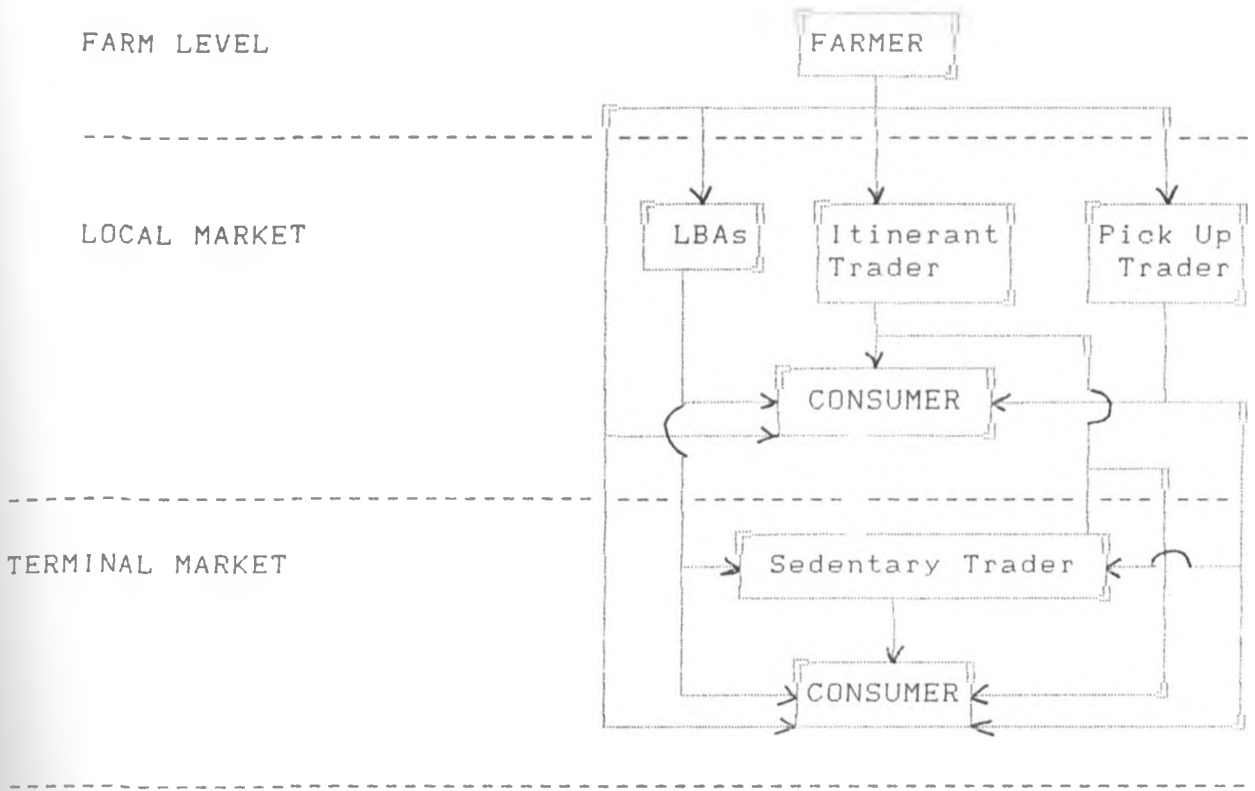


Figure 2.3: Informal Maize Marketing System in Nandi District

trade. Market days in a terminal market are usually two days in a week.

There are four main types of traders engaged in maize trade in the informal sector in Nandi District. These are sedentary market traders, itinerant traders, "pick-up" traders and LBAs. Figure 2.3 shows the linkages between the four types of traders involved in the informal maize trade. The role played by each group is as outlined in chapter 1 of this study.

CHAPTER 3

3. LITERATURE REVIEW

Advocates of public marketing³ argue that the "free market" situation is untenable in East and Southern African (ESA) countries (Rogers and Van Der Geest, 1988). This is because of the following factors:

- i) The special nature of agriculture - its reliance on volatile agroclimatic conditions - may frequently render large sections of the community at risk.
- ii) The skewed distribution of resources, often caused or aggravated by colonial policies that discriminated against indigenous populations, means that large sections of the population cannot adequately function in a free market.

These two conditions and the fragmentation of agricultural production result in monopoly situations developing and market information being neither available nor free. The downwards variability of prices in a free market situation may also be a disincentive to agricultural production.

The marketing board, which would be able to stabilize prices overtime, would act as a spur to production and provide food as well as income to the urban poor. However past empirical studies

³ Public marketing of agricultural produce is a case where the marketing of the produce is carried out by the government through the government's marketing board.

have observed the economic inefficiencies caused by marketing boards holding monopoly powers of grain marketing in Africa. These analysts recommend explicitly or implicitly various forms of market liberalization varying from gradual and/or partial decontrol to a total "free market" situation.

Abbott (1974) observed the inefficiencies of marketing boards in West Africa particularly in Nigeria. He cited mismanagement, lack of working capital and too low marketing margins as the key factors that limit the efficiency of marketing boards. Abbott argued for partial decontrol of grain markets and suggested a reduction in the scale of operation to between 10 and 23 percent of the marketable production. He suggested that free market should be encouraged to handle the remaining portion of the marketable output. However, Abbott failed to carry out an analysis of market efficiency of private grain trade which will handle the largest share of grain Marketing. This study provides an assessment of the efficiency of private grain trade, that Abbott failed to provide.

Schmidt (1978) like Abbott argues that the monopoly powers of NCPB do not result in government's objectives being realised and the food security needs of the disadvantaged rural poor were not being met. He suggested that, "the relaxation of maize and beans marketing controls is the first step and a pre-condition for improving marketing effectiveness". However, Schmidt does not envisage a total abolition of the board, only that its role should be reduced to that of maintaining a buffer

stock (and a strategic reserve) and intervening to maintain floor and ceiling prices. The board, he recommends, should be stripped of its monopoly purchasing role and its controls on the movement of grains. Though Schmidt argued for partial liberalization of the grain markets, he did not include an assessment of the efficiency of private maize trade. This study offers a thorough assessment of the efficiency of private maize trade in Nandi district.

Booker Agriculture International et al (1983) in their study, observed the monopoly position of NCPB in Kenya and called for the promotion of the private sector in grain marketing. They argued this would reduce the "costs and risks" of maize marketing in rural areas resulting in lower prices, particularly in areas prone to local or seasonal changes. The authors used analytical framework of competitive equilibrium theory, the pure free market situation being the reference point from which the impact of market intervention by external agencies is measured. The analysts argued that the government by supporting a relatively inefficient marketing authority will cause a reduction in quantity marketed as well as a reduction in consumer and producer surplus. Consumer surplus is defined as the maximum amount the consumer would pay for a particular good or service less the amount the consumer actually pays for it. Producer surplus is defined as the amount the producer earns for a particular good or service less the minimum the producer would get for that good or service. Booker Agriculture International et al concluded that

liberalization of such a market would benefit both the consumers and producers since the informal sector would supply the part of the reduction resulting from intervention and restore the consumer and producer surplus to their level at equilibrium. The loss in efficiency resulting from government support of inefficient marketing authority is measured in form of reduced consumer and producer surplus. In effect, Booker Agriculture International et al are explicitly maintaining that liberalization of the grain market would improve efficiency. Their arguments however, do not include an assessment of private trading competitiveness and efficiency. This study gives an assessment of competitiveness and efficiency of private trading of maize and thus offers the "counter factual analysis" lacking in the study done by Booker Agriculture International et al.

Coopers and Lybrand Associates (1987) did not take any dogmatic position on the monopoly position of NCPB in Kenya. They argued that greater private sector participation in grain trading may lead to lower real cost of marketing the quantity of grain usually demanded by the consumers. In view of this, they recommended a limited degree of liberalization phased over a period of time. In particular they recommended NCPB's withdrawal from primary marketing activities by reducing the number of primary marketing centres. Coopers and Lybrand Associates did not perform the "Counter factual Analysis" in their study. They defended their lack of "counter factual analysis" by maintaining that apart from 1977/78, when grain marketing was liberalized to

a high degree, there had not been much experience of significant private sector participation in grain marketing. They argued it would be difficult to make unequivocal statements about the conduct and performance of NCPB compared to private agents. The current study comes in the wake of liberalization under Cereal Sector Reform Programme (CSRP) initiated in 1987. CSRP has shown that there has been an active private sector participation in grain markets especially in surplus districts bordering deficit districts, since the onset of the liberalization programme (NCPB, 1990).

Kakuba (1986) carried out a financial analysis of NCPB's marketing of grain. Kakuba used current ratio, networth and the operating profits to show the financial position of the board. The current ratio of a firm measures the Liquidity position of the firm and it is given by the ratio of current assets of a firm to its current liabilities. The Networth of a firm is given by the difference between values of all assets and its liabilities. The profit of a marketing firm is a measure of the firm's competitiveness and it is given by the total revenue from its sales less the firm's total marketing costs. Kakuba found that between 1975/76 and 1983/84 the current ratio of NCPB was less than one and its networth was negative showing that the current liabilities of the board exceeded its current assets. During the period covered by Kakuba's study, NCPB made annual losses ranging from Ksh. 42.4 Million and 62.8 Million. While Kakuba's Method could easily be understood by the policy makers, the analysis of

private sector, using this method is difficult due to lack of accounting records in the private sector. Kakuba did not, in his analysis, show the yardstick that he used to measure the efficiency of marketing through NCPB.

Empirical studies on efficiency of marketing boards, have been done in other countries. Buccola and Sukume (1986) in a study of Grain Marketing Board (GMB) of Zimbabwe concluded that the board was inefficient in terms of profit margins and foreign exchange earnings. These analysts stated that the stockholding policies of GMB represented "unusually large financial risks". They went on to speculate that market liberalization was a necessary requirement for reducing market inefficiencies in grain marketing. These authors, however, in recommending an abrupt change in the market structure did admit that additional analysis would have to be made on grain marketing costs that would be incurred by new private agents in Zimbabwe. Buccola and Sukume, like other analysts did not provide an analysis of the new situation that would develop as a result of liberalization.

Few empirical studies have mentioned the complementary role played by NCPB in private trading or how private sector complements the marketing Board. Kariungi (1976) in his study of informal maize marketing in Kitui district of Kenya, argued that the rural traders by shipping large amounts of maize to deficit areas depress the consumer prices, hence, playing a complementary role to the Board. Booker Agriculture International et al (1983) argues that private sector has a role to play in a situation

where the board is unable to satisfy the local demand. The board complements the private sector by ensuring that producer prices remain high during years of high production and ensuring low consumer prices in years of production shortfalls. Thus, the Board acts as buyer and seller of last resort.

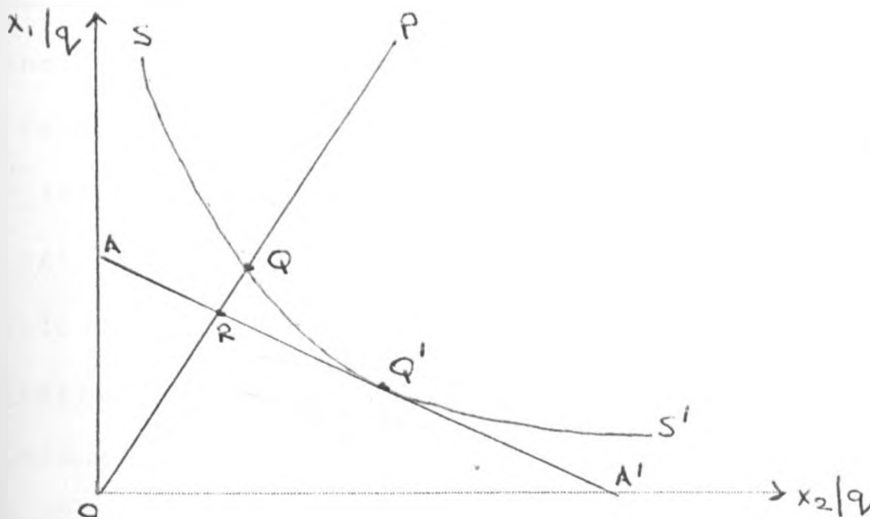
Perhaps the best assessment of the extent to which NCPB activities have successfully placed a floor and ceiling price on the market price, is the one done by Forward Planning Unit of NCPB (NCPB 1990). The analysts, studied the price trends in maize market by constructing a monthly deflator based on Nairobi Low income Cost of Living index, so as to separate out the effects on maize prices of general inflation in the Kenyan economy. The real average market price series were superimposed with the official producer price and NCPB selling price on the graph. The analysts found that, since the implementation of the liberalization programme in 1987, NCPB has been successful in moving the market price into the band between gazetted producer and consumer price of maize.

CHAPTER 4

4. METHODOLOGY

4.1 Theoretical Concepts of Marketing Efficiency

The analysis of the maize marketing system in Kenya follows the belief from the past studies that the current formal maize marketing system is inefficient. A firm is said to have attained economic efficiency in production if it is able to produce goods and services at the lowest cost possible i.e. the firm is able to allocate each of its resources to where it produces the highest value of output per unit cost of the resource. Farrel (1957) illustrated economic efficiency of a firm using efficient unit isoquant of a two-input, single output case as shown in figure 4.1



x_1/q = quantity of factor X_1 , per unit of output, q

x_2/q = quantity of factor X_2 per unit output, q

Figure 4.1 : The efficient unit isoquant

The curve SS^1 in figure 4.1 is the efficient unit isoquant and represents the smallest quantity of factor X_1 that can be used to produce one unit of output (q) as the amount of factor X_2 is varied. All points on this curve and the ones more distant from the origin are feasible, but all points between the curve and the origin are not feasible. Consider a firm producing at point P . A line drawn from origin to P intersects the efficient unit isoquant at point Q . The length QP is a measure of the excess use of the two factors relative to what is technically feasible, represented by length OQ . The ratio of OQ to OP is a measure of technical efficiency.

Slope AA^1 in figure 4.1 represents the relative prices of factors X_1 and X_2 and it is tangent to efficient unit isoquant at Q^1 . Point Q lies on the efficient unit isoquant but the resources required at this point are more costly than those required at point Q^1 . This is true because any point farther from the origin than line AA^1 represents a higher total cost than all points on or nearer the origin than AA^1 . The length RQ is a measure of the price inefficiency associated with the selection of the technically efficient but more costly Q as compared with the minimum cost at point Q^1 . The ratio of length OR to length OQ is a measure of price efficiency. A firm is economically efficient in production of goods and services if it attains both technical efficiency and price

efficiency. Economic efficiency is equivalent to the product of technical efficiency and price efficiency calculated from figure 4.1

(i.e. $DQ/OP \times OR/DQ = OR/OP$). The ratio of lengths OR to the length OP given in figure 4.1 is the measure of economic efficiency.

A marketing firm is said to be market efficient if it attains economic efficiency in production of market services, and the output prices that emerge from that marketing system are able to allocate resources efficiently (price efficiency). Price efficiency is achieved if the marketing system is able to generate competitive output prices that would act as signals to guide the producers in allocating resources to their best alternative use. Output prices are competitive if the marketing margins generated reflect transfer, storage and processing costs incurred between the marketing levels. Marketing Margins is the difference between prices at two market levels (e.g. Price at farmgate and price at wholesale market).

Marketing inefficiency is caused by market failure and government policies that support inefficient objectives. Market failure occurs in a situation where the marketing system fails to generate prices that would allocate society's resources to their best alternative use. A market fails if a single or few buyers and sellers are able to influence the market prices (i.e. Monopsony, Oligopsony,

monopoly and oligopoly respectively). This means that the factor prices that will emerge will not guide a firm to produce goods and services at the lowest cost possible as discussed previously. The factor prices that will emerge will be higher or lower than the efficient prices. The marketing margins that will emerge in such a situation will not reflect the transfer, storage and processing costs incurred.

A market may also fail due to externalities or external economies. Externalities are costs or benefits of a transaction that are incurred or received by producers and consumers but they are not reflected in the price system. The externalities are not taken into account in decision making since they are not part of the market prices. Therefore, the prices that guide producers of goods and services to achieve economic efficiency do not reflect the true values of factors and outputs. The externalities involved in transfer, storage and processing of goods and services are not reflected in the marketing margins.

Government's policy like income distribution and price stabilization cause factor and input prices to deviate from the efficient prices. The government in its attempt to support producers may set producer prices at levels higher than the competitive prices. The government in its attempt to protect the producers may set consumer prices lower than the efficient prices. Therefore, the prices generated by a

controlled market will not guide producers to allocate their resources to their best alternative use. The marketing margins will not also reflect transfer, storage and processing cost incurred in the marketing systems.

4.2 Methods of Measuring Marketing Efficiency.

Various methods can be used to measure marketing efficiency of marketing system. One of these methods measures the extent to which a marketing system meets the elements of a perfectly competitive market. The elements of a perfectly competitive market are undifferentiated product, many buyers and sellers, access to market information, and lack of barriers to entry and exit into an industry. The main weakness in this method is that market may be competitive without meeting all the elements of a perfectly competitive market. These elements are thus sufficient but not necessary for a market to achieve competitiveness. The method is also unable to capture the effect of government policy to the marketing system. Government policy is a major element in marketing in developing countries.

Measuring the degree to which the market is controlled by the few of the largest firms in the industry is also measure of market efficiency. A market whose largest share is held by a single or a few firms is likely to be inefficient. Again the method is weakened by its inability to capture the effects of government policy in the

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marketing system.

Efficient marketing systems are characterized by a high degree of price integration - i.e. there is closely correlated movements of series of prices connected over space, form-and time. Arbitrage ensures that prices in markets separated over space, form and time are integrated. High correlation coefficients between prices in market levels separated over space, form and time means that the prices are connected by transfer, processing and storage costs respectively. This method of measuring marketing efficiency is not able to estimate the distortions to prices, caused by government policy.

Finally marketing efficiency can be measured by analysing the extent to which marketing margins reflect the marketing costs. This method involves estimating costs and returns of activities involved in marketing. The profit in each marketing activity just covers returns to capital (including working capital, equipment and buildings) and the risk premiums. A risk premium is the payment required by an investor to compensate for the risk involved in employing the investors capital to the current activity.

Analysis of marketing margin, as a method of measuring market efficiency, is modified in a framework called Policy Analysis Matrix (PAM). The divergence from efficient resource use resulting from government policy and market failure can be identified using this modified version of

marketing margin analysis or PAM. PAM framework was developed in 1981 by Pearson et al to analyse the effects of price policies in rice systems in West Africa. The description of PAM given in the next section draws heavily from Monks and Pearson (1989).

4.3 Policy Analysis Matrix (PAM)

PAM framework for a commodity system is shown in Table 4.1. A crop or livestock system in a farm comprises activities that are involved from production to the final use of the product. These activities can be grouped as production, farm-to-processor, processing and marketing activities. A commodity system for a particular crop or livestock product may not include all the four groups of activities. An aggregation of all commodity systems in a farm constitute a farm system.

Table 4.1 : The Framework for Policy Analysis Matrix (PAM)

	Costs			
	Revenues	Tradable Inputs	Domestic factors	Profits
Private Prices	A	B	C	D
Social Prices	E	F	G	H
Effects of Divergences	I	J	K	L

Source: Monke and Pearson, 1989.

From table 4.1 it is seen that the PAM consists of three rows which identify "private" prices, "social" prices and effects of divergences. There are four columns in the PAM. These columns are for revenues, cost of tradable inputs, cost of domestic factors and profits.

4.3.1 The Private Prices Row

The entries in the first row are valued at "Private" prices. The term "Private" prices refers to the observed prices of outputs produced and inputs used in the commodity system. The Private or observed prices incorporate the underlying economic costs and valuations plus the effects of all distorting policies and market failures. The private revenue shown in entry A, is a product of private prices and observed quantities of output sold by producers, merchants or processors in the commodity system. Private revenue is a measure of the observed returns to the participants of the activities in the commodity system. The private costs of tradable inputs shown in entry B, is a product of private prices and quantities of tradable inputs employed in the commodity system. Tradable inputs are inputs that are traded in the world market, which includes fuel, fertilizers and machinery. The private cost of domestic factors shown in entry C, is a product of private prices and quantities of domestic factors employed in the commodity system. Domestic factors are the inputs that are not traded in the world market and thus their values are determined in the domestic markets. The domestic factors includes land, labour and capital.

The private profit shown in entry D, is given by Private revenue (A) less private costs of tradable inputs

and domestic factors (B+C). The cost of capital, defined as the pretax return that owners of capital require to maintain their investments in the systems, is included in the domestic costs, C and so, private profits, D are excess or supernormal profits. Supernormal or excess profits are defined as profits that are above the level of profit that is sufficient to induce existing firms to remain in the industry without inducing new firms to enter the industry. Thus, if D is positive, then the operators are earning supernormal returns and more entrepreneurs will enter the industry, until all the excess profits diminish to zero. Therefore, the private profitability entry is a measure of the industry's competitiveness. If D is negative, then the industry is making a loss and firms are expected to exit from the industry and thus contracting the system. This concept is used to measure the competitiveness of the private grain trade and also predict the future behaviour of the participants in the informal trade. If the excess profits are very high, then private trading in maize is expected to expand and hence able to handle maize marketing in the relevant region. If private profitability is too low or even negative, then the private trading in grain is expected to contract and may be unable to handle grain marketing in the region.

4.3.2 The Social Prices Row

The entries in the second row of PAM are valued at "social" prices. "Social" prices of products and factors are the efficient prices that would allocate resources optimally. The efficient prices of tradable outputs and inputs are estimated from the world market prices - cif import prices and f.o.b. export prices for importables and exportables respectively. This is in line with the Theory of International Trade which states that, "selling at domestic prices that are equal to world prices allows the economy to exhaust potential gains from trade and realize maximum national income". The world market is also known to have distortions especially in a case where the country being considered is large enough to affect world prices. However, Kenya being a small country that would not affect the world prices of commodities, the economic question to ask is whether it would be worth importing or exporting to the given world market, even if the world market prices are also distorted.

Since the components of the social prices row are valued in efficient terms, then social profit, H is a measure of the profits that would result if the resources are employed optimally, in absence of distorting government policies and market failures.

4.3.3 The Divergences Row

The third row of PAM gives measures of relative efficiency or measures of distortions in the product and factor markets. It is given by the private prices entry less the social prices entry and so, it is a measure of how much the revenues, costs, and profits deviates from those in the perfect competitive model given in social valuation row. In the absence of market failures, the divergences between private and social components of the Matrix are caused by distorting policies. Therefore, the entry on effects of divergences is a measure of trade-offs between efficiency and non-efficiency objectives of government intervention.

This concept of effects of divergences is used in this study to give a measure of relative efficiency of private grain marketing. If entry, I on effects of divergences on revenues, is positive, then government intervention and market failures are causing the participants in grain trade to receive more revenue than they would get in a perfect market situation. This is an indication that the government policies are subsidizing the system. The opposite is true if the entry I is negative, indicating that the participants are being taxed by the government.

If entries J and K, on tradable and domestic factor costs are positive, then the traders are incurring more costs than would be the case in absence of government

policy, and market failures. In absence of market failures, then the extra costs incurred by the traders are received by the government in form of tax. If entries J and K are negative, then the traders are incurring less costs than they would in perfect market situation (i.e. in absence of distorting policies and market failures). In absence of market failures, the reduced costs are due to a subsidy given to traders by government policy on factors of production.

The effects of divergence on profit is a measure of the overall effect of product and factor policies, and market failures, on relative efficiency of the marketing system. A negative entry L, is an indication of the overall loss in profits resulting from government intervention and market failures in the marketing system. A positive entry L, shows that the government intervention and market failures offer subsidies to the participants of the marketing system. If each of the entries in the last row of PAM is zero or approaches zero, then the system is perfectly competitive or it is approaching a perfect market situation. The percentage deviation from this benchmark (or zero level) is used as a measure of relative efficiency of the marketing system.

4.4 Sampling Procedures and Data Collection

Work at the field sites for the preparation of PAM is focused on the collection of data on prices and quantities

of maize sold in the rural markets, as well as quantities and prices of inputs employed. Private revenues (A), private costs of tradable inputs (B) and private costs of domestic factors (C) were then calculated. An understanding of the cropping calendar in the district is vital for the verification of data on monthly prices and quantities of maize in the market. The cropping calendars were established using information obtained at the District Crops Office (DCO), with verification from the farmers.

4.4.1 Sampling Procedures.

Data collection was carried out at farm, local market and terminal market levels. A three-stage cluster sampling followed by random sampling was used in selecting farmers for the farm level survey. The sampling procedure at the farm level was as follows:

- (i) Three divisions were randomly selected from the six administrative divisions in Nandi district.
- (ii) Two locations were randomly selected from each division selected. Each division consists of three to four locations.
- (iii) A single village was randomly selected from each location selected. Each location consists of five to ten villages.

A village is under the jurisdiction of a village elder. The village elder of the selected village provided a list of households in his village. One fifth of the farmers

in each village was randomly selected for farm level survey. Table (vii) in Appendix A shows the number of households selected from each village. A total of 91 farmers were interviewed.

Data on monthly prices of maize in the local markets within the district was available in the Ministry of Agriculture in the district. Three divisional headquarters out of six were selected at random and the secondary data from their monthly records was used. Tables (viii), (ix) and (x) in Appendix A show the monthly prices of maize in selected local markets in the divisions.

A single stage cluster sampling was used in selecting the terminal markets that were surveyed. Nine terminal markets out of the twenty-two terminal markets serving the district were randomly selected. Each terminal market consisted of three to six maize traders who were all interviewed. Table (Vi) in Appendix A shows the number of traders interviewed in each selected market. A total of thirty nine traders were interviewed.

4.4.2 Collection of data on Prices and Quantities of Inputs and Outputs.

Questionnaires were used in collecting information from farmers and traders. Appendix B shows the questionnaires used at the farm and terminal market surveys

respectively. The main information sought at the farm level was:

- (i) farmgate prices of maize.
- (ii) the main market outlet used by the farmer i.e. whether farmer sold the maize in the formal or informal market.
- (iii) the price of maize in the local market if the farmer sold the maize at the local market. This was done to verify the secondary data collected from the Ministry of Agriculture.
- (iv) the level of farm wages.

The main information sought at the terminal market level was:

- (i) monthly prices of maize from July 1990 to March 1991.
- (ii) monthly purchases and sales during the above period.
- (iii) transport and handling costs.
- (iv) storage costs if any.
- (v) market charges for using the facilities in the market place.
- (v) other miscellaneous charges specified by the trader.

Handling of maize at the farm involves assembling, packing and transporting it to local market for sale to itinerant pick-up traders or LBA's. The average of the handling costs given by the traders in the terminal market was used as the handling cost of maize in the informal

maize trade. Maize in the informal sector is transported mainly in pick-ups and lorries. The average cost of transport was obtained from main transporters in the district.

Local market charges are the costs incurred by the trader as payment for using the market facilities. The market charges varied with the size of market and the district. Charges are usually higher in large municipal markets in Kisumu, Nandi Hills and Kapsabet than other small markets in rural areas. Market charges are higher in Nandi district than in Kakamega and Kisumu district. The mean market charges obtained from nine terminal markets surveyed was used as the market charges in this study.

The private price of gunny bags was obtained from bag dealers in Eldoret and Kapsabet towns. The average useful life of a bag was estimated as four months. Therefore, the trader buys only one third of the total number of bags required in a year.

The average producer price of maize collected over 91 farmers in the district was used as the producer price of maize in this study. The most common unit of sale in the terminal market is a "gorogoro" (two-kg kimbo tin). The tin carries approximately 2.10 kg of maize; 90kg-bag of maize contains 42.5 "gorogoro". The consumer price of maize during the harvesting season was estimated from the maize prices in July to November 1990 collected from the 39

traders in the selected terminal markets. The consumer prices in December 1990 to March 1991 were used to estimate the mean consumer prices of maize after the harvesting season.

Working capital cost is the cost of capital required to purchase goods and services employed in maize trade from the time maize is bought to the time it is sold. (i.e. production cycle). Therefore, working capital in the informal maize trade is the capital required to purchase and market maize in a given period. The cost of working capital was estimated from interest rate charged on short term loan as given by the Central Bank of Kenya. The interest rate was 17 percent during the period covered by the study (July 1990 to March 1991).

The study found that there are other costs incurred by the trader but are difficult to obtain for they are not well defined or are kept secret. These costs include costs of meals, accommodations, passenger transport and various forms of inducement to law enforcement officers like the police and local administrators. These costs were estimated to be one percent of the total costs of marketing.

4.5 Classification of Inputs and Outputs

After compilation of an inventory of inputs and outputs for each activity of the selected channels, the items were categorized into six categories:

i) **Fixed Inputs**- These are inputs that have a useful life

of many years and only a portion of fixed input costs is attributed to a particular year's production.

- ii) **Direct Labour:-** This covers all labour directly employed in the activity, which includes both hired and family labour resources.
- iii) **Intermediate Inputs:** These are inputs that are characterized by a useful life of less than one year and the level of their employment varies with the level of production. Intermediate inputs in this study are mainly gunny bags.
- (iv) **Commodity-In-Process:** This category covers the commodity of interest in the commodity system being studied. In this study, maize is the commodity of interest and the cost of maize appears in several budgets of the system. Since profitability is calculated for each channel, inclusion of the cost of maize in each budget is necessary. In the marketing of maize at the local market, for example the purchase price of maize at the farmgate and the sales price at the local market are observed, to help in calculation of the channel profit in a particular channel.
- (v) **Non-Tradable Inputs:** These are inputs in which no particular cost category discussed above appear to dominate. The category includes handling, local market and transport charges. Decomposition Coefficients for these inputs are obtained by preparing budgets for the

production of these inputs or from technical coefficients of input-output tables. The decomposition coefficients show the proportion of intermediate, direct labour and fixed input costs in the non-tradable input.

(vi) **Output:** This category includes all the outputs of the system with the primary output being listed first in the category list, followed by other secondary outputs. In this study the primary product is maize grains. Other secondary outputs in maize commodity system are maize flour and maize stovers. Due to time and resource constraints in this study, only the primary product was considered.

4.6 Social Pricing of Inputs and Outputs.

Disaggregation of inputs and outputs into tradable commodities and domestic factors precedes the social pricing of commodities. In this study fixed input costs were entirely classified as capital cost. The direct labour costs were allocated entirely in labour cost category and intermediate input costs allocated entirely in tradable input cost category. The non-tradable costs were disaggregated using input-output tables of Kenya (1976) to give the proportions of tradable inputs and domestic factor costs.

The social prices of tradable commodities are estimated from their import parity prices for the

importable and from export parity price for exportables. Import parity price of a commodity is the estimated price of a commodity at the wholesale market derived by adjusting cif price by the relevant charges between the port of entry and the wholesale market. Following Pearson (1990), if P_M is the import parity price of commodity, m , then,

$$P_M = (P_{cif} \times ER) + IC$$

where P_{cif} is cif price of m at Mombasa in convertible currency such as US dollars

ER is the real or efficient exchange rate

IC are the internal marketing costs in local currency (Kenya Shillings)

The private marketing costs of maize from Mombasa to wholesale market in Kapsabet was estimated from the 1991/92 projections of marketing costs from the Ministry of Finance (1990) Table 4.2 shows the estimation of social price of white maize from its 14-year average cif price (1973-1986) During this period Kenya was actively involved in world maize trade as an importer and occasionally an exporter. This was the only reliable data from the Ministry of Finance but sources from this Ministry confirms that cif prices of maize has not changed significantly since 1973 as shown in table (xii) in Appendix A. A 14-year average was used to show the long-run trend in maize prices so that the years when Kenya was also an exporter of maize could be included in the study. The use of an average that dates

back to 14 years reduces the effects of short-term price fluctuations observed in marketing of agriculture products.

The social price of maize is estimated from its import parity price by adjusting for quality differences, foreign exchange distortions and internal marketing cost distortions. The officials from the Central Bank of Kenya estimate a 15 to 20 percent difference of official exchange rate from the parallel market exchange rate. A sensitivity analysis was carried for a possible overvaluation of 15 and 20 percent. The social costs of internal marketing are estimated from their import or export parity price in case of tradable inputs, or treated as domestic factors and

Table 4.2 Estimation of Social Price of White commercial maize from its 14-year Average import Parity Price (1973-1986)

ITEM	P-cost (Kshs/Bag) or US dollar/bag	Tax (Kshs/bag)	S-Cost (Kshs/bag)
1. Cif Yellow maize at Mombasa(US dollars/Bag)	13.39	-	13.39
Official Exchange rate (Kshs./Us dollar)	25.30	-	25.30
cif Yellow maize(Ksh/bag)	338.71	-	338.71
2. Insurance	3.15	-0.06	3.21
3. Stevedoring	22.70	0.39	22.31
4. Miscellaneous	3.41	-0.06	3.47
5. SGS Inspection	1.71	-0.03	1.74
6. Port handling bulk	5.81	0.09	5.10
7. Wharfage			
8. Stevedoring Bonus and Dispatch	5.18	5.18	-
9. Bagging at quayside	13.66	-0.25	13.91
10. Bag	21.00	14.10	6.90
11. Road Transport from Port to Mombasa warehouse	8.80	0.10	8.65
12. Offloading at warehouse	2.30	0.04	2.26
13. Storage at Mombasa warehouse	1.84	-0.03	1.87
14. Loading onto rail	2.30	0.04	2.26
15. Rail transport from Mombasa to Eldoret	53.00	0.90	52.10
16. Unloading at Eldoret	2.30	0.04	2.26
17. Road transport to NCPB Depot Mosoriot	16.50	0.28	16.22
18. Offloading at NCPB depot Mosoriot	2.30	0.04	2.26
19. Into-NCPB depot Mosoriot import Parity Price of Yellow maize	509.19	21.48	487.71
20. Quality adjustment in price of yellow maize(%)	10.00	-	10.00
21. Into-NCPB Mosoriot depot import Parity price for white commercial maize	560.11	21.48	536.48
22. Loading onto Lorry	2.30	0.04	2.26
23. Road transport to Local market	16.50	0.28	16.22
24. Off-loading at local market	2.30	0.04	2.26
25. Import Parity Price at the local market	539.01	23.26	515.74

Source: Author's Estimates

non-tradable inputs and their social values estimated.

Gunny bags are classified as tradable inputs and their social costs were estimated from their import parity prices. The average cif prices of gunny bags in the period 1986 to 1988, when Kenya imported gunny bags, was used as the social price of a gunny bag. Since maize was considered to be bagged at the port of Mombasa, marketing costs of gunny bags were considered negligible; social price of gunny bags was taken to be equal to cif price of bags at the port of Mombasa. Table (xi) in Appendix A shows value and quantities of gunny bags imported in Kenya in period 1986-1988.

The principle labour market that was of interest in this study is the unskilled agricultural labour. Researchers disagree on the competitiveness of this market. Collier and Lal (1986) emphasised the presence of natural imperfections but a survey by Mukumbu et al (1990) found that agricultural labour markets were highly competitive. The minimum wage rate is hardly observed in the study area and coupled with the fact that Nandi district is served by an infrastructural network that is well above the average Kenyan district, and the fact that it borders Kakamega district where labour force is plenty, this study considered agricultural labour in the district to be competitive. Hence, the private market labour cost was taken to be equal to the social cost of labour.

From informal interviews conducted with Managers of the Barclays Bank of Kenya Limited (BBK) and Kenya Commercial Bank (KCB), and the past studies done in Kenya on money markets, there is evidence that the official interest rates in Kenya are less than the competitive interest rates. The Managers of the two Banks (BBK and KCB) suggested that the nominal interest rates would increase to well above 30 percent if the capital markets were liberalized. Paulson (1984) calculated the competitive nominal rate of loans to be 30 percent in 1983, even though the official ceiling rate was 14 percent. Mukumbu et al (1990) estimated a nominal interest rate closer to 35 percent, or about 25 percent in real terms. Based on these arguments, this study estimated the competitive nominal interest rate to be 37 percent. The report by the Central Bank (1991) estimated an inflation rate of 12 percent and so the real rates of interest was estimated to be 25 percent. This interest rate was used as the social cost of borrowed capital.

The commodities that neither fall in tradable commodity category nor in domestic factor category are classified as non-tradable commodities. The social prices of non-tradable commodities were estimated by first disaggregating the commodities into their tradables and domestic factor components. The components were valued at social prices and then summed to generate the social value

of the non-tradable commodity. Figure 4.1 shows a schematic diagram of the process of disaggregating non-tradable inputs. The non-tradable input was disaggregated to a point where the non-tradable component diminishes or is negligible.

There are two approaches that can be used to estimate decomposition coefficients of a non-tradable commodity. Decomposition coefficients are constants that give the proportions of capital, Labour and tradable inputs in a non-tradable input. The two approaches are:

- (i) identification of all the direct and indirect inputs used to produce the non-tradable input, from the annual budgets and reports of the institution that produces the non-tradable inputs. The inputs are disaggregated into domestic factor and tradable inputs and their social prices estimated.
- (ii) using partial multipliers from the national input-output Matrix (I-O matrix). Technical coefficients or partial multipliers in I-O matrix gives contributions from other industries and domestic factors, as proportions of gross output from the industry under consideration. These shares are measured at private market prices, and each category of private costs is

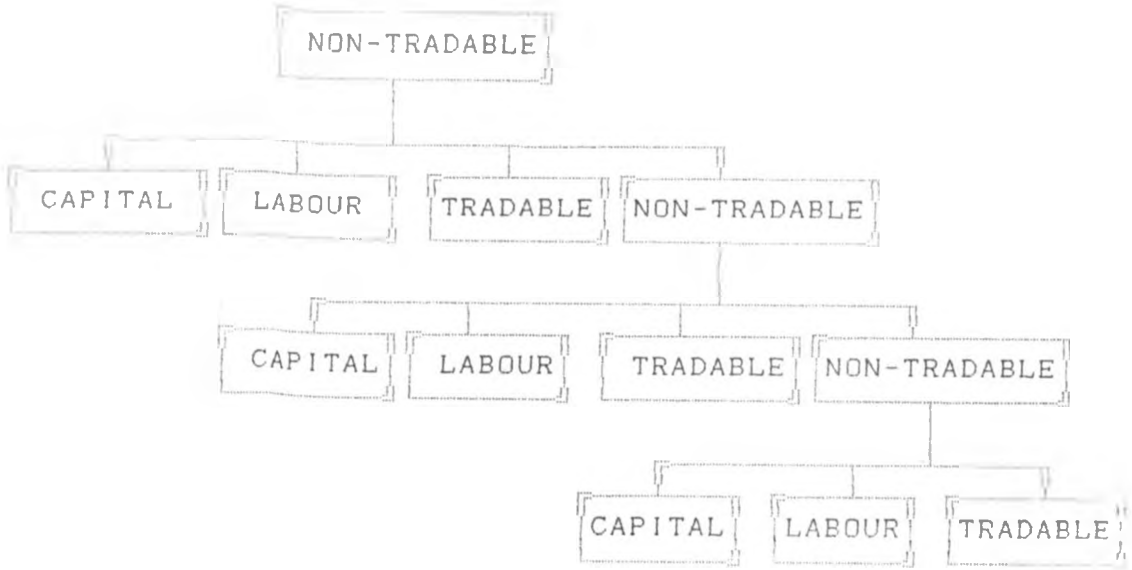


Figure 4.2: Process of Disaggregating Non-tradable Inputs into their Tradable and Domestic Factor Components

multiplied by the ratio of social to private prices to obtain the social cost of the non-tradable input.

The partial multipliers from the national Input/output (I-0) tables of Kenya (1976), were used as decomposition coefficients in this study. They provided the estimates of the cost shares for imported inputs, indirect taxes, subsidies, depreciation, profits, labour incomes, interest paid and other inputs from other domestic sectors. The only available National I-0 matrix in Kenya is that of 1976. This I-0 matrix gives approximate technical coefficients assuming that they have not changed overtime.

The partial multipliers for indirect taxes and subsidies, depreciation, corporate profit and interest paid were summed to give the private share of capital. The corporate profits of a firm is that part of a firm's income that is used for payment of corporate tax, payment of dividends to the shareholders or retained in the firm as undistributed corporate profits, to help finance expansion or to be used as working capital. Corporate tax is that portion of corporate profits that is paid to the government. Indirect business tax is the tax paid indirectly by the consumers in form of sales and excise taxes. Interest is the payment made for the use of borrowed capital. Depreciation is the decline in value of the firm's stock of capital because of wear and tear or obsolescence resulting from the production process. The partial multiplier for wages and salaries was taken to be the private shares for Labour, and partial multiplier for imported inputs including duties as the private cost share of tradable inputs. The partial multipliers for other inputs from other domestic sectors was shared equally among labour cost share and capital cost share.

The social cost share of capital is obtained by subtracting indirect business taxes and subsidies, dividing corporate profit by 1.375 to reflect corporate tax rate of 37.5 percent, and multiplying interest paid by 1.47, which is the ratio of social to private cost of borrowed capital.

The private cost share of labour was taken to be equal to social cost share of labour. The social cost share of imports was obtained by separating the imported input costs into cif costs and import duties. The Tariff data in the annual trade report (1988) was used to estimate the percentage import duty of the imported inputs from other domestic sectors. The social cost shares obtained are used as decomposition coefficients for non-tradable inputs.

The social cost of insurance miscellaneous, bagging and storage costs were obtained from the decomposition coefficients for miscellaneous services shown in table 4.6. The social costs of wharfage was estimated from decomposition coefficients for building and repair of transport equipment shown in table 4.4. The social cost of transport was estimated from the decomposition coefficients of transport and services allied to transport shown in table 4.3. The social cost of local market charges was estimated from the decomposition coefficients for other government services shown on table 4.5.

Table 4.3 Decomposition Coefficients for Transport and Services Allied to Transport

		<u>Social-Analysis</u>			
<u>Private Analysis</u>		TI	L	K	Tax/Subsidy
TI	0.076	0.066	-	-	0.010
L	0.488	-	0.488	-	0.000
K	0.436	-	-	0.429	0.007
-----		-----			
Total	1.000	0.066	0.488	0.429	0.017
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Source: Author's Estimates

Table 4.4: Decomposition coefficients for Building and Repair of Transport Equipments

		<u>Social Analysis</u>			
<u>Private Analysis</u>		TI	L	K	Tax/subsidy
TI	0.244	0.213	-	-	0.031
L	0.349	-	0.349	-	0.000
K	0.407	-	-	0.308	0.099
-----		-----			
Total	1.000	0.213	0.349	0.308	0.130
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Source: Author's Estimates

Table 4.5: Decomposition coefficients for other Government Services

		<u>Social Analysis</u>			
<u>Private Analysis</u>		TI	L	K	Tax/subsidy
TI	0.050	0.050	-	-	0.000
L	0.794	-	0.794	-	0.000
K	0.156	-	-	0.154	0.002

Total	1.000	0.050	0.794	0.154	0.002

Source: Author's Estimates

Table 4.6: Decomposition coefficients for Miscellaneous Services Excluding Government Services

		<u>Social Analysis</u>			
<u>Private Analysis</u>		TI	L	K	Tax/subsidy
TI	0.058	0.058	-	-	0.000
L	0.657	-	0.657	-	0.000
K	0.283	-	-	0.301	-0.018

Total	1.000	0.058	0.657	0.301	-0.018

Source: Author's Estimates

4.7 Preparation of Social Budgets and PAM

Analysis

The social prices estimated as discussed in the previous section were used in preparation of a social budget. The social and private Budgets were used to prepare the PAM analysis framework discussed in the second section of this chapter. The private revenue from maize was fed into entry A, private cost of tradable inputs in entry B, and private costs of domestic factors in entry C shown in table 4.1. This was done for all the channels and the private profitability (D) for each channel was calculated and used as a measure of competitiveness of each marketing channel. The social revenue, tradable inputs and domestic factors costs were entered in E, F, and G respectively. The effects of divergences were calculated by subtracting entries in the second row from entries in the first row. The percentage divergences from efficient resources use for each market channel was calculated by dividing entries of the third row by their counterparts in the second row and multiplying by hundred.

CHAPTER 5

5 EMPIRICAL RESULTS AND DISCUSSIONS

This chapter gives the results of the fieldwork which involved identifying the representative market channels, collection of data on inputs and outputs in each activity, preparation of budgets and finally calculating the baseline results for PAM.

5.1 Marketing channels Identified

Four representative marketing channels were selected. These were:

i) Farmgate -> Local market -> Terminal market -> Consumer

This marketing channel entails assembling of maize in local market for sale to the "pick-up" trader or itinerant trader. The assembling of maize is carried out by the traders' agents or the farmers themselves. The maize is sold to the traders who transport it to terminal markets where they sell it directly to consumers, or indirectly through sedentary traders.

(ii) Farmgate -> LBA's -> Terminal Market -> Consumer

The second marketing channel is the same as the first one but assembling is done by Licensed Buying Agents (LBAs), who buy maize from the farmers at the official buying price. LBAs transport maize to terminal markets

where they sell it to sedentary traders, who eventually sell it to consumers.

iii) Farmgate -> Terminal Market -> Consumer

The marketing channel involves assembling maize directly in the terminal markets. The marketing channel is dominated by itinerant traders during the maize harvesting period in the areas surrounding the terminal markets. These itinerant traders turn sedentary after the harvesting period in the area surrounding the terminal market is over. This is because the cost of transporting small quantities of maize from surplus areas far from terminal markets is very high. From interviews done with matatu⁴ operators, the cost of transporting maize ranged between Kshs.35 to Kshs.65 per bag.

iv) Farmgate -> Local Market -> Consumer

The marketing channel involves buying maize from farmers by the itinerant traders, who sell it to consumers in the local market. Consumers in the local market include local teachers and other government officials in the locality (i.e. the non-farming community in the maize producing areas).

⁴ A matatu in this study is taken as a small passenger vehicle with a sitting capacity of not more than 25 passengers

5.2 Price Data on Inputs and Outputs

Table 5.1 shows the private prices of inputs and outputs and their estimated social prices. The social prices of inputs and outputs are estimated as discussed in chapter 4. The private and social inputs and output costs are used to prepare private and social budgets for each channel. The quantities of inputs and outputs were converted to one year basis for ease of comparing the results of the market channels. Maize purchased in the local markets by each trader takes about one week to be sold. Working capital in the private trade is therefore the capital required to purchase and sell a one-week consignment of maize:

Table 5.1: Mean Costs of inputs and Outputs

Inputs/output	Unit	Private Cost	Social Cost

Intermediate Inputs			
(a) Gunny Bags	Kshs/Bag	21.00	6.90
(b) Working capital	Percentage	17.00	25.00
Commodity-in-process			
a) Maize Purchased at the Farmgate	Kshs/Bag	268.00	268.00
(b) Maize in the Local Market	Kshs/Bag	277.00	515.74
(c) Maize in the Market during harvesting	Kshs/Bag	291.10	536.48
(d) Maize in the Terminal Market after harvesting season	Kshs/Bag	335.20	536.48
Non-Tradable Costs			
(a) Transport	Kshs/Bag	16.50	16.22
(b) Local Market charges	Kshs/Bag	9.30	9.28
(c) Miscellaneous	Percentage	1.00	1.00
(d) Handling costs	Kshs/Bag	6.63	6.51

Source Author's estimates

5.3 PAM Results for Market Channel 1:

Farm-gate -> Local -> Terminal -> Consumer
 market market

Tables 5.2 to 5.5 (a) and (b) show the PAM results for market channel 1. Table 5.2 shows the private budget for this channel. The input costs are disaggregated to their tradable inputs and domestic factor costs as shown in table 5.3. Table 5.4 shows the disaggregated social budget, for market channel 2. Unlike in the private budget the input costs have been classified into their tradable inputs and domestic factor costs components.

Table 5.2 :Private-Budget for Market Channel 1

Farmgate ->Local -> Terminal-> Consumer
 Market Market

Input/Output	Quantity (Bags/year)	Private-Price (Kshs/Bag)	Cost/Return (Kshs/ Year)
Output	325.51	335.20	109110.97
Input Costs			
Empty Bags	109.00	21.00	2278.58
Handling costs	325.51	6.63	2156.52
Transport	325.51	16.50	5370.95
Market charges	-	-	966.06
Cost of maize	325.51	268.03	8724.68
Working capital	1815.14	0.17	308.57
Miscellaneous	-	-	983.26
Total costs	-	-	99309.63
Private profit	-	-	9801.34

Source Author's Estimate

Table 5.3 Disaggregation of input costs (Ksh/Year) to their Tradable and Domestic Factor costs for market channel 1.

Farmgate-> Local -> Terminal -> Consumer
market market

Input Cost	Tradable Input	Capital	Labour	Commodity in process	Total
Empty Bags	2278.58 (752.10)	-	-	-	2278.58 (752.10)
Handling	163.90 (142.33)	940.24 (925.15)	1052.38 (1052.38)	-	2156.52 (2119.86)
Transport	408.19 (354.43)	2341.73 (2304.14)	2621.02 (2621.02)	-	5370.95 (5279.64)
Market Charges	48.30 (48.30)	150.71 (148.77)	767.05 (767.05)	-	966.06 (964.13)
Cost of maize	-	-	-	87245.68 (87245.68)	87245.68 (87245.68)
Working capital	-	308.57 (453.79)	-	-	308.57 (453.79)
Miscellaneous	57.03 (57.03)	278.26 (295.96)	646.00 (646.00)	-	983.26 (998.99)
Total	2956.00 (1354.19)	4019.51 (4127.81)	5086.45 (5086.45)	87245.68 (87245.68)	99309.63 (97814.13)

The figure in brackets are the social costs.
Source: Author's estimates.

Table 5.4: Social Budget for market channel 1:
Farmgate -> Local -> Terminal -> Consumer
market market

Output/input	Social cost/Revenue (Ksh/year)
Output @ Ksh. 536.48/bag	174630.68
Tradable inputs	1354.19
Capital	4127.81
Labour	5086.45
Commodity-in-Process	87245.68
Total Costs	97814.13
Social Profit	76816.55

Source: Author's estimates

Table 5.5(a) PAM Analysis for Market Channel 1: Short-run Situation

(The Cost and Returns are given in Ksh/Bag)
 Farmgate -> Local -> Terminal -> Consumer
 Market Market

	TR	TI	K	L	CP	II
Private Price	335.20	9.09	12.35	15.63	268.03	30.10
Social Price	536.48	4.13	12.68	15.68	268.03	236.01
Divergencies	-201.28	4.96	-0.33	0.00	0.00	-205.91
% changes*	60.04	-54.57	2.67	0.00	0.00	684.10

Table 5.5(b) PAM Analysis for Market Channel 1: Long-run Situation

(The Cost and Returns are given in Ksh/Bag)
 Farmgate -> Local -> Terminal -> Consumer
 Market Market

	TR	TI	K	L	CP	II
Private Price	335.20	9.09	12.35	15.63	268.03	30.10
Social Price	536.48	4.13	12.68	15.68	443.84	30.10
Divergencies	-201.28	4.96	-0.33	0.00	-175.81	0.00
% changes*	60.04	-54.57	2.67	0.00	-65.59	0.00

TR = Total Revenue
 TI = Tradable Input
 K = Capital
 L = Labour
 CP = Commodity-In-Process
 II = Profit

$$* \% \text{ change} = \frac{\text{Social Price} - \text{Private Price}}{\text{Private Price}} \times 100$$

Source: Derived from tables 5.2, 5.3, and 5.4.

Table 5.5 (a) shows the expected effects of liberalization in the short-run situation. The short run period is the period when supply of maize is relatively inelastic i.e. the short period when maize farmers cannot increase their maize supply. From table 5.5 (a) it is seen that the traders made a profit of Ksh. 30.11 per bag during

the period covered by the study. This is normal profit and covers the returns to entrepreneurship and risk premium, which were not incorporated in domestic factor cost. On liberalization, the short term effect would be an increase in consumer prices of maize from Ksh. 335.20 to Ksh. 536.48 (or by 60 percent), as shown in table 5.5 (a).

Trade liberalization would reduce tradable input cost from Ksh. 9.09 to Ksh. 4.13 per bag (or by 54.6 per cent). This reduction would mainly result from reduction of prices of gunny bags from Ksh. 21.00 to Ksh. 6.90 as shown in table 5.1. The capital cost would increase from Ksh. 12.35 to Ksh. 12.68 per bag (or by 2.7 percent). The price of the commodity -in-process which is the producer price would not change in the short-run. The overall effect on profits would be an increase from Ksh. 30.11 to Ksh. 236.01 per bag (by 684.1 percent). About 98 percent of this increase in profits would be caused by removal of trade restriction that increases consumer prices of maize by Ksh. 201.28 per bag.

If the returns to entrepreneurship and risk premium do not change on liberalization, then the traders would be making an excess profit of Ksh. 175.81 per bag. This excess profit would attract more traders into private maize trade. The trade would be more competitive and farmers would increase the producer price of maize. Table 5.5 (b) shows the long-run situation. The longrun period is the period

long enough for new traders to enter the industry but not long enough for farmers to increase output. From table 5.5 (b), it is seen that the producer price of maize would increase from Ksh. 268.03 to Ksh. 443.84 per bag (or by 65.59). This would mean that the traders would continue to enter the industry until all the excess profits have diminished or passed to farmers.

In the very long-run (i.e. the period long enough for farmers to increase their output), the farmers would increase supply by increasing use of modern inputs on maize and by increasing maize acreage. The consumer price would be reduced and the consumers would enjoy the benefits of liberalization. Some analysts may argue that with increased output and reduced consumption, liberalization may lead to export surpluses. This would in the long run make Kenya to find itself at export parity price which would give no incentive to farmers. The consumption of maize would not be reduced significantly by liberalization because maize is a basic food and it is relatively price inelastic. It is right that once domestic supply outstrips domestic consumption, the country would experience export parity price. The country would have already achieved its objective of self-sufficiency. The policy measures would then change to those of maintaining self-sufficiency through supporting consumers i.e. maintaining a producer price that would ensure self-sufficiency.

Table 5.6 shows the results of sensitivity analysis carried out to show the effects of 15 and 20 percent over-valuation of domestic currency. Over-valuation of domestic currency increases the social prices of tradable inputs and outputs. From table 5.6 it is seen that a possible over-valuation of 15 and 20 percent would change tradable inputs cost distortions from 118 percent to 90 and 82 percent respectively. But the overall effects of possible over-valuation is insignificant as indicated by the changes in profits. The divergences for social profit change from 117 percent to 89 and 90 percent for 15 and 20 percent over-valuation respectively.

5.4 PAM Analysis Results for Market Channel 2

**Farmgate -> LBAs -> Terminal -> Consumer
market**

Tables 5.7 to 5.10 shows the empirical results for market channel 2. Table 5.7 shows the annual private budget for the channel. Table 5.8 shows the disaggregated input costs and table 5.9 shows the annual social budget for market channel 2. Tables 5.10(a) and (b) show the PAM analysis results for the channel. From table 5.7 it is seen that traders in this channel made a private profit of Ksh. 25300.75 per year (or Ksh. 77.73 per bag). If the returns to entrepreneurship and risk premium remains at Ksh. 30.10 per bag, then the LBAs made excess profit of Ksh. 47.63

during the period covered by the study. In theory, the excess profit is expected to induce more traders into the channel resulting to expansion of the channel. In practice this may not happen for the channel is restricted to LBAs who are appointed by NCPB. The LBAs are required to buy maize on behalf of NCPB and it is illegal to sell it in the rural markets.

Table 5.6 Effects of 15 and 20 percent possible over-valuation of domestic currency for market channel 1

Farmgate -> Local Market -> Terminal Market -> Consumer

	TR	TI	L	CP	II	
Private Price	109110.97	2956.00	4019.51	5086.45	87245.68	9801.34
Social Price	191094.26	1557.32	4127.81	5086.45	87245.68	76816.55
	(198271.66)	(1626.03)	(4127.81)	(5086.45)	(87245.68)	(100186.69)
Divergencies	-81983.29	1398.68	-108.30	0.00	0.00	-83275.66
	(-89160.87)	(1330.97)	(-108.30)	(0.00)	(0.00)	(-90385.35)
Divergencies*	-42.90	89.81	-2.62	0.00	0.00	-87.47
	(-42.96)	(81.90)	(-2.62)	(0.00)	(0.00)	(-90.22)

The figure in parenthesis are for 20 percent over-valuation

TR = Total Revenue

TI = Tradable Input cost

L = Capital

L = Labour cost

CP = Commodity-In-Process

II = Profit

Source: Authors estimates.

$$\% \text{ Divergencies} = \frac{\text{Private Price} - \text{Social Price}}{\text{Social Price}} \times 100$$

Table 5.7: **Private Budget for Market Channel 2**
Farmgate -> LBA's -> Terminal Market -> Consumer

Input/Output	Quantity (Bags/Year)	Private Price (Kshs/Bag)	Cost/Return (Kshs/year)
Output	325.51	325.00	109110.97
Input cost			
Empty Bags	109.00	21.00	2278.58
Handling cost	325.51	6.63	2156.52
Transport	325.51	16.50	5370.95
Market charges	-	-	966.06
Cost of Maize	325.51	221.00	71938.15
Working capital	1590.58	0.17	270.0
Miscellaneous Cost	-	-	829.40
Total cost	-	-	83810.60
Private Profit	-	-	25300.31

Source: Authors Estimates

Table 5.8 **Disaggregation of input costs (Ksh/year) to their Tradable and Domestic Factor Costs for Market Channel 2.**

Farmgate-> LBAs -> Terminal market -> Consumer

Input Cost	Tradable Input	Capital	Labour	Commodity in process	Total
Empty Bags	2278.58 (752.10)	-	-	-	2278.58 (752.10)
Handling	163.90 (142.33)	940.24 (925.15)	1052.38 (1052.38)	-	2156.52 (2119.86)
Transport	408.19 (354.43)	2341.73 (2304.14)	2621.02 (2621.02)	-	5370.95 (5279.64)
Market Charges	48.30 (48.30)	150.71 (148.77)	767.05 (767.05)	-	966.06 (964.13)
Cost of Maize	-	-	-	71938.15 (71938.15)	87245.68 (87245.68)
Working capital	-	270.40 (397.65)	-	-	270.40 (397.65)
Miscellaneous	48.13 (48.13)	234.84 (249.77)	545.19 (545.19)	-	829.81 (843.09)
Total	2947.10 (1345.29)	3937.92 (4025.48)	4985.64 (4985.64)	71938.15 (71938.15)	83810.81 (82294.56)

The figure in brackets are the social costs.

Source: Author's estimates.

Table 5.9: Social Budget for Market Channel 2:

Farmgate -> LBAs -> Terminal -> Consumer Market		Social cost/Revenue
Output/Input		
Output @ Ksh. 536.48/bag		174630.68
Tradable Inputs		1354.19
Capital		4025.48
Labour		4985.64
Commodity-in-Process		71938.18
Total Costs		82294.56
Social Profit		92336.12

Source: Author's estimates

Table 5.10 (a) PAM Analysis for Market Channel 2: Short-run Situation
(Cost and Returns given in Ksh/Bag)

Farmgate -> LBAs -> Terminal -> Consumer Market						
	TR	TI	K	L	CP	II
Private Price	335.20	9.05	12.10	15.32	221.00	77.73
Social Price	536.48	4.13	12.36	15.32	221.00	283.67
Divergencies	-201.28	4.92	-0.26	0.00	0.00	-205.94
% changes*	60.05	-54.36	2.15	0.00	0.00	264.94

Table 5.10 (b) PAM Analysis for Market Channel 2: Long-run Situation
(Cost and Returns given in Ksh/Bag)

Farmgate -> LBAs -> Terminal -> Consumer Market						
	TR	TI	K	L	CP	II
Private Price	335.20	9.05	12.10	15.32	221.00	77.73
Social Price	536.48	4.13	12.36	15.32	474.57	30.10
Divergencies	-201.28	4.92	-0.26	0.00	-253.57	47.63
% changes	60.05	-54.36	2.15	0.00	114.74	61.28

TR = Total Revenue

TI = Tradable Input

K = Capital

L = Labour

CP = Commodity-In-Process

II = Profit

$$* \% \text{ change} = \frac{\text{Social Price} - \text{Private Price}}{\text{Private Price}} \times 100$$

Source: Derived from tables 5.7, 5.8, and 5.9.

Tables 5.10(a) shows that without government interventions, the total revenue and profits earned by traders would increase by about 60 and 25 percent respectively in the short run. The tradable input costs would be reduced by about 54 percent. If the normal profit do not change on liberalization, the traders would be making an excess profit of Ksh. 253.57 per bag. Table 5.10(b) shows that in the long-run the excess profit would be passed on to the farmers. This would raise the producer price from Ksh. 221.00 to Ksh. 474.57 (or by 114 percent). However, this channel may not exist after liberalization. The LBAs buy maize at official producer price and liberalization will involve deregulation of the producer prices of maize. The government would no longer engage in primary marketing of maize and would therefore not appoint LBAs.

Table 5.11 shows the effects of 15 and 20 percent possible over-valuation of domestic currency. From this table it is seen that divergencies on revenue changes from 36 percent to 43 percent and 45 percent for 15 and 20 percent over-valuation respectively. Divergencies on tradable input cost changes from 119 percent to 90 and 87 percent for 15 and 20 percent over-valuation respectively. The divergencies on profit changes from 78 percent to 73 and 76 percent for 15 and 20 percent over-valuation respectively. Therefore, the results of sensitivity

analysis shows that although over-valuation of domestic currency has the effect of increasing social revenue, it increases the costs of tradable inputs resulting to small changes in social profits.

Table 5.11 Effects of 15 and 20 Percent Possible Over-valuation of Domestic Currency for Market Channel 2

Farmgate -> Local Market -> Terminal Market -> Consumer Market

	TR	TI	K	L	CP	IT
Private Price	109110.97	2956.00	3937.92	4985.64	71938.15	25302.16
Social Price	191094.26	1547.08	4025.48	4985.64	71938.15	108597.91
	(198271.66)	(1614.35)	(4025.48)	(4985.64)	(71938.15)	(115708.04)
Divergencies	-81983.29	1400.02	-87.56	0.00	0.00	-83295.75
	(-89160.87)	(1332.75)	(-87.56)	(0.00)	(0.00)	(-90405.88)
% Divergencies*	-42.90	90.49	-2.18	0.00	0.00	-76.70
	(44.96)	(82.56)	(-2.18)	(0.00)	(0.00)	(-78.13)

The figure in brackets are for 20 percent over-valuation

TR = Total Revenue

TI = Tradable Input cost

K = Capital

L = Labour cost

Cp = Commodity-In-Process

IT = Profit

$$* \% \text{ Divergencies} = \frac{\text{Private Price} - \text{Social Price} \times 100}{\text{Social Price}}$$

Source: Authors estimates.

5.5 PAM Analysis Results for Market Channel 3

Farmgate -> Terminal Market -> Consumer

The PAM analysis results for market channels 3 are shown in tables 5.12 to 5.15. From table 5.12 it is seen that the traders made a normal profit of Ksh. 871.79 per year (or Ksh.2.68 per bag). This channel exists during the harvesting period in areas surrounding the markets.

The main participants are the farmers and itinerant

traders who turn sedentary after the harvesting period. This is an important channel because the farmers get a chance to benefit directly from maize trade. Although the channel exists when the consumer prices are at the lowest table 5.12 shows that the traders or farmers were able to make an annual profit of Ksh 871.79

Table 5.12: Private Budget for market channel 3
Farmgate -> LBA's -> Terminal Market -> Consumer

Input/Output	Quantity (Bags/Year)	Private Price (Kshs/Bag)	Cost/Return (Kshs/year)
Output	325.51	291.08	94751.01
Input cost			
Empty Bags	109.00	21.00	2278.58
Handling cost	325.51	6.63	2156.52
Market charges	-	-	966.06
Cost of Maize	325.51	268.03	87245.68
Working capital	1781.67	0.17	302.88
Miscellaneous Cost	-	-	929.50
Total cost	-	-	93879.22
Private Profit	-	-	871.79

Source: Author's Estimates

Table 5.13 Dissagregation of Input Costs (Ksh/Year) to their Tradable and Domestic Factor Costs for Market Channel 3.

Farmgate -> Terminal -> Consumer market

Input Cost	Tradable Input	Capital	Labour	Commodity-in-process	Total
Empty Bags	2278.58 (752.10)	-	-	-	2278.58 (752.10)
Handling	163.90 (142.33)	940.24 (925.15)	1052.38 (1052.38)	-	2156.52 (2119.86)
Transport	408.19 (354.43)	2341.73 (2304.14)	2621.02 (2621.02)	-	5370.95 (5279.64)
Market Charges	48.30 (48.30)	150.71 (148.77)	767.05 (767.05)	-	966.06 (964.13)
Cost of maize	-	-	-	87245.68 (87245.68)	87245.68 (87245.68)
Working capital	-	302.88 (445.42)	-	-	302.88 (445.42)
Miscellaneous	53.91 (53.91)	263.05 (279.78)	610.68 (610.68)	-	929.50 (944.37)
Total	2544.69 (996.64)	1656.88 (1779.12)	2430.11 (2430.11)	87245.68 (87245.68)	93879.22 (92471.55)

The figure in brackets are the social costs.

Source: Author's estimates.

Table 5.14: Social Budget for market channel 3:

Farmgate -> Terminal -> Consumer Market

Output/Input	Social cost/Revenue
Output @ Ksh. 536.48/bag	174630.68
Tradable Inputs	996.64
Capital	1799.12
Labour	2450.11
Commodity-in-Process	87245.68
Total Costs	92471.55
Social Profit	82159.13

Source: Author's estimates

Table 5.15(a) PAM Analysis for Market Channel 3 : Short-run Situation
 (Costs and Return given in Ksh/bag)
 Farmgate -> Terminal -> Consumer
 Market

	TR	TI	K	L	CP	IT
Private Price	291.08	7.82	5.09	7.47	268.03	2.68
Social Price	536.48	3.06	5.52	7.47	268.03	252.40
Divergencies	-245.40	4.76	-0.43	0.00	0.00	-249.72
% changes*	84.31	-60.87	8.45	0.00	0.00	9317.91

TR = Total Revenue

TI = Tradable Input

K = Capital

L = Labour

Cp = Commodity-In-Process

II = Profit

Source: Derived from tables 5.12 to 5.14.

Table 5.15(b) PAM Analysis for Market Channel 3 : Long-run Situation
 (Costs and Return given in Ksh/bag)
 Farmgate -> Terminal -> Consumer
 Market

	TR	TI	K	L	CP	IT
Private Price	291.08	7.82	5.09	7.47	268.03	2.68
Social Price	536.48	3.06	5.52	7.47	517.73	2.68
Divergencies	-245.40	4.76	-0.43	0.00	-249.72	0.00
% changes*	84.31	-60.87	8.45	0.00	93.17	0.00

* % changes = $\frac{\text{Social Price} - \text{Private Price}}{\text{Private Price}}$

Tables 5.15 (a) shows that with liberalization, the total revenue would increase by about 84 percent in the short run. Profits would increase by 9317.91 percent and traders would enjoy about 61 percent reduction in tradable input costs. If the normal profit does not change on liberalization (i.e. remains at Ksh 2.68) the traders would

be making excess profits at Ksh. 249.72 per bag of maize. This excess profit would attract more traders into maize trade. Table 5.15 (b) shows that in the long-run the excess profit would be passed on to farmers in form of higher producer prices. This would raise producer prices from Ksh. 268.03 to Ksh. 517.73 per bag (or by 93.17 percent).

Sensitivity analysis was carried out to show the effects of 15 and 20 percent over-valuation of domestic currency. Table 5.16 shows the results of the sensitivity analysis. From table 5.16 it is seen that 15 and 20 percent over-valuation would cause the total revenue to increase from 46 percent to about 50 and 52 percent respectively. Table 5.16 shows that 15 and 20 percent possible over-valuation of domestic currency has negligible effect on percentage divergencies on profit; divergence on profit remained around 99 percent .

Table 5.16 Effects of 15 and 20 Percent Possible Over-valuation of Domestic Currency for Market Channel 3.
Farmgate -> Terminal -> Consumer

	Market					
	TR	TI	K	L	CP	IT
Private Price	94751.01	2544.69	1656.88	2430.11	87245.68	871.79
Social Price	191094.26	149.50	1799.12	2430.11	87245.68	99469.85
	(198271.66)	(199.33)	(1799.12)	(2430.11)	(87245.68)	(106597.42)
Divergencies	-96343.25	2395.36	-142.24	0.00	0.00	-98598.06
	(-103520.65)	(2345.36)	(-142.24)	(0.00)	(0.00)	(-105725.63)
% Divergencies*	-50.42	120.16	-7.91	0.00	0.00	-99.12
	(52.22)	(117.62)	(-7.91)	(0.00)	(0.00)	(-99.18)

The figure in brackets are for 20 percent over-valuation

TR = Total Revenue

TI = Tradable Input cost

K = Capital

L = Labour cost

Cp = Commodity-In-Process

IT = Profit

* % Divergencies = $\frac{\text{Private Price} - \text{Social Price}}{\text{Social Price}} \times 100$

Source: Author's estimates.

5.6 PAM Analysis Results for Market Channel 4

Farmgate -> Local -> Consumer
Market

Table 5.17 shows that the annual private profit in market channel 4 was Ksh 3273.61 (or Ksh.10.06/bag). Since the Local markets are near the farms, a large number of farmers are able to sell maize directly to consumers. Therefore, the farmers get higher returns from their produce by engaging in maize trade.

Table 5.20(a) shows that without government intervention in maize marketing, traders in market channel 4 would increase their revenue and profits by 73 and 2203 percent respectively in the short run. Like in other market channels discussed previously, the gains from liberalization would in the long-run benefit the farmers.

The producer price would in the long-run increase by about 83 percent to Ksh 489.63 per bag. The farmers would subsequently increase their output by increasing the use of inputs and increasing maize acreage.

Table 5.17: Private Budget for market channel 4

Input/Output	Farmgate -> Local market -> Consumer		
	Quantity (Bags/Year)	Private Price (Kshs/Bag)	Cost/Return (Kshs/Year)
Output	325.51	298.46	97153.61
Gunny bags	109.00	21.00	2278.58
Handling Costs	325.51	6.63	2156.52
Market charges	-	-	996.06
Cost of maize	325.51	268.03	87246.45
Working capital	1761.68	0.17	302.89
Miscellaneous Cost			929.50
Total costs	-		93880.00
Private Profit			3273.61

Source: Author's Estimates

Table 5.18 Disaggregation of Input Costs to their Tradable a n d Domestic Factor Costs Components for Market Channel 4.

Input Cost	Farmgate-> Local -> Consumer market				Total
	Tradable Input	Capital	Labour	Commodity in process	
Empty Bags	2278.58 (752.10)	-	-	-	2278.58 (752.10)
Handling	163.90 (142.33)	940.24 (925.15)	1052.38 (1052.38)	-	2156.52 (2119.86)
Market Charges	48.30 (48.30)	150.71 (148.77)	767.05 (767.05)	-	966.06 (964.13)
Cost of maize	-	-	-	87246.45 (87246.45)	87246.45 (87246.45)
Working capital	-	302.88 (445.42)	-	-	302.88 (445.42)
Miscellaneous	53.91 (53.91)	263.05 (279.78)	610.68 (610.68)	-	929.50 (944.37)
Total	2544.69 (996.64)	1656.88 (1779.12)	2430.11 (2430.11)	87246.45 (87246.45)	93880.00 (92471.55)

The figure in brackets are the social costs.

Source: Author's estimates.

Table 5.19: Social Budget for market channel 4:

Farmgate -> Local -> Consumer
Market

Output/Input	Social cost/Revenue
Output @ Ksh. 515.74/bag	167878.53
Tradable Inputs	996.64
Capital	1799.12
Labour	2430.11
Commodity-in- Process	87246.45
Total Costs	92471.55
Social Profit	75406.98

Source: Author's estimates

Table 5.20(a) PAM Analysis for Market Channel 4 : Short-run Situation

(Cost and Returns given in Ksh/Bag)

Farmgate -> Local -> Consumer
Market

	TR	TI	K	L	CP	II
Private Price	298.46	7.82	5.09	7.46	268.03	10.06
Social Price	515.74	3.06	5.52	7.46	268.03	231.66
Divergencies	-217.28	4.76	-0.43	0.00	0.00	-221.60
% changes*	72.28	-60.87	8.44	0.00	0.00	2202.78

Table 5.20(b) PAM Analysis for Market Channel 4 : Long-run Situation

(Cost and Returns given in Ksh/Bag)

Farmgate -> Local -> Consumer
Market

	TR	TI	K	L	CP	II
Private Price	298.46	7.82	5.09	7.46	268.03	10.06
Social Price	515.74	3.06	5.52	7.46	489.63	10.06
Divergencies	-217.28	4.76	-0.43	0.00	-221.60	0.00
% changes*	72.80	-60.87	8.44	0.00	82.68	0.00

TR = Total Revenue

TI = Tradable Input

K = Capital

L = Labour

Cp = Commodity-In-Process

II = Profit

* % change = $\frac{\text{Social Price} - \text{Private Price}}{\text{Private Price}} \times 100$

Source: Derived from tables 5.17 to 5.19.

Table 5.21 shows the possible effects of 15 and 20 percent over-valuation of domestic currency. From tables 5.20 and 5.21, it is seen that the effects of 15 and 20 percent over-valuation changes percentage distortion on total revenue from 42 percent to 47 and 49 percent respectively. Percentage distortion on tradable inputs cost changes from 155 percent to 120 and 118 percent respectively. Divergences on profit remained around 96 percent. This indicated that over-valuation of domestic currency increases significantly the percentage divergence in tradable inputs costs and revenue, but the overall effects on social profit is negligible.

Table 5.21 Effects of 15 and 20 percent possible over-valuation of domestic currency for market channel 4
Farmgate -> Local -> Consumer

	Market					
	TR	TI	K	L	CP	II
Private Price	97153.61	2544.69	1656.88	2430.11	87245.68	3273.61
Social Price	184437.89	149.50	1799.12	2430.11	87245.45	92813.71
	(189951.49)	(199.33)	(1799.12)	(2430.11)	(87245.68)	(98277.48)
Divergencies	-92979.88	2395.36	-142.24	0.00	0.00	-89540.10
	(-92797.88)	(2345.36)	(-142.24)	(0.00)	(0.00)	(-95003.87)
%Divergencies*	-47.32	120.16	-7.91	0.00	0.00	-97.47
	(48.85)	(117.62)	(-7.91)	(0.00)	(0.00)	(-96.67)

The figure in brackets are for 20 percent over-valuation

TR = Total Revenue

TI = Tradable Input cost

K = Capital

L = Labour cost

Cp = Commodity-In-Process

II = Profit

* % Divergencies = $\frac{\text{Private Price} - \text{Social Price}}{\text{Social Price}} \times 100$

Source: Author's estimates.

CHAPTER 6

SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS

6.1 Summary and Conclusions:

This study was aimed at showing the following:

(i) Even with the current punitive government policies towards maize industry, the informal maize marketing is profitable enough to handle a larger share of maize marketing in Nandi district.

(ii) The current government intervention in maize industry has caused significant divergence from efficient resource use in the informal maize marketing in Nandi district.

The study identified four market channels within the informal maize trade in Nandi district. These channels are:

(i) Farmgate -> Local market -> Terminal market -> Consumer market

(ii) Farmgate -> LBAs -> Terminal market -> Consumer market

(iii) Farmgate -> Terminal market -> Consumer market

(iv) Farmgate -> Local market -> Consumer market

6.1.1 Private Profits in informal Maize Marketing

The study found that all the four main channels in the private maize trade had positive private profits. Table 6.1 shows the estimated private profits of the four market

channels.

Table 6.1: Estimated Private Profits for the Four Main Marketing Channels in Private Maize Trade in Nandi District.

Marketing Channel	Private Profit (Ksh/Bag)
(I) FG->LM->TM->C	30.11
(II) FG->LBA->TM->C	77.73
(III) FG->TM->C	2.68
(IV) FG->LM->C	10.06

FG = Farm Gate. TM = Terminal Market.
LM = Local Market C = Consumers.
LBA = Licenced Buying Agent

Table 6.1 shows that market channel (I) is the second most privately profitable channel. The channel is also the longest and the most important in the district for it is through this channel that a large consignment of maize moves to maize deficit rural and urban markets. The profit in this channel is an indication that the channel is capable of further expansion and can replace NCPB in maize distribution in the country.

The second market channel which involves the LBAs was found to be partially official because the LBAs are appointed by NCPB. The LBAs buy maize at the prevailing official producer price but illegally sell it in the informal markets at prevailing market prices making exorbitant profits. If the channel persists after Liberalization, it will attract many traders and will expand.

Market channel (III) is the least profitable channel. This channel prevails during the harvesting period in areas surrounding the terminal markets, when consumer prices are at the lowest. Most traders in this channel are the farmers themselves and the consumer prices fetched in this channel can actually be considered as the producer prices of maize.

Market channel (IV) is the channel through which non-farming consumers in maize surplus area buy their maize. Maize farmers are also able to sell maize to non-maize farmers within the region. Table 6.1 shows that the market channel has positive profits and it is capable of expanding. Like in market channel (III), most traders in this channel are the farmers themselves and so the consumer prices can be considered as the producer prices of maize.

From the results shown in Table 6.1, the study concluded that the informal maize marketing is profitable enough to handle maize marketing in Nandi district. The first hypothesis that private maize is profitable enough to handle maize marketing in Nandi district was not rejected.

6.1.2 : Effects of Divergences.

This study found that the current government intervention in maize industry has caused significant divergences from efficient resources use in the informal maize marketing. Table 6.2 shows percentage changes in total revenue, tradable input costs, capital costs and producer prices (commodity-in-process) that would result in

Market channel (III) is the least profitable channel. This channel prevails during the harvesting period in areas surrounding the terminal markets, when consumer prices are at the lowest. Most traders in this channel are the farmers themselves and the consumer prices fetched in this channel can actually be considered as the producer prices of maize.

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6.1.2 : Effects of Divergences.

This study found that the current government intervention in maize industry has caused significant divergences from efficient resources use in the informal maize marketing. Table 6.2 shows percentage changes in total revenue, tradable input costs, capital costs and producer prices (commodity-in-process) that would result in

the long run on liberalization of maize market.

Table 6.2 Percentage Changes in Total Revenue (TR), Tradable Input Costs (TI), Capital Costs (K) and Commodity -in-Process (CP) in the Four Informal Marketing channels in Nandi district.

Channel	Percentages Changes			
	TR	TI	K	CP
(I) FG->LM->TM>C	60	-55	3	66
(II) FG->LBA->TM>C	60	-54	2	114
(III) FG->TM->C	84	-61	2	93
(IV) FG->TM->C	73	-61	8	83

FG - Farm Gate TM = Teminal Market
 LM = Local Market C = Consumer
 LBA = Lincenced Buying Agent

From table 6.2, it is seen that the traders would increase their revenues by between 60 and 84 percent if the government interventions are removed. The largest policy distortion is found in producer price where traders pay between 66 and 114 percent loss to the maize farmers. However, the subsidy given by the government to the traders in form of reduced capital cost is relatively insignificant. This subsidy ranges from 2 percent in market channel (ii)and (iii) to 8 percent in market channel (iv) . The effect of policy on as reflected in producer price increase, ranges from 66 to 114 percent. This indicates

that if the government intervention is removed maize farmers would benefit in the long run. The farmers will eventually increase maize output and consumer prices will be depressed.

From the results shown in table 6.2, this study concluded that government intervention in maize marketing has caused significant divergences from efficient resource use. The second hypothesis tested in this study, that the government policy in maize marketing has caused significant divergence from efficiency, was therefore not rejected.

6.2: Policy Implication

This study urges the government to effect major liberalization measures in maize marketing if it is to achieve its dual objectives of self-sufficiency and high farm incomes. The traders are able to pass the effects of government intervention to the farmers through low farmgate prices. Losses in producer incomes of between 66 and 114 percent was observed in this study. The estimated social price of maize at the wholesale market was Ksh. 536.46 while the observed market price was Ksh. 335.20 in the terminal markets.

The greatest loss in efficiency in the informal maize trade can be traced in government policy on tradable commodities. The government policy has caused a loss ranging from 60 to 84 percent in traders revenue and an

increase in tradable input cost of between 55 and 61 percent. To reduce this loss of traders income the government should set the consumer prices of maize in line with the import parity price of maize. In the short term period the traders would receive the benefits of the action through increased revenues of more than 60 percent. The excess profits would increase and induce more traders into private maize trade and its competitiveness would increase. In the long-run the excess profits are passed on to the farmers in form of high farmgate prices and the farmer would increase their output. This study estimated an increase ranging from 66 to 114 percent in producer price in the long run. The period taken for the effects of this policy action to be felt would depend on how fast the traders adapt to the new situation and how fast a competitive private maize trade would be formed.

The government should relax its protection on tradable input industries especially gunny bags industry. This action would reduce inputs costs considerably some analysts may argue that reduced protection of domestic industries may reduce employment. The expansion of private maize trade would increase farm incomes and outputs and eventually the maize industry would absorb the excess labour.

The government should remove controls on maize movement and allow a competitive private trade to form. The private maize trade would be able to distribute maize in

the country and the government should focus its attention to provision of the essential infrastructure like roads, credit, storage and marketing facilities. The provision of these facilities would allow a competitive transport industry to form and reduce losses incurred in maize marketing.

The government should withdraw from primary marketing of maize. The role of the board should be limited to maintenance of a buffer-stock and strategic reserves. The failure of the board to protect the consumers during periods of low supply can be attributed to the inappropriate consumer prices set by Ministry of Finance. The consumer prices set are far below the efficient prices (i.e. import parity prices). If the NCPB is to engage in maize marketing, then it should be allowed to compete with other private traders. This would ensure maize marketing efficiency in the country.

BIBLIOGRAPHY

1. Abbott, J.C. "Efficiency of Marketing Board Operations" in H.M.A. Onitiri and D. Olatunbosun (eds) 1974, The Marketing Board System: Proceedings of an International Conference. Institute of Social and Economic Research, Ibadan, pp.229-240.
2. Abbott, J.C. 1984, Marketing Improvement in the Developing World: What Happens and What We have Learnt. FAO, Rome.
3. Ackello-Ogutu, C. and M.O. Odhiambo, 1986: Maize Production in Kenya: Technology Constraints Associated with Output Expansion, Final Report. USAID, Kenya.
4. Booker Agriculture International and Githongo and Associates, 1983, Grain Marketing Study Volume IV. Ministry of Finance, Nairobi.
5. Bressler, R.G. (JR) and R.A. King (1970). Markets, Prices and Interregional Trade John Wiley and Sons INC. New York.
6. Buccola, S.T. and C. Sukume 1986, "Optimal Grain Pricing and Storage Policy in Controlled Agricultural Economics: Application to Zimbabwe", University of Zimbabwe, Harare.

- Byrus, T.R. and G.W. Stones, 1987: Macroeconomics Third Edition, Scott Foresman and Company, Glenview, Illinois and London, England.
- Collier, P and D. Lal 1986, Labour and Poverty in Kenya, Oxford University Press, Nairobi.
- Githongo and Associates, 1983, Grain Marketing Study. Final Report Volume IV, Ministry of Finance, Nairobi.
0. Heyer, J. " The Marketing System" in J. Heyer, S.K. Maitha and W.M. Senga (eds) 1976, Agricultural Development in Kenya: An Economic Assessment. Oxford University Press, Kenya pp.313-363.
1. Jaetzold R and H. Schmidt 1983, Farm Management Handbook, Volume IIB, Ministry of Agriculture, Nairobi.
2. Jones, W.O. 1972. Marketing of Staple Foods in Tropical Africa". Ithaca, London.
3. Kenya, 1965 National Development Plan 1965-1969. Government Printers, Nairobi.
4. Kenya, 1970 National Development Plan 1970-1974. Government Printers Nairobi.
5. Kenya, 1974 National Development Plan 1979-1983.. Government Printers, Nairobi.
6. Kenya, 1979 National Development Plan 1979-1983. Government Printers, Nairobi.

17. Kenya, 1979 Input-Output Tables for Kenya (1976),
Government Printers Nairobi.
18. Kenya, 1984 National Development Plan 1979-1989,
Government Printers Nairobi.
19. Kenya, 1986 Sessional Paper No. 1. Economic
Management for Renewed Growth.
20. Kenya, 1988 Annual Trade Report, Ministry of
Finance, Kenya.
21. Kenya, 1989 National Development Plan 1984-1993,
Government Printers, Nairobi.
22. Kenya, 1989 Statistical Abstract 1989, Central Bureau
of Statistics, Nairobi, Kenya.
23. Kakuba, T. 1986 Maize Marketing in Kenya: Factors
influencing The Marketing Efficiency of
NCPB. M.Sc. Thesis, University of Nairobi.
24. Kariungi, F. 1976. Structure, Conduct and Performance
of Kitui Local Maize Market. M.Sc. Thesis
University of Nairobi.
25. Leys, T. 1986. Underdevelopment in Kenya. The
Political Economy of Neo-Colonialism. HEB
Ltd., London.
26. Monke, E.A. and S.R. Pearson, 1989. The Policy
Analysis Matrix for Agricultural
Development. Cornell University Press, Ithaca and
London.

27. Monke, E.A. and S.R. Pearson, 1990 "Introduction to the Policy Analysis Matrix". Working Paper Series No.1, Egerton University, Njoro.
28. Monke, E.A. and S.R. Pearson, 1990 "Notes on Field Research Methods for PAM." Working Paper Series No.2, Egerton University, Njoro.
29. Mukumbu, J.M., F. Avillez, E.A. Monke and A.W. Nelson, 1990 " Social Prices for the Analysis of Kenyan Agricultural Commodity Systems". Working Paper Series No.3, Egerton University, Njoro.
30. NCPB, 1990 Liberalization Under CSRP:An Evaluation. NCPB, Nairobi.
31. Newberry, D.M.G. and J.E. Stiglitz, 1981. The Theory of Commodity Price Stabilization: A study of Economics of Risk. Clarendon Press, Oxford.
32. Nyiti, Z.A., 1976. Maize Marketing in Tanga Region, Tanganyika, with special Reference to Illiff Trading. M.Sc. Thesis, University of Nairobi.
33. Paulson, J.A. 1984. The Structure and Development of Financial Markets in Kenya, unpublished Dissertation submitted to the Food Research Institute, Stanford University.
34. Pearson, S.R. 1990 "Agricultural Growth in Kenya: Application of PAM." Working paper Series No.13, Egerton University, Njoro.

35. Rogers, J.B. and W.V. Geest, 1988. "Empirical Approaches to Public Food Grain Marketing and Food Security in East and southern Africa" FSG, University of Oxford.
36. Schmidt, G. 1979 : Maize and Beans in Kenya, the Interaction and Effectiveness of the Informal Marketing Systems". IDS, University of Nairobi, Occasional Paper No.31.
37. Schmidt, G. 1979 "Effectiveness of Maize Marketing Controls in Kenya" in J.T. Mubui (eds) 1979, "Price and Marketing Controls in Kenya" IDS, University of Nairobi Occasional Paper No. 32.
38. Stanning, J.L. 1987 " Policy Implications of Household Grain Marketing and Storage Decisions in Zimbabwe". University of Zimbabwe, Harare.
39. Technosynthesis and Coopers and Lybrand Associates, 1987. Reorganization Study: Interim Report Volume I, NCPB, Nairobi.
40. Van Zwaneberg, R. and A. King, 1975 An Economic History of Kenya and Uganda 1900-1970. McMillan Press Ltd., London and Basingstoke.
41. Wonnacott, T.H. and R. J. Wonnacott, 1977 Introductory Statistics for Business and Economics, Third Edition. John Wiley and Sons, New York, Chichester, Brisbane, Toronto and Singapore.

APPENDIX A : TABLES OF VARIOUS SURVEY RESULTSTable (i) 1990 Maize Purchases (in bags) by Mosoriot Depot in Nandi District

MONTH	FARMERS	AGENTS	CO-OP	TOTAL
FEBRUARY	48,933	3,270	4,111	56,314
MARCH	59,724	2,285	4,848	66,857
APRIL	5,784	150	192	6,126
MAY	792	-	265	1,057
JUNE	-	-	-	-
JULY	-	-	-	-
AUGUST	-	-	-	-
SEPTEMBER	-	-	-	-
OCTOBER	-	-	-	-
NOVEMBER	171	230	-	374
DECEMBER	3,038	2,034	-	5,072
TOTAL	118,442	7,942	9,416	135,800

Source: NCPB, Kapsabet, 1990.

Table (ii) 1990 Maize Purchases (in Bags) by Meteitei Depot in Nandi District

MONTH	FARMERS	AGENTS	CO-OP	TOTAL
FEBRUARY	1,917	-	-	1,917
MARCH	930	-	-	930
APRIL	46	-	-	46
MAY	6	-	-	6
JUNE	-	-	-	-
JULY	-	-	-	-
AUGUST	34	-	-	34
SEPTEMBER	10	-	-	10
OCTOBER	634	-	-	648
NOVEMBER	3,630	-	-	3,630
DECEMBER	713	-	-	713
TOTAL	7,934	-	-	7,934

Source: NCPB, Kapsabet, 1990.

Table (iii) 1990 Maize Purchases (in Bags) by Kipkarren Depot in Nandi District.

MONTH	FARMERS	AGENTS	CO-OP	TOTAL
FEBRUARY	13,955	2,293	475	16,723
MARCH	19,056	4,301	597	23,954
APRIL	3,949	625	-	4,574
MAY	510	160	-	670
JUNE	-	-	-	-
JULY	-	-	-	-
AUGUST	-	-	-	-
SEPTEMBER	-	-	-	-
OCTOBER	-	-	-	-
NOVEMBER	-	-	-	-
DECEMBER	-	-	-	-
TOTAL	37,470	7,379	1,072	45,921

Source: NCPB, Kapsabet, 1990.

Table (iv) 1990 Maize Purchases (in Bags) by Lessos Depot in Nandi District.

MONTH	FARMERS	AGENTS	CO-OP	TOTAL
FEBRUARY	7,727	-	1,183	8,910
MARCH	4,793	-	1,644	6,437
APRIL	685	-	370	1,055
MAY	353	-	-	353
JUNE	13	-	-	13
JULY	-	-	-	-
AUGUST	-	-	-	-
SEPTEMBER	-	-	-	-
OCTOBER	-	-	-	-
NOVEMBER	-	-	-	-
DECEMBER	24	-	-	24
TOTAL	13,595	-	3,197	16,792

SOURCE : NCPB, Kapsabet, 1990.

Table (v) Total Maize Purchases by the NCPB Depots in Nandi District (1980/81 - 1989/90).

YEAR	TOTAL	MOSORIOT	METEITEI	KIPKAREN	LESSOS
1980/81	146,517	50,309	15,656	28,701	51,851
1981/82	174,943	131,544	16,902	26,460	37
1982/83	247,349	211,224	18,988	17,137	-
1983/84	166,851	143,463	13,251	10,137	-
1984/85	23,760	12,043	954	10,763	-
1985/86	97,351	49,764	14,035	16,795	16,757
1986/87	150,614	115,487	10,406	9,886	14,835
1987/88	188,543	165,805	763	10,677	11,298
1988/89	245,903	223,418	2,588	9,635	10,262
1989/90	255,020	165,430	12,641	57,761	19,188

SOURCE : Nandi District NCPB field office, 1990.

Table (vi) The Nine Terminal Markets Selected for Sampling and the Number of Traders Interviewed.

TERMINAL MARKET	NUMBER OF TRADERS
NANDI HILLS	3
KAPSABET	6
CHEPSONOI	5
SEREM	4
MUDETE	5
CHAVAKALI	4
MBALE	4
KIBOSWA	4
MUHORONI	4
TOTAL	39

SOURCE: Author's Field survey.

Table (vii) The Villages Selected for Farm Survey and the Number of Farmers Interviewed in each Village

VILLAGE	DIVISION	NO. OF FARMERS
KABIYET	MOSOP	16
MOSORIOT	MOSOP	18
ARWOS	KILIBWONI	15
LESSOS	KILIBWONI	18
SURUNGAI	KAPSABET	13
NAMGOI	KAPSABET	11
TOTAL		91

Source: Author's Field Survey.

Table (viii) Prices of maize in Rural Markets (in Sh/Bag) as Recorded by MOA -Aldai Division Nandi, District (1990).

MONTH	CHEMASE	KOBUJOI	SEREM*	AVERAGE*
APRIL	320	320	320	320
MAY	320	320	320	320
JUNE	320	320	320	320
JULY	320	320	320	320
AUGUST	280	280	308	289
SEPTEMBER	200	200	200	200
OCTOBER	280	240	240	253
NOVEMBER	280	280	280	280
DECEMBER	300	300	280	293

Table (ix) Prices of maize (in Sh/Bags) in Rural Markets as Recorded in Tinderet Division in Nandi District (1990)

MONTH	NANDI HILLS	LABUIYWA	SIRET	AVERAGE*
APRIL	384	240	336	320
MAY	384	240	360	328
JUNE	384	336	360	360
JULY	384	384	360	376
AUGUST	384	360	360	368
SEPTEMBER	384	300	384	356
OCTOBER	384	300	384	356

Table (x) 1990 Prices of Maize (in Sh/Bag) in Rural Markets as Recorded by MOA, Kilibwoni Division, Nandi District.

MONTH	LESSOS	KILIBWONI	ARWOS	AVERAGE
APRIL	250	250	250	250
MAY	-	-	-	-
JUNE	330	300	300	300
JULY	330	300	306	312
AUGUST	360	300	330	330
SEPTEMBER	270	300	300	290
OCTOBER	270	300	330	300
NOVEMBER	210	240	192	214
DECEMBER	210	240	252	234

Source: MOA, Kapsabet, 1990/91.

Table (xi) Value and Quantities of Gunny Bags Imported in Kenya (1986-1988)

YEAR	VALUE (K£'000)	QUANTITY ('000)	VALUE PER BAG
1986	4,205	18,100	0.232
1987	4,577	12,165	0.376
1988	1,270	3,000	0.423
AVERAGE	-	-	0.343

AVERAGE PRICE OF BAG KSHS.6.90

Source: Stastistical Abstract, 1989

Table (xii) Cif Price of Yellow maize at Port of Mombasa
(1962-1986)

Year	Cif Price (US. Dollar/90 kg Bag)
1962	5.73
1963	6.39
1964	6.43
1965	6.49
1966	6.55
1967	5.93
1968	5.55
1969	6.22
1970	7.58
1971	6.36
1972	6.41
1973	12.36
1974	14.78
1975	12.48
1976	11.76
1977	10.30
1978	10.98
1979	14.18
1980	15.69
1981	15.74
1982	13.01
1983	15.57
1984	15.68
1985	14.10
1986	10.80

Source: Ministry of Finance

Table (xiii) Statistics of Important Measurements Taken in the Field

Measurement	Unit	Mean	S.E.	Median	Mode	S.D
Cost of handling	Ksh/bag	6.63	0.56	8.00	8.00	2.75
Life span of a gunny bag	months	3.71	0.56	2.00	1.00	3.47
Maize purchases	bags month	27.13	1.65	20.00	15.00	28.16
Producer price of maize	Ksh/bag	268.03	7.20	290.00	300.00	44.39
Purchase Price of maize in local market	kshs/bag	277.31	5.46	270.00	270.00	27.83
Consumer Price in local market	Kshs/bag	298.46	6.45	270.00	270.00	48.31
Consumer price at Terminal Market (Harvesting season)	ksh/2kg tin	6.85	0.06	6.50	6.50	0.799
Consumer price at Terminal market (before harvest)	Kshs/2kg tin	7.89	0.09	8.00	8.00	1.09
Distance from terminal market to farm	km	33.50	4.94	19.00	15.00	27.93
Local market charges	ksh/bag	9.29	1.10	4.50	4.00	6.77

Source: Author's Estimates

APPENDIX B: QUESTIONNAIRES

QUESTIONNAIRE FOR TRADERS IN TERMINAL MARKET .

A. General information

1. Name of the trader: _____
2. Local Market/Urban centre: _____
3. Location of the Market: _____
4. Dates of Accounting Year _____

B. (1) Monthly Purchase and sales
(July 1990 - March 1991)

Months	Purchases (Bags)	Unit Cost (Ksh/Unit)	Sales (Bags)	Unit cost (Ksh/Unit)
July 1990				
August "				
September "				
October "				
November "				
December "				
January 1991				
February "				
March "				

(2) (i) Where do you buy your maize (Name of Village)

(ii) What is the distance of the above place to selling
centre (km)

C: Transport and Handling costs:

(1) Fixed inputs

(i) What means of transport do you use to bring your maize to the Market?

A - Matatu B - Bus C - Bicycle D - Donkey

E - Own Vehicle F - Others.

(ii) If the means of transport is owned by the trader, then:

a) What is the purchase date? _____

b) What is the purchase price? _____

c) What is the current value? _____

d) What is the salvage value? _____

e) Expected useful life? _____

f) Estimated replacement cost? _____

(iii) If the trader uses public means (i.e. buses, matatus, etc):

a) How much were you being charged before the recent increase in prices of fuel? _____

b) How much are you being charged now? _____

(iv) What containers do you use to handle your maize?

A - Traditional bag (Kiondo).

B - Modern bags.

C - Others (specify).

(v) What is (a) purchase price of the containers? _____

b) Purchase date? _____

c) Salvage value? _____

d) Expected useful life? _____

e) Estimated replacement cost _____

(vi) What containers do you use as a unit of measurement?

(vii) What is (a) purchase price of the container? _____

b) purchase date? _____

c) Salvage value? _____

d) Expected useful life? _____

e) Estimated replacement cost? _____

(viii) What other equipments do you use in transportation and sale of maize?

<u>Equipment</u>	<u>Purchase date</u>	<u>Purchase price</u>	<u>Expected life</u>
-----	-----	-----	-----
-----	-----	-----	-----
-----	-----	-----	-----
-----	-----	-----	-----
-----	-----	-----	-----

(2) Direct Labour

(i) Do you employ people to help you in handling, transporting and selling of maize?

A - Yes B - No.

(ii) If yes, how many people do you employ?

(iii) How much do you pay them?

a) payment of the handlers at the farm _____

b) payment to the drivers if the means of transport is owned by the trader _____

c) payment to those involved in selling _____

d) payment to others (specify) _____

(iv) How many hours is each worker engaged in his/her work?

- a) handlers _____
- b) drivers _____
- c) sellers _____
- d) others _____

3. Intermediate inputs

(i) If the means of transport is owned by the trader:

- a) How much fuel do you use in transport?

- b) How much oil do you use in transport? _____
- c) What is the cost of fuel? _____
- d) What is the cost of oil? _____
- e) What is the maintenance cost? _____

(ii) Other intermediate inputs (specify).

<u>Input</u>	<u>Cost/unit</u>
_____	_____
_____	_____

D. STORAGE COSTS:

(1) Fixed inputs:

(i) Do you store the maize that is awaiting to be sold?

A - Yes B - No.

(ii) Where do you store this maize?

A - Granary B - Modern store C - Own house

(iii) What is the construction cost of the structure where you store the maize? _____

(iv) What is the construction date? _____

(v) What is the expected useful line of this structure?

(vi) If you are to construct another structure, how much would it cost you? _____

(vii) How do you stone your maize?

- A - in bags (traditional or modern bags)
- B - No bagging done.
- C - others (specify).

(ix) If bagging is done, what is:

- a) The purchase price of the bag? _____
- b) purchase date? _____
- c) current price of the bag? _____
- d) salvage value? _____
- e) expected useful life? _____

x) Other fixed inputs used in storage (specify)

<u>Input</u>	<u>Purchase date</u>	<u>Purchase price</u>	<u>Salvage value</u>	<u>Current price</u>	<u>Expected useful life</u>
_____	_____	_____	_____	_____	_____
-----	-----	-----	-----	-----	-----
-----	-----	-----	-----	-----	-----
-----	-----	-----	-----	-----	-----
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(2) Direct Labour

(i) Have you engaged a storeman who is engaged in no other work except managing the store?

A - Yes B - No.

(ii) If yes, how much do you pay him or her? _____

(iii) How long does he work per day? _____

(iv) Have you engaged handlers in your store?

A - Yes B - No.

(v) If yes, how many are they? _____

(vi) How much do you pay them? _____

(vii) How long do they work per day? _____

(3) Intermediate inputs:

(i) What chemicals do you use in your maize store?

<u>chemical</u>	<u>quantity</u>	<u>price/unit</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

(ii) What is the cost of maintaining your store?

(iii) What are the storage losses? _____

E. MISCELLANEOUS COSTS

- (i) Electricity charges? _____
- (ii) Water charges? _____
- (iii) Market charges? _____
- (iv) Others (Specify) _____

Questionnaire for Farmers**A. General Information**

Name of Farmer _____

Division _____

Location _____

Village _____

Name of Interviewer _____

Date _____

B. Main Information

1. What is the size of your farm in acres: _____

2. Acres planted with maize (1990) _____

3. How much maize was harvested in Bags _____

4. When was the maize harvested (Month) _____

5. Where was the maize sold?

A - Direct to NCPB

B - Sold to Private Traders

C - Sold in rural markets by the farmer.

5 If maize was not sold to NCPB give reasons why it was not?

A - No access to NCPB due to transport problems

B - Delayed payment by NCPB

C - Too low prices

D - Maize too little

E - Not aware that NCPB exists

F - Others (specify)

6. How much maize did you sell (in Bags) _____

7. What was the selling price in Ksh/Bags ? _____
8. Do you engage handlers at the farm ?
- A - Yes
- B - NO
9. If yes how much do you pay them per bag of maize handled ?

10. Do you employ casual labour in your farm?
- A - Yes
- B - No
11. How much do you pay them per day? _____