REFORMS OF THE MAIZE MARKET SYSTEM IN ZAMBIA: ISSUES OF PRICE AND MARKET POLICIES, COOPERATIVES AND INTERPROVINCIAL TRANSPORTATION

by

F. Kapola Sipula

A DISSERTATION

Submitted to the
Michigan State Universsity
in partial fulfilment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Agricultural Economics

1993

ABSTRACT

REFORMS OF THE MAIZE MARKET SYSTEM IN ZAMBIA: ISSUES OF PRICE AND MARKET POLICIES, COOPERATIVES AND INTERPROVINCIAL TRANSPORTATION

by

F. Kapola Sipula

Zambia embraced market liberalization as a strategy for economic development in 1980 due to failings of the price policies and public marketing enterprises which depended on subsidies and became a major drain on government revenues. This dissertation presents three issues related to maize market liberalization namely: 1) Evolution of the Pricing and Marketing Policies; 2) The Role of Primary Cooperative Societies in Maize Marketing; and 3) Interprovincial Maize Transportation.

The past agricultural policies were characterized by uniform pricing that did not reflect transport costs and public monopoly marketing organizations. The system resulted in mis-allocation of resources. Maize production pattern changed from major consumption areas and nearby regions of Central, Copperbelt, Lusaka and Southern towards remote Eastern and Northern provinces. On-farm storage and rural milling were discouraged and consequently, marketing costs increased causing subsidy requirements to increase.

To reduce subsidy costs, the government attempted several market coordination mechanisms including cooperatives whose performance was dismal too. In the four-tier cooperative system, the Primary Cooperative Societies were surveyed to study their potential to carry out basic market functions under the reforms. The societies were found to be solvent but barely so and had serous liquidity problems. Credit gaurantees for investments in their education and infrastructure was recommeded for the short run.

Transportation, a major market coordination cost component was studied using a linear programming model. The results re-affirmed that major maize consumption provinces and those in close proximity had a comparative advantage over remote provinces based on transportation costs. The remote deficit provinces would also benefit from producing maize from within and/or other grains. In the long run, the change in production patterns will minimize the transportation costs and help keep food prices low.

The dissertation supported the need for market liberalization for an efficient maize market coordination mechanism and as a strategy for economic growth of Zambia.

DEDICATION

This dissertation is dedicated to my wife Pumulo Muyatwa

and my two lovely sons Kachinga and Chisulo Kapola

ACKNOWLEDGEMENTS

It is not possible to itemize the quantity and quality of contributions made to this dissertation by many people involved. I would, however, wish to express my deep gratitude to Professor James Shaffer for his generous guidance and suggestions as my advisor. I also extend my appreciation and respect to him for the support outside of the academic environment afforded to me and my family. Great appreciation is extended to Professor John Staatz for being there for me during the most trying time of my study program. Special thanks go to professors Carl Eicher and Richard Bernsten for their support received during my studies. I would also like to thank my other members of the committee, Professors Mike Weber and Carl Liedholm. Thanks go to Michigan State University, Department of Agricultural Economics, Food Security in Africa Cooperative program for their financial support for research.

I would like to thank the USAID/ZATPID II for financial support of my whole study program and special appreciation goes to Dr. Florence Chenoweth for the great encouragement in the course of my studies. Thanks also go to the University of Zambia, Rural Development Studies Bureau, the Ministry of Cooperatives and the research team for their hard work on the research project.

In Winnipeg, my gratitude goes to the University of Manitoba, Department of Agricultural Economics and Farm Management for the support and facilities accorded to me. I extend thanks to the Zambian and New Apostolic Church communities, Drs. Rubinger and Dow G. and their staff at the Health Sciences Centre for their caring.

I am deeply indebted to my father, G. K. Sipula, my mother, E. M. Namusamba, my late sister, Namulinda, my late uncle, K. C. Sipula and the entire family for their continuous support and encouragement throughout my years of education.

And finally, I dedicate this thesis to my academic partner and wife Pumulo and to my sons Chisulo Kapola and Kachinga for their sacrifice, traquility, and patience.

TABLE OF CONTENTS

Page

Page

LIST OF TABLES

Page

Page

LIST OF FIGURES

ACRONYMS

BF	Breakfast maize meal
CFB	Commercial Farmers Bureau
CSO	Central Statistics Office
DCU	District Cooperative Union
FAO	Food and Agricultural Organization of the United Nations
GDP	Gross Domestic Product
GNP	Gross National Product
GRZ	Government of the Republic of Zambia
ZK	Zambian Kwacha (currency)
LINTCO	Lint Company of Zambia
MAWD	Ministry of Agricultural and Water Development
MOC	Ministry of Cooperatives
NAMBoard	National Agricultural Marketing Board
NCZ	Nitrogen Chemicals of Zambia
NMC	National Milling Company
OLR	Old Line of Rail
PCS	Primary Cooperative Union
PIC	Prices and Incomes commission

RM	Roller maize meal
ZAMSEED	Zambia Seed Marketing Company
ZCF	Zambia Cooperative Federation Limited
ZCF/FS	Zambia Cooperative Federation/Finance Services

Provinces

C	Central Province
B	Copperbelt Province
E	Eastern Province
L	Luapula Province
K	Lusaka Province
N	Northern Province
T	North Western Province
S	Southern Province
W	Western Province
I	Imports from the rest of the world

Commonly Used Units

ZK	=	US$ 0.0017 ZK, July, 1993
Bag of Maize	=	90 kilogram weight
Weights (Kg)	=	Kilogram
Distance (Km)	=	Kilometres
Rainfall (mm)	=	Millimetres

CHAPTER ONE

THE EVOLUTION OF MAIZE PRICING AND MARKETING POLICIES

Introduction

The structural adjustment efforts under way in many African countries since the 1980s have sought to liberalize existing government restrictions on markets. As a result, the relative roles for the private and public sectors in the economies are being debated. This has involved redefining the role of the state in the economy and achieving stability with respect to macroeconomic variables such as balance of payments, government budget, the rate of inflation, the growth of the national income and income distribution. Zambia is one country that has seriously attempted such market reforms beginning in 1980.

Zambia manifests a dualistic economy, with relatively developed, densely populated urban areas and sparsely populated undeveloped rural areas. The country depends heavily on the mining sector, whose contribution to the economy has been declining. The economy has consequently been declining, forcing the country to rely more on domestic borrowing and external financing for development projects.

The country suffered from a combination of significant external shocks and domestic policy errors which have culminated in a severe economic and political crisis in recent years. There has been a rapid deterioration in balance of payments,

budget balance, per capita income and the social and physical infrastructure such as health, education, housing and transportation services.

Recognizing that earlier economic policies were not conducive to realizing national goals of economic diversification and self-sufficiency in staple food production, the government undertook changes. The main thrust of these was to decontrol and liberalize the economy from the high degree of direct state participation and regulation that had existed since independence in 1964. The agricultural sector was identified as the priority sector for development. Improvement in the agricultural sector is important in order to make full use of the land and labour resources and in increasing incomes and foreign exchange earnings.

In the past, agriculture has contributed about sixteen percent to the country's GDP. The government has begun formulating and implementing a policy and institutional reform program that will put agriculture as the leading sector. In addition wholesale and retail prices of all agricultural commodities including maize and maize meal prices have been decontrolled and Government monopoly marketing institutions have been abolished, with markets opened to private participation at all levels.

Maize is by far the most important agricultural commodity in Zambia. It is the staple food and accounts for seventy percent of the marketed value of agricultural commodities. Any changes in the maize policy is bound to affect not only the agricultural sector but the economy as a whole. The centerpiece of the reforms has been the liberalization of the maize market. The aim is to revitalize the sub-sector under the revised set of production and marketing policies. One of the

major changes will be the withdrawal of maize related government subsidies which had been increasing uncontrollably. A large percentage of the subsidies went toward market coordination functions.

The dissertation discusses the maize sub-sector in relation to price and market policies, cooperatives and interprovincial transportation. Chapter one presents an overview of the country, looking at the geographic and demographic, characteristics, economics, the agricultural sector and the maize sub-sector. Chapter two reviews the past pricing and marketing policies of the country. Chapter three draws lessons for the past agricultural policies and presents likely impacts of the market reforms in Zambia. Chapter four provides a review of the cooperative in maize marketing in Zambia. The chapter presents a problem statement, the objectives of the study on cooperatives and reviews the past role of cooperatives. Chapter five presents methodology of the cooperative study and Chapter six, the results. Chapter seven introduces the interprovincial maize transportation problem, objectives, model framework and methodology. Chapter 8 presents results of the interprovincial transportation and the last chapter, Chapter nine includes a summary conclusion.

1.1. Geographic and Demographic Characteristics

Zambia is a landlocked country occupying an area of 752,614 square kilometers. The country shares borders with Zaire, and Tanzania in the north, Malawi and Mozambique in the east, Zimbabwe and Botswana in the south, Namibia in the South West and Angola in the West (See map, Figure 1.).

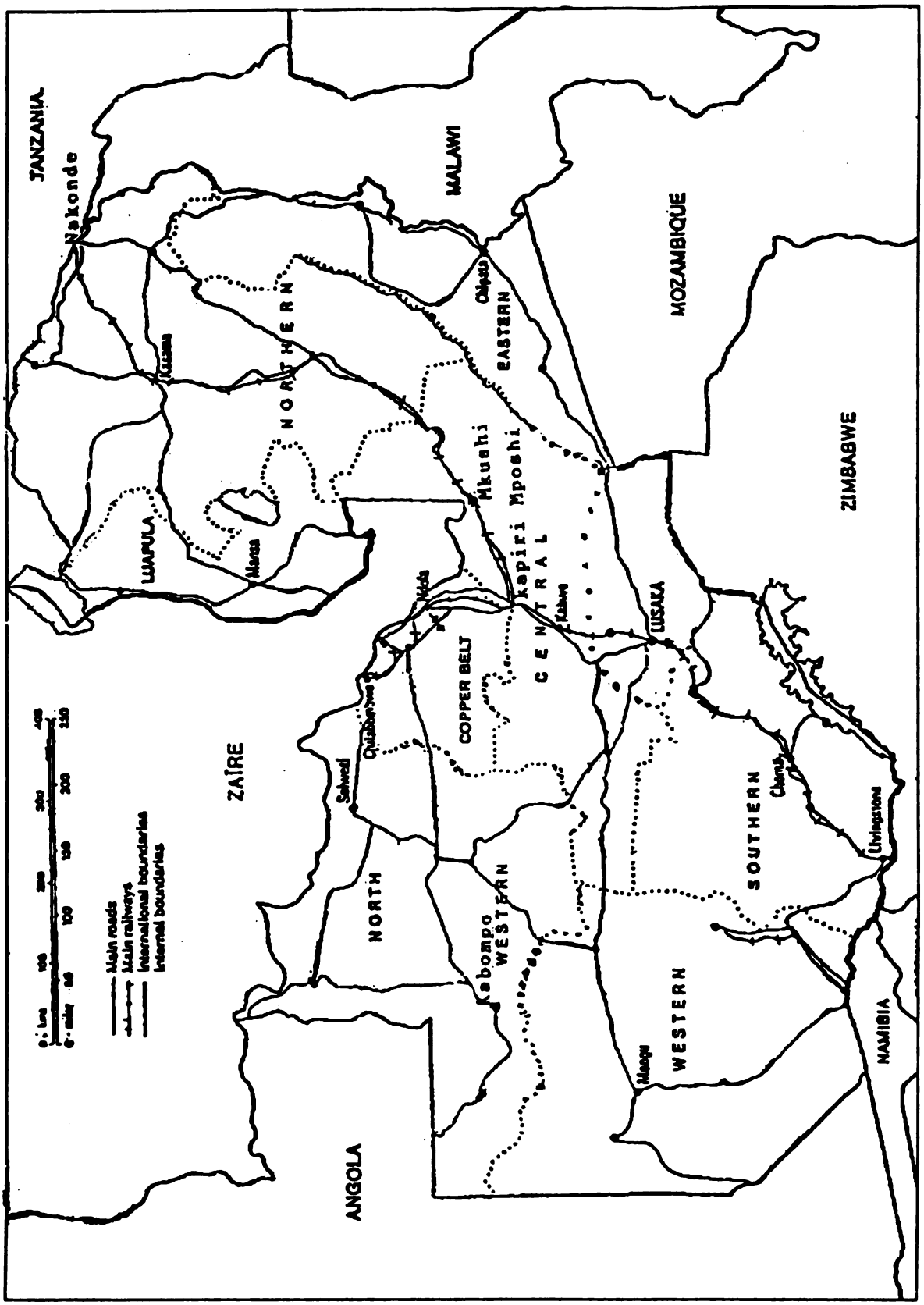


Figure 1 Map of Zambia: Provinces, Districts, Major Road and Rail Links.

Zambia has a tropical climate and vegetation with three distinct seasons, namely: the warm-wet season stretching from November through to April, the cool dry winter season stretching from May to August and the hot dry season from September to October. The country is normally divided into four ecological zones. These include the northern rainfall zone, with an area of 350,000 square kilometers. This zone comprises the Northern, Luapula, Copperbelt, and parts of North Western provinces. It has highly leached soils with rainfall ranging from 1,100 to 1,400 millimeters. The soils are relatively infertile. The zone is suitable for the production of perennial tree crops and has limited potential for cassava, cotton, tobacco, maize, sorghum, millet, beans, rice and beans (Malambo, 1987, p. 32).

The second zone is the western semi-arid plains, with an area of 208,000 square kilometers. The zone comprises the Western and parts of the North Western provinces. The rainfall is low, averaging about 600 to 800 millimeters, and the area is suitable for cattle rearing.

The third zone is the Central, Southern and Eastern plateaus with an area of 94,000 square kilometers. The rainfall ranges between 600 and 1,000 millimeters. The zone is the most fertile in the country. The area is suitable for many crops, including maize, tobacco, cotton, sunflower. It is also suitable for livestock production.

The fourth zone is the Luangwa-Zambezi rift valley, with an area of 101,000 square kilometers. Rainfall is below 800 millimeters in this zone. It is characterized by valleys with hot and humid temperatures. Sorghum, millet and cotton are suitable

(Malambo, 1987, p. 32). The zone lies in parts of the Southern, Central, Lusaka and Eastern provinces. The zone has limited agricultural potential.

Administratively the country is divided into nine provinces, namely: Central, Copperbelt, Eastern, Luapula, Lusaka, Northern, North Western, Southern and Western (See Figure 1). There is, however, no direct relationship between the ecological zones and the administrative regions. The high agricultural potential zones cover parts of Central, Copperbelt, Eastern, Lusaka and Southern provinces.

The population of the country is currently estimated at 7.8 million people (Table 1.1). The Copperbelt province has the largest population followed by Lusaka province. The two urban areas account for over 35 percent of the total population.

Population density is high in the Copperbelt and Lusaka provinces. Copperbelt has 50.4 and Lusaka province has 55.2 persons per square kilometer. The rural areas, on the other hand, have only between 14.1 in the Eastern province to 3.0 persons per square kilometer in the North Western province. The population densities in the rural areas indicate the vastness of the country whereas the urban densities show the concentration of people within a limited area.

According to the census of 1990, 52 percent of the population was in the urban areas.[1] The Copperbelt province accounts for 43.5 percent of the total urban population. Lusaka accounts for 31.7 percent. The two provinces thus account for over 75.0 percent of the urban population. The urban population relies on marketed

---

[1]Urban areas are defined as "all areas with a population of more than five thousand inhabitants most of whom are involved in non-agricultural activities and sharing such facilities as piped water, electricity, post office and police station" (CSO, country profile: Zambia 1989/1990, December, 1990, p. 5).

Table 1.1 Provincial Size, Total Population, Distribution, Growth Rate and Density.

Province	Area ('000 sq Km)	Total Population	% Distribution of Population	Growth Rate (1980-1990)	Density
Central	94	725,611	9.3	3.5	7.7
Copperbelt	31	1,579,542	20.2	2.3	50.4
Eastern	69	973,818	12.5	4.0	14.1
Luapula	51	526,705	6.7	2.2	10.4
Lusaka	22	1,207,980	15.5	5.6	55.2
Northern	148	867,795	11.1	2.5	5.9
N. Western	126	383,146	4.9	2.3	3.0
Southern	85	946,353	12.1	3.4	11.1
Western	126	607,497	7.8	2.2	4.8
Zambia	753	7,818,447	100	3.2	10.4

Source: CSO, 1990c, 1990d.

food commodities from the rural sector. The importance of marketing can not be over-emphasized, as the distribution and density of the population indicates.

The national population growth rate was recorded at 3.2 percent between 1980 and 1990. The population density at the national level increased from 5.3 in 1969 to 7.5 in 1980 and to 10.4 persons per square kilometer in 1990. Population growth rates per province are shown in Table 1.1. The highest population growth rate between 1980 and 1990 was recorded by Lusaka province at 5.6 percent. This was due to the natural population growth through high birth rates (accompanied by lower death rates) and to rural-urban migration.

The Eastern province was next in the population growth rate for the given time period, with 4.0 percent. The Copperbelt had a low population growth rate of

2.3 percent, similar to the less-populated rural areas. This indicated a slow down in rural-urban migration rates. This is true for the urban areas in general.

The background so far presents the general physical challenges, obstacles and opportunities that the Zambian economy faces, particularly the agricultural sector. Briefly these include:

i) the landlocked position of the country raises the costs to participate in world markets. Neighbors are largely agricultural countries capable of producing a similar range of commodities and suffering similar climatic catastrophes. This has happened in the past three years with severe droughts in the whole of the southern Africa region. The scope for agricultural exports to neighboring countries is, therefore, limited.

ii) Zambia's low population density and dispersed rural settlement patterns has disadvantages. It raises the cost of providing services to agriculture and the cost of extracting agricultural commodities.

iii) the high proportion of the population that resides in the urban areas requires producing a relatively large food surplus from widely distributed and sparse rural populations to feed the urban population.

iv) large sections of Zambia's labour force are urban and do not have the agricultural or marketing skills or experience of rural living. People may be slow to accept that they have few alternatives to becoming involved in agricultural production either as independent smallholder, agricultural laborers or traders. The transfer of labour to agriculture employment is, therefore, unlikely. The regional dispersions, population densities,

urbanization, vastness of the areas are key challenges for production and marketing of agricultural products.

1.2. Economic Characteristics

The economy is largely based on its majority state-owned copper industry, which is the only significant foreign exchange earner. The industry accounts for one-third to one-half of government revenues.

The country's main export is copper. In 1988, for example, copper exports accounted for 85.2 percent of the total value of exports (CSO, 1990c, p. 14). There has been a relative decline in the mining sector's GDP share from 37 to 14 percent from 1970 to 1985 (Jansen, 1990, p. 6). The heavy dependence on copper for Zambia's foreign exchange earnings has resulted in a very volatile and poor economic performance due to fluctuations in the world copper prices. In addition, copper production in the country has been going down. In 1975, copper prices dropped by 40 percent and the situation was made worse by increased oil prices which raised import costs. The effect was particularly severe for imported inputs, on which Zambia depends heavily.

Zambia's major imports include mineral fuels, chemicals, machinery and transport equipment and food and beverages. In 1988, the highest annual growth rate of imports was that of mineral fuels, with petroleum and petroleum products rising by 17 percent. This was followed by chemicals with 16 percent.

Overall the economic performance has been weak particularly since 1974. The real GDP grew at an annual rate of 5.6 percent from 1965 through 1974. Since

then the growth rate has been about nil. In 1965 real per capita GDP was 518 kwacha and was 252 in 1985. In 1989 the per capita GDP had dropped to 148 kwacha (Table 1.2). In the last ten years (from about 1982) the real GDP per capita has declined by about 2.5 percent annually. With a rapid population growth rate and slow economic growth, the real per capita GDP has declined to seriously low levels.

To lessen the heavy dependency on mineral export earnings, the government embarked on a policy to restructure and diversify the economy. The development of agriculture was identified as the key sector for the strategy. Wood (1990, p. 40) observed several reasons why the agricultural sector was and should be the engine of growth for Zambia. First, Zambia could not afford to use its scarce foreign exchange resources to import foodstuffs that could be grown locally. Financial problems, for example, threatened to disrupt food imports on several occasions, with the consequent threat of the urban unrest. The government could not remove this threat.

Second, the increasing government deficit required it to seek foreign funding, which in turn led to recourse to the World Bank (WB) and the International Monetary Fund (IMF) with their stringent conditions for loans. It became desirable to remove maize subsidies to meet the loan conditions and for the long-run economic development. Third, agriculture has become increasingly important to the economy in view of the poor prospects for copper. Agriculture and agricultural industries could generate employment, foreign exchange and government revenue.

The terms of trade between the rural poor and the urban dwellers had been worsening against the rural. Income for the rural population was only a quarter of

Table 1.2 Real GDP and Real Per Capita GDP: 1964-1991

Year	GDP (ZK million)	Per Capita GDP (ZK million)	Real Per Capita GDP
1983	3,872	628	207
1984	4,556	714	234
1985	6,001	908	252
1986	10,017	1,463	242
1987	16,297	2,297	252
1988	21,063	2,864	173
1989	33,701	4,419	148

Source: GRZ 1990a (Real per capita GDP base year 1975=100).

the urban incomes in 1978 (Wood, 1988, p. 17). Urban produced products were also becoming more dear. It was imperative to arrest the rural urban drift brought about by these factors and the cheap food policy. The agricultural sector is important for several other reasons, among which is the fact that the sector could be less dependent on the imported inputs compared to many other sectors.

Although the maize sub-sector has been making an important contribution to the economy, substantial opportunity for improvement in rural food security and economic efficiency of production and marketing would also make a major contribution to reducing the government's financial difficulties.

1.3. The Agricultural Sector

The agricultural sector as it exists today is dualistic. There are a relatively few but well-developed large-scale commercial farms, mainly in areas along the Old Line of Rail (OLR) and in the Eastern province. The low-cost maize production areas are comprised of 95 percent of Central province, and 85, 80, 70 and 40 percent of Eastern, Southern, Lusaka and Western provinces, respectively (FAO, 1991, p. 136). Commercial farming has concentrated in these areas. The commercial farmers are highly mechanized and usually highly specialized. They number about three thousand in the whole country (GRZ, 1990a, p. 86). The commercial farmers cultivate over forty hectares annually.

Between 1964 and 1982 the government tried to achieve its food production targets by encouraging a variety of production forms which included cooperatives, state and parastatal farms (Wood, 1990, p. 3). These institutional farms owned and operated by the government directly or as parastatal entities were classified as commercial farms as well.

The small-scale farms scattered all over the country are a much larger number of producers. This group sometimes includes the emergent farmers, who are basically upcoming medium size commercial farmers. Emergent farmers number 67,000 (about 10% of all farmers) and cultivate between five and twenty hectares on average. They grow crops for subsistence and for the market. Emergent farmers use mostly family labour, oxen and/or hired tractors. This category of farmers is considered separate from the small-scale farmers (also known as traditional or subsistence farmers).

Small-scale farmers number about 580,000 (80% of farms) according to 1988/89 estimates. The small-scale farmers cultivate on average two hectares (or less than 5) per household using family labour and simple hand tools. Maize, sorghum, millet and cassava are their principle food crops (Malambo, 1987, p. 36). The estimated number of farms by size, category and region is presented in Table 1.3. Southern, Eastern and Central have the largest number of commercial and emergent farms.

About 50 percent of the maize is produced by the small-scale farmers. The emergent farmers contribute 27 percent of the total maize output. The remainder comes from the commercial farmers, who put in 16 percent, and the institutional farms, which provide 7 percent. In the Eastern province, 55 percent of the maize comes from the small-scale farmers. Central gets 40 percent of its maize from small-scale farmers and 33 percent from emergent farmers. Southern province, with the largest number of emergent farmers, gets most of its maize from this category. Forty-two per cent is contributed by emergent farmers and only 27 percent comes from small-scale farmers. Luapula, North Western, and Western provinces get over 80 percent of their maize from small-scale farmers.

Small-scale farmers, therefore, provide an important share of maize output in almost all the provinces. Together with the emergent farmers, this category of farmers provide the country with over 70 percent of the total maize produced. The numerous and various locations of small-scale farmers causes a major marketing challenge for crop extraction and food and input distribution. The market has to deal with small quantities of the commodities scattered all over the country.

Table 1.3 Estimated Number of Farmers by Size, Category and Province: 1990

Province	Small-Scale	Emergent	Commercial	Institutional	Total
Central	47,981	9,658	874	383	58,896
Copperbelt	15,315	749	123	157	16,344
Eastern	182,262	23,645	315	311	206,533
Luapula	89,871	338	15	290	90,514
Lusaka	22,488	1,157	163	94	23,902
Northern	75,478	5,380	91	411	81,360
NWestern	36,817	217	18	472	37,524
Southern	64,145	22,977	1,417	534	89,073
Western	47,914	2,656	39	197	50,806
Zambia	582,271	66,777	3,055	2,849	654,952

Source: GRZ, 1990a.

All the categories of farmers in Zambia utilize in total only one sixth of the arable land. There is, therefore, a significant opportunity for the agricultural industry to contribute to the development of the economy. In the past, farming, forestry and fishing industries have been contributing between 12 to 16 percent to GDP. Between 1970 and 1974 the farming industry contributed 12 percent to GDP. For 1975 to 1979, 1980 to 1982, and 1983 the contributions were 15, 14, and 14 percent respectively (See Table 1.4). Farming hardly contributed more than 16 percent to GDP until 1990, belying the sector's potential and importance to the country.

Despite the steps taken and the seemingly high priority accorded to the sector in the past, the performance has been far below potential in both food and raw material production. The major reason could be the limited public investment directed to agriculture and rudimentary infrastructure such as roads, extension, and

Table 1.4 Sectoral Percentage Shares in GDP: 1983 - 1991

	SECTOR			
Year	Agriculture	Mining	Service	Other
1983	14.0	15.0	48.0	23.0
1984	14.5	13.7	46.8	25.0
1985	13.1	15.6	44.8	26.5
1986	12.2	18.2	43.3	26.3
1987	11.0	13.6	44.1	31.3
1988	16.1	10.4	39.3	34.2
1989	17.6	12.9	41.8	38.7
1990	17.8	n.a	n.a	n.a
1991	18.7	n.a	n.a	n.a

Source: Malambo, 1988; CSO, 1990b; Weekly Post, 1992.

irrigation. Government expenditures have been directed more at consumption than capital investments (Mumeka, 1991, p. 73).

The major aims of the Zambian agricultural policy from independence to 1992 were driven more by political rather than economic factors.[2] Securing the urban food supply at a "reasonable" price had been the major goal. As a result an index of per capita food production which had reached a peak of 112.4 in 1976 dropped to 72.2 in 1988[3] (Jansen, 1988, p. 221). There has been need to increase food production in order to meet the rapidly growing urban and rural demand. Maize is

[2]This was so until the new government took over at the end of 1991.

[3]Per capita food production (measured in calories) involves total food production divided by the total population. Given food requirements per person, the index shows whether the country is self-sufficient if the number is hundred or higher.

the major grain, but Sorghum and millet contribute about 10 percent of total marketed grain production. Wheat, a crop grown mainly by commercial farmers, has gained importance but little progress has been made to meet demand from local production. Cassava is an important drought-resistant crop in the Luapula, Northern, North Western, and Western provinces.

Cotton, groundnut, soybean and sunflower have been produced as cash crops and the marketing performance has been dependent on the performance of the parastatal marketing organizations handling each crop (except for groundnut). Cotton particularly did well by small-scale farmers who also produced most of the sunflower and groundnut.

Export crops, such as tobacco, coffee and tea, have performed very poorly. Tea and coffee are mostly produced by parastatal farms. Tobacco is produced mostly by the commercial farmers and earns the country about one percent of total export earnings (agriculture as a whole earns about three percent only). Livestock production is limited, but includes mostly cattle, goats, poultry and pigs.

The potential for increasing production of crops and livestock is considered to be very high. As stated earlier, only one sixth of arable land was under cultivation and in 1990, the unemployed labour force was estimated at 1.2 million people (FAO, 1991, p. 1). Not only is increased production necessary but an efficient marketing system is required, particularly for the staple food-maize.

1.4. The Maize Subsector

Maize accounts for 70 percent of the cultivated crop area and Small-scale farmers obtain 90 percent of their cash receipts from the crop sales (GRZ, 1990b, p. 1). Over 90 percent of the grain produced in Zambia is maize, making it the most important economic commodity after copper.

The production performance of maize is considered successful only under favorable weather conditions, when the country has been able to produce sufficient maize to meet its needs, such as in the 1970s, 1988 and 1989. Production, therefore, has fluctuated considerably depending on weather conditions.

Maize has contributed to improved food security of some rural households by increasing their land productivity, increasing their income and providing them with an opportunity to enter the cash economy. Despite such success in maize production at the national level and in some provinces, some rural maize growing households have been exposed to food insecurity.

Agricultural product prices in the 1980s continued to be controlled directly or indirectly, but manufactured goods and services were not. This worsened the terms of trade between the rural and the urban areas (GRZ, 1990a). The gap in real incomes widened against the rural dwellers (Sipula, 1987). In addition, food products moved from the rural areas to the urban areas through the official marketing channels, but there was no similar mechanism to move the food into the rural areas. The rural areas were thus exposed to food insecurity either through lack of food on the market and/or higher prices or costs to obtain food from urban centers.

The measure of success for maize production, therefore, has been judged on the basis of national levels of quantities produced and marketed. The production of maize has shown an increasing trend since 1964. Table 1.5 shows the estimated quantity of maize produced and marketed each year from 1964 to 1990. Maize production in the 1980s expanded significantly and peaked in 1988, with a record marketed production of 14,990,000 bags of 90kg weight. The increased output was attributed to good weather, increased area devoted to the crop, and increased productivity due to increased use of the subsidized fertilizer input (Jansen, 1988, p. 34, GRZ, 1990a, p. 40). A large percentage of the increased production was attributed to increase in area put under maize. For example, in 1980 the area was 335,000 hectares and in 1990, it had increased by 96.8% to 659,000 hectares.

Average yields per hectare per year remained stable changing by only 9.6% from 1980 to 1990. The erratic yields has been mainly due to the weather and government policies. In addition, erratic changes in producer prices have lead to some loss of confidence amongst farmers and to doubts concerning the prospects for a sound marketing and pricing policy which would encourage agricultural production. This was particularly important between 1985 and 1991 when there was no clear and reliable agricultural policy.

Maize is consumed by a large majority of the people both in the urban and rural areas. The processed product, maize meal or mealie meal, is an inexpensive source of calories. In 1980, the average cereal consumption per capita was estimated at 170 kilograms, of which 62 percent was derived from maize (GRZ, 1990a, p. 23).

Table 1.5 Maize Cultivated Area, Production Yield and Marketed: 1980-1990.

Year	Land Area ('000 Ha)	Production ('000 bags)	Yield (bags/Ha)	Marketed ('000 bags)
1980	335.0	6,657	19.9	4,247
1981	540.0	10,658	19.7	7,703
1982	454.5	8,336	18.3	5,671
1983	541.2	10,392	19.2	5,901
1984	501.0	9,686	19.3	6,347
1985	575.8	12,471	21.7	7,069
1986	571.7	12,006	21.0	10,607
1987	583.3	12,365	21.2	7,296
1988	600.5	12,851	21.4	14,990
1989	629.4	13,595	21.6	13,559
1990	659.1	14,369	21.8	7,100

Source: Jansen, 1988; CSO, 1990b; FAO, 1991; Malambo, 1988; GRZ, 1990a

Per capita maize consumption in the rural areas varies widely by region. Nutritional surveys have found that the lower the per capita maize production, the higher the incidence of food deficiency cases. This could be due to the fact that traditional food crops are less nutritious compared to maize. The government policy of promoting maize on this basis was, therefore, good for improving the nutritional status of consumers.

The incidence and severeness of protein-energy malnutrition in rural areas is almost twice as high as in urban areas. This provides a great challenge to the reformed market in the future, especially with the increased consumption of maize in rural areas.

In 1980, eighty percent of the rural households and a quarter of the urban families were found to be living below the poverty level in Zambia (Greiner, et al, 1988, p. 10). Not only was physical availability of maize and maize meal, a problem in urban and rural areas but the income levels were low. The low income group spends 90 percent of their income on food either retained or purchased (GRZ, 1990a, p. 27). For policy purposes in Zambia, the vast majority of rural households are assumed to produce most of their food requirements and have small quantities of surplus for sale. Weber et al. (1988, p. 1045), however, cautioned that in some rural areas as many as 50 percent of the households have been net food buyers and not net food sellers, in major grain producing countries of Africa.

In the Zambian case there is not enough documented evidence to support or refute the assumption that most rural households are net food sellers, which was a basis for not providing food coupons to the rural households in 1989. However, Malambo (1987) in his study of Mumbwa district in Central province found that a significant portion of the population were net food buyers. This specific region was generally known to be a food surplus area. The net food buyers had difficulties in purchasing food from the market in times of need. The marketing system, he concluded, was geared towards moving maize from the rural areas to the urban areas and had no backward linkages. This is particularly important in the event of poor harvests due to droughts, which have been frequent in the 1980s.

These issues complicate the food price policy problem. Increased producer prices may increase incomes for the net food sellers and thus improve their food

security situation, and yet higher prices may reduce food security for a substantial rural population who are net food buyers (Timmer et al., 1983).

Even though it is recognized that the absence of maize does not necessarily imply food insecurity, it can be discerned from the foregoing that the crop plays an extremely important role in the country. There is need to increase the production of maize, improve the location of production and improve the marketing system in order to meet the demand for the commodity.

CHAPTER TWO

PRICING AND MARKETING POLICIES

In order to understand the agricultural status of the country, one needs to look at the historical background of the pricing and marketing policies which have thus shaped the sub-sector's structure, conduct and performance.

2.1. Government Agricultural Sector Objectives

Major agricultural objectives of the Zambian government since 1964 when the country attained independence have included:

a) to increase the sector's contribution to GDP and thus aid in diversifying the economy away from total dependence on copper;

b) to provide cheaper food to the Zambian people;

c) to promote import substitution;

d) to attain self-sufficiency (and food security) in food and industrial raw materials;

e) to create new employment and income opportunities particularly for the rural areas and hence arrest the high rural-urban migration; and

f) to increase the purchasing power of people in the rural areas and thus provide an expanded market for the urban industrial sector.

To fulfill these objectives over the years a number of policies were instituted. The major ones were price controls of major agricultural products and inputs, direct control or ownership of marketing organizations, subsidies on maize and agricultural inputs and the 1989 coupon system to ease the effects of maize meal direct subsidy withdrawals.

These measures were implemented and defended by the government as the only way to achieve regional and social equity, and maintain food security in the country. However, poor balance of payments and increasing levels of subsidies contributed to extremely high levels of budget deficits, as Table 2.1 shows. For example, the maize related subsidy as a percentage of the budget deficit averaged 58 percent between 1980 and 1991. In 1980, the subsidy level was nearly the same as the budget deficit, and by 1990 the subsidy level as a percentage of the budget deficit was 120 percent. The budget deficit could have been eliminated by the elimination of the subsidies. The government was, therefore, forced to institute measures aimed at reducing the cost of marketing maize by liberalizing the economy. Firstly, the government decontrolled prices, reduced subsidies, and encouraged privatization in marketing of most of the agricultural products.

The impacts of these new measures have not yet been evaluated since they have been genuinely established but for a few years and the measures have not been complete as planned. Further reforms towards a "free" market are still in the process of being instituted. The subject matter can, however, be dealt with in terms of what is likely to happen concerning the performance of the reformed maize market system. The remainder of the paper will, therefore, concentrate on reviewing

Table 2.1 Maize Related Subsidies in Relation to Government Budget (Recurrent and Capital) and Budget Deficit: 1980-1990

Year	Govt Budget (ZK m)	Budget Deficit (ZK m)	Maize Subsidy (ZK m)	% Maize Subsidy*	% Retail Subsidy**
1980	1,657.6	160.3	154.0	96.1	61.7
1981	1,388.6	155.7	87.1	55.9	59.1
1982	1,643.2	658.1	138.0	21.0	30.1
1983	1,475.9	288.6	124.7	43.2	10.7
1984	1,484.6	284.8	81.6	28.7	12.9
1985	2,184.3	280.4	134.0	47.8	1.4
1986	5,383.6	1,025.7	565.0	55.1	32.0
1987	5,837.5	2,146.8	638.4	29.7	67.0
1988	8,359.3	1,531.2	1,413.0	92.3	118.0
1989	9,838.0	3,699.0	1,585.6	42.9	18.0
1990	245030.3	2,801.4	3,363.9	120.1	n.a

Source: GRZ, 1990a; Jansen, 1988.
* as a % of budget deficit and as a % of retail price. Govt = Government

and documenting the major past and current maize pricing and marketing policies[1] and attempt to predict the implications of the new policies and practices on marketing of maize.

2.2. Maize Pricing Policies

Maize pricing policies in Zambia included the setting of producer prices (prices received by the farmers for their products at what ever point of sale), input

[1] The historical role of the price policies and practices has been well documented by such scholars as: Jansen, D. (1987, 1988, 1990), Wood, A. (1988), Kydd, (1988), GRZ, (1990, 1991), and Ndalamei, L. (1990). It is, however, necessary to present this background briefly in order to set the stage for the discussion of the reforms. This then assists in understanding what is being reformed and helps predict the likely impacts of the changes.

prices, into-mill prices (prices the millers pay to acquire their maize), retail prices (refers to final maize meal prices paid by the consumer) and costs or rates related to transportation, storage, processing and packaging.

2.2.1. Producer Pricing

In 1936 a maize control board was established. The board was given the power to purchase and sell all the maize at fixed prices in the OLR areas[2]. This is where most of the marketed maize was produced. The maize control board was restricted to eight districts in the line-of-rail provinces, but African producers in all other areas had no guaranteed market. Restricting the board's operation system to the OLR region helped to increase the disparity in the profitability of OLR agriculture with rural areas where most of the African producers lived. From the time of independence in 1964 to 1971 the government maintained some form of regional price fixing policy (Producer prices for 1980 to 1992 are shown in Table 2.2). There were regional differences in producer prices that reflected transport cost. But during the 1973/1974 maize marketing season, prices were set at a uniform level for the whole country (pan-territorial) and for the entire cropping season (pan-seasonal). Other crop prices and fertilizer prices were also later set at a uniform level. Under

[2] OLR = the stretch of rail line from Livingstone to Chililabombwe and a distance of about 40 kilometers on each side of the line. The new rail line is the Tanzania-Zambia Railways (TAZARA). It stretches from Kapiri Mposhi to Nakonde on the Tanzanian border (See map, Figure 1.).

Table 2.2 Nominal and Real Maize Producer Prices, 1980-1992

Year	Nominal Price (ZK/bag)	Real Price (in 1985 ZK/bag)
1980	11.70	29.58
1981	13.50	30.21
1982	16.00	31.52
1983	18.30	30.14
1984	24.50	33.63
1985	28.32	28.32
1986	55.00	36.22
1987	78.00	35.92
1988	80.00	23.68
1989	125.00	18.84
1990	284.20	16.97
1991	800.00	24.81
1992	1200.00	18.61

1985 = 100

Source: Ndalamei, 1989, GRZ, 1990a and 1991a, and News reports, 1992.

this uniform pricing system[3] transport costs were eliminated at all depots so that the price received by a producer at any local depot was the same as that at a district center depot.

The government introduced the uniform pricing system in order to ensure a "fair" compensation to all the farmers, especially those in the remote areas. It was especially feared that should prices be left to market forces alone, a significant sector

[3]Uniform pricing is a particular type of price control such that the price for a given quality of commodity at a given stage in the marketing-processing chain and at a point in time shows no regional variation (Muntanga,1984,p.10).

of the small scale farmers (subsistence) would be left untouched in the sense that this category of farmers would not be absorbed into the market economy and thus lag behind in development. The government also introduced this system of pricing in an attempt to appease the urban consumers by controlling producer prices and final product prices.

Producer prices were fixed on the basis of a number of often-conflicting criteria, namely: cost of production, fair return to the producers, fairness to consumers, import/export parity, relative crop profitability, food security and political acceptability. Fairness to consumers and political acceptability no doubt were the overriding considerations, and, consequently, the fixed producer prices tended to lag behind the cost of production.

The policy of uniform pricing remained basically the same with minor modifications from 1974 until the early 1990s. In the 1980s, the government in consultations with the Commercial Farmers Bureau (CFB), a farmers' lobby group, set the fixed price. The "bargained" price was, like before, based on criteria like the cost of production for maize[4], export and import parity, crop profitability, and fairness to producers and consumers. Currently, however, a farm-gate uniform floor price is in existence as a policy. The producer can bargain with the buyer for the producer price and account for transportation costs. Since 1964, nominal prices have been increasing, but real prices showed an increase trend from 1980 to 1987 and then

---

[4]The costs of production took into consideration all the three categories of farmers. A weighted average was calculated with the commercial farmers' weight at 30%, the emergent farmers' at 40% and the subsistence farmers' at 30%. The cost of production has assumed to be uniform throughout the country.

dropped about 50 percent in 1990 and the following year increased again as a result of the new policy (Table 2.2).

The uniform producer pricing system did not achieve the equity goal it was set up for (Jansen, 1988, Muntanga, 1984). The beneficiaries of the uniform price system could be said to have been producers off-OLR, who were subsidized. In general the fixed producer prices tended to lag behind the cost of production and the assumption of similar costs for the whole country basically taxed those farmers with a comparative advantage in maize production and promoted production in areas which would not have produced maize for the urban markets in the absence of input and transportation subsidies.

2.2.2. Input Pricing

The major input in maize production in the country has been chemical fertilizers. Imports of fertilizer (including donations) account for over 90 per cent of total fertilizer supply in the country, and 90 percent of this is consumed by the maize sub-sector. The fertilizer price was determined by the government and was arrived at by taking into account the average cost of a ton produced domestically by the Nitrogen Chemicals of Zambia (NCZ). The total estimated quantity and the availability of the subsidy are then taken into account before setting the input price.

Nominal fertilizer prices increased substantially in 1990, 1991 and 1992 when subsidies were reduced drastically. Real fertilizer prices, however, remained relatively unchanged between 1985 and 1989 as shown by Table 2.3. From then onwards the real prices increased sharply, as less subsidy was made available and the

Table 2.3 Compound 'D' and Urea Nominal and Real Prices: 1985-1991.

Year	CPD'D' price (ZK/50kg)*	Real price 'D'(ZK/50kg)	Urea price (ZK/50kg)	Urea real price (ZK/50kg)
1985	26.75	26.75	26.75	26.75
1986	26.75	17.62	26.75	17.62
1987	80.00	36.84	65.00	29.93
1988	80.00	23.68	65.00	19.24
1989	98.27	14.81	71.00	10.70
1990	396.00	23.66	384.00	22.94
1991	1,572.36	48.77	1,601.87	49.69

Source: GRZ, 1990a
Real prices, 1985 = 100
*CPD = compound

policy was changing towards border pricing from fixed rates. Subsidies, provided for purposes of supplying small scale farmers with affordable inputs in order to improve their incomes, had played a major role in maintaining low and below-border fertilizer prices. The government introduced fertilizer subsidies in early 1972 and by 1982 the subsidy covered as much as 61 percent of the landed cost (Jansen, 1988, p. 93).

The fertilizer price policy encouraged consumption of the input among small scale and emergent producers and thus promoted output of maize. Commercial farmers did, however, benefit more than the emergent and small-scale farmers (Jansen, 1988, Ndalamei, 1989, Wood, 1988). Commercial farmers had access to credit and better transportation and storage facilities which helped them in acquiring adequate inputs in time. On the regional basis, however, the effect was similar to that of the producer price in that it favored the off-OLR. In 1975, 84.9 percent of the fertilizer was consumed in the OLR and was down to 60.5 percent by 1987.

Since the government declaration that there was going to be economic pricing of the fertilizer input in 1991, the price has been pegged at c.i.f. Lusaka plus transportation to the consumption location. The nominal price increased, for example, from a cost of about 396.00 kwacha per 50 kilogram bag in 1991 to over 1,572 kwacha for compound 'D,' and in real terms the price doubled (Table 2.3). The price increase over a crop season was over 200 percent, one of the indications for the large levels of subsidies the input carried prior to the policy change.

Fertilizer has been a major cost component in the production of maize, unlike seed costs. Seed costs have remained a low cost input at approximately five percent total cost of producing maize. Seed prices were previously set by the Zambia Seed Company (ZAMSEED), a monopoly company in the seed industry but subjected to government approval. This in effect limited the monopoly's pricing flexibility. The prices of seeds did not reflect transportation costs to different areas. Since the 1991/92 season, however, the Zambia Seed Company has been able to set its price with little government interference. Seed prices currently reflect import parity prices and transportation costs.

Other inputs such as machinery have experienced little direct price control from the government, particularly in the 1980s. However, the macro policies that were in existence, such as overvalued exchange rate, negative real interest rates and import tax exemptions for agricultural inputs, tended to benefit the commercial farmers. The commercial sector resulted in being capital-intensive, and this did not assist in slowing down the rural-urban migration.

2.2.3. Credit Provision

A 1991 government study of the credit system reported that the agricultural credit system for small scale farmers in Zambia was in a state of financial disarray (GRZ, 1991b, p. 1). The system was likely going to severely curtail the production of maize due to limited government funds since nearly the entire credit system was dependent upon them.

Repayment of loans by farmers especially in the last two seasons (1989/90 and 1990/91) was very poor, usually below fifty percent on average from over 90 percent in good yielding years. Reasons for such poor results ranged from drought, lack of adequate fertilizer, liberalization of the marketing system (resulting in poor market coordination) and lack of payment to farmers for their output. These factors made lending organizations depend on government funds and/or guarantees. Real interest rates have been negative due to government direct controls that have kept nominal rates below inflation rates. In 1991, the nominal annual interest rate was 46 percent and the annual inflation rate was estimated at over 100 percent. The credit delivery system to small scale farmers has chronically been inefficient and ineffective in reaching many farmers.

2.2.4. Transport Pricing

The final product price which is paid must in the long run reflect all the costs involved in its production. One of these costs is that of transporting the commodity several times before it reaches the consumer. Transport services increase the value of the commodity by creating place utility.

In Zambia, transportation rates have had little relationship to producer or retail prices. This was due to price controls that prevailed where transport costs were not reflected in the final price of the commodity. Uniform pricing completely ignored all consideration of inter and intra provincial comparative advantage, and allowed for the transport subsidy that equalled one hundred percent of cost to the farmer. Farmers received the same net maize producer price regardless of their location. The uniform price tended to penalize those who produced most economically--namely, those in locations nearest to the market. Since maize is a bulky, low-value commodity, transportation costs are a large component of the total cost. It has been stated that at times 70 percent of marketing cost of maize in Zambia are those related to transportation and handling. For example, Table 2.4 shows a breakdown of the costs for 1989/90 market season. The cost of transportation and handling from Kasama to Ndola was 1,080 kwacha, a value larger than that of the commodity itself. In the 1989/90 season intraprovincial maize movement cost on average 74 percent of the costs that included, salaries, bank interest, bank charges, weight loss, profit margin, and fumigation costs (GRZ, 1990a, p. 121). Transportation rates (Table 2.5) were generally determined through a compromise between the Transport Association of Zambia (TAZA), Contract Haulage (CH)[5] and the Ministry of Power, Transport and Communications. The rates took into account average operational costs (TAZA and CH estimates), and a profit margin of 33 percent. Real transportation rates as shown in Table 2.5, were stable over time implying that the market margins were reducing as other costs like

[5]TAZA's membership comprises of private traders. CH is a parastatal company.

Table 2.4 Costing of a Bag of Maize from Selected Supply Sources 1989/90 Market Season.

Cost (ZK)	Chipata to Lusaka	Kasama to Ndola	Mkushi to Ndola
Farm price of maize	800	800	800
Transport cost	600	780	300
Six months interest cost (ZK)	184	184	184
Handling cost up to depot	200	300	200
Storage cost @ 3% loss	24	24	24
Package cost	17	17	17
Administration charges 7%	72	91	51
Profit @ 5%	55	70	39
Total	1,952	2,266	1,615

Source: MAWD, Planning Division, 1991

fuel had been increasing. There was one major weakness in the determination of transportation costs. There was no differentiation in rates between good (tarmac) and bad (gravel) roads. Transport rates were a function of distance only. Due to lack of differentiation between the types of roads, private truckers avoided the bad roads and when they got involved with rural roads, preferred shorter distances. Remote areas were thus avoided. This was justification for government intervention.

The country consumes approximately ten million bags per year of marketed maize with major consumption areas being Lusaka and the Copperbelt provinces. These two provinces consume 3.2 and 4.7 million bags respectively. The Copperbelt province produces no more than twenty percent of its requirements and the rest has to be transported from outlying provinces. Generally, maize moved from surplus provinces to the deficit urban areas. Table 2.6 provides an example of the provincial

Table 2.5 Maize and Maize Meal Road Transportation Rates, 1983-1991 (ZK/ton/kilometer)

	Distance in Kilometers				
Year	1 to 50 nominal	51 to 100 nominal	101 to 200 nominal	over 200, nominal	over 200km, real
1983	0.25	0.25	0.20	0.15	0.25
1984	0.25	0.20	0.15	0.10	0.14
1985	0.70	0.65	0.41	0.30	0.30
1986	0.80	0.70	0.55	0.45	0.30
1987	0.91	0.80	0.63	0.51	0.23
1988	1.45	1.20	1.00	0.80	0.24
1989	4.00	3.30	2.80	2.60	0.39
1990	7.20	5.94	5.04	4.85	0.29
1991	11.60	9.50	8.10	7.80	0.24
1991*	18.00	15.00	13.00	11.00	0.34

1985=100 for over 200km real rates.

Source: GRZ (1990a), and Ministry of Transportation and Communication.

*From August 1991

movement of maize for 1989/90 season. Most of the maize moved from Eastern and Central to Lusaka province and from Central, Southern and Northern provinces to the Copperbelt and Lusaka (including Zambia Cooperate Federation reserves). Because of the long distance and large quantities of maize involved, transport costs and hence subsidies tended to be very high. For example, in 1990, with a transport subsidy of 852 kwacha per 90 kilogram bag, for the movement of maize from Chipata in the Eastern province to Lusaka (a distance of just under 600 kilometers) required a total outlay of 2.8 billion kwacha (GRZ, 1990a).

Table 2.6 Interprovincial Maize Movements 1989/90 Market Season ('000 bagsx90kg)

To / From	C	K	L	W	ZCF reserve	Total
C	2100	400			257	2757
E		2200			1103	3303
N	1000		3		42	1045
S	541	474		20	927	1962
Total	3641	3074	3	20	2329	9067

C=Central; K=Lusaka; E=Eastern; N=Northern; S=Southern; L=Luapula; W=Western.

Source: GRZ, 1990a

2.2.5. Into-mill Pricing

Into-mill prices were set by the government through the Prices and Incomes Commission (PIC). The prices were calculated on the basis of producer prices, expected average marketing costs by cooperatives, the average cost of processing by the major milling companies in the country, and the amount of government subsidy to be made available (GRZ, 1991b, p. 93).

The movement of the into-mill prices in relation to the producer prices and maize meal retail prices are shown in Table 2.7. The into-mill prices were the same as the producer prices from 1982 to 1983. However, in 1986 the into-mill price was only 64 percent of the producer price. The producer price was 55 kwacha and yet millers purchased maize from the official marketing board at 35 kwacha. This obviously meant large magnitudes of subsidies to cover the price differential and in

addition to transportation and handling costs and losses[6]. The producer price was increased and the into-mill prices remained unchanged from 1986 to 1988. In 1989, the trend was reversed and the into-mill prices were above producer prices reflecting transfer costs as shown in Table 2.7 under the into-mill to producer price column.

By 1990 the into-mill price had increased substantially in nominal terms due to higher annual inflation as can be seen through the consumer price index in Table 2.7. In real terms, the into-mill price had an increasing trend from 1980 to about 1985 and then dropped drastically from 25.82 kwacha in 1980 to 10.36 kwacha in 1988 per 90kg bag, before starting to increase again (See Table 2.7). In 1989 the price doubled with the on-set of market liberalization. The price trends indicated the magnitudes of the subsidy requirements over time and the low food prices beneficial to those with access to it.

2.2.6. Retail Pricing

As early as 1941, the consumer price of maize meal was less than the import parity price. This pricing policy and resultant government subsidies extended into the post-independence period. The reason for keeping the price of maize to consumers

---

[6]This market arrangement provided additional problems, whereby millers took advantage of the difference between the producer and the into-mill prices. NAMBoard would purchase maize from producers at a fixed rate of 55 kwacha for the 90 kilogram bag and would sell to millers at a lower price of 35 kwacha. Millers would then act as producers (some millers are farmers in any case) and resell the same maize to NAMBoard without having processed the grain. They would then gain 20 kwacha for this "illegal" conduct, which cost the government even more subsidies. Shortly after this arrangement, food riots occurred due to short falls of maize meal. The government nationalized all large milling private companies. The industry was declared a politically strategic one that needed even more control.

Table 2.7 CPI Nominal and Real Prices: Into-Mill and Retail in 1980-1991

Year	CPI	Into-Mill (ZK/90kg) Nominal	Price Real	Into-Mill as % of product price	Breakfast (ZK/25kg) Nominal	Price Real	Roller (ZK/25kg) Nominal	Meal Real
1980	39.5	10.21	25.82	87	4.10	10.37	3.75	9.48
1981	44.7	13.50	30.21	100	6.63	14.84	5.00	11.19
1982	50.8	16.00	31.52	100	7.25	14.28	6.31	12.43
1983	60.7	18.30	30.14	100	10.29	16.95	8.55	14.08
1984	72.9	26.00	35.68	106	12.90	17.71	10.74	14.74
1985	100.0	35.00	35.00	124	19.15	19.15	14.85	14.85
1986	152.0	35.00	23.05	64	19.15	12.61	14.85	9.78
1987	217.2	35.00	16.12	45	19.15	8.82	14.85	6.84
1988	337.8	35.00	10.36	44	19.15	5.67	14.85	4.40
1989	663.4	160.00	24.12	128	114.50	17.26	82.30	12.40
1990	1,674.4	442.00	26.40	156	269.00	16.07	198.00	11.83
1991	3,224.9	1,100.00	34.11	138	570.00	17.67	320.00	9.92
1992	9,394.1	1800.00	19.16	150	1,800.54*	19.7	1354.00*	14.4

1985=100

CPI= Consumer Price Index

Source: MAWD, PIC, IMF *International Financial Statistics*, 1991/92.

*Averaged monthly prices in Lusaka

below cost of imported maize was to assure a cheap supply of food for African labour (Marter, 1978, Jansen, 1988, p. 11). In the post independence era, the rationale for cheap prices did not change. The need to keep wages low[7] remained important and maize meal prices had to be kept low in order to appease the urban

[7]The government has been a major employer and wage increases have direct and significant effects the budget deficit and hence on inflation rates. In July, 1993, public workers were offered a fifty percent wage increase; as a consequence, high inflation rates are expected.

politically sensitive group. The consumer price continued to be set by the government independently of either the producer price transfer costs or import parity considerations. This practice continued for roller meal and in 1992 the maize price was expected to be set at 3,270 kwacha per 90 kg bag, at parity with South African imports (Mwiinga, 1992, p. 3). As of July 1993, the price was below the parity price, as some form of price controls were still in existence especially for roller meal. In real prices, both Breakfast and Roller meals showed an increasing trend from 1980 to about 1985. However in 1986, soon after the food riots, real prices dropped drastically until 1989. The real price for breakfast meal, for example, dropped by 70 percent between 1985 and 1988. The real prices began to increase in 1989 as less subsidies were made available.

The dependence by consumers on cheap maize since the pre-independence time no doubt made the price of the commodity a very sensitive political issue. Few consumers in the urban areas expected or were prepared to have maize meal expenditures to be a significant percentage of their food budgets.

To illustrate the extent to which the subsidy has had to cover the price differential, an example is presented for the situation as it prevailed in August 1991. The total cost to produce a 25 kilogram bag of breakfast mealie meal by one of the major milling companies was 506 kwacha (Sipula and Maleka, 1991). The costs included those of maize, the raw material; processing; packaging; and losses. The retail price through the parastatal companies was pegged at 220 kwacha, resulting in the need for subsidies of over fifty percent of the cost of mealie meal. The above figures in effect underestimated the costs by not including subsidy costs on

transportation, handling, and retail margins of processed maize. According to Jansen (1990), consumer subsidies as a percentage of the actual retail price increased from 61.7 percent in 1980 to 118.0 percent in 1989 (See Table 2.1).

Of all the different prices discussed, retail prices have been the least flexible. The low retail prices have indeed favored the urban consumers (to some extent the rural-net food buyers). The food security situation in the urban areas has been better due to such policies compared to the rural areas[8]. Other beneficiaries of subsidies were those across the borders who had access to subsidized mealie meal that was smuggled out of Zambia. Retail prices remain the most contentious issue even though nominal prices have normally been increased; they still tended to lag behind the cost of production and import parity. Real prices have tended to decrease, indicating that maize meal prices was supplied at below cost. The threat of food riots recurring has been the major pressure that keeps the retail price of mealie meal low.

2.2.7. Subsidy and Coupon System

The control of input, output, transport, storage and retail prices created the need for monopoly institutions and the need for subsidies in the market. Most of the transportation, storage, processing and handling costs and risks were born by the government. With the increasing production and no market discipline, the subsidy bill continued to increase. Subsidies have been a big burden on the government

[8]This is despite the fact that an urban consumer has paid a higher price when one takes account of the time spent on long lines or the payment, to another person to stand in the line to get the subsidized meal.

budget. Between 1980 and 1990 the cost of maize subsidy ranged from 9.3 to 16.9 percent of the fiscal budgets (See Table 2.1). In 1990, 13.7 percent of the fiscal budget went directly or indirectly towards maize subsidies. Between 1970 and 1982, an average of 65 percent of the total Ministry of Agriculture expenditures were allocated towards subsidies (Mumeka, 1991, p. 62). The percentage of the subsidy in the Ministry of Agriculture budget increased from six percent in 1981 to seventy percent in 1986 (Katongo, 1991, p. 39). Tables 2.2 and 2.7 contain real producer and final product retail price trends and indicate that the price differential had remained constant till 1989. The subsidy level was, therefore, not decreasing.

Most of the subsidy went towards market coordination expenses[9]. Despite heavy subsidies, the maize marketing system was not able to perform the basic function of matching supply and demand[10]. It instead contributed to the budget deficits and consequently to very high annual inflation rates.[11] The marketing system simply aggravated the financial problems of the government to a point were it was almost impossible to solve.

In January 1989, the coupon system was introduced with the view of facilitating a gradual removal of maize subsidies without jeopardizing the food

---

[9]In a competitive market economy, coordination takes place across markets and within firms, within a set of institutional constraints imposed by the government and customs. Coordination requires transactions which involve the exchange of claims to benefits and agreements. Explicit prices are central to coordination across markets (Shaffer, 1987).

[10]This refers to the equalization of demand and supply at each stage of vertical coordination.

[11]In order to cover the deficit, the government printed money or borrowed from commercial banks, thus contributing to inflation.

security of the poor urban population. The system was supposed to be an income level targeted subsidy. The coupon system was expected to reduce the amount of subsidy on maize and decrease the downward pressure on producer prices. The targeted group was identified as urban households, with an income of less than or equal to 20,500 kwacha per annum for a households of four (adjustments were made for different household sizes). This did not include the rural households, who were assumed to be net sellers of grain and hence self sufficient. Since such an assumption was not true, the program represented a major potential bias against rural people. The system was unable to accomplish the task of reducing maize subsidies due to the large size of the target group, poor administration and maize shortages.

The vast amounts of the subsidies, pressure from the IMF and World Bank and the poor performance of the coupon system forced the government to attempt a "free" market system. The "free" market system would not only free the government from the responsibility of providing low-cost food, but would introduce an element of competition in order to reduce marketing costs. The performance of the new market system is yet to be seen as its implementation has just been started. The subject matter is, however, discussed below after the review of the performance of the maize market organizations.

2.3. Maize Marketing Organizations

Many scholars have identified maize marketing as a complex and politically contentious problem in Zambia. It is for this reason that a brief historical perspective is indispensable for an appreciation of the contemporary issues.

The government control of maize marketing started as early as 1936. By 1964 most of the agricultural marketing system was either directly operated by government or carried out by organizations which were highly dependent on it.

The purchase of maize from the mainly commercial farmers was the responsibility of the Grain Marketing Board (GMB), which had a monopoly in controlled products in prescribed areas. In areas where marketed production by small scale farmers was significant, producer cooperatives were encouraged. Large areas were not served by the GMB or Cooperatives. In many areas commercial production did not develop because of the remoteness from markets. In 1964, the Agricultural Rural Marketing Board (ARMB) was formed to supplement the existing board and the GMB was set up to serve remote areas. In 1969, the government merged ARMB and GMB to form the National Agricultural Marketing Board (NAMBoard). The government was concerned with ARMB and GMB perpetuating a dualistic agricultural structure favoring the commercial sector.

NAMBoard had a difficult task (under the set of rules and regulations set by the government) and performed poorly which resulted in the government switching its attention to the potential of cooperatives. From the mid 1970s the role of Cooperatives in maize marketing was rapidly expanded. It was planned that NAMboard would withdraw from rural marketing between 1978 to 1981 and hand

over rural depots to Provincial Cooperative Unions (PCUs). PCUs purchased maize and other produce from Primary Cooperative Societies (PCSs). The PCUs were responsible for arranging and collecting bagged maize from numerous rural PCSs' premises (for schematic representation of the controlled market linkages. See Figure 2).

By 1988, it was clear that is was not only difficult but extremely expensive to maintain two organizations competing in the market (usually with overlapping responsibilities), since both organizations (NAMBoard and the cooperatives) depended on government funding for their operating expenses. In 1988, therefore, the government restricted primary maize purchasing to the unions and fertilizer and maize import and export to NAMBoard.

In June, 1989, the government decided to dissolve NAMBoard and transfer the remaining functions to the cooperative movement and the parastatal NCZ. The Zambia Cooperative Federation (ZCF), the apex body of the cooperative structure, was charged with the functions of importing and distributing of maize and empty grain bags, fumigation services and maintenance of strategic grain reserves. Importation and distribution of fertilizer functions were given to the fertilizer manufacturing company (i.e., NCZ).

From 1989 to 1991, before the market allowed private trading, marketing coordination not only became more difficult and complex but also more dependent on government subsidies. This defeated the purpose of encouraging cooperatives to undertake maize from NAMBoard to take over marketing. Under the cooperative monopoly, the same problems continued namely:

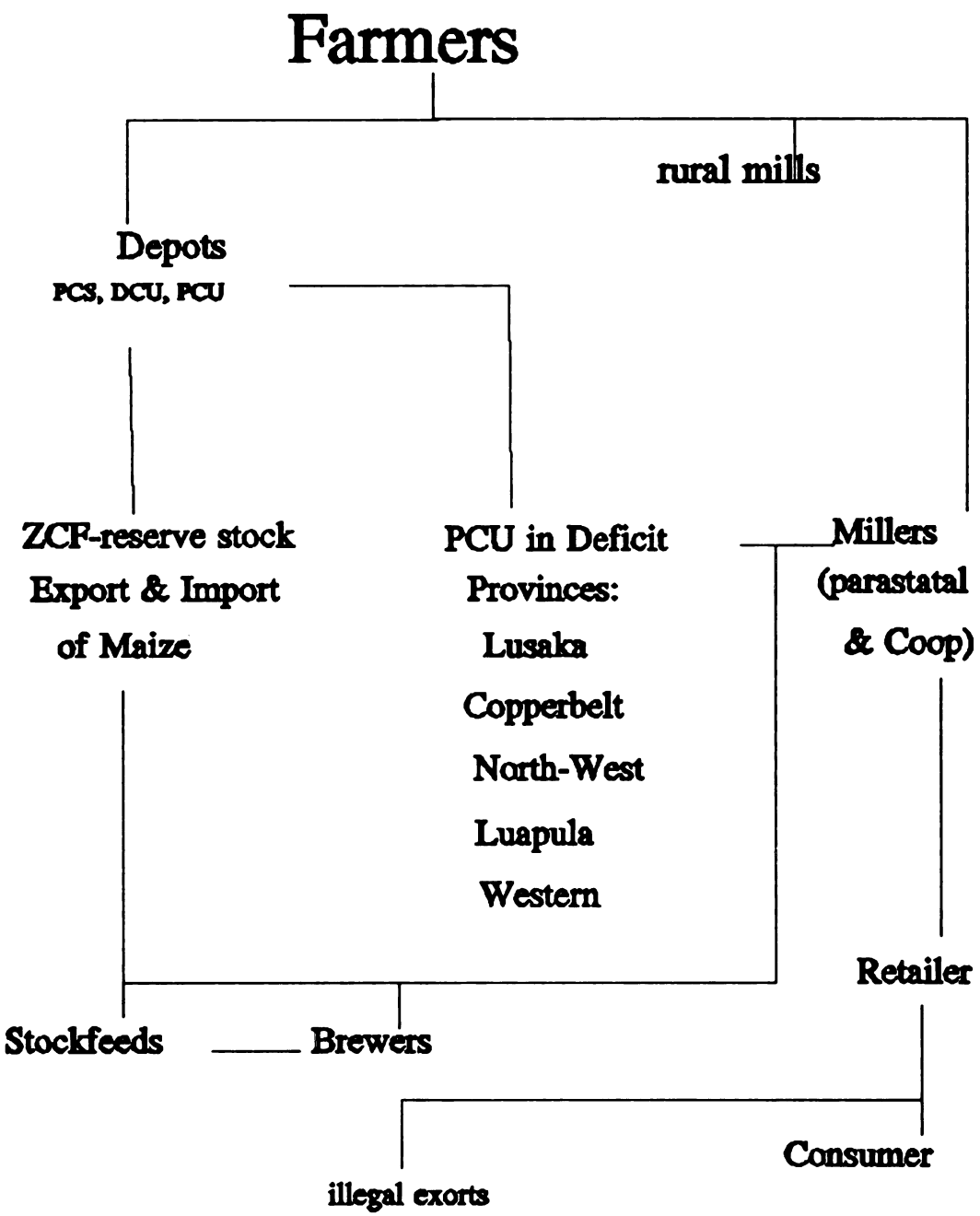


Figure 2 "Controlled" Maize Market - 1989/90.

a) there was an inability by the cooperative system to collect maize from rural areas and to move it to safe storage depots situated mostly in the urban areas;

b) there was untimely payment to the farmers for their crops;

c) subsidy requirements to operate the cooperative marketing system were high and increasing; and

d) the poor coordination resulted in demand and supply of maize not matching at different levels of vertical coordination.

In 1991 private traders and millers were allowed to trade in maize and negotiate a price with the farmers (See schematic representation of the 1991 "free" market linkages in Figure 3). The liberalization was in reality partial since the control of producer and into-mill prices was still in effect (ZCF, 1991, p. 17).

Due to the poor performance of the marketing institutions and high levels of subsidies required to run the centrally planned marketing system, the government decided to go for market reforms and by August 1991 lifted the ban on private trade in maize.

2.4. Need for Market Liberalization

The general goals of market liberalization include reducing public expenditure through reduced or elimination of subsidies, assuring a reliable and low cost source of domestic food supply for consumers, privatizing input and product markets and enhancing producer decision-making.

In the past, the government justified direct participation in the maize market by assuming, among other things, that the country did not have a domestically advanced private sector. The government also believed that the private sector was unlikely to market a commodity or service at economically appropriate prices. Another justification for government intervention was the argument that a laissez-faire policy could not function effectively so long as the economy remained heavily dependent on expatriate owners[12]. More Zambians, therefore, had to be deliberately brought into the market to participate as traders. The centrally planned economic system, popularly known as the "mixed economy" in Zambia, performed inefficiently and serious reforms were inevitable.

The effectiveness of the market reforms so introduced will depend upon the degree to which it succeeds in privatization and achieve competitive markets. Privatization refers to a change in ownership and control from the public to the private sector. The efficiency impact from privatization varies with the competitive structure of the market or industry, and the most substantial efficiency results can be anticipated where there are no constraints on entry[13]. Conceptually, private ownership can be argued to be superior to public ownership or control in achieving economic efficiency in commodity market given a competitive environment. In a private ownership, the decision maker also bears the risks as apposed to a publicly supported organization. This is because a competitive market eliminates those who

---

[12]The expatriate category included the Asian-Zambian business community (a minority ethnic group), dominating the staple food market. This was a politically sensitive issue.

[13]Efficiency gains can be presumed from a monopoly (public or private) if related to the profit motive.

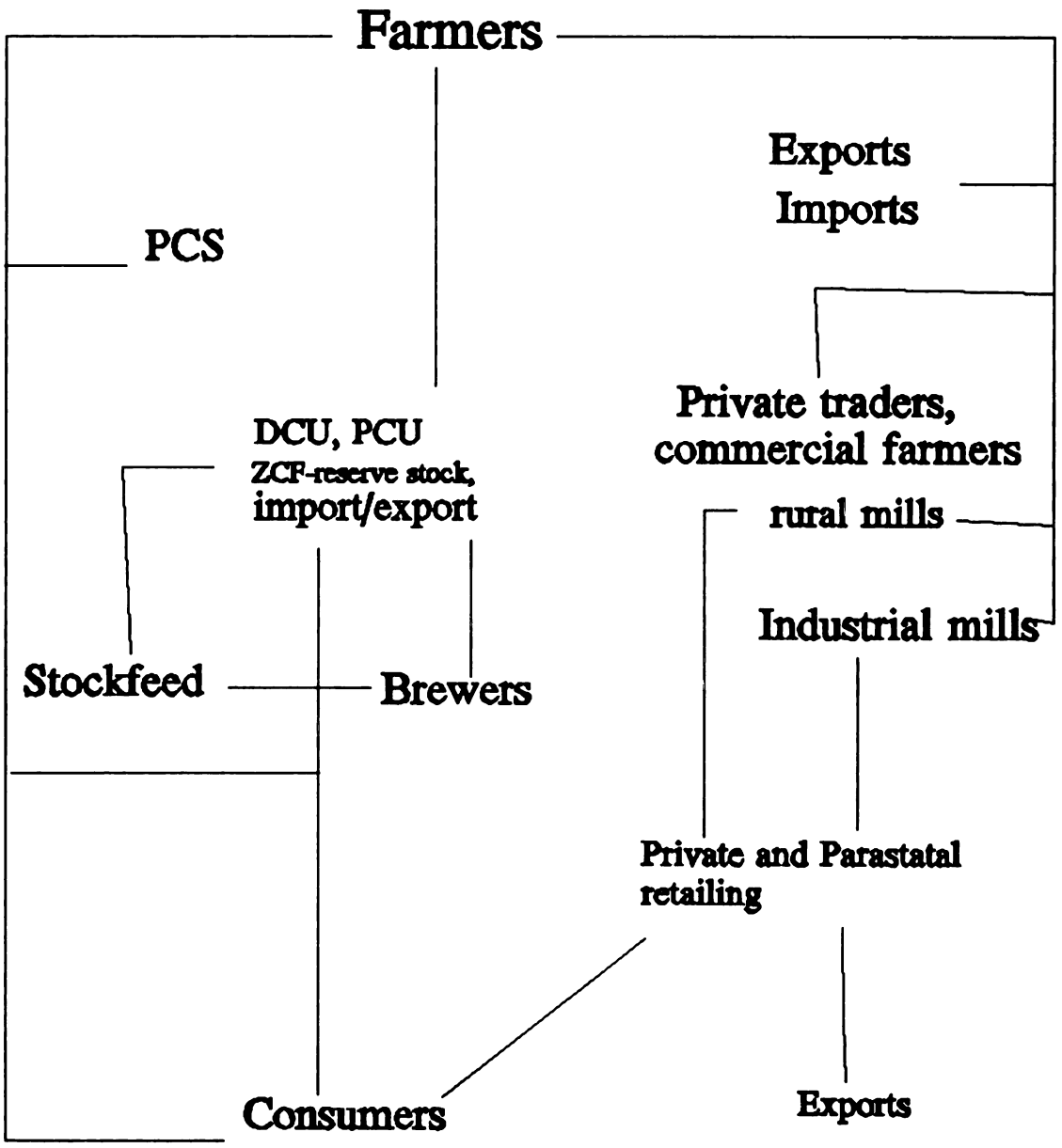


Figure 3 "Free" Maize Market: August 1991

are inefficient. Market efficiency comprises competitive implications of exchange efficiency (price efficiency) and efficiency with which physical market functions are performed (operational efficiency).

Exchange efficiency focuses on the coordination of activities as a product flows through the marketing process, which involves buying (demand) and selling (supply) functions. Market price is discovered by the interplay of demand and supply forces. Prices should accurately and quickly respond to consumer demand, and should reflect accurately the necessary costs incurred in the utility-yielding production and marketing process. Given adequate information flows, competition can bring about a more desirable set of prices that reflect cost efficiency. Operational efficiency focuses on cost-reducing alternatives and technologies for physical marketing functions. The physical functions add form, place and time utility to the product.

When a competitive market exists for a standard commodity, a strong argument in favor of privatization exists. A weaker preference for the private sector is more common when imperfect competition characterizes the market. It follows that when reforms would merely replace a public monopoly with a private monopoly, changing ownership needs to be carefully examined. The ultimate goal of market liberalization under imperfect market conditions is to discover or create those market institutions which best direct private interest to serve public purposes.

The market can be and is an instrument of economic development, observes Johnson (1978). The market can ration supplies of consumer goods among consumers, direct the allocation of production between commodities according to the criteria of maximum profits, allocate different factors of production among various

uses according to criteria of maximizing incomes, govern the relative quantities of specific types of labour and capital equipment made available, and distribute income between factors of production and therefore, between individuals.

A market serves to provide incentives to economic growth, making goods which may stimulate consumers to seek to increase their incomes. Access to markets on the other hand provides opportunities for investors to profit from new goods and technical improvements. In addition, the market provides incentives for the accumulation of personal capital in form of skills and material capital which earn income. A properly functioning market system would stimulate both economic growth and efficiency with little government policing other than providing a legal system for the enforcement of contracts (given no externalities or scale economics, perfect information, etc). The following section discusses what a market system is, how to evaluate market performance, and why the "free" market system was selected as the best alternative for the economic development of Zambia.

2.4.1. Marketing System

The traditional definition of agricultural marketing has generally included all of the activities of firms handling farm products from the farm gate through to the retail store. According to Haveman and Knopf (1966), a market is the "sum of contracts between buyers and sellers of the product or service." It may be formally organized and geographically centered. Markets are institutions through which the interaction of buyers and sellers determine prices and quantities exchanged and is, in general, synonymous with the price system.

Shaffer (1968) believed that the traditional definition of agricultural marketing had dealt with problems at all levels of organization including physical processes, but had excluded the relationship between markets for factors and products. He saw a market as an organizing or coordinating system with relationships involved in a group of transactions, with market characteristics such as the rules governing the participants, the commodities or services involved in transactions, the number and size of participants, location and so on. The market, according to Shaffer, included institutions which modified the outcome of the exchange process.

Rhodes (1987, p. 14) defined agricultural marketing, as "the performance of all business activities involved in the forward flow of the agricultural commodities from the producers to the consumers." He saw a marketing system as a price system which knits together the decisions of numerous participants into a smoothly working system. Within this system a vast flow of agricultural commodities is assembled, transported, stored, processed, priced and distributed to consumers. Shaffer's definition of an agricultural market had a wider scope and his holistic definition is, therefore, adopted in this text.

In order to understand markets, according to Rhodes (1987, p. 7), one could look at the subject through the functional, institutional or behavioral approaches. The functional approach focuses on the functions performed in the market by specialized activities such as exchange functions (procurement, merchandising), physical functions (storage, transportation, processing) and facilitating functions (standardization, financing, marketing intelligence gathering and risk bearing).

The institutional approach entails looking at middlemen such as transporters, processors etc. Other important institutions include government agencies that provide public services, such as market information and commodity grades, and those that regulate various marketing activities. Institutions are thought of as organized systems of rules influencing behavior of participating organizations like marketing boards, marketing orders, cooperatives and firms.

The behavioral approach combines the functional and institutional approaches to focus on the interdependence and coordination of all the participants and all the functions of the entire system[14]. The approaches require performance criteria.

The performance of a market is judged against a communal purpose such as matching supply of maize and maize products with demand at low cost at all stages of vertical coordination. The performance refers to those attributes of the market which directly affect the well-being of the participants. Performance looks at the flow of economic results as they affect the welfare of farmers, marketers and consumers (Shaffer, 1968).

Attributes that directly influence welfare involve some of the following factors according to Sosnick (quoted in Shaffer, 1968, p. 3): production efficiency, technological progress, product suitability, profit rates, level of output, exchange efficiency, cost of sales promotion, unethical practices, participant rationality, conservation, external effects and labour relations. Other performance criteria may be price stability, supply stability, income stability, income distribution, levels of

[14]The behavioral approach was the basic approach used in this research project. The research was concerned with the cooperative organization and market reforms.

unemployment, levels of costs of production and distribution, the combination of output, and the rate of real economic growth. These criteria are multi-dimensional and subject to change over time. Evaluation of market performance can be made by contrasting an existing situation with an ideal type, contrasting the same industry over time, or by simply contrasting several alternatives possible, none of which can be identified as ideal.

In the case of contrasting with alternatives, Shaffer (1968) suggests that the best approach to judge performance would be to contrast the potential performance of several alternatives with respect to a variety of normative dimensions and to examine present systems to identify incremental changes that would be judged to be improvements by the community.

In the case of contrasting the existing situation with the ideal, the model of perfect (pure) competition is usually taken as the ideal market system. Performance of a market is, therefore, judged by its deviations from this ideal model (Shaffer, 1968, p. 3). A perfectly competitive market refers to a situation where participants have complete knowledge of market conditions and that any discrepancy in price will be acted upon instantaneously. Under perfect competition, the market possesses a magnitude of participants with each participant so small relative to the entire market that he/she has no significant influence on the market or on the other competitors. There is also no obstruction or restriction placed on the forces of supply and demand or the level of price and anybody is free to enter or exit the market.

The competitive model as a guide to efficient production stems from Adam Smith's "invisible hand" paradigm. Each producer is encouraged to produce in a

technically efficient manner in order to maximize profits. Competition by other producers pursuing the same goal not only emulate the best ideas of their competitors, but further assure that they satisfy the needs of the public at the lowest cost of production and marketing, and thus achieving operational efficiency.

The success of the model (system) hinges critically upon individual incentives, whereby a profit-seeking firm strives for efficient production and marketing. The firm or organization does this because the benefits accrue to the firm's owners. Competition is crucial, for without it a firm (such as a monopoly) can earn profits even from inefficient operations.

For a number of reasons, the competitive system may not prove to be the most efficient, justifying at least in principle government intervention. Causes of "market failure" could be due to reasons such as economies of scale, public goods, externalities and information asymmetries. When the limited size of the market precludes competition, when private producers will not enter a market because of the free-rider nature of the good, when others rather than the producing firms bear the costs or appropriate the benefits of production, or when the information needed to make rational decisions is itself scarce, the market mechanism will not provide efficient results.

In addition in the real world, there is always someone with the ability to interfere in the market. The ability to exert influence implies possession of economic power. Governments and monopolies are examples of organization with economic power. Governments usually enter the market and/or impose rules upon the market with the expectation of a particular performance. Motives behind government

intervention are many and may include ideology, economic sovereignty, income, finance, and employment (Prager, 1992). Most of these are related to economics but not directly to economic efficiency, as examples from Zambia indicated.

Unanticipated consequences to rules and regulations can, therefore, occur. These consequences can be desirable or undesirable. As the complex economic system changes, rules which may have been desirable in a previous period could become barriers to desirable performance in the new situation (Shaffer 1968, p. 6). Any firm or organization must, therefore, direct its efforts to adapting to or avoiding obsolete rules.

The task of identifying the best alternative in the market system for the Zambian imperfect maize market is enormous. The private sector has not developed and has no history in maize marketing. The public sector performance on the other hand has been disastrous and created a bad reputation. The marketing board, which had the potential to stabilize prices, farm incomes and food supply, did not do so and as a marketing alternative face unfavorable considerations. Cooperatives face similar perceptions, but unlike the marketing board, are still existing and have a chance to operate in the "free" market economy.

Added to these problems is the lack of information on maize marketing which made it difficult to relate conduct to performance. This makes it difficult to make any comparisons of performance based upon historical data and also limits viable alternatives for consideration. Research on the market is ,therefore, vital if informed policy decisions will be made.

CHAPTER THREE

LESSONS LEARNED AND LIKELY IMPACTS OF LIBERALIZATION

The pricing and marketing policies proved to be the most serious institutional problem in Zambia. The policies were erratic and often unclear or inconsistent with social goals the country had identified. Uniform pricing encouraged mis-allocation of resources by stimulating production of maize in outlying provinces, some of which would not have produced surplus maize under competitive conditions (Mwanaumo, 1987; Jansen, 1988). Eastern and Northern provinces are the cases in point. The policies tended to depress production of maize in areas close to the main consumption areas of Lusaka and Copperbelt regions.

As the move towards the market liberalization proceeds, there is increasing pressure to supply maize to the urban markets from within and nearby provinces. This marketing challenge could change maize production patterns in the country. The far flung surplus provinces are expected to face low prices and because of the high transport costs are expected to decrease their contributions to marketed maize. For deficit provinces the market challenge will include production of other crops such as millet, sorghum and cassava and/or other cash crops. The challenge will also include in-shipments of maize and/or maize products into the provinces.

Relative to other crops, maize prices had in general been better for off-OLR regions. In Eastern province, once a major producer and exporter of groundnut, for example, switched to maize in the 1980s (GRZ, 1990a, p. 78). Commercial farmers around the urban areas, on the other hand found maize relatively unprofitable in the 1970s and 1980s and switched to other crops such as wheat and soybeans. Early indications after the reforms are that the maize producer price is gaining relatively over other crop prices and producers (mostly commercial farmers) near major consumption areas have began to expand their maize crop areas.

Maize producer prices in pre-liberalization era had no relation to international prices and, for the most part, were below border prices, implying that local farmers were being taxed. Below border prices encouraged smuggling to neighboring countries. The liberalization of the market is expected to bring local prices and border prices at parity. Together with decreased urban pressures for low real prices, producer prices are expected to increase and hence stimulate maize production particularly in comparatively advantaged regions.

Pan-seasonal pricing had encouraged farmers to sell their maize at the earliest convenient time in order to avoid risks associated with storage. The buyers (NAMBoard and/or Cooperatives) on the other hand, had no incentive to disburse funds to farmers early in the marketing season. In fact delaying the purchase and payments to farmers yielded interest earnings and allowed the organizations to use the government advance funds for other activities (Ndalamei, 1989; Chabala, 1991). Delayed payment improved the organizations' cash flows and earned interest which was not passed on to the agent-societies. With the introduction of the "free" market

system, it is expected that farmers may store their maize until market prices are attractive to them. Spoilage is expected to be minimized as the risk of loss will be borne by the farmers themselves or who ever will be participating in storage.

In the short run (about ten years) the decontrol of input prices is expected to raise the level of input prices and this may have an adverse effect on yields and marketed output. Input prices cannot, however, be considered in isolation from producer prices. Thus the influence of the two prices together cannot be determined a priori. For decontrolled input and output prices to have any positive influence on the marketed output they must be accompanied by an orderly food market so that farmers could be able to pass on the costs to the consumer. In order for a market to work reasonably well, infrastructure, especially roads and storage facilities which are severely lacking at present, will be needed.

The credit system, unfortunately, is riddled with problems such as, unavailability or insufficient credit supply for small scale farmers, negative real interest rates which lead to excess credit demand and little incentive to save, inefficient and ineffective delivery credit system to small scale farmers, low loan recovery rates, especially in drought periods; and lack of suitable collateral among many small scale farmers. In addition to these problems will be the expected elimination of government guarantees which will raise the cost of credit supply, forcing lending institutions to be more prudent. Demand for credit is also expected to increase as the need for credit for marketing purposes is also recognized. These problems may stifle the progress towards the development of a reasonable credit system necessary in order to have an improved production and coordination system.

The cooperative system has always been identified as an alternative and/or complementary market coordination system to the "free" market system. With many small scale and emergent farmers to deal with throughout the entire country, cooperatives are well placed geographically to deal with such a situation. If cooperative societies are able to supply and distribute products at low cost, they could assume a large maize market share. In order to achieve an efficient market coordination system, competition from the private sector, especially in carrying out marketing functions will be needed.

In the past, rural milling had been discouraged by regulations, uniform pricing (resulting in low and/or negative marketing margins) and the availability of subsidized commercial maize meal. Macro policies such as overvalued exchange rates and controlled interest rates were all in favor of large capital-intensive commercial mills. With liberalization more rural mills are expected to be operational since commercial meals will reflect all the market costs (especially transportation costs) which will result in high final product prices. Storage of maize by rural millers is expected to develop alongside the milling industry. Millers have now an opportunity to process maize and dispose of it as grain and/or meal in addition to the service operation. Such market coordination (and integration) could potentially create substantial savings in packaging, transport and handling costs.

The major cost component of maize marketing was the cost of maize transfers. To reduce this cost will require a major change in production patterns, with more maize being produced near the major consumption areas. Price differentials reflecting transfer costs are expected to be instrumental in the development of the

new production pattern. Southern, Central, Lusaka and Copperbelt provinces are expected to be major maize production centers. Eastern and Northern provinces are expected to lose a significant market share due to the high transportation costs.

With all the marketing costs expected to be reflected, the final product price of maize is expected to increase drastically. The net effect on consumers cannot be determined easily since beneficiaries of the low food prices (subsidized food) were also victims of the high inflation rates brought about by subsidies. The subsidies had a significant adverse effect on the budget deficits which resulted in the government borrowing from commercial banking and/or printing money. Some income categories whose wages and hence real incomes increased may have had net benefits from the program. Unfortunately wage increases were one major reason for high inflation and high unemployment rates (stagflation).

The unemployed or small item traders and the rural net food buyers may also have benefitted from low food prices but they suffered low producer prices, poor terms of trade between the rural and urban areas and high inflation rates. The removal of subsidies may threaten some households' food security situation in the short run. Net food buyers, low income groups and the unemployed in particular may need subsidies if they are to be protected during the difficult transition period of the reforms. Assistance in form of food-for-work programs, for example, could be conducted for the vulnerable groups.

In the long run, price, supply and rural income stabilization programs could replace targeted subsidy programs. Stable food supplies and prices are unlikely to develop without increased food production and a better and efficient marketing

system. Consumers (including producers who are net buyers) may need protection from higher and volatile final product prices and producers from low producer prices which de-stabilize food and non-food production and hence rural incomes. A stabilization program requires the government or publicly supported organization (e.g. cooperatives) to purchase excess maize when producer prices are running too low and release stocks when final product prices are running too high.

In the event that reforms are carried out smoothly without political disturbances, the food security situation will improve only if there is economic development resulting in reduced inflation and unemployment. Economic growth is expected to result from market efficiency brought about by the liberalization program. Advocates of market liberalization will introduce an element of competition in the economy and maize market system, in particular, and consequently improve the market efficiency. This should result in relatively low cost maize with little or no need for government subsidy programs.[1]

The liberalization of the marketing system alone, however, will not automatically result in an efficient market coordination arrangement, especially in the short run. The lack of an existing trader class, lack of private investments and uncertain future government policies will slow down the privatization process, which is central to a successful market liberalization program. The role of the government

---

[1]The performance potential of private trading in Zambia is well illustrated by the sweet bean market. The commodity was not controlled and private traders performed the whole array of vertical coordination effectively. Transportation costs were reflected in the prices and demand and supply forces determined the market prices. As a result shortages of the commodity were absent. Such a performance is expected by liberalization advocates for the maize market.

remains in facilitating competition by supplying or improving the availability of information on crop forecasts and price movements, providing legal support and improving infrastructure for domestic and international trade.

Hopcraft (1987, p. 39) noted that the results of market liberalization include the integration of markets, permitting prices to reflect quality, scarcity and costs of transportation and storage. Liberalization could, therefore, stimulate market efficiency. In Zambia the performance of the cooperatives and the private sector will influence the performance of the maize sub-sector. The performance of the maize sub-sector will most likely affect the growth of the economy and hence economic development, resulting in a higher standard of living for the country's population.

CHAPTER FOUR

THE ROLE OF PRIMARY COOPERATIVE SOCIETIES IN MAIZE MARKETING

The on-going restructuring of the Zambian economy involves a movement from a centrally controlled economy to a more market-oriented economy. Restructuring or market liberalization in a broader sense refers to the reduction in direct government control of markets. The definition assumes that market distortions occur as a result of government interventions, which result in significant costs in terms of economic growth and development. The removal of these distortions, therefore, is assumed to stimulate the growth of an economy.

In Zambia, the impetus for market liberalization stemmed out of two major reasons: 1) The realization that public sector production and marketing performance did not work as anticipated; and 2) having relied heavily on IMF/World Bank structural adjustment loans, the country responded to these organization's insistence that the public sector should play a reduced role in the economy.

In the process of reforming markets, the government faces many problems in identifying constraints and formulating policies to improve the performance of the economy. Agriculture was identified as a crucial industry to the development of the

country, and the importance of the maize sub-sector[1] in the industry and indeed to the economy cannot be over-emphasized.

In recognition of the role the maize sub-sector has in the economy, a study was conducted in 1990 by several government and donor agencies. The study, "Evaluation of the Performance of Zambia's Maize Sub-sector," identified several objectives to improve the sub-sector performance (GRZ, 1990a, p. 6). Among these were two objectives related to marketing. The first was to improve the economic efficiency in both the production and marketing of maize. The second objective was to improve the viability of the cooperatives, which were expected to play a vital role in the new competitive market.

In marketing, vertical coordination has been and continues to be the most contentious problem in the country. In the absence of marketing boards and a developed private trading sector, cooperatives may be the most viable institutions to undertake coordination in the short run (here taken to be about ten years).

On the subject of the best marketing alternative many scholars reject both total public sector domination of production and marketing and the laissez-faire approach. Despite the serious issues raised with respect to public sector failure, public enterprise may prove to be less inefficient than the private sector in some cases. The critical issue, therefore, becomes one of being able to determine what role each sector, public, private and cooperatives will play in the market.

---

[1]The sub-sector is a meaningful grouping of firms related vertically and horizontally by market relationships. Industry has a narrower definition. It is a group of firms producing similar products and does not take into account some important market relationships, especially those involved in vertical coordination (Shaffer, 1968, p. 2).

To this effect, research was conducted on cooperatives in order to provide useful information on some of the important issues the policy markers, cooperative organizations and private traders face in order to address market coordination efficiency issues. The study looked at the economic and financial viability of Primary Cooperative Societies (PCS) and the role they could play in the changing policy environment of the maize market. The research project also attempted to provide insights into the role of the private traders.

4.1. Problem Statement

Many constraints impede the development of the maize sub-sector. Generally, the constraints include: a) Political and economic policy environments; b) Geographic dispersion and year to year variation of production; c) Geographic dispersion of the population; d) Poorly developed market infrastructure such as transportation, processing, storage, and information systems; e) Limited markets within regions; and f) Lack of credit facilities.

In an effort to supply urban consumers with inexpensive staple food items, prices were controlled, and in order to implement such a policy, public monopoly organizations were required. The market functions done by these organizations (NAMBoard and the Cooperatives) were poorly and inefficiently conducted.[2] One reason for the dismal performance of the organization was because of institutional arrangements existing at the time.

---

[2]Both NAMBoard and the cooperatives have acted as monopoly organizations in the input markets and monopsony organizations in the maize market. The term monopoly will, however, be used in this text for both characteristics.

Another difficulty stemmed from the accounting system and conduct of the marketing organizations. Since input and output prices were fixed administratively without consideration of relative scarcities, it was difficult to determine the true economic picture of the various monopoly organizations. The costs of inefficiency were not borne by the marketing organizations and indeed, failure by the organizations was more likely to bring a fund infusion than success. The absence of market discipline on the part of the public organizations consequently relegated efficiency in marketing to a low level of priority. It was evident by 1980 that the performance of government ownership and/or control of marketing organizations was dismal as well as a costly drain on government revenues. Given the institutional problems, marketing liberalization was an inevitable alternative for improving the performance of the maize sub-sector.

Liberalization of the maize market may be a necessary but not sufficient condition for improving market coordination activities of the sub-sector. Some form of public agencies or publicly supported efforts may be required, at least in the short run, to stimulate the development of an effective commodity market (Harrison, et al., 1987, p. 3). With the abolition of NAMBoard and the absence of a fully developed private sector, the cooperative is worth considering as an alternative or complementary system. Since the cooperative is a major player in the maize market, it is important to understand how it currently operates in addition to evaluating it in order to draw conclusions and policy implications on how best to re-organize the system.

4.2. Objectives

The overall objective of this study is to determine what policy pointers can be drawn from Zambia's past efforts in promoting cooperatives in the development of the maize market. Prescriptions will then be made regarding the changes needed for the future role of primary cooperative societies in the maize market. The specific objectives are:

1) to review, in general, constraints faced by primary cooperative societies by examining the internal constraints (structure of PCSs and standard operating procedures) and the barriers to improved financial and economic performance;
2) to examine the impacts of the entry of traders on PCS since trade restrictions were lifted;
3) to identify cooperative marketing functions that the PCSs could participate in with emphasis on efficiency; and
4) to present implications of the study findings on the role of PCSs in maize marketing, potential benefits or costs to farmers, and sub-sector performance.

4.3. Literature Review

In this section a brief review of the history of cooperatives and their involvement in maize marketing in Zambia is presented first for a better perspective. A discussion of the underlying issues of cooperative definition is presented in order to provide a basis for understanding the subject matter concerning the structure, conduct and performance of the cooperatives.

4.3.1. Development of Primary Cooperative Societies in Zambia

The Zambia Cooperative movement is composed of the Zambia Cooperative Federation (ZCF) at the national level and nine affiliated provincial Cooperative Unions (PCU). Each provincial union has some District Unions (DCU) and Primary Cooperative Societies (PCS) affiliated to it. PCSs are affiliated to the DCUs or directly to the PCUs but DCUs are affiliated to their respective PCUs. Membership in PCS is drawn from mainly small scale and emergent farmers (For schematic presentation of affiliation, see Figure 4).

The first cooperative society to be registered in Zambia, then Northern Rhodesia, was in 1914. The society[3] had a membership of 1948 and was restricted to the European settlers. Attempts to establish cooperatives among the Africans in the 1930s were unsuccessful due to the low level of agricultural production and lack of trained, experienced and trustworthy personnel to run them (Lombard, 1971, p. 8).

In 1947, the cooperative societies ordinance was passed by parliament and the department of cooperatives was formed (Mwila, 1989, p. 1) to encourage cooperatives formation among Africans. By 1948 there were 23 societies with 3567 members. African cooperative societies had increased to 192 with 39,677 members by 1964. The societies that developed were primarily in crop marketing although a few were loan, consumer and supply cooperative societies. The marketing cooperative societies were generally successful, with the value of their turnover increasing tenfold

[3]The terms PCS and society are used interchangeably in the text.

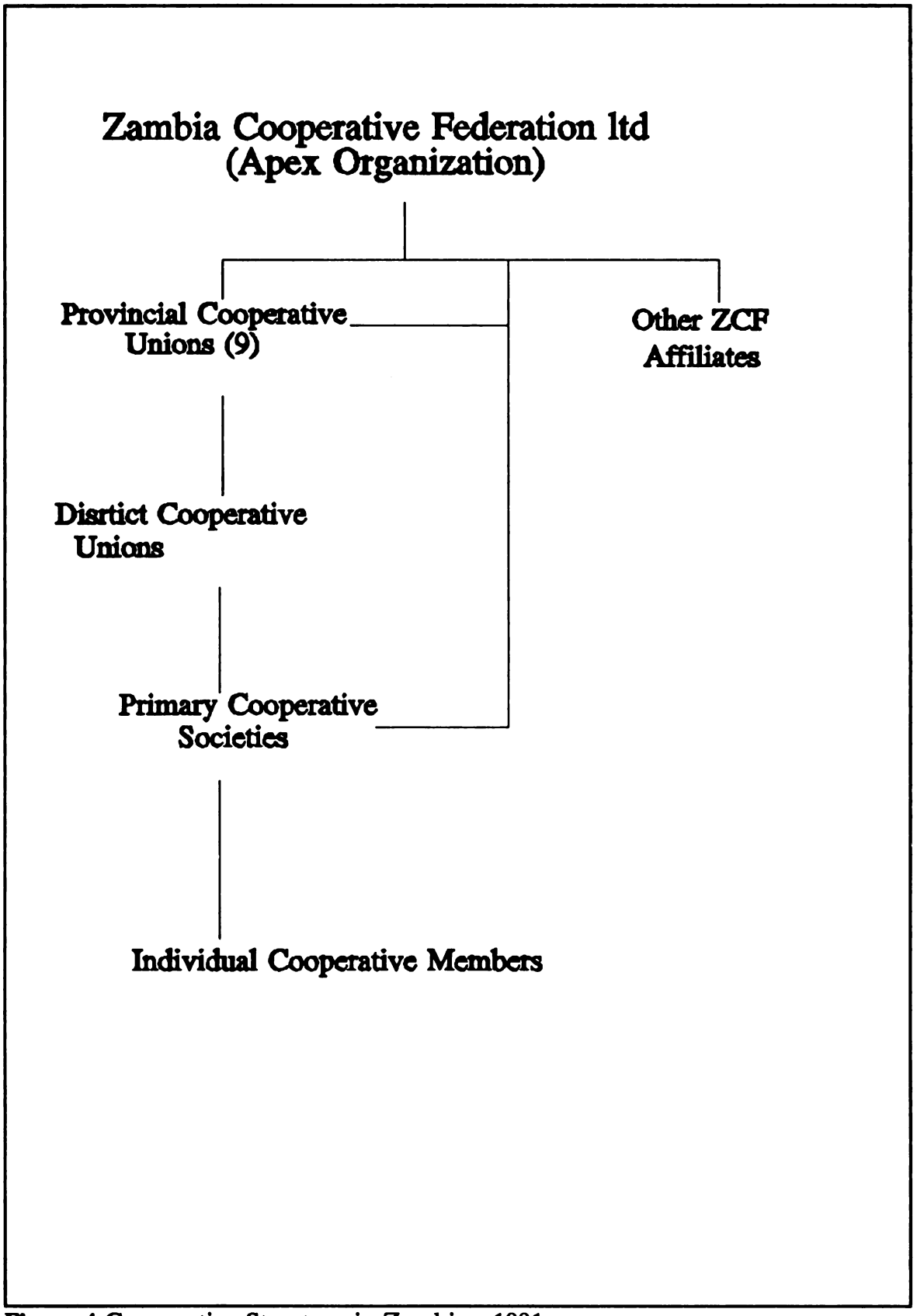


Figure 4 Cooperative Structure in Zambia - 1991

between 1949 and 1960 (Wood, 1983, p. 4). The societies in Southern and Eastern provinces were notably successful.

With the coming of independence in 1964 came the new government which saw cooperatives as the best avenue for involving Africans in the country's efforts at economic development. The assumption was that African participation through the cooperative movement would improve the quality of life of the underprivileged and unemployed rural population (Mwila, 1989).

A major campaign to promote cooperative formation was launched in 1965[4]. The unemployed, especially, were called upon to form cooperative societies and were assured of funds to assist in these ventures. Free membership was encouraged and members were to have "full control" of their organizations with only necessary government supervision. The support provided to the societies included agricultural loans, farm inputs (seed and fertilizer) and at times, oxen or tractors (Mwila, 1989, p. 4). A cash subsidy was also provided in return for surplus crop produce.

With these attractive conditions the growth of the cooperative societies was overwhelming and by 1970 there where 1,280 societies with an estimated 53,000 members. Promotion of cooperatives was again intensified during the 1970s, and by 1990 membership was estimated at half a million patrons (See Table 4.1). The number represented just under eighty percent of the total estimate of emergent and small scale farmers (GRZ, 1990a, p. 18).

---

[4]The new cooperative directive was issued by president K.D. Kaunda and is popularly known as the "Chifubu declaration." It provided the policy framework for the formation of the cooperatives. The president called for people to supply the "energy, skills and enthusiasm while the finance, supervision and guidance" would and did come from the government (Quick, 1978, p. 4).

Table 4.1 Growth of PCSs: 1948-1990.

Year	Number of PCS	Membership
1948	23	3,567
1964	192	39,667
1970	1,280	53,000
1980	715	117,000
1984	1,031	150,000
1988	1,500	400,000
1990	1,468	500,000*

Source: FNDP, Volume I, 1989, MOC.

* estimated

The rapid growth of the movement was accompanied by major problems which led to the collapse of nearly half the societies by 1980. Some of the reasons for the failure of agricultural societies have been documented and included:

i) total unpreparedness on the part of both the societies themselves and the government machinery and bureaucracy to deal with the unprecedented rapid expansion of the cooperative movement;

ii) lack of cooperation on the part of bureaucrats who were not ready to implement government policies;

iii) lack of skilled, trained and experienced personnel to run the societies;

iv) farmers' preference for individual private units rather than communal or cooperative form of production;

v) peasant's lack of technical, political and inter-personal skills to manage complex organizations such as cooperatives. Consequently there was a lot of mismanagement of the societies;

vi) inadequate infrastructure, especially in terms of transport;

vii) the belief on the part of some of the more influential members that the money government was pumping into the cooperatives was in actual fact a reward for their participation in the freedom struggle few years back; and

viii) most of the people who formed or joined cooperatives had been unemployed and others were attracted by the relatively large sums of money which were provided. They joined so that they could obtain a share in these funds by any means (See Mwila, 1989; Quick, 1978; Lombard, 1971; and Lungu, 1976).

Other reasons documented were that societies could be registered without any assessment of their economic viability or of their internal coherence and commitment to the cooperative movement (Wood, 1983, p. 20). For example, Parents Teachers Associations were converted into marketing cooperatives in the 1970s. The government also broke away from the conventional cooperative practice in stating that it was not essential for members of the new groups seeking registration to subscribe share capital before commencing operations (Lombard, 1971, p. 20).

Cooperative societies in particular encountered numerous problems such as under-capitalization and lack of the infrastructure needed to produce the services they were directed to do. The administrative capacity was poor and in the absence of the full-time or well-trained managers the elite in the form of board of directors managed the societies usually for their personal gains. The surge and subsequent

dismal performance of the cooperatives since independence has left a lasting detrimental image of the cooperative system. This has retarded subsequent attempts to stimulate interest and improve the quality of the movement (Sipula, 1986, and Wood, 1983, p. 9).

In the recent past (1980s), the failures of the cooperatives to function in the economy has been in part due to the image created that they were government and political organs and that local effort was not needed. This was because the movement had been supported almost entirely by government funds and were believed to be badly organized, inefficiently run and bound to fail anyway.

Prior to 1972, a two-tier cooperative system existed. In 1972 a three-tiered system was created with the formation of the Zambia Cooperative Federation as the apex organization. The creation of the apex organization was justified on the grounds that societies could not develop in an environment where activities such as credit provision, education and input supply were being provided as isolated and uncoordinated activities by different organizations. An apex organization could coordinate these activities and at the same time assist in the implementation of national cooperative development plans and in the channelling of development aid to primary societies (ZCF, 1982).

ZCF was charged with many other responsibilities of administering various programs through its specialized departments and subsidiaries. Some functions and responsibilities included:

i) the role of spokesmanship for the cooperative movement;

ii) coordination of long-term planning;

iii) monitoring of agricultural policy and pricing and statistics and provision of such information to its affiliates;

iv) public relations and provision of training;

v) provision of insurance;

vi) provision of commercial services such as transportation, wholesaling, and machinery maintenance and repairs;

vii) Auditing, accounting and provision of credit to societies;

viii) importation of the consignment of farm inputs; and

ix) management of strategic stocks and maintenance of silos and grain sheds.

Even with the formation of ZCF, the movement was ineffective and in a state of dormancy. It was not until 1976, after the coming of the Swedish International Development Agency (S.I.D.A.) with its financial support, that a serious attempt was made to revitalize the movement again.

In 1980, the government reiterated the importance it attached to the cooperatives by planning to streamline NAMBoard and allocate more functions to the cooperative system. At this time only three provincial unions (in Eastern, Northern and Central) were in existence. Six new extra unions, one in each province, were created under government directives and support. The government and the ruling party continued to believe that the cooperative movement was one way of sensitizing the rural masses for the collective self-help projects. This was particularly important in view of the fiscal budgetary difficulties which prevented social and economic services and infrastructure to be provided. The movement was also seen

as an instrument for decentralization of economic activities to complement the administrative decentralization that was being carried out (Wood, A., 1983, p. 12).

The economic reason for revitalizing the cooperatives was that NAMBoard had become too monolithic and increasingly inefficient. The government believed that smaller organizations of the provincial rather than national levels would likely be more efficient and hence reduce the drain on government revenues that went to supporting the market system. The development of the unions affiliated cooperatives were seen as a better market organization alternative.

By the mid 1980s, it was clear that cooperatives did not do any better than NAMBoard in terms of market effectiveness and efficiency. The government, therefore, started to encourage cooperatives to become autonomous and economically viable entities. In 1989 the government decentralized the cooperatives further by introducing the District Unions. The DCUs were supposed to bring services closer to the people unlike provincial unions, which were accused of being far removed from members. The performance of the DCUs so far has had little impact on the market since they were hurriedly implemented and are not yet well established.

The brief review of the history of the cooperative movement in Zambia shows, in addition to the problems narrated above, that the movement has grown out of government initiative and support. The government (and the ruling and only political party at the time) supported the movement in order to achieve political, social and economic goals as perceived by the bureaucracy. As a result, the cooperative

organizations at all levels operated more like government agencies than as autonomous business entities.

The dismal performance of the cooperatives, however, has not diminished the determination of the new 1991 multi-party government to use the movement as a strategy for reaching and raising the standard of living of the rural population. The new government does not intend to control or influence the movement directly as happened before. Funding will be restricted to facilitating the operations of the maize market through education and information provisions for example.

4.3.2 Cooperatives' Role in Agricultural Marketing

As stated before, the period of the cooperative formation saw the major role being that of marketing. Before 1961, producer marketing cooperative societies were particularly important in the remote outlying areas (Lombard, 1971, p. 12). At about 1948 the great majority of cooperative societies were mainly responsible for financing of member's crops, the marketing of the bulk of produce, and provision of transport for collection and supply of seed and fertilizer.

Historically, the outlying Eastern province provided the impetus in organizing the marketing cooperatives. A tobacco marketing cooperative society emerged in 1938 at Petauke. The Luangwa cotton growers organized themselves into a marketing society in 1949. The society leased a gin from the government and marketed lint cotton.

In 1952, the first union, the Petauke Cooperative Marketing Union (P.C.M.U.), was formed in Eastern province. This was followed up by the formation,

in 1956, of the Katete Cooperative Marketing Union (K.C.M.U.) and the Alimi Cooperative Union (A.C.U.) in Chipata (Lombard, 1971, p. 14). The unions owned assets such as feeder transport vehicles and grading machines, and provided and made available services such as stores for implements, seed and fertilizer.

Southern province was another area where producer marketing cooperatives have been important. In 1951 the Namwala Cooperative Marketing Union (N.C.M.U.) was formed. The union entered the maize market competing with the private traders who hitherto had been buying on behalf of the maize control board.

In 1954, the Northern Province Cooperative Marketing Union (N.P.C.M.U.) based in Kasama, Northern province, was formed. The Southern Province Cooperative Marketing Union (S.P.C.M.U.) was formed in 1960. A cooperative marketing union was also formed in the Central province and lasted but a short time (Lombard, 1971, p. 15).

The major function of cooperatives has always been the marketing of crops. In the post independence era, maize marketing came to dominate the activities of the cooperatives. Before 1980 and in 1985 the PCUs acted as agents for the monopoly/monopsony NAMBoard in as far as input distribution and maize marketing were concerned. The PCSs were used by unions as assembling and collection centers and were paid a service commission. After 1985, the PCUs took over the purchasing of maize, leaving inter-provincial transfers and stock holding to NAMBoard, and the role of PCSs' did not change.

In 1989 NAMBoard was dissolved and marketing functions of maize directed to the cooperatives and fertilizer distribution to Nitrogen Chemicals of Zambia

(NCZ). Within the cooperative movement ZCF and provincial unions were directing the district unions and primary societies to carry out the functions. The DCUs and primary societies were expected to market the bulk of the maize until 1991, when the restriction of private trading was lifted. In the short run, before a significant private sector confidence and entry develops, primary societies may have to carry the burden and appear to have some potential in conducting market functions as autonomous organizations.

4.3.3 Cooperative Definition

Cooperative firms are traditionally defined as businesses that are owned by their patrons and follow at least some of the Rochdale principles[5]. Since not all the Rochdale characteristics can easily be followed in reality, scholars have suggested three essential principles.

1) Service at cost to member-patrons;

2) Democratic control by member-patrons; and

3) Limited return on equity capital.

In summary, a cooperative business is "an association of patrons, democratically governed, that owns one or more firms from which voluntary patrons

---

[5]The Rochdale principles include: 1) net margins distributed according to patronage; 2) democratic control--one member/one vote; 3) limited return to stock; 4) limitation on the number of shares owned; 5) open membership; 6) trading on cash basis; 7) membership education in the cooperative way of doing business; 8) political and religious neutrality; 9) no unusual risk assumption; and 10) goods sold at regular retail prices, with net margins rebated to members rather than discounted retail prices (quoted from Staatz, 1987, p. 33).

receive benefits or incur costs based on patronage rather than stock ownership" (Shaffer, 1987, p. 63).

Zambia "cooperatives" violated these principles in one way or the other due to the direct government and ruling political party involvement as narrated earlier. Under the definition or principles described above, Zambian cooperatives were cooperatives in name only. The reformed market environment is expected to present an opportunity for the cooperatives in Zambia to operate as true cooperative organizations.

CHAPTER FIVE

METHODOLOGY AND DATA

A study of a major participant such as the cooperatives in a market system can be very involved. A rapid appraisal aids in narrowing down the subject matter to manageable levels, while assisting in problem-solving goals. A rapid appraisal was, therefore, conducted in February and March of 1991. The regions visited included the Central, Copperbelt, Eastern, Northern and Southern provinces. The appraisal was particularly important to this study because the country was in the midst of market liberalization and economic policy reforms.

5.1. Methodology

The preliminary survey conducted gave insights into the relationship between different levels of the cooperative movement (ZCF-PCUs-DCUs-PCSs). It provided the researcher with a clear range of issues important to the cooperatives in the maize sub-sector. It was clear that provincial unions intended to avoid assembling maize and were pushing the difficult task to the PCSs and inexperienced district unions.

The PCS level appeared to be a potential key player in the liberalized maize market and a decision was, therefore, made to concentrate the survey at the PCS society level. In any case it is at this level that the cooperative system is closest to

its members and indeed the agricultural population at large. The primary purpose of research was to examine the opportunities and barriers to using PCS for improving market coordination of maize in Zambia. The PCSs' behavior may ultimately affect the maize market system performance.

The specific purpose will be to evaluate the financial status of a sample of PCS and to determine whether they become efficient economic organizations. The working assumption will include that PCS with good financial standing could survive competition without government direct support and could effectively participate in maize marketing. Market competition will bring about market discipline in the PCS organizations' conduct and improve their financial position. Once the PCS constraints are determined, recommendations to improve the cooperative form and system performance can be made. In this regard, the net worth and income statements will be prepared and financial ratios generated for a "typical" sampled PCS. The analysis will then compare a number of loss PCS generating losses with those generating profits. The following section provides survey information on sample selection, data collection, quality of data, and data management. Techniques for analysis and results are then presented in the chapter that follows.

5.2. Sampling

The PCS samples came from four maize surplus and two deficit provinces. The surplus provinces were Central, Eastern, Northern and Southern. The deficit

provinces were Lusaka and North Western provinces[6]. Lusaka province is an urban major maize consumption center located on the Old Line of Rail (OLR). North Western province is a rural location off the OLR.

Central and Southern provinces are near major consumption areas and are served by a railway line. Eastern province, on the other hand, is far from the major consumption areas and lacks a railway line as an alternative transportation system. The province is known to have production advantages for maize in terms crop agronomy and husbandry, but is economically disadvantaged due to high transportation costs. Northern province, though served with a line of rail, is dramatically unsuitable for maize production and is also far from the major consumption areas.

A list of existing and active primary cooperative societies was collected in each province and a number of societies was then randomly selected. Table 5.1 shows the estimated number of PCS in the sampled provinces, the number sampled and number retained for analysis. Sixteen societies, out of a list of 102 were visited in Southern province and fourteen were retained. Of the fifty societies listed in North Western province, four were visited and retained in the analysis. Six societies in Central, five in Lusaka, four in Northern provinces, and ten in Eastern provinces where retained for analysis. At least four private rural mill service operators were interviewed in each province. A second questionnaire was administered after the lifting of the ban on private trading and a quick survey was conducted with a sample

[6]Four provinces enjoyed the surplus status in 1990/91 marketing season.

Table 5.1 Sampled Primary Cooperative Societies.

Province	Number PCS	Sample PCS	Retained PCS
Central	72	7	6
Eastern	100	16	10
Lusaka	35	6	5
Northern	61*	6	4
NWestern	50	4	4
Southern	102	16	14
Total	420	55	43

* Estimated for the sampled Districts only

of forty-five farmers, five millers (as private buyers) in Central, Eastern, Lusaka and Southern provinces.

5.3. Data

The field work was conducted between April and November, 1991. Three experienced enumerators and two research assistants were recruited and trained for the survey. The enumerators, one supervisor, and one principal researcher were all involved in pre-testing and the eventual administration of the questionnaires. The administration of the structured questionnaires involved at least one visit to the research society. A few PCSs were visited more than once for clarifications to be made.

Initially one structured questionnaire was prepared and the questionnaire was the major source of data. As stated above, a second short questionnaire was added

towards the end of the survey in order to gain insights into a major policy change of August, 1991. The policy involved lifting the ban on private participation and was announced while the research was being conducted. The questionnaire attempted to gather information on the immediate reactions of some participants.

Additional data to the main questionnaire came from financial records kept by PCSs. Collection of data from financial books was based on how well and clear the records were kept. The financial statements collected had some of the same variables as those in the questionnaire. The statements in most cases were not well maintained and thus only provided complementary data to the questionnaire[7]. Sixteen financial records for the 1990 financial year were retained for analysis in total.

The first questionnaire was administered to a PCS as the research unit. It had questions relating to the structure of the unit, including management and board characteristics. The questionnaire sought information on selected economic enterprises of the primary society. Enterprises included milling, maize assembling, input supply, credit provision, transportation and communication and consumer goods retailing.

In the questionnaire an attempt was made to value the total assets and liabilities of each society at replacement value to incorporate the effects of a severe inflation rate the country was experiencing. At the time of the survey, by law, land

---

[7]The "New Cooperative Cash Column Book" as popularly known by the cooperative movement, contained in some cases only a few months of data. The financial year also differed among societies, and the calendar year convenient to the research for analysis.

did not attract rent and was, therefore, not valued in monetary terms (i.e., carried a zero value) in the survey.

Interviews and observations were part of the survey and concentrated on attitudes and market information issues of participants towards cooperatives and the new market system. Other sources of quantitative data used in the study included census data, survey reports and financial reports from the Ministry of Cooperatives (MOC), Zambia Cooperative Federation and its affiliates, Central Statistics Office (CSO), University of Zambia (UNZA), Ministry of Agriculture (MOA), Prices and Incomes Commission (PIC), ZCF, etc. Data were also obtained from on-going national research programs such as "An Evaluation of the Agricultural credit System in Zambia" by GRZ and "Rural Trade and Processing of Traditional Crops in Zambia" by ICRISAT, Rohrbach and others.

5.4. Data Quality

The main problem encountered in the collection of data, other than time, was that of mobility. The vehicle used was not capable of reaching some parts of the research areas. Consequently, some randomly picked PCSs were dropped.

After the appraisal had been conducted, it was determined that society managers were the best source of information from the organizations. On several occasions, however, the society manager was either absent or new on the job and thus had no access to or was unfamiliar with the records. Depending on the severity of the problem the affected PCS was either replaced or another respondent interviewed.

A language problem anticipated in the early stages of the survey turned out to be insignificant as the English language employed in the interviews was familiar to all the respondents. The other major difficult the researchers and indeed the market participants faced, was that of interpreting and understanding frequent policy pronunciations within the course of the research period. It was consequently difficult to obtain answers to questions on new policies when some market participants where not even aware of the policy changes. The problem of poor information was exacerbated by the re-introduction (after seventeen years) of the democratic multi-party elections and the rural population was particularly uncomfortable with the researchers and questions posed during these political election activities.

Problems in desegregating some joint expenses of the society's business to individual enterprises within the business was common. This was particularly so for labor and transportation expenses, and little could be done to alter this situation. Records for maize were particularly poor because most of the PCSs viewed themselves as mere agents and actually obtained instructions from the upper levels of the cooperative system. There was, therefore, complacency or deliberate acts to maintain bad records on the part of the society management.

The accuracy of survey data is generally difficult to ascertain, especially where answers are based on memory. The errors in this case were minimized by the initial rigorous training of enumerators, good field supervision, editing and supplementary financial records. Apart from the difficulties encountered in generating data, the data were relatively good and useful for drawing policy implications and as a basis for future performance comparisons.

5.5. Data Management

Each questionnaire was edited by the supervisors in the field and usually on the spot. The supervisor checked for completeness, missing and inconsistent answers. Corrections were made immediately while the survey team was still in the locality of PCS. Editing was particularly important in the early stages of the survey when it was necessary to check whether the enumerators understood the questionnaire and were complying with the instructions. Edited questionnaires were taken to the Rural Developed Studies Bureau, University of Zambia, in Lusaka, which served as the research center. The data was coded and entered with the help of the Norton Editor program on micro computers.

CHAPTER SIX

ANALYSIS OF PCS RESULTS

The results of the survey of the primary cooperative societies were analyzed and are presented in this chapter. Structural characteristics, economic and financial results are presented as averaged values or common characteristics. A test for sample distribution showed that the sample was normally distributed (with a coefficient of skewness of 0.918 with a standard deviation of 0.333). The mean values as a statistical measure of central tendency were, therefore, reasonable.

In conducting general economic analysis of any program involving private and public participation, financial analysis may be required (Frank, 1989). Financial analysis should show evidence of profitability in order to induce individuals to devote resources to an activity. Under market reforms, PCS will be expected to operate autonomously without government direct support. Future participation of PCS in the maize market will depend upon how well they organize and operate as independent firms and compete against the private traders. Profitability and financial ratios will be used in an effort to have reasonable criteria for judging performance. The ratios will provide insights into how solvent, liquid and profitable the cooperative firms were for January 1st to December 31st, 1990 financial year.

In order to gain some insights into the factors that influenced the volume of maize handled, a regression analysis will be attempted using selected regressors. Social and management regressors will be included, and economic variables will not be since uniform prices (pan-territorial) were in place and only cross-section data will be available in this case.

6.1. Structural Characteristics of Sampled PCS

The average PCS sampled had been in existence for nine years, although a few were as old as 34. The average membership was found to be 427, but the number ranged from 32 to 2,500. Membership was scattered over a mean radius of about 11.6 kilometers, with some members coming from as far as 22 kilometers away. The average distance a society was located to the nearest district was 37 kilometers, but could be as far as 88 kilometers away. Society locations were thus well scattered and in good proximity to the farmers.

Every sampled society had a board of directors, management and general membership. The board of directors was composed of the board chairman, vice chairman, secretary, treasurer and three board members. The composition of the board was standard for all PCSs in the country as specified in the "by-laws" of the registrar of societies.

In the survey, all societies had a male board chairman, with an average age of fifty years and average formal schooling of nine years (i.e., junior secondary school level). In most cases the chairman was a prominent member of the community, usually an active primary school teacher, retired primary school teacher, retired

police officer or a retired government civil servant. With a junior secondary school education level, the chairman was reasonably literate to follow general economic policies but probably not comprehend complex economic and financial concepts.

The secretary to the board and treasurer were also mostly male, with average ages of 43 and 46 years respectively (Table 6.1). The secretary on average had 10 years of schooling (i.e., junior secondary school) and the treasurer had only 8 years of schooling (basically primary school). The treasurer was considered semi-literate at this level of formal schooling. The reason for having a semi-literate treasurer was difficult to comprehend and the author speculated that it may have been for intimidation of the office holder and to gain control of the finances by the chairman and/or the society manager. Indeed the treasurer tended to know little of what was going on in the PCS business activities. Another possible reason could be that financial mismanagement could easily be blamed on the poor qualifications of the treasurer when auditors from ZCF or PCU examined the records.

The management of the societies surveyed comprised of the society manager assisted by a shop keeper, and hammermill operator, security guards and hired seasonal labor. The cooperative society manager was responsible for the day-to-day running of the PCS, particularly with the business aspects of the firm. The society manager in general, was found to be male (95 percent) with an average age of 31 (Table 6.1) and an average twelve years of formal education (i.e. senior secondary level). In addition to the formal education, the society manager attended cooperative

Table 6.1 Average Society Management and Board Characteristics.

Board member	Age (yrs)	Education (yrs)
Manager	31	12
Chairperson	50	9
Secretary	43	10
Treasurer	46	8

Sample (n) = 43

school to study book-keeping, accounts and cooperative theory as a requirement by the cooperative movement[1].

The society manager was younger, more educated, more active, and thus tended to possess more decision making power even though it was the chairman who was perceived to have that power according to cooperative members. The society manager, however, was noted to be more knowledgeable on the business aspects of the organization. From discussions with members of the societies, it was suggested that economic decisions were made by the manager in most of the societies and that these decisions were made for personal gain. Clues to such a conclusion included the fact that the manager, for instance, made "business trips" to other districts and in the process earned allowances. For personal protection from misuse of funds, the manager maintained poor records, which made it difficult for auditors to quantitatively determine the sources of revenue and expenditures. For example,

[1]Once some of the society managers acquired some of these skills, they moved on to better jobs.

many expenses were buried under the term "other expenses" which covered a wide range of unexplained expenditure items. Misappropriation of funds was often discovered after a few years and the manager was dismissed but hardly prosecuted for the "crime" committed. Managers were changed on average every three years, making record keeping a difficult task. The new manager could not gain access to the old records or could not interpret them and hence had a good reason to start all over again.

Ordinary members were hardly concerned with monitoring the PCS activities even though they believed that they would receive net benefits from patronage. The reason could have been a free rider problem with each member assuming that others would spend their time monitoring the running of the organization. In the end, apathy permitted tribalism, nepotism and mismanagement to emerge.

Through informal interviews with members of the PCSs, it was learned that in many cases, the shopkeeper employed was a relation (often a wife or daughter) to the board chairman, secretary or to the society manager. Nepotism introduces a problem of discipline of subordinates for undesirable and negligent conduct. Tribalism and political party affiliation were less of a problem than nepotism, as there was only one political party at the time of the survey and most members were usually of the same tribe for a given society. Mismanagement as a result of the apathy shown by members was another serious problem. The "Annual General Meeting" was held on average in the survey area every fifteen months. Few members attended the meetings and had low morale, resulting in a low level of participation. Often members attended meetings to learn about that year's market season loan

application and maize marketing regulations as directed from the upper-tier cooperative organizations. The impression obtained from the survey was that the management of the organization was of low priority at the meetings and that misappropriation of funds surfaced only when there were conflicts between the management and members of the board.

Mismanagement examples include the fact that the manager and/or the board chairman usually made personal trips but passed them on as business trips, goods were often kept at a manager's or board chairman's house with no appropriate records kept, some societies' tools and equipment where used by board and society management for personal activities and consumer shops could be closed at the discretion of one of the members of the board or the society manager. One of the reasons this was allowed to occur was that the expectations by members on the cooperative's business performance was low.

Members recognized that the societies were one way of having access to credit regardless of the financial status of the cooperative organization. The board of directors and management were also more concerned with provincial unions and/or ZCF management and were not answerable to the membership for the same reason. It was the upper-tier organization that could take action for mis-conduct by the society manager in most cases. Monitoring of societies by the provincial unions, on the other hand, was very infrequent, as the auditing of financial books showed. Auditing was behind schedule by as much as four years and often books were taken to the provincial union offices and not returned over a long period of time. This gave the management and/or board more latitude in conducting the organization's

business activities with little fear of repercussions for illegal or negligent conduct. Little capital formation, for example, was initiated by the management or the board of directors for the benefit of the organization. Even consumer shops and milling (hammermill) operations where initiated by ZCF.

The impression obtained from interviews, discussions and observations on the issues of mismanagement, nepotism, negligence and tribalism, point to the fact that, Primary Cooperative Societies in Zambia had serious internal organizational problems over and above the external policies. The conduct of the management and the board was identified as a serious hindrance to the operations of the societies. In this area, changes in incentives will be needed if attitudes are to change and hence, progress made by the organizations. The societies did, however, manage to attract young and relatively educated society managers to run the organizations, but without monitoring by the general membership little could be gained. The management and the board of directors will basically have to re-focus their attention from serving the upper tier interests to those of the membership. Competition among the societies and private traders for attention of farmers will be the impetus for change in the societies' attitudes and business norms and inefficient organizations will be eliminated under the new market environment.

6.2. Economic Activities

The major economic activities for the sampled PCSs included crop assembling, input distribution, credit distribution, milling services and consumer goods retailing. The analysis of each activity (individual enterprises) within the business enterprise

of an average society from the sample and financial statements averaged over the sample are presented in this section.

6.2.1. Maize Assembling Activity

Ninety-five percent of the PCSs sampled were agents of their respective provincial unions and not autonomous traders in the maize market. The rest did not deal in maize at all but were instead agents of a more successful cotton board, the Lint Company of Zambia (LINTCO). Of the societies that handled maize, 36 percent also handled sorghum, 85 percent handled sunflower, and 8 percent handled millet. In maize marketing, a society was offered a commission of 7 kwacha on each bag of maize handled in the 1990/91 market season. On average a PCS handled 5,719 bags of maize in 1989/90 and 5,020 in the 1990/91 market seasons respectively (Table 6.2). The volumes, however, ranged from a mere 13 bags for a North Western region society to 72,000 bags for a Southern province society in the sample. The PCS handling a large quantity of maize was found to be a center for other smaller PCS's which could be considered as subdepots. In the 1990/91 market season the maize activity earned an average annual revenue of 35,140 kwacha. The revenue of the maize represented approximately 5.8% of total annual revenue of the whole PCS (Table 6.6).

Since most of the firm's temporary hired labor was used for stacking maize, the annual temporary labor costs of the whole business enterprise could be allocated to the maize activity. With such an assumption, the maize activity would have recorded a loss of 6,119 kwacha in the 1990/91 market season for an average society.

Table 6.2 Mean Economic Characteristics - 1991

Activity	Value
Maize handled in 1989/90 (90kg bags)	5,719
Maize handled in 1990/91 (90kg bags)	5,020
Commission per bag (ZK)	7
Fertilizer handled in 1990/91 (50kg bag)	
Basal dressing	2,561
Top dressing	2,974
1990/91 fertilizer commission (ZK)	4.68
Milling charge to members (ZK/25kg)	20
Milling charge to non-members (ZK/25kg)	25
Private milling charge (ZK/25kg)	30
Mill service radius (Km)	7.20
Distance to other mill (km)	2
Distance to other shop (km)	4.50

Source: Survey, n=43

Assuming that an average society had not been an agent of the union but autonomous and the official marketing margins of the 1990/91 are used, a possible situation could be analyzed (See Table 6.3). A society that handled 5,020 bags of maize would have spent 4.016 million kwacha to purchase maize from farmers at 800 kwacha per bag. The society would have gained 5.533 million kwacha as revenue with the into-mill price of 1100 kwacha per bag. The society would have incurred 265,608 kwacha transportation cost from its location to the miller averaging a distance of 37 kilometers and a transportation rate of 1.43 kwacha per bag per kilometer. A net income of 1.24 million kwacha would have been realized by the

Table 6.3 Maize Costing PCS under Assumed Autonomy
(Sample means and 1990/91 Market Season Parameters).

Item	Value/income	Item	Value/Cost
Maize Sold	5,020	Maize Bought	5,020
Into-mill Price	1,100	Product Price	800
Revenue (ZK) (5,020*1,100)	**5,522,000**	Cost (ZK) (5,020*800)	4,016,000
		Mean Distance (km)	37
		Trans Rate (ZK/bag)	1.43
		Cost (ZK)(5,020*37*1.43)	265,608
		Total Cost (ZK)	**4,281,608**
		Net Income (ZK)	**1,240,392**

Source: Based on survey averages (n=43) and 1990/91 market season, market margin.

society from the maize activity, given all else the same. This would have been a reasonable level of income for a small business in Zambia for the 1990/91 market season. One would conclude that the societies would have benefitted more from being autonomous than as agents based on this criteria. Other costs not considered in the above scenario include full-time labor costs, packaging, fumigation and interest payments.

In order to gain some insights into the factors that influenced the volume of maize handled by a typical PCS in the researched areas, an OLS regression analysis was attempted using cross-section data of the 43 societies sampled. A linear mathematical relationship was assumed and the intercept was suppressed to allow for

zero purchases of maize.[2] The regression equation was in general specified as follows:

Qm = f(A, W, E, D, R, M, DL, DS DW, DN, DE)

Where
- Qm = quantity of maize assembled by the PCS in 1990/91 market season (90 kg bags)
- A = Age of PCS (years)
- W = Work experience of society manager within the same PCS (years)
- E = Education level of society manager (no education; primary; junior secondary; senior secondary; and college education)
- D = Distance of PCS location to the nearest district (Km)
- R = Distance of the PCS location to the nearest all weather road (Km)
- M = Quantity of maize purchases per member (bags/farmer)
- DL = Dummy variable equal 1 for Lusaka province and 0 otherwise
- DS = Dummy variable equal 1 for Southern province and 0 otherwise
- DW = Dummy variable equal 1 for the North Western province and 0 otherwise
- DN = Dummy variable equal 1 for Northern province and 0 otherwise
- DE = Dummy variable equal 1 for Eastern province and 0 otherwise

The quantity of the maize handled in 1990/91 season was the regressant and the regressors (exogenous variables) included the age of the society, the number of years the manager was employed, the education level of the society manager, the distance of the society to an all weather road, the distance of the society to the nearest district and the per member sales to PCS. In order to capture regional differences, dummy variables for Lusaka, Southern, North Western, Northern and Eastern provinces were included, controlling for Central province. Under the uniform pricing system and

[2]The linear relationship used performed better than a non- linear relationship that was transformed using logarithms.

with the use of cross-section data, uniform price variables (producer price and transport rates, for example) could not be applied to make economic sense.

The age of the PCS and the number of years the manager was employed were used as proxies for the stability and experience in maize marketing of the cooperative organizations. A positive relationship to the regressant was expected in each case. The distance to the district and to an all weather road were expected to provide insights into the importance of the location factor. An ambiguous relationship was expected for each regressor. Farmers further away from good infrastructure tend to be small and to retain more maize for household consumption selling less to the market and on the other hand, the absence of private trading in remote areas could increase the volume of maize handled by PCSs. The education of the society manager was included as a proxy for the quality of management and a positive relationship between the volume of maize and quality of management was expected. The per capita maize sales variable included in the model was expected to have a positive relationship to the volume of maize handled by a PCS. The variable was included in order to try and capture contributions by farm size. The regression equation generated by the model is shown below with t-statistics indicated in brackets for each respective coefficient)

$$Qm = 52.6A - 647.8W - 3426.1E - 21.5D + 158.7R - 3481.4M + 3885.9DL$$
$$\quad (.5) \quad (-1.5) \quad (-4.0) \quad (-6.0) \quad (2.6) \quad (-1.0) \quad (1.5)$$

$$- 3496.3DS - 1831.0DW + 2214.7DN - 29.0DE$$
$$(-2.2) \quad (-.5) \quad (.7) \quad (-1.5)$$

Adjusted R-square: 0.2809

The selected regressors did not explain much of the variation in the volume of maize handled by the societies. Only 28 percent (adjusted R-square of 0.2809) of variation was explained by the variables included in the test. The variation in volume of maize handled by PCSs appeared to be more stochastic with over 72% unexplained variation. Because of the imperfect market situation that existed in the market and the direct government "protection" of all societies regardless of performance and other physical factors, this outcome not surprising. The results, however, indicated that the most influential variables in the model were the level of education of the society manager (i.e. primary, junior or senior secondary school), the distance to the nearest all-weather road and the Southern province region. These variables were significant at the 5 percent level of significance. With every stage of education level of a society manager, 3,426 bags bought by the PCS could be explained by this variable. At every kilometer increase in the distance of location of PCS from an all-weather road, 159 bags of maize were purchased. This suggested that remotely located PCS will most likely be important to farmers compared to those near the roads in maize assembling. The dummy variable for Southern province suggested that a variation of the volume of maize handled by a PCS in the province to those in Central province could be explained by the regional differences. Since the Southern province was experiencing a drought in the 1990/91 market season, the PCSs did not purchase more maize than those in Central province as expected.

Variables significant at 10 percent level of significance, included maize purchases per member and the regional differences of Lusaka and Eastern. The per

member sales suggested that the PCSs in areas were each member sold relatively large quantities of maize, the PCS handled less quantities of maize. The result implies that PCSs surrounded by many small farmers are likely to handle more maize compared to PCSs in areas with relatively large farmers. The significance of the Lusaka region dummy variable suggested that more maize was handled by an average PCS in Lusaka than in Central province. Eastern province, on the other hand, had lower volumes of maize handled by each society compared to Central province. The results showed that regional differences could explain some of the variations in maize handling by the PCSs.

The age of the society and the distance of the PCS to the nearest district were not significant variables at 10% level of significance. The distance to the nearest district not being able to influence the volume of maize bought by a PCS and the significant influence of the distance to the nearest road, indicated that, infrastructure was a more important influence on the volume of maize purchased by a PCS than the proximity to the major consumption areas. This points to the importance of the transportation development. The results also indicated that societies near major consumption areas are likely going to face competition from private traders and farmers who will take their maize directly to the central markets. Remote PCSs on the other hand stand a better chance to conduct maize market functions where farmers have fewer alternatives for disposing of their maize.

The PCSs in Northern and North Western provinces were found to be no different from those in the Central province in terms of the volume of maize handled.

The regression tests presented above suggested that the level of education of the society manager (good management) and societies located far from central maize markets and far from an all weather road, will be important variables to consider for primary cooperative societies' participation in the maize market. Infrastructure will be important in order to attain comparative advantage of productive areas between and within regions. The PCSs in rural Lusaka appeared to be important compared to those of Southern and Central provinces. PCSs in Eastern, Northern and North Western provinces were little different from those in Central provinces and the regional differences, therefore, were not major factors in determining the viability of the PCSs.

6.2.2. Input Handling

Input distribution was a common economic activity, with fertilizer distribution taking up the bulk of the activity. Societies as agents of provincial unions extracted a commission of 4.68 kwacha and 3.88 kwacha per 50 kilogram bag of fertilizer and seed respectively. The PCS on average handled 2,561 basal dressing and 2,974 top dressing fertilizer bags in 1990/91 season bringing in a total annual average income of 25,904 kwacha per society. The fertilizer commission was a source of 4.4 percent of the firm's annual average income (Table 6.6). The activity, though economically viable, was small and not too important to the firm as a revenue generating activity. The input handling service by the societies, however, will continue to be important to the farmers.

6.2.3. Credit Distribution

In the area of credit distribution to farmers, the societies played a minor role. The PCS supplied names of applicants and their respective requests for fertilizer financing to ZCF/FS (the major lending organization) and kept records for maize purchases from farmers for purposes of extracting loan repayments. The ZCF/FS processed and handled most of the transactions with the farmers. Since the loans were provided to farmers in kind, societies were responsible for storage and distribution of the physical inputs. Loan transactions were, however, handled mostly by ZCF/FS personnel.

In the 1990/91 marketing season a farmer was charged 28 percent interest on the loan with four percent of the recovered interest going to the society as commission and 24 percent to the lending organization (ZCF/FS). Due to the low recovery rates of loans, PCSs realized little revenue from this activity.

The potential role of PCS in credit distribution in the short run appears to be high even with the introduction of private trading. In the long run, farmers may be able to deal directly with the development and commercial banks, but meanwhile societies are a good source of information on farmers to lending organizations and could still play an important intermediatory role.

Societies as direct borrowers are themselves not familiar to commercial lending organizations. Societies with potential to operate in the new market could be identified through contact with their respective provincial unions. Government guaranteed loans from ZCF/FS and development banks are expected to decrease, resulting in less credit available to farmers and societies alike. Cooperative societies

may, however, have an advantage over private traders in the sub-sector regarding access to credit facilities. The societies have a history, though unfavorable, in the maize market. The history of individual societies could lead to the isolation of obvious undesirable organizations for targeted assistance programs where needed.

Other considerations, however, may also weigh against PCSs in favor of private traders. Commercial farmers (as private traders), for example, may hold an advantage over PCSs since they own storage and transportation facilities and they already have an existing relationship with commercial banks. Large commercial millers may also have a slight edge over societies on the basis of the size of their business. Lending organizations prefer to deal with fewer and larger business entities and familiar clients over numerous and small business entities which are difficult to police in case of defaults on loans. The credit system in Zambia, therefore, is one area that will present a great challenge to the primary cooperative societies' survival in the liberalized maize market.

6.2.4. Rural Milling

The provision of the mill service was a popular economic activity of the sampled societies, which owned on average a three-year-old diesel powered hammermill. Eighty percent of hammermills were acquired on credit at an average cost of 185,000 kwacha. Of these loans, 86 percent came from ZCF/FS, 8 percent from Small-scale Industry Development Organization (SIDO), and 6 percent from

commercial banks. At the time of the survey, an average sum of 36,778 kwacha was owed by the society to the lending organization.

The hammermill service charged about 20 kwacha for milling 25 kilograms of maize to members and 25 kwacha to non-members[3]. The PCS hammermills catered to people within an average radius of 7.2 kilometers with a range of up to 15 kilometers, especially during peak periods from June to August. Society service mills operated in competition with privately owned hammermills which were stationed on average only 2.0 kilometers away. The privately operated mills charged a higher average price of 30 kwacha for the same service[4]. Unfortunately, the PCS mills were less dependable due to extended periods of breakdowns. Privately operated hammermills tended to break down twice a year, just as often as those operated by the cooperative societies. It, however, took an average of three weeks before repairs were made on private mills compared to nine weeks for the sampled societies. In case of a mill, operated by a society, a repairperson from the provincial union had to be informed about the problem, upon which he would inspect, assess and identify the problem. Repairs called for a second visit, which would take a waiting period, in some cases, of as long as 16 weeks. The privately operated

---

[3]A hammermill operator could only process a consumer's grain. By law the operator was not allowed to maintain maize stocks for the purposes of selling in grain or milled form, other than to the official marketing monopoly of the time. This restriction together with the uniform pricing policy discouraged operators from developing their own storage facilities.

[4]In addition to the value of the 90 kilogram bag of 800 kwacha, the cost of transforming the grain to maize meal (on a 1:1 transformation rate) was 108 kwacha. The purchase of subsidized maize meal of the same quantity if available in 1990 was 968.40 kwacha which was comparable to the farmer processing their own maize in the rural areas. Where industrial meal was available, it was less costly to purchase maize without additional opportunity costs of labour and maize storage loss risks.

hammermills were, consequently, dependable and , therefore, popular among clientele (including cooperative members) despite the higher service charges.

In the mill enterprise, the major variable cost was that of fuel for operating the machine. The fuel cost was on average 31,763 kwacha per year. Average annual repairs and wages cost 21,331 and 19,949 kwacha respectively. With annual average revenues of 87,161 kwacha a net annual income of 14,118 kwacha was generated by the activity in the 1990 financial year.

The mill enterprise was a reasonable contributor to gross revenue, at 14.60 percent of the gross revenue (Table 6.6). The results showed that the hammermill operated with positive net income and had potential for profitability. Profitability could improve even further if societies eliminated the role of the provincial unions in the decision making process. Efficiency could improve through a shortened and cost effective decision making process on repairs of the mills. The need for rural milling is high not only as a source of maize meal to the rural areas but also as source of maize meal to the urban centers. The quality of the rural meal is relatively similar to the industrially processed roller meal in terms of appearance, texture and nutritive values. Rural meals and roller meals are both not decorticated especially in the last decade in the case of roller meal. Rural maize meal could, therefore, easily penetrate the urban market at the right price.

6.2.5. Consumer Shop Retailing

Almost every society had a consumer shop regardless of the location and/or presence of competing publicly and/or privately owned consumer shops. A non-

cooperative retail shop was located on average 4.5 kilometers away from the sampled society. Consumer shops stocked basic essential commodities such as salt, sugar, cooking oil, soap, candles, matches and kerosine. A few larger retail shops had clothes, mealie meal, ploughs and spare parts for implements. The enterprises in the sampled PCSs, generated an annual total revenue of 332,276 kwacha on average. The major variable costs included expenditures on acquiring shop inventories at an average of 237,130 and full-time labor wages at 20,587 kwacha. Miscellaneous expenses averaged 10,790 kwacha annually. The average annual net income came to 63,769 kwacha. The calculations did not consider transportation and overhead costs that could not be desegregated by enterprise.

The major problem faced by the consumer shop enterprise was the availability of transportation facilities to move retail goods from the wholesale shop. Inventories in general where acquired and transported only when union personnel visited the society. It was difficult to determine when such a visit would occur so that goods could be purchased in advance. When this was done, transport costs were debited to the society with little pressure for immediate payment, which prompted the society management to "ignore" these costs.

Another problem regarding the standard operating procedures for operating a shop enterprise was the banking relationship between the PCS and provincial unions. Revenues of the society from all enterprises were deposited in one account and withdrawals required a provincial union signatory[5]. The purchase of major

[5]In one case, the district union maintained one account for all the PCSs in its jurisdiction. A PCS with positive bank balances may end up being told they had less in their account since the district union may have used it on other PCSs or other activities.

items (the largest expense component-Table 6.4), therefore, required "permission" of the provincial union. This requirement was instituted in order to monitor the board and the management on behalf of the general membership. When purchasing shop items, money required for such purposes had to be requested in advance and in some cases a limit of 50,000 kwacha per withdrawal was imposed on the societies. This presented a planning problem in that the decision making process was unnecessarily prolonged. Under the conditions of high inflation rates, new requests and limited shopping lists were often made, raising the cost of consumer shop operations. The society, for example, incurred administrative and travelling costs of the manager or the shop keeper charged with making the arrangements.

Despite these difficulties in operating procedures, the consumer shop was a major revenue earner for the society, contributing over 55.80 percent to gross revenue on average (See Table 6.4 where other contributions to gross revenue and expenses are presented). By changing the standard operating procedures, particularly the elimination of the provincial union involvement in the decision making process, the shops could be able to run more efficiently and provide a better service to the consumers. In addition, farmers with their once a year household income could benefit from low prices and credit provisions from the retail shops.

Under the 1990 economic and political environment, the enterprises of maize, milling and consumer shops indicated potential for profitability, an indication of financial viability, a pre-condition for economic viability. Input and credit distributions activities did not show any evidence for economic viability due to inadequate data. These functions will, however, be necessary to the farmers and

Table 6.4 Revenue and Expense Percentages

Revenues	% of Gross Income	Expenses	% of Total Expenses
Maize revenues	5.80	Shop expense*	55.30
Input revenues	4.40	Mill expense**	15.10
Shop revenues	55.80	Salaries	8.50
Mill revenues	14.60	Transport	5.20
Fees	0.04	Other expense	16.00
Shares	0.70		
Other revenues	18.60		
Total Revenue	**100.00**		**100.00**

Source: From the survey (n=43)

* Expenses were not adjusted for inventories.
** Milling costs included: fuel, 43.5%; maintenance, 29.2%; and wages, 27.3%

cooperative societies may have to carry them out. The shop and hammermills enterprises may be less important to the community around the societies but these were important economic enterprises to the firm business and may continue to be so.

6.2.6. Surplus Versus Deficit Region Societies

Generally, societies sampled from maize deficit regions were composed of smaller organizations in terms of membership numbers, were younger in terms of formation period were further away from major districts and good all whether roads, and served a smaller radius of farmers (Table 6.5).

Table 6.5 Selected Mean Variables from Surplus and Deficit Maize Regions PCS Sample.

Variable	Surplus PCS	Deficit PCS	Total
PCS Age (yrs)	11.6	7.5	9.5
Membership	493	360	427
District distance (Km)	33.6	41.3	37.0
Road distance (Km)	12.0	15.5	13.8
Service radius (Km)	15.9	12.0	14.0
Manager education (yrs)	12.4	10.5	12.0
Work period (yrs)	4.0	3.6	3.8
Maize Volume (90kg bags)	8,433	1,714	5,020
	n=34	n=9	n=43

Source: Generated from the Survey

The societies sampled from deficit provinces also handled about one fifth of the maize produce as those in surplus provinces. They employed managers for a relatively similar time period, but the managers had fewer years of formal education. Managers in deficit regions had junior secondary school education compared to senior secondary school for the societies in surplus regions. The chances of societies in deficit provinces to survive under the "free" market system appears to be poorer than those societies in the surplus maize province regions. A special policy focus by the government may be needed especially in the supply of food items, inputs and consumer goods into deficit regions, in the event that private trading fails to carry out these functions.

Table 6.6 Sample Averaged PCS Net Worth Statement - 1990

CURRENT ASSETS		**CURRENT LIABILITIES**	
Cash at hand	5,204	Loan repayment	36,949
Crop revenues	35,140	Shop costs	237,130
Input revenues	25,904	Wages/Salary	81,795
Shop revenues	332,276	Fuel	31,730
Mill revenues	87,161	Transport costs	25,057
Shares/fees	4,582	Repairs/maint	21,331
Other revenues	75,503	Other expenses	51,440
Less inventory	82,143		
Total Current Assets	483,627	Total Current Liabilities	485,465
INTERM. ASSETS		**INTERM. LIABILITIES**	
Equipment	20,163	Princ. loan	36,778
Hammermill	185,000		
Less depreciation*	120,000		
Total Assets Interm.	85,163	Total Interm. Liabilities	36,778
FIXED ASSETS		**LONG-TERM LIABILITIES**	
Storage/Shop	117,600		
Mill shed	43,357		
Office	38,333		
less depreciation	20,000		
Total Fixed Assets	179,290	Total Long-Term	00,000
		Total Liab	522,243
		Net Worth	225,837
Total Assets	748,080	**Total Liab. & Net Worth**	748,080

Source: Based on the survey (n=43). Units = ZK
* depreciated for 3 years

6.3. Whole Enterprise Financial Analysis

In a firm, a manager is concerned with returns on investment of various assets and the efficiency of management. In order to bargain effectively for outside funds, the manager has also to be attuned to the aspects of financial analysis that outside suppliers of capital use. The net worth statement (also called balance sheet), and the income statement are two of the basic records useful in the financial analysis of a firm. The net worth statement shows the assets and liabilities of a business firm at a moment in time, usually at the end of the year (See Table 6.6). It summarizes the financial solvency and is the most commonly requested for statement by lending organizations (Harsh, et al., 1981). The income statement depicts a firm's financial progress, efficiency, stability and profitability and summarizes the financial transactions which occurred over a period of time (See Table 6.7). With the two records, substantial information for analyzing a business and making management decisions is available to the manager. However, in order to assess the financial condition and performance of a firm, financial ratios are needed so that comparisons could be made over time and/or with other firms of similar industries. No one ratio gives sufficient information to judge the financial condition and performance of a firm, but a group of ratios can be used to provide reasonable judgment. Liquidity ratios such as gross ratio are used to judge a firm's ability to meet short-term obligations[6]. Solvency ratios such as net capital ratio provide insights into the ability of the firm to meet long-term obligations, and profitability ratios (e.g., gross margins)

---

[6]Liquidity was defined by Van Hone et al. (1985, p. 135) as "the ability to realize value in money, the most liquid asset." Liquidity has two dimensions: 1) the time required to convert the asset into money and 2) the certainty of the realized price.

Table 6.7 Sample Averaged PCS Income Statement - 1990.

CASH RECEIPTS	
Maize revenues	35,140
Input revenues	25,904
Shop revenues	332,276
Mill revenues	87,161
Shares/fees	4,582
Other income	75,503
Less inventories	82,143
Gross Income	**478,423**
OPERATING EXPENSES	
Shop purchases	268,507
Mill expenses	51,712
Labour expenses	81,795
Transportation	25,057
Repairs/Maintenance	21,331
Loan repayment	36,949
Other expenses	51,440
Depreciation	60,000
Total Expenses	**545,465**
Net Income (profit/loss)	**-67,042**

Source: Based on the Survey (n=43). Units = ZK

Table 6.8 Sample Averaged PCS Financial Ratios - 1990.

Ratio	Formula	Value
Net Capital Ratio	Total Assets/Total Liabilities	1.43
Operating ratio	Total Operating expenses/Gross Income	1.02
Gross ratio	Total Expenses/ Gross Income	1.14
Capital Turn Over Ratio	(Gross Income + Major Purchases)/Average Capital Investment*	0.64

*Average Capital Investment = (beginning capital + ending capital)/2. (See Harsh S., et al., 1981).

provide indications of the firm's operational efficiency[7].

The sampled PCSs generated, on average, a net worth of 225,837 kwacha, indicating a small but healthy state of the business under the financial year in consideration (Table 6.6)[8]. The positive figure pointed to the fact that the average society was solvent. From the income statement (Table 6.7), prepared from the survey, a negative net income of 67,042 kwacha was calculated, indicating a loss to the owners of the operation (cooperative members). The value indicated liquidity problems for the firm business. Further analysis is, however, required to gain better

[7]Since there was no available data to compare PCSs' calculated ratios to other firms or with previous years of the same firms, the analysis applied rules of thumb to come to its conclusions.

[8]The net worth value was about five times less than the value of a one metric ton capacity utility vehicle at the time of the survey. This example illustrates the size of the PCS enterprise.

insights of the true financial conditions of a business. Selected financial ratios were, therefore, generated and are presented in Table 6.8.

The net capital ratio of an average surveyed society's business was calculated at 1.43, a value indicating that the business was solvent but barely so. For every kwacha of liability there was only 1.43 kwacha of assets to cover that liability should the firm be liquidated. The amount did not provide room for error, especially for an organization with poor management endowment and control. A higher ratio provides greater ability for the firm to pay its bills and a ratio of 2.0 and above is usually considered "safe" in many industries. In Zambia (specifically the survey areas), the average society would not be in a position to acquire loans based on their financial status. Net worth ratios of 3 to 4 could be helpful to the average society.

At 1.02 and 1.14 (Table 6.8), the operating and gross ratios respectively indicated that the average society business was unable to cover operating expenses and total expenses respectively[9]. The gross ratio suggested that each kwacha of explicit expenses generated only 0.88 kwacha of gross revenue and 0.98 kwacha in the case of the operating ratio. This was an indication of the depth of the liquidity problem for the average society business firm.

In order to look at the use of invested capital in the business in relation to the income generated, a capital turn over ratio of 0.64 was calculated using both income and net worth statements. At 64 percent of gross income to the amount

---

[9] In 1986, the author found an averaged operating ratio of 0.51 for three societies in Northern province (Sipula, 1986). This survey data would suggest an improvement for the societies. Not surprisingly, however, two of the societies visited in 1986 had dissolved when visited in the 1991 survey.

invested, it would take on average only 1.6 years for the business to generate revenues at a value equal to the total invested capital. The ratio, averaged over the sample, was unexpectedly high indicating relatively high efficiency in the operation. The inflation rates rather than production and management contributions were considered the reason for the high rate. The ratio was indeed interpreted with caution especially since the true economic picture of the societies' business could not be determined as not all costs and revenues were identifiable.

6.3.1. Selected Case Studies

Eleven case studies of PCSs out of the sixteen with financial records collected in the survey were analyzed using individual income statements. The societies were then separated into profit-making and loss-making categories for the 1990 financial year. Two societies from Southern, Northern, North Western, Central and Lusaka provinces were included and one from the Eastern province. Once individual income statements had been prepared and the categories determined, averaged income statements for each category were then prepared and the results are summarized in Table 6.9. A gross ratio for each category was determined for purposes of comparisons. The income statements were prepared for the 1st January 1990 to 31st December 1990 financial year. The analysis was biased towards those societies that tended to keep relatively good records.

The study of the two categories showed that there was no correlation between the category and the regions of the PCSs. Both loss making and profit making PCSs were distributed randomly across the regions. The separation of loss

Table 6.9 Averaged Category Income Statements 1990

	Loss-making PCS	Contribution to revenues %	Profitable PCS	Contribution to revenues %
Receipts				
Maize revenues	20,277	5.3	70,789	29.9
Input revenues	9,107	2.4	15,425	6.5
Shop revenues	276,242	71.3	60,820	25.7
Mill revenues	60,674	15.7	59,107	25.0
Shares/fees	2,986	0.8	3,898	1.7
Other revenues	17,195	4.5	26,447	11.2
Less Inventory	60,690	-	12,205	-
Gross Income	325,791		224,281	
Expenses				
Shop expenses	183,345		129,267	
Mill expenses	33,167		10,972	
Labor expenses	32,267		20,128	
Transport	15,442		5,510	
Repairs	2,617		8,080	
Loan Repayment	17,203		2,913	
Other expenses	79,322		16,737	
Depreciation	20,000		20,000	
Total expenses	383,363		213,607	
Net Income	-57,572		10,674	
Gross ratio	1.2		0.95	

making and profit making into surplus maize regions and deficit maize regions also indicated no correlation.

The results of the category comparisons indicated that relatively smaller PCS businesses were more profitable. The average gross income for the profit making

societies was 224,281 kwacha compared to loss-making firms with an averaged gross income of 325,791 kwacha. For the profit-making PCSs used in the analysis, the major revenue earner was that of the maize assembling activity which provided 30 percent of the revenues. Loss-making PCSs on the other hand earned only 5 percent of their revenues from the maize handling commission. The loss-making category earned over 71 percent of it revenues from the consumer shop. Profit-making PCSs managed to gain positive net incomes due to fewer and lower costs involved in their major activities. As agents of the PCUs in maize assembling, no transportation, and storage costs were borne by the societies. For societies with the major income earner from the consumer shop, more costs were incurred from transportation of shop inventories, poor management and poor accountability of the activity.

In both categories the milling enterprise was the next largest revenue earner with 15.7 percent and 25 percent contributions for loss-making and profit-making categories, respectively. For the profit making category, maize assembling and milling if vertically integrated seemed to have potential to improve in net income through lowered marketing costs. The societies that depended heavily on consumer shop revenues, not only made losses but depended on an activity heavily competed for by the private and parastatal sectors. The consumer shop activity was, therefore, not considered as a steady source of revenues to the PCSs even though the activity increased the volume of business to the society.

In an attempt to determine the efficiency of the two categories, gross ratios for each category were calculated. The gross ratio for the loss-making category was found to be 1.2 and that for the profit-making category was 0.95. The profit making

category was indeed able to cover its costs as each kwacha generated as revenue required 0.95 kwacha in expenses. Even though the ratio showed a poor financial position, the category was liquid. The loss-making category, needed 1.2 kwacha of expenses in order to generate a kwacha of revenues. This indicated a high level of inefficiency in the use of operating resources.

The categorized analysis of the PCSs indicated that the economic activity and not the size or region of the PCS was the important determinant of the organization's liquidity and profitability. In the reformed market system were the PCSs will be expected to operate autonomously, lowering costs of providing services may become more important than increasing the size of the business going by the performance criteria used above.

In general financial statements and ratios for the PCS analysis, indicated a poor state of financial position for the sampled societies. The results showed that on average the society firm was barely solvent and had serous liquidity problems. The society's business was small, undercapitalized and operated inefficiently. The results reiterated anecdotal evidence that the Primary Cooperative Societies in Zambia did not operate as financially and economically viable business organizations. Under the "centrally" controlled market system, the societies survived through various government protective policies and programs. This will not be the case under the liberalized market conditions and improvement in the operations of the business will have to be made if cooperative societies are to survive competition from private traders.

The data presented in the analysis of the cooperatives was the most complete possible based upon the information available from the societies. Based upon unstructured discussions the author believes that the bias in the data is such that an average society was made to look better than it was.

6.4. Private Trade Participation, August 1991

With the abolition of restrictions on private trading in August 1991, a snap survey was conducted to supply insights into farmers', primary cooperative societies' and private traders' immediate reactions to the new policy. Forty-five farmers and five service millers (one in an urban setting of a rural district) were interviewed in Central, Lusaka, Southern and Eastern provinces. The results of the snap survey showed that over 78 percent of farmers interviewed sold maize to their PCSs and 18.2 percent directly to ZCF (Table 6.10). In the short period of the new policy, the cooperative movement still dominated the maize market but had already lost some market share (from monopoly status). Among the farmers who sold their maize to cooperatives, 57.8 percent did so on belief that they had an obligation (related to the repayment of credit obtained through the society) to their society and 36 percent cited the nearness to the depot (society premises) as a reason for selling to the society. Five percent of respondents advanced price and 1.2 percent suggested prompt payment as a reasons for selling to their PCSs (See Table 6.10).

According to 79 percent of the societies, the volume of maize purchased had not been affected by the lifted restrictions on private traders. The response, however, appeared to conflict with expressed concern over loan repayment by the

Table 6.10 Private Participation Characteristics - August 1991/92 Market Season

Variable	Value
Maize sellers (%)	51.2
Mean maize sold (bags)	38.0
Mean price received (k)	771
Sold to Cooperatives (%) of which:	97.0
Sold to PCS(%)	78.8
Sold to ZCF (%)	18.2
Sold to private traders(%) of which:	3.0
Commercial farmers (%)	56.0
Millers	19.0
Local villagers	25.0
Reason for selling to PCS:	
Prompt payment (%)	1.2
Price (%)	5.0
Nearest depot (%)	36.0
Obligation/loan (%)	57.8
Maize purchasers (%) of which:	15.6
From other h/holds (%)	71.4
From shops (%)	28.6

Source: Based on the survey (45 farmers).

PCSs. Farmers were suspected of having bypassed the societies and having sold their maize to private traders directly to avoid loan repayments.

The survey of the 45 farmers, found evidence of private trading but this was an outlet for only three percent of farmers. The composition of private trade turned out to be 56 percent commercial farmers, 19 percent millers, and 25 percent local

villagers. The category of local villagers was unclear as to whether these were non farmers or farmers who were net-food buyers.

The five small scale millers interviewed were all service operators who in response to a question about their attitude about processing and selling their own maize meal, expressed concern on maize standards and grades and maize meal storage. The fear of buying underweight maize and that of finding foreign objectives in the bags was strongly expressed. The one urban based small scale miller interviewed (Choma District) serviced the local formal employed working group which tends to have gardens in the perimeters of the district. The impression from the interviewed millers was that demand for milling services would increase in the future as price increases of industrial meal occur.

For farmers who sold their maize to private traders, the results showed that an average price of 771 kwacha was attained. A transportation cost was deducted from the official "floor" price of 800 kwacha whenever the buyer picked the commodity from the "farm gate". The cost was calculated on the basis of the distance from the farm to the PCS as the official depot. The average cost of transportation was found to be 1.43 kwacha per kilometer per 90 kilogram bag. The low average price could explain why the farmers still preferred the PCS over private traders. Nearly all market participants interviewed interpreted the floor price to be the ceiling price and no evidence of an offer above the official floor price (farm-gate price) was found during the survey.

For the farmers who transported their own maize in order to gain the "floor" price, the commonest mode of transportation in the survey areas was ox-carts.

Seventy-six percent of producers used ox-carts, 17 percent hired vehicles (one to two metric ton) and 7 percent simply walked to the buyer.

Farmers were also asked whether they had purchased any grain or grain products such as maize, sorghum, millet or maize meal from the market up to the time of the survey in the 1990/91 marketing season. The purpose was to gain insights into how well the backward linkage in the market might operate in the liberalized market. The results showed that 15.6 percent of the respondents purchased some grain or grain products and of these 71.4 percent obtained their grain from other households and the rest from consumer shops (See Table 6.10). The low percentage of buyers, however, could have been a reflection of the short period that elapsed from the policy pronunciations to the survey. In addition, farmers had just had their harvests and may have had adequate grain in stocks. The survey areas were also surplus grain producing areas with farmers unlikely to suffer deficits. In addition, the respondents may have been uncertain of the lifting of the restrictions on private trading which may have influenced their response. The true volumes of maize sales and purchases may not have been fully disclosed.

From the snap survey it was concluded that the low rate of private trade participation was an indication that the new policy was yet to be comprehended. The flow of information to market participants was rather slow and information of poor quality. For example, some farmers indicated the they were unaware that they could actually bargain for a better price, and at the time of the research no official document had been released on the new policy. The only source of information that researchers, traders and farmers relied upon was the news media.. A point to note,

however, from the survey on private participation was the discovery of commercial farmers' role in maize marketing. The commercial farmers may turn out to be formidable competitors with cooperatives and other private traders.

6.5. Summary and Conclusions

Primary cooperative societies have been in existence in Zambia since 1914. The growth of cooperatives in the post independence era was due to the vigorous government promotion embarked upon between 1965 to about 1970 and then from about 1976 to the time of total market liberalization. Many problems such as mismanagement, and under-capitalization that plagued the societies in the 1970s, can still be found today.

Despite many problems, the cooperative societies played a significant role in the marketing of maize. The societies are expected to continue playing a major role even under the liberalized maize market and a less supportive government. The study of the cooperative societies was justified on the grounds that the organizations' role in maize marketing may still be crucial prior to private trader development. Without an existing alternative at the time of the survey, the societies appeared to be the avenue left for many small scale farmers. The societies could also serve as a vehicle whereby small scale farmers could collectively acquire inputs and market produce to their advantage, especially where private traders are not involved.

Results of the research found that primary cooperative societies were well placed geographically in terms of proximity to farmers. The organizations were rather large based on membership numbers, even though most of the members were

inactive. The society manager was found to possess most of the decision-making power within the organization and tended to be more answerable to the provincial unions than to the board of directors or membership.

The board of directors wielded somewhat less power than management and had little to do with generating policies for the society, as evidenced by the standardized economic activities and conduct of the societies surveyed.

Membership showed apathy towards the operations of the society and this led to nepotism, tribalism and mis-management. Informal interviews suggested that the lack of monitoring of activities within the organization was a serious problem for societies. The members expected the upper-tier organizations to monitor the society but this duty was at best behind schedule, leaving management and the board with a lot of latitude as to how they used the cooperative society's resources. This resulted into private use of PCS resources. The administration (particularly) of the societies was, therefore, identified as one major area that societies will have to improve if they are to survive in the competitive market.

Regarding economic activities, the primary cooperative societies surveyed were mostly involved in maize assembling, input distribution, credit supply, milling and consumer retailing. In maize marketing, the society acted as an agent to the provincial union and was compensated with a commission for the services rendered. The maize activity was relatively small, contributing about 5.8 percent to gross income. Had the sampled societies been autonomous in the 1990/91 market season and handled the same level of maize, on average 1.24 million kwacha could have been generated per society. This would have made a substantial additional

contribution to the incomes of these cooperatives and justification for supporting PCS autonomy.

To gain more insights into the factors influencing the volume of maize handled, a regression analysis was attempted. The non-economic variables (regressors) explained only 28 percent of the variations in maize volume handled by the societies in the survey areas. Regressors included age of the society, per member farm output sales, distance to an all weather road and district and education of the society manager. Dummy variables were used to capture regional differences. The variables indicated the type and location of an average society likely to survive under the liberalized market. Societies which employed educated managers and those far from districts and far from an all weather road stand a better chance to survive in the reformed maize market. The Southern and Lusaka provinces showed significant regional differences with Central province as captured by the regional dummy variables in the regression. Generally the maize assembling activity was important to the rural farming community (given the circumstances), but less so as a business enterprise to the average organization. The enterprise was seen to be important for small PCSs businesses which tended to be profit-making as well.

Input and credit distribution were both important to the farmers but less so to the business aspect of the society. Input supply was done on behalf of the provincial union and credit distribution on behalf of the ZCF/FS. In both cases commissions were offered for the services rendered, with the input supply component contributing only 4.4 percent of gross revenue. It was difficult to make predictions

on input and credit supply performance due to lack of appropriate data and lack of clear government policy on the subsectors.

The milling activity was an important aspect of the business, contributing about 14.6 percent to gross revenue. With the elimination of the provincial union involvement in the decision making process, the activity could have lower operating costs by basically altering such standard operating procedures. The activity could increase an average society's income and be able to supply maize meal to both rural and nearby districts.

The consumer shop was the most important component of the business firm (on average) in terms of contributions to the gross revenues. As much as 55.8 percent of the revenues came from this activity for an average society. The activity, like the milling activity, showed positive net incomes for the 1990 financial year (excluding loss-making case studies). The milling and consumer shop activity appeared to be vital to the average PCS business size. The activity appeared to be less essential to the farming community, as other traders provided similar services. The importance of the consumer shop to the PCS may increase as the privatization program eliminates rural publicly owned shops that enjoyed subsidized transportation.

Individual economic activities (enterprises) had reasonable returns. However, some of the costs due to individual enterprises were not included for each specific enterprise. Some costs could not be desegregated and directed to specific activities, and as a result specific problem enterprises could not be pinpointed.

The society members indicated an interest in rural transportation as a possible complimentary enterprise. Unfortunately, the PCSs owned no related assets

in this area, but could consider ox-carts as opposed to the motorized vehicles which they preferred. Farmers and/or cooperative societies will need to move maize over longer distances as adjustments in buying points change and rural transportation will become even more important.

When the average society's firm business was considered as a whole, a net worth of 225,837 kwacha was generated. The net worth did indicate that on average, the PCS business was solvent but barely and certainly under-capitalized. Major fixed assets included input storage facilities (with office space and/or consumer shop section) and the hammermill shed. Maize handling equipment was confined to basic slabs and or logs and tarpaulin covers.

The negative net income generated (67,042 ZK) in 1990 financial year for the average society in the survey was a sign of a serious liquidity problem of the firm. Financial ratios calculated from financial records also re-enforced such findings. The net capital, operating and gross ratio of 1.43, 1.02 and 1.14, respectively were very low indicating that the liquidity problem was serious. Based on the financial analysis, the cooperative societies will experience difficulties in borrowing capital for investments.

In the short run societies seemed to be the only available market coordination mechanism in the areas surveyed. Reported private participation in the market, a few weeks after restrictions were lifted was only 3 percent. This may, however, change rapidly with the market reforms. A notable group of private traders from the survey was that of commercial farmers who composed 56 percent of the private traders. Commercial farmers, like cooperative societies, are well placed to

small scale farmers geographically in Central, Copperbelt, Lusaka and Southern provinces. Anecdotal evidence points to the fact that they have good storage and transportation facilities and could, therefore, compete strongly for small scale farmers' products. Interviews during the survey suggested that some commercial farmers purchased maize (of all grades) to use as animal feed. This could reduce the availability of maize for human consumption (meat being a less efficient source of calories) and raise policy issues regarding the commodity. Commercial farmers, however, are likely to provide an alternative outlet to small scale farmers' maize and be competitors to other private traders and the cooperative societies. The growth of the private sector is expected to pick up over time as potential participants gain confidence that the policy will remain in place, with reduced uncertainty to make the investment to enter the market.

Marketing cooperative societies in Zambia under the less controlled market could provide better coordination between production and consumption, provide a more dependable market outlet to achieve channel leadership, including vertical integration and even market power, and provide a competitive yardstick against which to evaluate marketing performance. Given the performance of the cooperative societies in the past, private traders are bound to provide the performance yardstick for measuring cooperative performance in the short run. In the long run, the reformed cooperatives may perform the role of yardstick measure. In order for the cooperatives to contribute to the functions listed above, societies will need to improve their management capacities, including altering the incentives faced by management, board of directors and members regarding business conduct norms.

The board of directors, for example, will need to take hold of the policy aspect of the organization and provide leadership for the direction of each autonomous society.

Society managers, on the other hand, will need to be answerable to the board and the members rather than the provincial unions. Attracting well-qualified managers may be difficult given the small size and rural location of the businesses. The performance of societies, as already stated, will depend on the actions of members as well as boards and managers and this is one reason why the quality and not the quantity in membership will be an important aspect of re-organizing the cooperatives. Favorable programs (targeted at specific financially well standing PCSs) such as low market interest rates (loan guarantees) and even subsidies, could be justified for assisting specific cooperative societies in the short run. In practice, as opposed to the theory, cooperatives in Zambia have performed poorly. The author believes that the major reason for such performance was the lack of incentives within the organizations as a result of the restrictive economic environment. Lack of competition and the profit motive provided no market discipline to participants. The new environment, however, will provide an opportunity for cooperatives in Zambia to operate as true cooperatives.

Private traders and PCSs (competition amongst PCSs is also expected) will be competing for farmers' attention regarding produce acquisition, input supply, consumer retail, processing and provision of other services. Market coordination efficiency is likely to improve as inefficient firms are eliminated under the competitive environment.

CHAPTER SEVEN

INTERPROVINCIAL MAIZE TRANSPORTATION

The transportation system is composed of the networks over which freight is moved, and of equipment used to transport freight. There are five basic modes of transportation rail, truck, water, pipe and air. The system includes vehicles, terminals or depots, highways, and railway tracks. In Zambia and in the maize sub-sector in particular, only two reasonable possibilities exist, road and rail. There are 3,394 kilometers of rail track across the country, as shown in Figure 1. The road network is composed of 37,359 kilometers and only 19 percent is all weather roads. In Zambia, transportation represents the most important single element in logistics costs in the maize market. Transportation costs have accounted for the largest share of marketing costs and consequently subsidies (Mwanaumo, 1987).

An efficient and inexpensive transportation system contributes to greater competition in the market place, greater economies of scale in production and reduced prices for goods. With a poorly developed transportation system, the extent of the market tends to be limited to the areas immediately surrounding the point of production. Unless production costs are low enough in one market to offset transportation costs of serving the second market, not much competition is likely to take place. Inexpensive, high quality transportation encourages an indirect form of

competition by penetrating markets normally unavailable to certain products[1]. The goods from outside a region, therefore, have a stabilizing effect on prices of all similar goods in a market place (Ballou, 1992).

Wider markets permit economies of scale in production by more intense utilization and specialization of production facilities from the greater volume provided by these markets. In addition, inexpensive transportation permits decoupling of markets and production sites, which provides a degree of freedom in production site selection by allowing production to be located where there is a geographical advantage.

Inexpensive transportation also contributes to reduced prices not only because of increased competition in the market place but also because transportation is a cost component along with production, selling, and the other distribution costs that make up the aggregate product cost. As transportation becomes more efficient, society benefits through lower prices and a wider choice of products among other things.

7.1. Problem Statement

The preceding chapters showed that since 1974 the prices for maize and maize products were uniformly set. It was established further that this pricing mechanism tended to prevent maize production in accordance with regional comparative

---

[1]See discussions by Tomek W., and Robinson K.,(1985) Agricultural Product Prices, Cornell University Press, and Ballou R.H.,(1992) Business Logistics Management, Prentice Hall, Inc.

advantage[2]. Uniform pricing altered the regional structure of maize production by encouraging production further away from major consumption centers (FAO, 1992, Mwanaumo 1987, Muntanga, 1985, Jansen,1988, GRZ 1989, Ndalamei, 1989). The share of marketed production of maize moved steadily away from the OLR provinces (Central, Lusaka, Copperbelt and Southern) to the high cost outlying provinces (Eastern, and Northern).

In 1978, the OLR (low cost) provinces accounted for 80 per cent of total maize procurement and by 1986 this had fallen to 70 per cent and 66 percent in 1988. In 1989 the OLR provinces contributed only 51 percent[3]. Table 7.1 shows the trend in marketed maize shares between the OLR and the non-OLR regions. For example, between 1974 and 1976, the surplus OLR (Central and Southern provinces) had a market share of 86 percent, and between 1983 and 1985 this had dropped to 53 per cent. The Off-OLR provinces of Eastern and Northern provinces gained over 25 percent of market share (within surplus regions) between 1974 to 1985 (The market share was calculated over four provinces only).

The change in the regional structure of maize production in the country implies increased levels of maize shipment over longer distances. Transportation

---

[2]The areas of Zambia which appear to have comparative advantage in the production of maize include the medium rainfall zone (zone II) plus some additional area in the Copperbelt province. The main attributes of these areas are: a suitable physical environment, especially soils; presence of relatively good and well-organized research and extension service; more experience with and wide spread use of animal draught power; relatively good access to the rural areas and proximity to major consumption areas.

[3]The drop in contribution in 1989 could also have been due to the presence of drought that tended to be more severe in low-cost maize production provinces.

Table 7.1 Marketed Maize Production Pattern Changes (percentage): OLR vs Non-OLR Provinces, 1974-1985

	OLR Region			Non-OLR Region		
Year	C	S	Total	E	N	Total
1974-76	50	36	86	11	2	13
1977-79	35	42	77	12	3	15
1980-82	32	36	68	17	7	24
1983-85	34	19	53	27	11	38

Note: C=Central, S=Southern, E=Eastern and N=Northern provinces.

Source: Derived from Mwanaumo (1987).

costs thus tended to be unduly high. In the 1980s, market coordination costs were increasing at an alarming rate, resulting in large increases in maize market subsidies.

Maize subsidies, expressed in 1975 prices averaged 28.5 million kwacha between 1973 to 1979 annually. Between 1980 and 1984 the average was 37.84 million and was up to 53.7 million kwacha in the period 1985 to 1986 (Mwanaumo, 1987, p.4). In 1985, transportation subsidies accounted for 40 percent of total marketing subsidies and 53 percent in 1986. In 1990/91 marketing season the cost structure of maize meal was composed of 46.5 percent producer price, 13.1 percent milling and retailing costs, 11.1 percent distribution costs and 29.3 percent was the subsidy level. Sixty one percent of the subsidy was for interprovincial transportation alone (World Bank, 1992, p.59). Together with rural transportation, transportation costs have been estimated to be as high as 45 percent of the maize meal consumer retail price (World Bank, 1992, p.58).

By liberalizing the maize market system, Zambia hopes to reduce market costs even though geographical production structure of maize is likely to remain unchanged in the short run. The challenge will be how to minimize the rise in market coordination costs through minimized transportation costs.

The major question, therefore, is whether the introduction of a more competitive market system will reduce or contain major upward price adjustments of retail prices by maintaining low transportation costs in the short run. More and better information and analysis of the transportation industry is required in order to formulate good policy and present alternatives, particularly the potential of private trade participation. The paucity of data on transportation system in the maize sub-sector in Zambia is currently complicated by the transitional nature of the sub-sector economy from centrally planned to a more liberalized one.

7.2. Objectives

Given the transitional nature of the economy, it is important to determine and simulate the pattern of trade among regions that minimizes transportation costs. The specific objective is to obtain the least cost transportation network for maize in Zambia. Related objectives include:

1) to estimate the optimum physical flows of maize, and maize meal for each region;
2) to estimate the optimum quantities of maize stored in each region;
3) to estimate the optimum quantities of maize milled in each region;
4) to illustrate the pricing implications of these optimal maize flows;

5) to draw implications for future maize production patterns and

6) to recommend future research areas.

The study will achieve its stated objectives with the help of a Linear Programming (LP) model. The model intends to establish the least cost pattern of trade which minimizes transportation costs among the regions that satisfies supply, storage, processing and demand constraints using 1990/91 marketing season parameters.

7.3. Literature Review

In looking at transportation problems, the service may be viewed in terms of the basic characteristics such as cost, average transit time, and loss and damage to products and equipment. This section reviews the cost characteristics of transportation. Prior to the review a spatial price equilibrium theory and model are presented to provide the analytical framework of the transportation study.

7.3.1. Spatial Equilibrium Framework

Spatial equilibrium theory attempts to explain factors that cause prices to differ between regions, and particularly, economic forces that are likely to cause prices in one region to change in relation to those in the other.

The spatial price equilibrium model provides a convenient analytical framework that may be used to determine the indirect as well as direct effects of

changes in production in one or more regions on the volume and direction of trade[4]. The model may be used to ascertain the price effects of relaxing or increasing trade barriers between regions or countries.

When competitive conditions prevail, spatial price relationships are determined largely by transfer costs between regions. Transfer costs, which include transportation charges and other fees, loading or handling, are often high in relation to the farm value of most agricultural commodities. Farm prices tend to differ depending on whether the production area is near or far from the major consumption market and modest changes in central market prices when combined with high transfer costs, can result in wide swings in producer prices of the commodity.

The principles that underlie price differences between regions (assuming a competitive market structure including homogenous commodities, perfect knowledge, and no barriers inhibiting trade), were articulated by Tomek (1985, p.151) as follows:

1) Price differences between any two regions (or markets) that trade with each other will just equal transfer costs;

2) Price differences between any two regions (or markets) that do not engage in trade with each other will be less than or equal to transfer costs.

Based on these principles, therefore, price differences between two regions cannot exceed transfer costs. Any time the price difference is greater than the transfer costs, buyers will purchase commodities from the lower priced market and ship them to the higher priced market, thereby raising prices in the former and

---

[4]See Tomek W., and Robinson K., (1985) Agricultural Product Prices, Cornell University Press, p.151 and Mwanaumo A., (1987) "An Evaluation of the Marketing System for Maize in Zambia" a M.S. thesis, Purdue University.

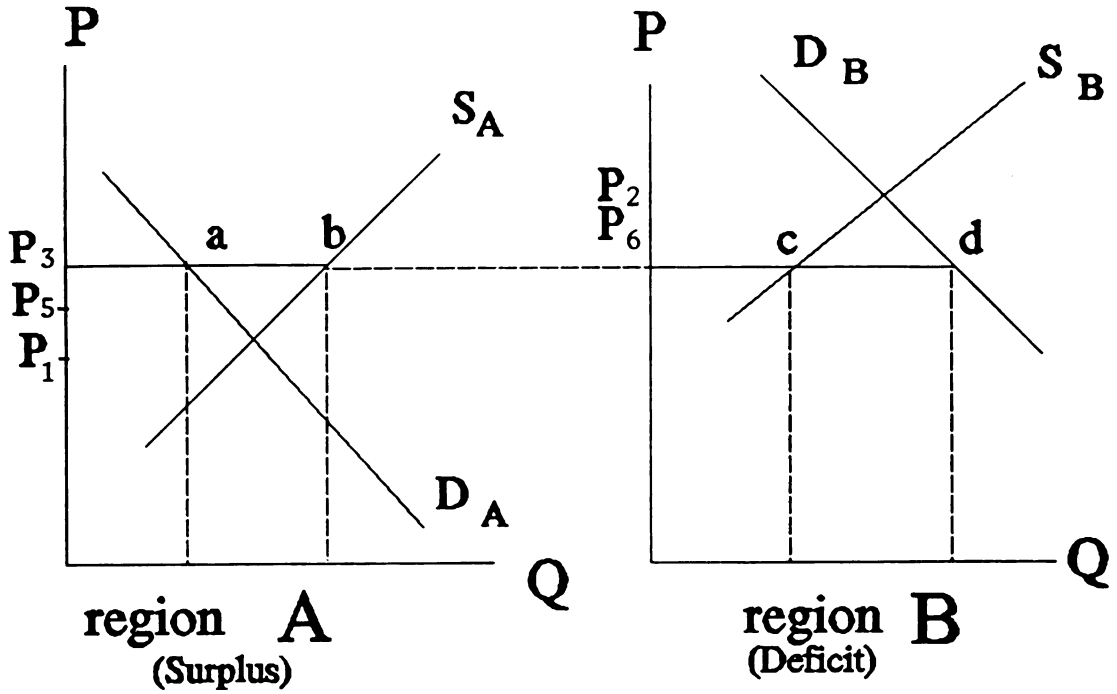
reducing them in the latter. This form of arbitrage continues until it is no longer profitable to ship commodities between the two regions.

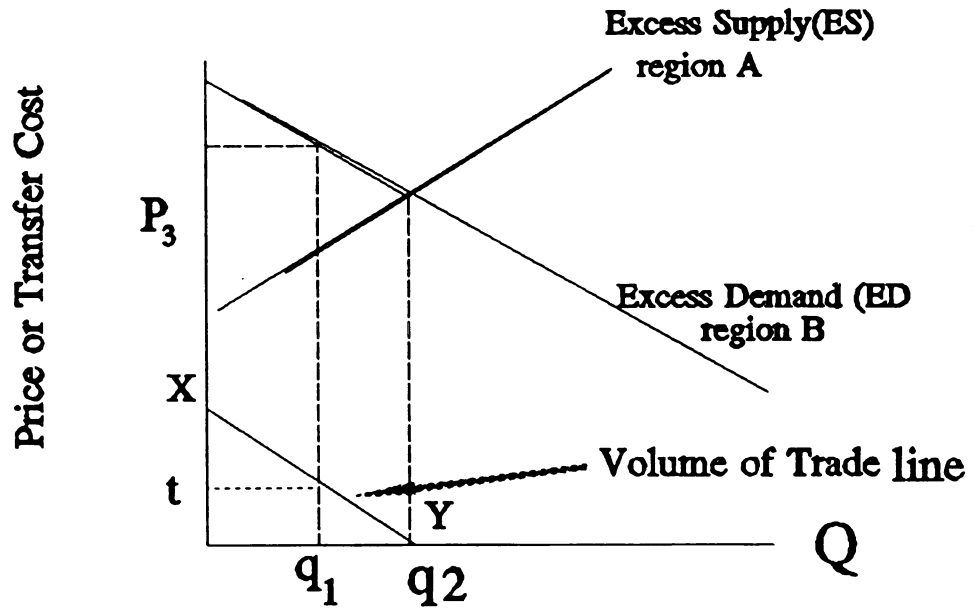
In the presence of barriers, such as tariffs, the structure of prices may not conform to what would be expected based on transfer costs. Price differences may exceed transfer costs because of incomplete or inaccurate information, preferences on the part of the buyers for produce grown in a particular area, and institutional or legal barriers to the movement of commodities between regions. Temporary factors, such as short supply of vehicles, for example, can lead to price differences between regions that at times exceed normal transport costs.

7.3.2 Spatial Equilibrium Model

Geographical price relationships can be analyzed using spatial price equilibrium models. These models provide insights into net prices that would prevail in each region and the quantity of a given commodity that any one region would sell or purchase from other regions. With spatial equilibrium models, an optimum or "least cost" trading pattern, given supply and demand conditions and a reasonable set of prices, can be estimated.

The general principles involved in developing inter-regional trade models can be illustrated with the aid of Figure 2.0 (See Tomek and Robinson, 1985, p.158-166 for detail). Supply and demand functions are presented for surplus region 'A' and a potential deficit region 'B'. In the absence of trade, demand and supply would be equated at a price of p1 in region 'A'and p2 in region 'B'. At a price above p1 in region A, some product will become available for shipment to another region.





Note: Based on Tomek G.W. and Robinson L.K. (1985)
Agricultural Product Prices, Cornell University Press.

SA, SB are Supply Schedules; DA, DB are demand Schedules.

Figure 5 Two-Region Spatial Equilibrium Model

Imports would be required to satisfy demand in region B if the price were below p2. Excess Supply (ES) and Excess Demand (ED) curves can be generated from the two schedules as in Figure 5.0.

The ES curve is based on the horizontal distance between supply and demand curves in region 'A' at prices above the point of equilibrium p1 (e.g. point 'b' minus point 'a'). ES is zero at the equilibrium price of p1. The ES curve is positively sloped like the conventional supply schedules since the gap between supply and demand widens as the price increases.

The horizontal distance between the demand and supply curves below the point of equilibrium in region 'B' (e.g. point 'd' minus point 'c') provides the information needed to construct the ED curve. The ED demand curve is negatively sloped since the gap between the demand and supply curves widens as the price declines. The ED schedule intersects the vertical axis at the equilibrium price of p2 per unit, since there would be no unfilled demand at this price.

The ES and ED schedules intersect at a price of p3 per unit. If no transfer costs exist between these two regions, a total of q2 units of the commodity would be shipped from region 'A' to region 'B' (ab=cd= q2 units). The price in both regions would be the same, p3 per unit.

The effect of changes in the transfer costs on the amount shipped between regions can be illustrated by constructing what Tomek (1985) calls a "Volume of trade" line which is shown as the diagonal line 'xy' in Figure 5.0. The vertical intercept for this line indicates the transfer cost at which no trade would occur. It is determined by subtracting the price at which ES curve intercepts the vertical axis

from the price at which the ED curve intercepts the same axis. No trade will occur if the transfer cost equals or exceeds 'x' per unit. The horizontal intercept of the "volume of trade" line shows the maximum trade that can occur when transfer costs are zero and is located directly under the point of intersection of ED and ES schedules at q2 units.

The volume that would be exported from one region to the other at any given transfer cost can be determined by drawing a horizontal line intersecting the vertical axis at the value which represents the transfer cost per unit. The number of units which will be transferred is indicated by the point at which the line representing transfer costs intersects the "volume of trade" line. For example, with a transfer cost per unit of 't' the total amount transferred would be q1 units. Given this information, the prices that could be expected to prevail in each region can then be determined. In the example, the effect of introducing a transfer cost of 't' per unit would be a total transfer of q1 units. The expected prices would be a reduction of price from p2 to about p6 in region 'B' and a rise in price from p1 to about p5 in region 'A'. An increase in the transfer costs, would, therefore, result in higher prices in deficit regions and lower prices in surplus regions. The absolute change will depend on how steep(less elastic or more inelastic) ED and ES schedules are.

When there are several markets to which producers may ship their product and several surplus producing areas, the determination of spatial price relationships (structure of prices) is no longer intuitively obvious. The identification of the pattern of trade and the structure of prices becomes more complicated and the aid of mathematics is required.

Once the surplus and deficits levels have been estimated for each region, linear programming mathematical techniques may be used to determine the optimum or least cost routing system (Tomek, 1985, p.161). The linear programming solution insures that all the requirements of deficit areas are met and also indicates how much will be shipped from each surplus region to each deficit region. In the final solution, the sum of all transfer costs is minimized and producer prices are maximized under the supply and demand relationships specified.

In Zambia, spatial equilibrium models to study the maize sub-sector transportation were applied by Muntanga (1984), Mwanaumo (1987), and Mulwanda (1989). Mwanaumo undertook an optimization study on transportation, storage and maize meal demand. He used provinces as market regions and applied quarterly data for 1982 and 1985. The use of quarterly data allowed him to study temporal maize issues as well. Muntanga, applying annual data of 1978 and 1981, used selected districts as market regions. Mulwanda, adopting Muntanga's model, applied data for 1988.

All three researchers mentioned above concluded that Eastern and Northern provinces were at an economic disadvantage in maize supply to major consumption areas due to high transportation costs. Western province was found to be the most disadvantaged source of maize (as well as destination) due to its poor physical endowment (thus likely to have above average production costs) and due to high transportation costs. They determined that the marketing system was inefficient and that transportation costs were a major component of the market coordination

expenses in Zambia. The general recommendation was for a "free" market system to be instituted.

This study intends to provide insights into the transportation of inter-provincial maize using 1991 data and estimates under the on-going market reforms. Sensitivity analysis will be conducted to generate information useful to policy formulators and potential private investors in the transportation of maize.

7.3.3. Transportation Costs and Rates

Cost (price) of transportation is the line-haul cost for transporting goods plus any accessorial or terminal (depot) charges for additional service provided. Additional costs could, for example, be insurance and preparing goods for transportation. Determining the actual cost for a particular shipment requires cost allocations which may include back haul costs[5].

Back-haul shipments tend not to be allocated their total costs, which may make the cost per forward shipment high. The forward-haul transport rates, therefore, run the danger of being set at a rate that restricts volume. In Zambia in the maize sub-sector it has been difficult to balance the forward-haul with the back-haul due to poor market information and difficulties in timing of imports of inputs to be distributed in the country. Empty back haul costs were, therefore, simply added to the forward haul costs.

---

[5]The forward haul is the heavy traffic direction and the back haul is the light traffic direction (Ballou, 1992, p.203). In Zambia, maize haulage is considered as the forward-haul and inputs, particularly fertilizer, and consumer goods as the back-haul.

Transport rates are the prices that carriers charge for their services. The most common rate structures are related to volume, distance and demand. Demand for the product and/or transport service may dictate the level of rates. Users of transportation services may have an upper limit which the rates cannot exceed in view of the demand and price conditions existing at the destination.

Shipments in consistently high volumes tend to be transported at lower rates than small shipments. If the quantity is small and results in very low revenue for the carrier, the shipment may be assessed a minimum charge. High volumes, therefore, tend to attract transporters and even special lower rates (discounts) on the service.

Transport rates as a function of distance can vary directly or be invariant with distance. A transport system could have a uniform rate where there is one transport rate for all origins to destinations or it could have rates that are proportional to distance. A transport rate structure where the desire may be to meet rates of competitors in a given commodity or region may be a blanket rate. Blanket rates are single rates that cover a wide area at the origin, destination, or both.

Another common rate structure is one where rates taper off. In this structure, rates increase with distance but at a decreasing rate. The degree of tapering may depend on the level of fixed costs that the carriers have and the extent of the economies of scale in line-haul operations. Charges can be distributed over more kilometers with increased distance of the shipment, and other costs.

Generally in Zambia, in the past and in the maize sub-sector, transportation costs were not reflected in the price differential of goods at source and destination or in the final product price as stated earlier. Government fixed transport rates

were applied throughout the country without differentiation based on road condition, supply and demand conditions or the form in which the commodity was transported. The controlled fixed rates (market subsidies hid the economic rates) carriers received were quoted on distance and weight basis and reflected a tapering rate structure as shown in Table 2.5 for selected years.

In addition to controlled transportation rates, the transportation industry operating in the sub-sector faced other constraints. Major challenges included the bulky nature of maize, limited time in which to haul maize to safe storage, inadequate and inappropriate location of the storage facilities, inappropriate location and domination of the processing of food commodities by parastatals operating medium and large-scale plants, poor transport infrastructure and lack of suitable vehicles and spare parts.

Rural transportation, on the other hand, suffered from the general use of large and heavy trucks which were unsuitable for small feeder roads and weak bridges. Estimates suggested that only 25 percent of utility vehicles were suitable for rural transportation in Zambia in 1990/91 market season (World Bank, 1992, p.60). Ox-cart transportation has been under-utilized due to lack of incentives to move maize for long distances from the farm gate (due to the presence of many PCS depots). The railway system, which tends to concentrate on products which are of low value per unit of weight and size, has unfortunately, not been used widely even for inter-district and inter-provincial transportation of grain and/or maize meal[6].

---

[6]The Copperbelt province, which imports about eighty percent of its maize, transports only about thirty percent of this by rail on average annually.

Documented reasons for the under-utilization of the rail system were not identified by the author.

Road transportation has dominated the maize sub-sector in Zambia. Contract Haulage (CH), a publicly owned trucking organization, and the cooperative movement (publicly supported organization) dominated the industry, with private traders participating on contract basis with the government. In addition to legal restrictions, private participation in the market was also limited by negative market margins and the cumbersome problem of recovering payments from government ministries.

Subsidies, poor information, uniform pricing, institutional and legal barriers to the free movement of the commodity between regions, contributed to the distortions in the spatial price relationships in Zambia.

Competition is expected to achieve an economically optimal allocation of resources and hence remove the costly distortions brought about by the subsidy programs. The government, however, will still need to provide guidelines to the market on, for example, transportation rates to provide an orderly working environment.

7.3.4. Maize Storage and Processing

Prior to the liberalized maize market system, publicly owned or controlled NAMBoard and the cooperatives purchased maize and hauled it to central depots from rural holding centers before transporting and storing it near the major consuming centers. This exercise had to be done within a short marketing period

(usually 3 months), and provided tremendous pressure on scarce and dear transport resources resulting, in a significant percentage of the produce spoiling with the on set of rains.

The available storage capacity for grain in Zambia has been estimated at 12.5 million bags (90kg), of which 1.2 million are silos, 3.6 million are in covered sheds and 7.7 million are on concrete slabs (hard-standings) with tarpaulin covers (FAO, 1991,p.10). The high physical storage losses, estimated at 15-20 percent of production in the country, is partly explained by the fact that 62 percent of storage capacity consists of hard standings (FAO, 1991, p.10 and Mwaba, 1984)[7]. Good storage capacity (see Table 7.2) is not sufficient especially in times of high marketed production and carry-over stocks. For example, in the 1989/1990 marketing season, the carry over stocks were over 7.0 million bags, far in excess of good and safe storage capacity. With good storage, losses can be as low as three percent (Mwanaumo, 1987).

The Central, Copperbelt, Lusaka and Southern provinces have the largest storage capacities. The off-OLR have a lot less of the good quality storage facilities. The on-farm storage has not been well developed as a consequence of pan-seasonal producer pricing, market restrictions, and mealie meal subsidies, farmers had little incentive to incur costs on surplus maize storage. At times consumer subsidies created incentives for farm households to sell nearly "all" their maize immediately after harvest and repurchase it as low cost maize meal.

---

[7]Grain stacked on hard-standings is insufficiently protected against rains and predators. Tarpaulins are often of poor quality.

Table 7.2 Provincial Capacities ('000x90kg), 1990: Annual Production, Storage, Milling and Final Product Demand

Province	Supply	Storage Capacity	Milling Capacity	Demand Capacity	Surplus (Deficit)
Central	2,538	2,292	1,845	840	1,698
C/belt	582	1,590	3,511	4,300	(3,718)
Eastern	1,909	213	350	420	1,489
Luapula	327	79	220	410	(83)
Lusaka	475	835	1,544	2,600	(2,125)
Northern	1,508	298	578	350	1,158
N/western	138	225	275	265	(127)
Southern	2,188	2,810	2,288	920	1,268
Western	255	251	785	350	(95)
Zambia	9,920	8,593	11,397	10,455	(534)

Source:Pervis Dennis (1986), and the Ministry of Cooperatives, 1990.

In Zambia, over 80 percent of the maize is consumed as mealie meal and the rest is used for beer brewing and animal feeds. The two forms of industrial mealie meal commonly produced in Zambia are Break-Fast (BF) and Roller-Meal (RM) with a transformation rate of 65 percent and 92-98 percent, respectively. Roller meal is little different from rural hammermill processed meal, on the basis of taste, texture and nutrition. Neither roller meal or the rural milled flour are decorticated.

Generally milling capacities in most of the regions are adequate for the processing of mealie meal to meet demand within the region (Mwanaumo,1987, p.16). In most cases these regional capacities (Table 7.2) are in excess of regional demands.

Major industrial maize milling facilities are concentrated in Central, Copperbelt, Lusaka and Southern provinces along the OLR. The bulk of maize milling is done by large-scale milling companies, almost all of which are publicly owned or controlled by government through National Milling Company (NMC) and cooperatives. Privately owned large commercial mills were nationalized in 1986 after the food riots, which were partly blamed on the industry (Sipula, 1987).

Rural small-scale processing was restricted and of a service nature until in the late 1980s. For urban areas, large scale milling continues to be important. The liberalized maize market is expected to improve the market margins, introduce seasonal price differentials and thus attract more private participation and investment in storage and processing facilities. Provincial maize demand estimates are presented in Table 7.2 with indications of whether the province is surplus or deficit in the last column.

7.4. Methodology and Data

In the transportation study, secondary sources of data were used as discussed in the previous section. Data on capacities of supply, storage, milling and demand are presented in Table 7.2 (maize being a staple food item, is relatively price inelastic and demand levels are stable over time). The 1991 (post August) transportation rates as shown in Table 2.5 were used in the model. The value of maize was that of the official "floor" price in 1990/91 market season. Storage and milling costs were generated by the author using data from various sources in Zambia.

The country had maize imports averaging 19 percent per year of total procurement between 1979 to 1986. In the 1990/91 market season, the country experienced a total annual deficit of maize, and imports were necessary. The model, therefore, included this source and assumed unlimited supplies from the rest of the world. The landed cost of the commodity to the Copperbelt was used and transportation to other regions were adjusted accordingly[8].

7.4.1. Market Boundaries and Distances

If producers have the option of shipping to different markets, the boundary between supply areas is determined by the price of each destination less the cost of transferring the commodity from each point of origin to each destination. Given free choice producers will always ship to the market offering a highest net price. But some producers may be located at points where the price is the same whether they ship to one market or the other. The locus of these points would determine the market boundary (see Tomek, 1985, p.1550). Under the uniform pricing system, maize flows were centrally allocated and provincial boundaries were used. These administrative provincial boundaries where adopted as "market boundaries" in this study and secondary data on production, storage capacity, processing capacity and maize demand was available and better organized at these regional levels.

Within each province, the provincial district center was taken to represent the province as the origin (node) and a basis for calculating the inter-regional distances

[8]Sources of maize imports include The United States of America (mostly yellow as maize food aid), Kenya, South Africa and Zimbabwe.

Table 7.3 Transportation Costs to Storage Facilities (ZK per 90kg bag), 1990/91.

To / From	C	B	E	L	K	N	T	S	W
C	800	1087			993				
B		800							
E		1784	800		1423				
L				800		1297			
K					800				
N	1574	1561				800			
T							800		
S					1149			800	
W	1575								800
I		3720			3297			3015	

Note: C=Central, B=Copperbelt, E=Eastern, L=Luapula, K=Lusaka, N=Northern, T= North Western, S= Southern, W=Western provinces and I=Imports from the rest of the world.

(Central province (C) was represented by Kabwe, Copperbelt (B) by Ndola, Eastern (E) by Chipata, Luapula (L) by Mansa, Lusaka (K) by Lusaka, Northern (N) by Kasama, North Western (T) by Solwezi, Southern (S) by Choma and Western (W) by Mongu). The districts (see map, Figure 1) were not exactly the true representative of the provinces in terms of location centeredness. North Western province could have been represented better by a district like Kabompo which is even further away from Copperbelt with an all passable road. The distances were not also necessarily the shortest routes between provinces. For instance, the all weather road between Kasama in Northern province and Chipata in the Eastern province is via Central and Lusaka regions (the route through Lundazi is not

favorable). A direct route could cut the distance by nearly two thirds. The distances between district provincial headquarters were adhered to for consistency in the model.

7.4.2. Transportation Routes and Costs

Given the history of the maize flows and existing transportation routes, the nodes and branches included in the model are shown in Table 7.3, 7.4 and 7.5, with obvious inefficient routes eliminated and intra-provincial costs omitted. A schematic representation is given in 6. To illustrate how to interpret the tables some examples are presented below.

The branch in Table 7.3, Row 'E', Column 'E' (Row, Column) or (E,E), shows a value of 800 kwacha. The value reads that a bag of maize valued at 800 kwacha is acquired in Eastern province and taken to storage in Eastern province. In (E,B) shows a value of 1,784 which means that a bag of maize was acquired at 800 kwacha from Eastern province and transported to the Copperbelt province (B) storage facilities and a transportation cost of 984 kwacha per bag was incurred. The activity carried, therefore, a total cost of 1,784 kwacha.

In Table 7.4, (B,B) with a value of 98 kwacha shows that a bag of maize stored on the Copperbelt had a storage cost of 98 kwacha. In the case of (E,B) the value (1,082 ZK) contains the cost of storage (of 98) incurred in Eastern province and the transportation cost to the copperbelt for milling. Table 7.5, (B,B) shows the within province cost of milling (664 ZK) a bag of maize and (C,B) shows the value (951 ZK) for maize processed in Central province and transported to the Copperbelt.

Table 7.4 Transportation Costs to Processing Plants (ZK per 90kg bag), 1990/91

To / From	C	B	E	L	K	N	T	S	W
C	98	385			291				873
B		98			521		388		
E		1082	98		721				
L		1356		98					
K					98				
N		859				98	1149		
T							98		
S		803			497		1260	98	1025
W									98

Note: Notations as in Table 7.3

An empty coordinate indicates that the branch was not included in the network due to limitations of the modelling programs and obvious inefficiency. The rest of the values from the three tables can be read in a similar way.

Supply constraints were imposed such that maize acquired in a region was most likely stored within that region. Similar restrictions were made on milling and demand requirements[9]. In the model, production, storage and milling costs in each region were assumed identical, thus the only variable cost involved was that of transportation. The problem was, therefore, more of determining distribution routes to be used and the quantity to be shipped via each route so that all distribution center demands could be met with a minimum total transportation cost.

[9]The demand requirements at each stage were assumed to have been adjusted for losses nd transformation rates.

Table 7.5 Transportation Costs to Demand Destinations (ZK per 90kg processed maize), 1990/91

To / From	C	B	E	L	K	N	T	S	W
C	664	951	1466		857				
B		664							
E			664						
L				664					
K					664				
N		1425		1161		664			
T		954					664		
S			1642		1013			664	
W					1309				664

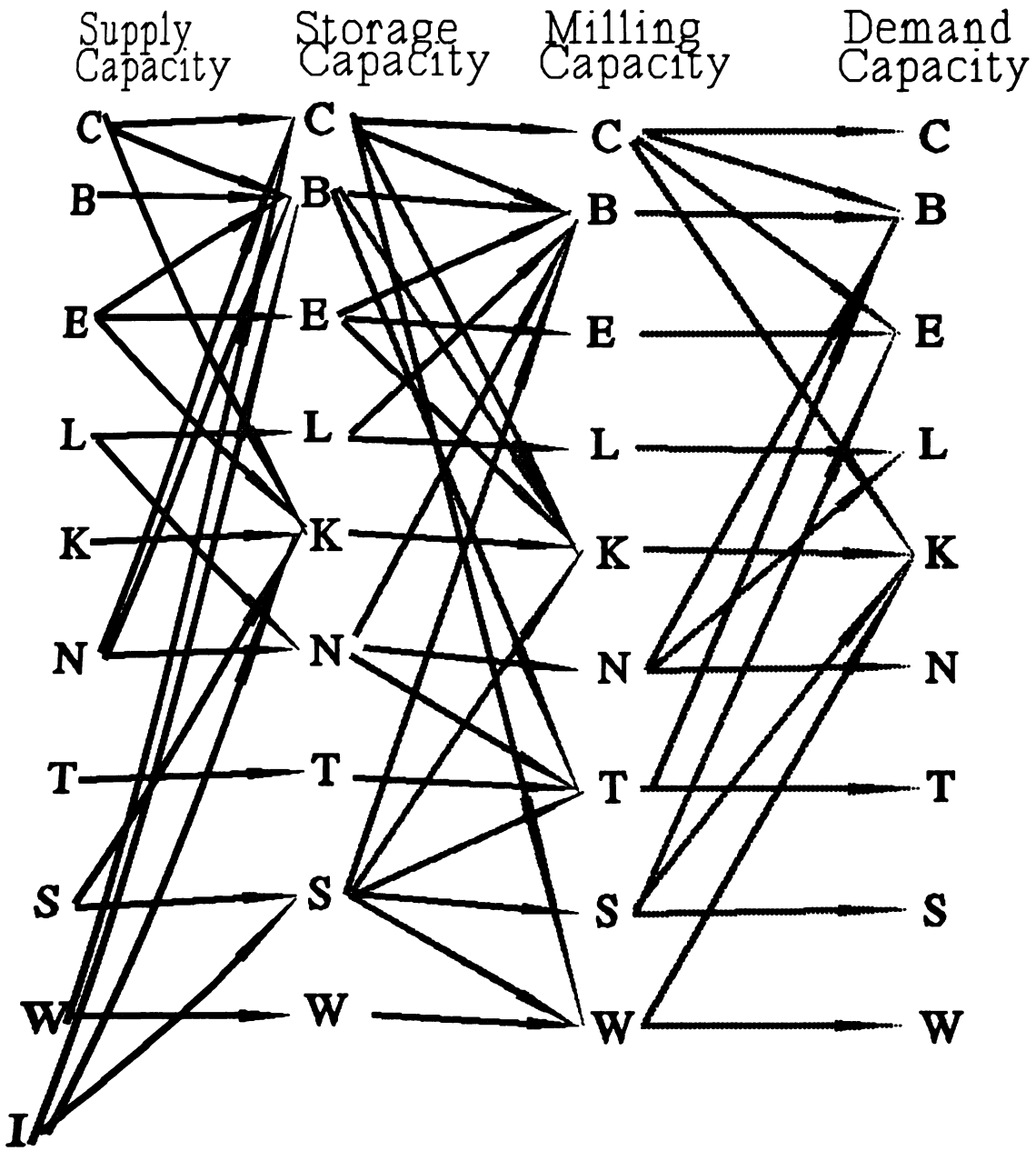
Note: Notations as in Table 7.3.

A linear programming model was used in order to determine the least cost route system of maize flows in Zambia. Assumptions of the LP transportation model used included:

1) all units of the product available in each region are homogenous with respect to quality and appearance; consumers are assumed to be indifferent as to the source of supply;

2) production and consumption within each region are presumed to occur at precisely the same point and transfer costs within regions are ignored;

3) No physical or institutional barriers exist to prevent the movement of goods between regions;



C=Central; B=CopperBelt; E=Eastern
L=Luapula; K=Lusaka; N=Northern
T=NorthWestern;S=Southern; W=Western
I=Imports

Figure 6 Interprovincial Maize Transportation in Zambia

4) Transfer costs are assumed to be uniform per unit of product, and to remain constant regardless of volume or direction of movement;

The first assumption implies that the commodity would attract one price in each region. If consumers, for example, preferred a commodity of a particular appearance from a particular region, then the price of that commodity would differ from the optimal price which may exceed normal transportation costs.

Assumption two was applied mainly for analytical purposes. The limitations from this assumption precludes inter-temporal issues. Transportation, storage and processing constraints could be staggered out and the form in which the commodity is stored becomes more important when inter-temporal variables are introduced. Maize meal, for example, stores much more poorly than grain and this could affect when and where the milling is conducted if included in the model. Assumption 3, attempts to remove non economic distortions in order to give all participants the same chance in the market.

Assumption four assumes that the quality of the infrastructure such as roads is uniform and that only distances matter. In reality, good infrastructure may attract more services and lower transportation rates. With this assumption regions with poor infrastructure had the same probability of being served as those with good infrastructure. The assumption simplifies the model to manageable levels but weakens it.

With the resource constraints, objective function coefficients, routes selected and the assumptions narrated above, an initial tableau was set up and a Linear Interactive and Discrete Optimizer (LINDO/PC) program was employed to run the

model. The results of the model are presented and analyzed in the following chapters.

CHAPTER EIGHT

ANALYSIS OF TRANSPORTATION MODEL

The transportation problem arises frequently in planning for the distribution of goods and services from several supply locations to several demand locations. Usually the quantity of goods available at each supply location (origin) is limited and there is a specified amount needed at the destination point (demand). With a variety of shipping routes and differing costs for the routes, the objective is to determine how many units should be shipped from each origin to each destination so that all destination demands are satisfied and total transportation costs are minimized. In this chapter, the results of the transportation model are analyzed and presented

8.1. Optimal Solution

In this study the acquisition of maize was from ten sources (origins). Once the maize was acquired it had to be stored in nine locations (storage nodes), one in each province. From storage facilities maize was transported to nine milling facilities (milling nodes) for processing and, thereafter, processed maize went to meet demand in nine final demand destinations.

8.1.1. Minimum Marketing Costs

The linear programming computer optimal solution generated showed that the maize market system in Zambia could have minimized costs to meet demand in each region at no less than 21,056 million kwacha in 1990/91 marketing season. The total cost was inclusive of storage, milling and transportation. Under the 1990/91 marketing environment when the government undertook most of the maize marketing functions, would have used 7,936 million kwacha to purchase maize from farmers and for imports. Storage costs would have cost 1,025 million kwacha and the milling costs would have been 6,942 million kwacha. Transportation of the optimal quantities to meet demand in each region would have cost 5,153 million kwacha. Transportation costs which the government subsidized in full, was 25 percent of the total marketing costs under the optimal conditions as determined by the model. The optimal solution was large considering the country's total government budgeted expenditures of 47,347 million kwacha in 1991 (U.S. government, 1992). The optimal solution was influenced by the demand conditions imposed on the model, the storage and milling constraints as they existed and the fact that the country was in a maize deficit situation in 1991. The constraints, for example, forced small quantities of maize to be shipped between regions in order to satisfy the demand restriction of equality imposed on the model.

In addition, the large value could have been a result of high rates of inflation which made nominal numbers astronomical (See CPI trends in Table 2.7). In reality, however, the marketing costs were not incurred since the market system simply

allowed for short falls to occur and made food aid inevitable. The demand as specified by the model was not met in the actual situation in 1991 and the issue of food aid was not considered in the model.

Since the actual maize flows of 1991 were unavailable to the author, a comparison of the savings made between the optimal maize flows and the actual maize flows for 1991, could not be made. The alternative was to compare the 1985 maize flow savings as determined by Mwanaumo (1987). Mwanaumo determined that the optimal flow of maize could have saved 53 percent in reduced transportation costs compared to the actual flow of maize in 1985 (the government deliberately allocated maize to each province). The market system as a whole would have saved 38 percent. Using these savings and inflating the figures to the 1991 prices, the optimal solution as determined indicated that savings would have been substantially greater than 38 percent. The savings would have been higher due to increased demand for industrial maize meal in the last decade. Secondly, the restriction of the model to meet all demand requirements, may have contributed to the large estimate of cost savings percentage. Thirdly, real prices of maize, maize meal, milling and transportation have been increasing as the price decontrol measures have been undertaken and any deviation of maize flows from the optimal solution would imply higher costs and hence less savings. Even though the comparison of the 1985 conditions and those of 1991, just before market reforms were seriously implemented, was weak, it does provide an indication of the savings that could be realized from rationalizing the transportation system.

Table 8.1 Optimal Provincial Maize Flows to Storage ('000x90kg bags)

To / From	C	B	E	L	K	N	T	S	W
C	2538								
B		582							
E		411	969		529				
L				232		95			
K					475				
N		927				581			
T							138		
S								2188	
W									255
I					535				
Total	2538	1920	969	232	1539	676	138	2188	255

C=Central province; B=Copperbelt; E=Eastern; L=Luapula; K=Lusaka; N=Northern; T=Northwestern; S=Southern; W=Western; I=Imports.

The optimal solution provided the quantities of maize shipped between each destination. Tables 8.1, 8.2 and 8.3 show maize movement from supply sources to storage facilities, from storage to milling and from milling to retail demand destinations, respectively. To illustrate how to read the tables, an example is provided below. Looking at Table 8.1, row E, column E, (E,E) shows that 969,000 bags of maize should have been acquired and stored within the Eastern province. For cell (E,K), 529,000 bags should have been acquired from Eastern province and shipped to Lusaka province (K) for storage.

From Table 8.2, reading of (C,B) cell indicates that of the maize stored in Central province, 947,000 bags should have been shipped to the Copperbelt province

Table 8.2 Optimal Provincial Maize Flows to Mills ('000x90kg bags).

To / From	C	B	E	L	K	N	T	S	W
C	1591	947							
B		1793					127		
E		614	350		5				
L		12		220					
K					1539				
N		98				578			
T							138		
S		47						2046	95
W									255
Total	1591	3511	350	220	1544	578	265	2046	350

for milling. An example from Table 8.3 using (C,B) cell reads that, of the processed maize in Central province, 751,000 bags should have been sent to the Copperbelt towards meeting the later's demand of 4,300,000 bags. The market system as a whole imported 535,000 bags of maize from the rest of the world and the amount was shipped directly to Lusaka province as shown by (I,K) cell in Table 8.1. An empty cell indicates that the activity did not take place and the rest of the maize flows in each cell can be read in a similar way from the three tables.

The last rows of Tables 8.1, 8.2 and 8.3 show the optimal storage, milling and retail demand, respectively. For each region, the value is equal to or less than the capacity of the activity in question.

Table 8.3 Optimal Provincial Maize Flow to Retail Demand Destination ('000x90kg bags)

To From	C	B	E	L	K	N	T	S	W	Supply
C	840	751								1591
B		3511								3511
E			350							350
L				220						220
K					1544					1544
N		38		190		350				578
T							265			265
S			70		1056			920		2046
W									350	350
demand	840	4300	420	410	2600	350	265	920	350	10455

According to the optimal solution, all available maize in each region was acquired. Since equality constraints were imposed on consumer demand, all demand levels were met in each province, as indicated by the last row of Table 8.3. With regard to storage, Central province did not utilize all its storage capacity and showed a slack of 206,000 bags. Eastern province, North Western, Southern and Western provinces also showed storage slacks of 154,000, 40,000, 622,000 and 236,000 bags respectively. In processing, Central province had 254,000 bags, North Western had 10,000 bags, Southern had 243,000 bags and Western had 435,000 bags worth of unused milling capacities. Table 8.4 shows the optimal storage and milling capacity utilization and slacks for each region. Specific aspects of each region are discussed below under provincial analysis.

Table 8.4 Optimal Provincial Storage and Milling Capacity Utilization ('000x90kg bags)

Province	Stored	Storage slack	Milled	Mill Slack
Central	2538	206	1591	254
Copperbelt	1920	-	3511	-
Eastern	969	154	350	-
Luapula	232	-	220	-
Lusaka	1539	-	1544	-
Northern	676	-	578	-
Northwestern	138	40	265	10
Southern	2188	622	2046	243
Western	255	236	350	435

8.1.2 Provincial Level Analysis

In addition to providing optimal maize flows, the model provided reduced cost values or shadow prices. Reduced costs or shadow prices (shown in Table 8.5 as opportunity costs for non-optimal routes) indicate how much the objective function coefficient of each decision variable would have to improve (get smaller) before it would be possible for the variable to assume a positive value in the optimal solution. In other words, the reduced costs show how much the marketing costs would increase by forcing in a non optimal route. If the decision variable is already positive in the optimal solution, its reduced cost is zero (Anderson, and others, 1988, p. 82). The discussion below provides the analysis of both maize flows and reduced costs on a regional basis.

Table 8.5 Opportunity Costs for Using Non-optimal Routes, 1990/91 Marketing Season (ZK per 90kg bag)

Route	Reduced Cost	Route	Reduced Cost
Central to Lusaka	267	Central to Western Milling	266
Northern to Central	300	Southern to Lusaka Milling	5
Southern to Lusaka	5	Southern to Northwestern Milling	167
Western to Central	1,284	Central to Eastern Demand	242
Imports to C/belt	62	Central to Lusaka Demand	262
Imports to Southern	62	Northwestern to C/belt Demand	580
Central to Lusaka Milling	267	Western to Lusaka Demand	1,223
C/belt to Lusaka Milling	784		

8.1.2.1. Central Province

Central province met all its supply, storage and milling requirements from within the province. A demand satisfaction of 840,000 bags was met. A reduction in the cost of transportation of maize from Northern to Central province of 300 kwacha would be needed if this transfer route were to be used (Table 8.5). Alternatively if this route was forced into the solution, the cost of marketing would have increase by 300 kwacha. Western province as a source of maize to Central province would have required a transportation cost reduction of 1,284 kwacha per bag. With this shadow price, the province would be a high cost source of maize for the Central province if used.

8.1.2.2. Copperbelt Province

The Copperbelt region used up all its maize supplies, storage and milling capacities but could not satisfy its final product demand. The region obtained additional maize for storage from Eastern (411,000) and Northern provinces (927,000 bags). The province then needed 947,000, 614,000, 12,000, 98,000 and 47,000 bags from Central, Eastern, Luapula, Northern and Southern provinces respectively, for milling purposes. In the meantime the province had to send 127,000 bags of its stored maize to North Western province for milling.

Other relatively economic sources of maize for the Copperbelt province would have been imports from the rest of the world since only an additional cost of 62 kwacha would be incurred for forcing in this route. North Western province, on the other hand, if forced to supply the Copperbelt with processed maize would increase the marketing costs by 580 kwacha for each bag transported. This would have been a high cost source of maize for the Copperbelt.

8.1.2.3. Eastern Province

Eastern province utilized all its maize supplies, and milling capacities. The milling capacity was the most restrictive constraint and as a result processed maize had to be imported into the province. A quantity of 70,000 bags of processed maize was shipped from Southern province. Central province could have supplied the Eastern province with processed maize if the transfer costs were reduced by 242 kwacha per bag (Table 8.5). Imports of processed maize from other provinces carried a high opportunity cost and was, therefore, not economical.

Eastern province, although favored by the large number of small scale farmers, good soils and good rainfall, is unlikely to have production costs low enough to counter high transportation costs if the region were to produce maize for major consumption centers. Transportation costs which are equally high for input supply contribute to increased production costs in the region.

8.1.2.4. Luapula Province

Luapula province, with a demand for processed maize of 410,000 bags, produced 327,000 bags and had a milling capacity of only 220,000 bags. In order to process the extra quantity of maize produced within the region, the province sent 95,000 bags for storage to Northern province (See Table 8.1) and in return received 190,000 bags from Northern province in form of processed maize (Table 8.3)

8.1.2.5. Lusaka Province

Lusaka province, a major deficit region, utilized all its storage and milling capacities. However, to meet all its processed maize demand, the province imported 535,000 bags of maize from the rest of the world (Table 8.1). Eastern province supplied a small amount of 5,000 bags to fill up the gap for milling capacity (Table 8.2). To meet processed maize demand, the province acquired an additional 1,056,000 bags from Southern province.

For an extra bag of maize brought into Lusaka from the Southern province, only a transport cost increase of 5 kwacha per bag would be incurred. The low transport shadow price was a strong indication that Southern province was a relatively good source of maize supply to Lusaka. Other sources of maize to Lusaka

could be obtained only at higher transport cost reductions. Central province needed transport reduction costs of 267 kwacha to supply Lusaka storage and milling and 262 kwacha to supply processed maize. The Copperbelt could supply Lusaka at an extra cost of 784 kwacha. The Copperbelt region though near Lusaka, is a deficit region and hence the high opportunity cost to supply Lusaka province.

In case of processed maize, Southern province was equally favored, as only 5 kwacha reduction in transfer costs would be necessary in order for the activity to take place. Western province (1,223 ZK), as expected, was less favored as a source of processed maize for Lusaka province.

8.1.2.6. Northern Province

Northern province met its requirements from within the region for maize supplies, storage and milling. The province sent 927,000 bags for storage (See Table 8.1), 98,000 bags for milling (See Table 8.2) and 38,000 of processed maize to the Copperbelt (See Table 8.3). The province also supplied Luapula province with 190,000 bags of processed maize.

8.1.2.7. North Western Province

North Western province, with a supply of 138,000 bags, had extra storage capacity of 40,000 bags and extra milling capacity for 10,000 bags. The province obtained 127,000 bags extra maize for milling from the Copperbelt (Table 8.2). For the North Western province to utilize all its milling capacity, Southern province would be the cheapest source of maize but a transport cost increase of 167 kwacha

per bag would be incurred. The Southern province would be a relatively good source of maize for North Western province.

8.1.2.8. Southern Province

The Southern province, a major source of maize supply showed surplus storage capacity of 622,000 bags and extra milling capacity of 243,000 bags (Table 8.4). The province met its processed maize demand from within the area. Extra processed maize of 1,050,000 bags and 70,000 bags were sent to Lusaka and Eastern provinces, respectively. The province also sent 95,000 bags to Western province and 47,000 bags to the Copperbelt for milling (Table 8.2). Imports from the rest of the world into Southern province could occur at a transport cost increase of 62 kwacha.

8.1.2.9. Western Province

Finally, the Western province was limited by the amount of maize produced. As a result a slack of 236,000 bags storage and 435,000 bags milling capacities were recorded. All the maize consumed within the province was milled within the region. For any stored maize from Central province to get to Western province transport cost of 266 kwacha would be incurred indicating that Western province was a costly region to supply maize to.

Given the restrictions imposed on the model and the prices used, the results of the model were expected. The small quantities of maize (5,000 bags) moved from Eastern to Lusaka province would probably not occur in reality. The fact that the inter-temporal and product form issues were not covered, may have influenced the flow of maize from regions with extra storage and milling capacities. For example,

Southern province, with its excess storage and milling capacities, could have utilized the capacities and exported more processed maize had the product form considerations been included in the model.

In general, the results of the model showed that maize moved from maize production surplus regions of Central, Southern, Northern and Eastern provinces to deficit areas of Lusaka, Copperbelt, North Western, Western and Luapula regions as expected. The surplus provinces, with the exception of Eastern province met their demand requirements within the province and exported the rest. Eastern province, with the milling capacity limitations exported maize and imported processed maize to meet demand.

From the non-optimal routes (reduced cost) values generated it was clear that as a source of grain and processed maize to other regions, Western province was the least favored among the deficit regions. The province was also the most costly one to supply maize to. Northern province was the least favored among the surplus regions. The highest opportunity cost to supply other regions with processed maize within major consumption areas was held by the Copperbelt region.

Luapula region could increase its storage and milling capacities in order to meet its demand, but production for export to other regions would not be economical. Eastern province imported processed maize from Southern province, implying that the maize moved out of the region before returning as processed maize meal. The second haul was unnecessary and could be eliminated through increased milling capacity. The improvement of milling capacity in Eastern province would reduce costs tremendously as the dual prices suggest (See dual price section.). Rural hammermills would be a great option for increasing the milling capacity in the

Table 8.6 Dual Prices for Maize Supply Sources (ZK per 90kg bag)

Maize Supply Region	Dual price
Central	2571
Copperbelt	2858
Eastern	1874
Luapula	1600
Lusaka	2497
Northern	2097
North Western	3148
Southern	2153
Western	3080

province without a large volume of investment needs. The private sector and Primary Cooperative Societies could easily undertake such investments.

8.1.3. Dual Price Analysis

For further analysis of the transportation cost minimizing problem, dual prices were generated by the LP model. A dual price (associated with a constraint) was defined as "the improvement in the optimal value of the objective function resulting from a one-unit increase in the Right Hand Side (RHS) value of the constraint" (Anderson et al., 1988, p. 82). In a minimizing problem, negative dual prices indicate that the objective function will not improve but worsen if the value of the RHS is increased by one unit. Dual prices could be considered as shadow prices associated with the RHS constraints.

8.1.3.1. Supply Constraint Dual Prices

Dual prices (or shadow prices) for maize supply sources are presented in Table 8.6. Dual prices for milling capacities are presented in Table 8.7 and those for consumer demand constraint are presented in Table 8.8. Shadow prices for storage were all zero showing that the regional activities were optimal and/or with a slack. The supply shadow prices are positive even for exporting regions because an increase in supply from a surplus region would reduce imports from the rest of the world. Imports (inclusive of transportation costs) were much more costly than domestic supply sources.

From the reading of dual prices, increasing the supply of maize by one bag in North Western and Western provinces (deficit and off-OLR) would reduce marketing costs by 3,148 and 3,080 kwacha per 90kg bag supplied, respectively (See Table 8.6). The benefits from supplying maize from within the provinces, therefore, would provide an opportunity for savings in the market system.

These results imply that the two regions are indeed disadvantaged regions in terms of obtaining maize from other areas. With high potential for savings from local production, the provinces could increase local production and/or substitute other grain such as millet and sorghum to meet grain demand. The disadvantage in maize supply by the two regions go further than the shadow prices suggest. The production costs for maize in the regions are known to be high due to sandy soils in Western province and acidic soils in North Western province. Both soil characteristics are unsuitable for hybrid maize production and even better resource allocation could be achieved by a reduction in maize demand.

Table 8.7 Dual Prices for Milling Capacity (ZK per 90kg bag)

Mill region	Dual Cost
Eastern	1,257
Luapula	994
Lusaka	5

The Copperbelt, Central, Lusaka, and Southern regions were respectively with relatively low dual price values. Within this group, the Copperbelt province provides savings of 2,858 kwacha per extra bag produced in the province. Production of maize should be encouraged on the Copperbelt compared to Lusaka province, for example (as deficit regions with 2,497 kwacha dual price). More cost reductions could be attained if Central (2,571 ZK) and Southern (2,153 ZK) provinces increased their maize supply even though they are currently surplus regions. This would decrease import needs of maize. Eastern province is the most disadvantaged surplus region for increasing maize production with a dual price of 1,874 kwacha per 90 kilogram bag. An extra bag of maize supplied in Eastern Province would reduce total marketing costs by only 1,874 kwacha, a poor source of market savings compared to other surplus regions. Northern province (2,097 ZK) and Luapula province (1,600 ZK) are relatively poor sources of maize supply, as shown by dual prices, which suggest that little could be gained from increased maize production in the areas.

The above analysis reiterates the need for maize to be produced in the major consumption areas of the OLR regions, whether currently deficit or surplus. Increasing maize production in Northern and Eastern provinces (surplus off-OLR)

Table 8.8 Dual Prices for Final Product Demand (ZK per 90kg bag)

Retail demand region	Dual price	OLR/Off OLR
Central	-4,133	OLR
C/Belt	-4,420	OLR
Eastern	-4,693	Off OLR
Luapula	-4,156	Off OLR
Lusaka	-4,064	OLR
Northern	-3,659	Off OLR
North Western	-4,710	Off OLR
Southern	-3,715	OLR
Western	-4,642	Off OLR

would contribute little to lower the total marketing costs. The two off-OLR surplus regions do not have a comparative advantage in the economics of maize supply.

8.1.3.2. Milling Constraint Dual Prices

With respect to milling activities, an increase in milling capacity in Eastern province would improve the objective function by as much as 1,257 kwacha (See Table 8.7). Savings of 1,257 kwacha would be attained if the milling capacity was increased to process an extra bag of maize. Similarly 994 kwacha reduction in marketing costs would be realized for every unit increase of milling capacity in Luapula province. Lusaka's need for increased maize milling capacity was small and its contribution to lowering costs was only 5 kwacha[1]. This suggested that importing processed maize from other regions was more desirable over grain imports. The

[1]Dual prices for storage were zero for all regions

study did not address the product form or inter-temporal issues that could have better covered this issue.

8.1.3.3. Final Product Demand Constraint Dual Prices

Demand is one area were a unit increase would bring about an increase in the objective function value. An increase in the objective function value implies that total costs would be increased due to a unit increase in the demand constraint. The negative reduced costs as reported in Table 8.8 are an indication of this fact.

North Western (-4,710 ZK), Eastern (-4,693 ZK) and Western (-4,642 ZK) provinces showed relatively large increases in market costs (differences reflecting transportation costs) brought about by a unit increase in the final product demand in each region.

The Copperbelt as a deficit but major consumer would also be discouraged from increased maize consumption with a dual price of -4,420 kwacha. However, given the situation on the Copperbelt, where a large population works in the mines and depends on marketed food, increased local production of maize rather than reduced demand would be recommended.

Unlike Western and North Western provinces, the Copperbelt province has good ecological conditions for maize production and is served by a rail link that provides low cost imported inputs. The opportunity cost of maize supply for the province also supports local production. Luapula (-4,156 ZK), Central (-4,133 ZK), Lusaka (-4,064 ZK), Southern (-3,715 ZK) and Northern (-3,659 ZK) would have had less effects on the marketing costs if demand increased compared to the four provinces presented earlier.

With the LP assumptions, and the 1991 constraints, price coefficients used in the model and given the optimal maize flows, a minimum marketing cost of a locally produced, stored, and milled final product would have been 1,562 kwacha in each region. The lowest prices for each region that were derived from the optimal maize flows of maize, therefore, would be 1,562 kwacha for Central, Southern and Northern provinces which were net exporters of maize. The other derived minimum regional prices are presented in Table 8.9. The prices were determined based on the cost of the last bag of maize to satisfy demand for each respective region (i.e., price equal marginal cost). Lusaka province would have had the highest price level of 5,031 kwacha per bag of the final product. The Copperbelt was next with 4,565 kwacha.

Table 8.9 Derived Minimum Final Product Prices by Region

Province	Derived Price
Central	1,562
Copperbelt	4,565
Eastern	2,540
Luapula	2,059
Lusaka	5,031
Northern	1,562
North Western	1,852
Southern	1,562
Western	2,489
Mean OLR price	3,180
Mean off-OLR price	2,100

Source: Transportation mode.

The average level of prices for the OLR regions was determined to be 3,180 kwacha which was higher, as expected, than that of the off-OLR regions with an average price of 2,100 kwacha. Trade would therefore, occur between the two regions as long as the transportation costs were at or below the price differentials (i.e., average of 1,080 ZK). The consumer at the time of the research was not only paying less than the transport cost but far below the cost of the final product. The consumer was paying an equivalent of 700 kwacha and the rest was covered by a government subsidy program (See also Sipula and Maleka, 1991).

8.1.3.4. Conclusion

The generated dual prices reaffirm what most researchers such as Muntanga (1985), and Mwanaumo (1988) found in Zambia. Western province, North Western province as deficit regions were disadvantaged in terms of producing and receiving maize from other sources. Eastern and Northern provinces as surplus regions do not have a comparative advantage in maize supply for major consumption centers. Little would be gained for increased maize supplies in these regions, and alternative crops and/or livestock production are good subsectors for consideration.

The deficit and surplus regions in major consumption areas, on the other hand, would provide large savings from increased maize production. The Copperbelt, in particular, needs to increase its production, storage and milling capacities in order to contribute to decreased maize marketing costs.

Although the study reaffirmed, in Zambia's case, what other researchers have found and in conformity with trade theory, the issue of magnitude was also brought out. The transportation and indeed market cost for meeting demand with the

production levels available for the 1990/91 market season was astronomical. Major savings could be expected from an optimal maize marketing arrangement. It was especially important to change the production and demand patterns, given the limited resources needed for investments in infrastructure.

The optimal market cost levels provided insights into how much investment might be required in production, storage, milling and transportation industries and in which region each activity would be concentrated. Would the private sector be able raise large investments and what type of market structure would develop? More importantly, what would be the effects on the final product price in each region? To answer these questions, more research would be needed on a regular basis to inform the policy making process.

8.2. Sensitivity Analysis

An introduction of the rail transportation system, were available, to the optimal solution would have reduced marketing costs by 25 percent. The rail transportation rate was assumed to be 30 percent lower than the road transportation rates. The sensitivity test was conducted in order to gain insights into the importance of the alternative transportation system for maize. The results indicated that the rail linkage was a viable alternative and could provide savings of up to 25 percent.

In order to learn about the stability of the optimal solution sensitivity analysis was conducted on some other costs and constraints for each region. The stability of

Table 8.10 Objective Function Coefficient Ranges

Branch	Coefficient	Increase	Decrease	Branch	Coefficient	Increase	Decrease
CCS	800	0	-	NCS	1,574	+	300
CBS	1,087	+	0	NBS	1,561	300	0
CKS	993	+	267	NNS	800	0	1,600
BBS	800	2,858	-	TTS	800	3,148	-
EBS	1,784	0	300	SKS	1,149	+	5
EES	800	62	O	SSS	800	5	-
EKS	1,423	0	62	WCS	1,575	+	1,284
LLS	800	0	-	WWS	800	1,284	-
LNS	1,297	1,600	0	IBS	3,720	+	62
KKS	800	2,497	-	IKS	3,297	62	1,600

+, -, denote allowable infinite increase or decrease respectively.

the solution refers to the degree of variation in the coefficient that can be absorbed by the model before a change in the optimal solution. Results of the sensitivity analysis are shown in Table 8.10 for objective function coefficient ranges (cost ranges). The Right Hand Side ranges (constraint ranges) are shown in Table 8.11. Before the analysis is presented, some notations are explained below.

In Table 8.10, the column labelled "branch" shows the origin and destination of the route. For example, 'CBS' shows Central province (C) supply to Copperbelt province (B) storage route. The first letter stands for the origin province, the second letter for the destination province and the third letter stands for the activity at the destination (where; 'S' denotes storage; 'M' denotes milling; and 'D' denotes demand for the final product). In the case of 'CBM', it reads that Central province maize from storage goes to the Copperbelt milling facilities. Similarly, 'CBD' would read

Table 8.10 (Continued)

Branch	Coefficient	Increase	Decrease	Branch	Coefficient	Increase	Decrease
ISS	1,315	+	62	EKM	721	5	0
CCM	98	580	0	LBM	1,356	0	994
CBM	385	0	300	LLM	98	994	-
CKM	291	+	267	KKM	98	0	-
CWM	873	+	266	NBM	859	0	0
BBM	98	0	0	NNM	98	0	-
BKM	521	+	784	NTM	1,149	+	0
BTM	388	0	580	TTM	98	3,148	-
EBM	1,082	62	0	SBM	803	5	62
EEM	98	1,257	-	SKM	447	+	5
STM	1,260	+	167	KKD	664	5	-
SSM	98	242	5	NBD	1,425	0	-
SWM	1,025	266	1,223	NLD	1,161	+	994
WWM	98	1,284	-	NND	664	+	-
CCD	664	+	-	TBD	954	+	580
CBD	951	580	0	TTD	664	+	-
CED	1,466	+	242	SED	1,642	242	1,257
CKD	857	+	262	SKD	1,013	262	5
BBD	664	0	-	SSD	664	+	-
EED	664	1,257	-	WKD	1,309	+	1,223
LLD	664	994	-	WWD	664	+	-

Central province processed maize goes to the Copperbelt province to meet final product demand.

Table 8.11 Right Hand Side Ranges ('000 bags)

	RHS	Increase	Decrease		RHS	Increase	Decrease
		Supply				**Storage**	
C	2,538	206	154	C	2,744	+	206
B	582	411	465	B	1,920	614	154
E	1,909	535	465	E	1,123	+	154
L	327	411	95	L	232	95	12
K	475	535	465	K	1,539	5	154
N	1,508	411	465	N	676	614	98
T	138	40	138	T	178	+	40
S	2,188	535	47	S	2,810	+	622
W	255	95	47	W	491	+	236
		Mill				**Demand**	
C	1,845	+	254	C	840	154	535
B	3,511	751	254	B	4,300	154	535
E	350	70	47	E	420	47	70
L	220	12	38	L	410	38	190
K	1,544	614	5	K	2,600	47	535
N	578	98	38	N	350	38	350
T	275	+	10	T	265	10	127
S	2,289	+	243	S	920	47	535
W	785	+	435	W	350	47	95

8.2.1. Objective Function Coefficient Ranges

The original objective function coefficients (variability based on transport costs only) are shown in column labelled "coefficient." The signs '+' and '-' stand for allowable increase to infinity and allowable decrease to infinity, respectively.

The objective function coefficient sensitivity analysis indicated, for example, that Central province could supply the Copperbelt (CBS) and Lusaka province (CKS)

storage facilities over a wide range of increased transport costs without altering the optimal solution (as shown by positive infinity value). An example from Copperbelt illustrates a relatively stable situation. An increase of 2,858 kwacha could occur without altering the optimal solution allowing for a relatively large increase in transportation cost (in this case local price).

Another example to include allowable decreases, can be obtained from route 'SED.' Southern province would continue to supply Eastern province with maize if the transport cost were to be increased by 242 kwacha from 1,642 (value includes milling cost of 664 ZK) to 1,884 kwacha without altering the optimal solution. If the cost was reduced by 1,257 kwacha, the same solution could be maintained. The range of 1,499 kwacha was relatively stable. Stability of other specific routes can be read from the Table 8.11 in a similar way.

In general, routes originating from Central province at all the stages of the chain were relatively stable, as shown by the allowable increase to infinity. Central province was highly favored to supply several regions with maize over a wide range of transport costs.

Routes leading to the Copperbelt were the most unstable ones, as suggested by the low range of allowable increases. Routes originating from Southern province tended to be relatively less stable as well. This could be explained by the fact that Southern province had many alternative outlets for its maize and small transport changes could bring about re-routing of the commodity. The Copperbelt was unstable based on the many sources of maize supply available to the region.

8.2.2. Right Hand Side Ranges

In Table 8.11, RHS ranges are shown and they contain information that as long as the constraint RHS value stays within these given ranges, the associated dual price gives the improvement in the value of the objective function per unit increase in the RHS. For example, an increase in supply of one bag of maize on the Copperbelt would reduce the marketing costs by 2,858 kwacha (its dual price). This dual price would remain valid for increases of maize production of up to 411,000 and decreases of up to 465,000 bags.

Central, Eastern, North Western, Southern and Western provinces could increase their storage capacities over large ranges without increasing the minimum costs. Central, Eastern, North Western, Southern and Western provinces could reduce storage capacities just by their slack capacities otherwise, the optimal solution changes.

Copperbelt province had a higher range for the RHS constraints and with a high dual price, implied higher opportunities for total cost reductions in producing, storing, and milling. Eastern province also followed that pattern but needed to reduce production of maize and increase the milling capacity. Specific RHS range results can be read from Table 8.11.

Sensitivity tests of the results of the analysis indicated that the conclusions drawn from these results were stable across a relatively wide range of parameter values. The stability allows increased confidence in both the representativeness of the data and its use as a basis for future analysis.

8.3. Summary and Conclusion

The results attained in the transportation model were found to be consistent with past studies in Zambia and indeed economic trade theory. Major consumption centers and regions nearby ought to produce more maize to satisfy demand within and import less from other regions.

The price level of maize is expected to be higher in OLR provinces compared to off-OLR regions. Southern and Central provinces will supply more maize to the Copperbelt and Lusaka provinces as suggested by low transportation cost shadow prices.

The deficit regions off-OLR have a higher opportunity cost for not producing maize locally. Imports of maize from other regions carried a high transportation cost (shown by the large shadow prices) for North Western, and Western provinces. Eastern and Northern provinces, on the other hand, had lower opportunity costs for increasing maize production and it would not be economical to do so.

The Copperbelt provided a situation where the opportunity cost for the province not to increase production was high but the opportunity cost for not increasing the processing facilities was low. This suggested that more could be gained from increased production from the farming sector than from the increased processing capacity. Should demand for maize increase in the province, however, both aspects would become important.

The transportation study brought out the seriousness of the marketing problem through the magnitudes of transportation costs involved. The analysis showed that the controlled and government funded market system was very inefficient and that more resources had been mis-allocated than believed. Since the

government did not have resources to meet all the market requirements, benefits had to be rationed through food aid and persistent short falls of supplies. The benefits and costs were very unevenly distributed, disavantaging especially the rural net grain buyers. The need for reforms was, therefore, overwhelming if marketing costs, particularly transportation costs, were to be minimized. Once price differentials reflect transportation costs, for example, production patterns will change and so will consumption patterns. With maize being a staple food and relatively price and income inelastic, an efficient market system can reduce the final product price and help contain potential political disturbances.

The limitations of the transportation model were that regional production costs were assumed uniform, thus taking away the advantage of the low costs areas, some of which may be far from major maize consumption areas. However, when considered together with input transportation costs, the problem becomes less serious. The lack of inter-temporal and product form considerations also weakened the model, as did the assumption of uniformity within regions and the large regional units of analysis used. Smaller regions would have provided better results. Similarly, uniform transport rates, storage costs and milling costs limited the model. Uniform transport rates weighed against areas with good infrastructure, especially those on the OLR.

Apart from the government having to continue to provide market infrastructure, information, legal support, grades and standards etc., more urgent problems appear to be those of facilitating competition in the market by investing in infrastructure, and provision of market information to participants. The transportation industry specifically is a high-cost industry and requires a substantial

amounts of imported capital and operational variable inputs in form of imported fuels and before one invests he/she needs information on how profitable the activity is and good infrastructure is necessary for low costs to be attained. The government policy should be to facilitate the development of an efficient transportation system. In general the government should create a conducive environment for investments through the provision of infrastructure, information and enforcing contracts, grades and standards while maintaining stable and consistent economic growth policies.

Further research is recommended in the areas of transportation with issues of differentiated production costs, inter-temporal, final product form, market margins and retail prices addressed in a more complete way. In Zambia, a 90kg bag is used for grain packaging and little bulk transfer are made. The costs of bags are high, as is the labor requirement for packaging. A study to look into sources of reducing costs, therefore, should include packaging. The credit and detailed transportation studies are two areas of concern for the Zambia maize market liberalization program. How the maize sub-sector will perform will greatly depend on the transportation industry.

CHAPTER NINE

SUMMARY, CONCLUSION AND POLICY IMPLICATIONS

Three issues on maize marketing liberalization in Zambia have been presented in the dissertation covering: 1) The evolution of maize pricing and marketing policies; 2) the role of primary cooperative societies and 3) the inter-provincial maize transportation system.

The social, demographic, geographic and economic characteristics, the agricultural sector and the maize sub-sector, have been presented in the dissertation. The past maize pricing and marketing policies were also reviewed and were accompanied by a discussion on what a market system is and why the Zambia government undertook to reform it.

Considering that market liberalization in itself would not automatically introduce an efficient marketing system, a discussion was presented on the role the cooperative societies could play in the market, especially in the short run (taken to be about ten years). The four-tier cooperative system was referred to in the discussion, but the focus was on primary cooperative societies which have been involved in maize marketing as agents between the farmers and the provincial marketing unions. The primary cooperative organizations were perceived to be

important in the reformed market system especially before the development of the private sector.

Another issue analysed in the dissertation, was the inter-provincial maize marketing problem. Transfer costs had been a major drain on government revenues because of uniform pricing which did not reflect the costs in the final product prices. A transport cost minimization problem was conducted with the help of a linear programming model and the results were analyzed and their implications were drawn for maize production patterns, storage, milling and transportation rates. The present chapter summaries and presents conclusions and draws policy implications of the three issues discussed in the dissertation. Further research areas are then recommended.

9.1 Summary

Under the past pricing and marketing policy reviews (before August 1991), social, demographic, geographic and economic characteristics of the country are presented before discussing the agricultural sector and the maize sub-sector in particular. The discussion laid out the challenges of regional dispersions, asymmetric population densities, relatively high urbanization rate (over 50 percent) and the vastness of the country for marketing. The importance of the agricultural sector was recognized and maize was identified as the most important crop in the country. Over 70 percent of cultivated land area is usually under maize and 90 percent of the grain produced in the country is maize. Most of the marketed maize comes from small scale farmers (70 percent in the 1980s).

Past agricultural pricing and marketing policies increased the market share of small-scale farmers, but brought about mis-allocation of resources in terms of production patterns, since transportation costs were not reflected in the producer, into-mill, input and final product retail prices. The major maize consumption areas in Zambia are concentrated along the OLR in Lusaka and Copperbelt provinces (See Figure 1). The OLR regions are suitable for maize production and are relatively dominated by commercial production. Small-scale and emergent farmers (over 90 percent of the farmers), on the other hand, are scattered all over the country, and especially in off-OLR regions such as Eastern and Northern provinces.

The increase of maize production in off-OLR regions by small scale farmers was a result of uniform pricing and monopoly marketing arrangements. The OLR surplus regions of Southern and Central provinces, with a market share of 86 percent in 1974-1976, lost a part of the market to surplus off-OLR (Eastern and Northern) regions. By 1983-1985, the OLR regions had only 53 percent of the market (See Table 7.1). Pan-territorial and pan-seasonal pricing policy was introduced in the early 1970s, in order to draw into the market, farmers who may not have been reached by the "free" market system. In addition, to reach the targeted farmers, the government vigorously promoted cooperatives between 1965 and 1970.

For the uniform pricing system to work, accompanying institutional arrangements were needed. Publicly owned monopoly organizations were, therefore, necessary and were in charge of maize marketing until 1991, when private participation restrictions were lifted. The institutional arrangements brought about inefficiency in production and marketing of maize, and the government had to heavily

subsidize the maize marketing system in order to provide the urban areas with low-cost food. This was not only a drain on government funds, but also contributed significantly to high rates of inflation (consequently the real per capita GDP dropped from 207 kwacha in 1983 to 148 kwacha in 1989).

Under the fixed-price system, producer prices were set below border prices, thus implicitly taxing farmers. Consumers, on the other hand, benefitted from low final product prices brought about by subsidy programs and below-border prices. Pan-seasonal pricing and legal restrictions discouraged on-farm storage and rural processing of maize.

The change in production patterns necessitated the need for major interprovincial maize movements, thus increasing the cost of transfers. The government budgetary shares of the subsidies became uncontrollable, especially since final product prices had to be maintained at low levels. For example, in 1988, the subsidy as a percentage of the retail final product price was 118 percent and in 1990, the maize related subsidies were 120 percent of the government budget deficit. A large percentage of the subsidy went towards market coordination mechanisms, mostly by running inefficiently operated NAMBoard and/or cooperative organizations.

With increased subsidy levels the government was aware that its equity goal was in fact resulting in inequities, favoring the urban consumers. The terms of trade between the urban and rural areas worsened against the rural population, some of whom consequently migrated to the urban centers. The goal of increasing food production, increasing rural incomes, decreasing unemployment and containing rural-

urban migration could not be attained through the existing system. Consumer subsidies were draining government funds that could go to essential investments such as schools, infrastructure, research and extension. The government, therefore, was left with little choice but to seek other market system alternatives.

By 1980, having determined that the controlled market system was not sustainable and because of a push from international funding agencies (WB and IMF), the government began to liberalize the economy including the maize market. The liberalized economic system is expected to introduce an element of market competition, which is expected to attract private traders in pursuit of profits. Competition and the pursuit of profits are expected to bring about a more efficient market coordination arrangement by the elimination of inefficient firms.

If the government plays its role of facilitating competition, providing better infrastructure, market information, legal support and in special cases guaranteeing credit, the liberalized market could be expected to improve the economic performance. In Zambia, the liberalized market is expected to change the maize crop production patterns, with the OLR picking up more maize production, since prices will reflect transfer costs. The remote areas are expected to reduce their marketed maize shares and concentrate more on other suitable food and cash crop production and other agricultural activities.

The privatization process, an essential component of market liberalization, is expected to develop slowly since private traders have to build confidence in government policies prior to committing their investments. Private traders tend to specialize in market functions which could not only improve efficiency but increase

employment opportunities through forward and backward linkages. This could contribute to reduced rural-urban migration. Before privatization matures, however, cooperative societies may be needed to fill the gap left by government monopolies in maize marketing.

The cooperative system has been involved in maize marketing from as early as 1914. In 1964, when the new government took over, the cooperative system was promoted vigorously. Unfortunately, the performance of the cooperative system has not been any better than the publicly owned monopolies like NAMBoard. Reasons for the poor performance ranged from members attitudes to the institutional arrangements and government direct control. Under the liberalized market system, cooperatives and cooperative societies in particular are expected to operate autonomously and under economic and financial viability requirements.

The study of the cooperative societies indicated that the societies were well scattered around the country, with easy access to the small scale farmers. The societies were, however, poorly organized, with apathy shown by the general membership. Apathy resulted in mismanagement, nepotism, tribalism and mis-appropriation of funds by management. One of the reasons for the poor conduct was that the management and the board of directors were answerable to the upper-tier provincial unions and not to their members. The PCUs could not monitor societies' activities closely, and auditing of financial records could be as much as four years behind schedule. This allowed management and board to have no supervision and hence no market discipline.

Major economic activities of primary cooperative societies in the survey areas included maize assembling, input distribution, milling and retailing of consumer goods. The maize enterprise was found to be profitable, but could have done better under the "free" market system. The maize assembling activity contributed 5.8 percent to gross revenue of the sampled 43 societies. This activity is expected to expand under the liberalized market. Concerning the PCS's role as an agent in input and credit distribution, not much could be determined due to lack of data. The other major economic activity was that of milling. The enterprise was found to be economically viable but barely so. The main reason for the undesirable performance was the unfavorable standard operating procedures which involved the provincial marketing unions as participants in the decision making process. The decision making process was unnecessarily prolonged, just as in the case of the retailing enterprise. The consumer shop, however, provided the largest percentage of revenues, contributing 55.8 percent to gross revenues. However, as operated the consumer shops were not contributing to profits. The enterprise was therefore important in the firm's effort to realize economies of scale.

The PCSs as a whole business firm tended to have high overhead costs and were poorly operated. Financial statements and ratios averaged over the survey showed that the firms, in 1990, were barely solvent and in serious liquidity positions. A net worth of 225,837 kwacha, indicated a liquid, but small-scale business enterprise. Financial ratios (Table 6.10) were low and indicated that the societies could not easily cover their liabilities, that their asset management performance was poor and that the firms were under-capitalized.

Even though the sampled PCSs showed poor financial, economic and administrative performance, they have some experience in maize marketing over the private traders and may hold an advantage in this respect. In the short run, cooperative societies may need to conduct many market functions. In order for them to do so, investments will be required and the government may consider loan guarantees to potential staple food marketing cooperatives and private participants. The cooperative societies may face competition from commercial farmers, (private trader groups) who have the assets and ability to engage in the assembling enterprise and will likely do so if it is profitable. This will provide a competitive environment for the societies, calling for a change in working norms.

The study concluded that milling and consumer shop enterprises will remain important for stabilizing the societies' financial positions. The cooperative societies will, however, be important to their communities in carrying out necessary functions such as maize assembling, input supply, credit distribution, maintenance of standards and grades, market information and rural transportation. The chances of cooperative societies being involved in interprovincial maize transportation appeared to be extremely low, according to the study. The smallness of the society business and the large volume investments required in road transportation point to this conclusion.

Transportation costs remain the most costly component of maize marketing and will likely continue to be as long as maize production patterns remain unchanged. In order to gain insights into the problems of transportation in maize marketing, a study was conducted using 1990/91 market season parameters. A provincial transportation network problem was developed and linear programming

model was applied. The network included constraints of supply, storage, milling and demand capacities, with the objective of minimizing transportation costs of maize in the country (storage and milling costs were added but assumed uniform across regions).

The optimal solution suggested that the minimum cost for marketing maize in the 1990/91 marketing season given the location of production and demand was 21,056 million kwacha. A value nearly half that of 1991 government expenditure budget plan. Considering that the government was conducting nearly all the market functions up to retail, this could not have been undertaken and in reality, short falls and food aid became part of the market system. Major savings could have been made by adopting optimal maize flows. In the optimal solution of maize flows Central, Eastern, and Southern provinces supplied the major consumption areas of Lusaka and Copperbelt. Eastern province imported maize meal from Southern province due to its milling limitations, and Lusaka imported maize from the rest of the world.

Shadow prices generated for non-optimal routes showed that Western and North Western provinces were costly regions to supply maize to. In case of surplus regions, Eastern and Northern provinces were unfavorable sources of maize to major consumption areas, and Central and Southern provinces were the best placed to supply the urban areas.

According to the results of the transportation study, the off-OLR deficit provinces (Western and North Western provinces) could have produced their maize requirement within their regions. This was indicated by the high production shadow

prices generated of 3,148 and 3,080 kwacha for Western and North Western provinces, respectively (See Tables 8.10 and 8.11). The OLR deficit regions (Lusaka and Copperbelt) had lower opportunity cost for not producing locally compared to the off-OLR deficit regions. Lusaka had a dual price of 2,497 and Copperbelt had 2,858 kwacha per extra bag of production. Production within the major consumption regions had a lower opportunity cost than those far from consumption areas since they had nearby low cost supply sources.

Surplus OLR regions such as Central (with a dual price of 2,571 ZK) and Southern (2,153 ZK) provinces could still increase their maize supply and reduce marketing costs (transport costs) to the market system much more than the off-OLR surplus regions of Eastern (with a dual price of 1,874 ZK) and Northern (2,097 ZK). Increased maize production in the off-OLR would not have made significant savings to the market system. Luapula and Eastern provinces needed to increase their processing capacities in order to meet demand for maize meal from within their respective provinces. The results of the study suggested that Southern, Central, Lusaka and Copperbelt regions had an absolute advantage in maize supply. Eastern and Northern as surplus regions had an absolute disadvantage in maize supply. Deficit provinces of North Western and Western provinces were the costliest places to supply maize or maize meal to.

The findings of the study reiterated what similar studies concluded but showed in addition the magnitude of the marketing costs involved if maize were to keep moving according to the 1990/91 marketing season production and consumption patterns.

The low population density and dispersed rural settlement patterns, the high proportion of population that resides in urban areas, high unemployment rates, high costs of transportation, underdeveloped information, credit, and infrastructure systems and lack of confidence in government policies all contributed to the high costs of marketing maize and currently provide a formidable marketing challenge to the policy planners.

9.2 Policy Implications

The first tentative step toward an efficient maize market system was undertaken by the government in 1980. The effort to liberalize the economy and specifically the maize market, was an important first step towards achieving the goal of reduced marketing costs. The first effort attempted to decontrol prices, but a total lifting of price controls was threatened by potential urban food riots. This made it necessary to maintain some level of subsidies and targeted subsidies were provided to the urban vulnerable groups. The above problem illustrates the difficult task of reforms and problems likely to be encountered in the liberalization program.

Consequences of rules and regulations can be anticipated or unanticipated, desirable or undesirable. The challenge for policy makers in Zambia will be to make clearly defined, stable and consistent policies and not waver to different pressures that may be applied by those who may find the new rules and regulations undesirable. As the economic system changes, efforts should be directed to modifying the new situation rather than the abandoning the entire program as

happened in the past. This will be an important aspect for the success of the liberalization program.

As stated in the policy review section, the liberalization of the maize market alone is unlikely to provide an efficient market and the government will need to facilitate the privatization process of the market by providing information, developing the legal support system, and improving infrastructure for domestic and international trade. In the short run, as privatization takes place, utilization of existing institutions to conduct market functions, will be necessary. In the Zambia maize market, the cooperative system is one market coordination alternative already in place. The primary cooperative societies in particular will have to fill the vacuum left by the public monopoly marketing boards that were dissolved.

Even though cooperatives may be criticized for being less efficient than other organizational forms in Zambia, the cooperatives did not have a chance to operate independently and this may change. With good incentives, cooperatives may change their working norms and compete well with private traders. Once controls and movement restrictions are removed and private participation is significant, the cooperatives could provide an opportunity to many farmers to exercise location market power. This could be important in Zambia as maize production is done by a large number of dispersed farmers who act as price takers. Consequently, cooperatives could have an overall favorable impact on the economy thus justifying favorable policies as well as use of public resources to promote them in addition to promoting private trading.

Cooperatives will likely engage in the assembling of maize and this could be a major activity for the rural organizations. Maize is a bulky commodity and thus costly to transport. Rural transportation of the commodity will likely to be conducted by farmers using ox-carts and the PCSs. Interprovincial transportation, on the other hand, might become a preserve of the private sector. The transport industry is characterized by increasing returns to scale and a large volume capital investment is required before production can commence at any level. At least the business needs to be large enough to employ a whole truck. A truck is a large investment under the Zambian standards. Once this capital investment has been made, additional increments of output can be achieved at low cost. Because of such requirement the privatization of the maize market industry is expected to have a long gestation period since in the past publicly owned or supported organizations dominated the industry.

To speed up the process, the government may have to provide incentives to attract private investments, such as tax exemptions on utility vehicles and developing guidelines for transportation rates, for example. Guidelines are important in order to prevent conflicts among participants. This is also true for any orderly market system.

In the long-run, as maize production and consumption patterns change and transportation costs reduced, the government's role in the market may include some supply and price stabilization programs. The government will need to be buyer of last resort if the goal of stabilizing rural incomes is to be maintained. There will be need to maintain maize stocks if prices will be kept low to the urban consumers. The stocks could be used in emergencies arising out of lowered production. Stocks

could be used to control maize prices by purchasing excess supply in order to protect producer prices. In order to protect consumers when there is excess demand, stocks could be released to lower final product prices. All such programs can work only when market forces determine the price, as would be the case in a less regulated market economy. The issue, therefore, to policy makers in Zambia is whether and how to implement and maintain the reforms program in view of the unanticipated problems which will arise and the political importance of food supplies and prices.

9.3 Further Research Recommendation

In future food policy research, the challenge lies in designing inquires that can inform policy about the on-going market reforms so that policies can be made based on more than just theory and ideology. There are many areas which require empirical data, but this study identifies three areas that need attention.

Major areas for further research include the credit system, milling and the maize transportation industries. Financing of marketing organizations such as the primary cooperative societies and the transportation industry will be crucial to the performance of the maize sub-sector. Economic variables such as price effects on maize purchase, should be studied in the future. Issues of availability of funds and lending regulations have to be investigated. Milling and locations and large industrial and rural mills should be determined and information supplied to potential investors. The capacity and cost of rural mills will be important to the satisfaction of rural and urban demand as privatization continues. This area of study could provide a area of cost minimization for maize meal.

Under the transportation studies, the major issue would be how to promote rural and interprovincial maize transportation focusing on infrastructure, regional production, storage, and milling cost, packaging, product form and inter-temporal issues. Adding more origin and destination points to the optimizing analysis, would improve the results. Adding production costs would reflect comparative advantage as opposed to absolute advantage. Answers are required on how to reduce transportation costs over the adjustment period from current production and consumption patterns to patterns expected to be quite different. Investments in the transportation industry is also closely tied to credit facilities and the two areas, therefore, will be crucial to an improved maize market performance. A better maize sub-sector performance can help the whole economy grow and with it the standard of living of the majority of people in Zambia.

BIBLIOGRAPHY

BIBLIOGRAPHY

Alreck, P. L., and Settle, R. B. (1985), The Survey Research Handbook. Irwin, Illinois.

Anderson, D. R., Sweeney, D. J., and Williams, T. A., (1988), An Introduction to Management Science: Quantitative Approaches to Decision Making, West Publishing Company, New York.

Ballou, H., Ronald (1992), Business Logistics Management, third edition, Prentice Hall, Inc. Englewood, New Jersey.

Banda, Jeremiah (1989), "Value of Children, Well-being and Family Size in Zambia," a Ph.D dissertation, Department of Population Planning, University of Michigan, Ann Arbor.

Bhattacharyya, G. E., and Johnson, R. A., (1977), Statistical Concepts and Methods, John Wiley and Sons, New York.

Carter, Stephen (1990), "Maize Marketing," FAO, Network and Centre for Agricultural Marketing and Training in Eastern and Southern Africa.

Casley, D. J. and Lury, D. A., (1989), Data Collection in Developing Countries, 3rd edition, Clarendon Press, Oxford.

Central Statistics Office (1984), Country Profile: Zambia 1984

_____**(1990a),** National Accounts Statistics Bulletin, No.3, January, GRZ.

_____**(1990b),** Monthly Digest of Statistics, January-August.

_____**(1990c),** Country Profile: Zambia 1989/1990, GRZ.

_____**(1990d),** 1990 Census of Population, Housing and Agriculture: Preliminary Report, GRZ.

_____**(1991a),** Monthly Digest of Statistics, February/March, GRZ.

_____(1991b), Consumer Price Statistics-November 1990, February, 1991.

_____(1992), Food Security Bulletin, October 1992, Issue No. 9, GRZ.

Chabala Charles, (1991a), "An Analysis of the Effects of Government Regulated Marketing and Input Supply Policies on Marketing Institution's Ability to Service Agricultural Producers. And Proposals for Institutional Improvement and Support in a De-regulated Marketing System," ZCF, Lusaka.

_____(1991b), "Review of Recent Economic Policy Changes and Its Effects on the Role of Cooperatives in Agricultural Marketing," Occasional paper, ZCF.

Christiansen, Robert and Stackhouse, Lee-ann (1989), "The Privatization of Agricultural Trading in Malawi" in World Development Journal, Vol. 17, No.5 p.729-740.

Condon, A. M., (1987), "The Methodology and Requirements of a Theory of Modern Cooperative Enterprise" in Cooperative Theory: New Approaches, ed. Royer, J.R., USDA.

Food and Agricultural Organization (1990), Maize Marketing, editor Carter Stephen, Network and Centre for Agricultural Marketing Training in Eastern and Southern Africa.

_____(1991), " Zambia: Comprehensive Agricultural Development and Food Security Programs," TCP/ZAM, GCPS/ZAM.

Frank, Dean (1989), "An Economic Analysis of Small-Holder and Large-Scale Mechanized Wheat Production in Northern Tanzania," A M.Sc. dissertation, Department of Agricultural Economics and Farm Management, University of Manitoba.

Goetz, S. and Weber, M. T. (1986), "Fundamentals of Price Analysis in Developing Countries' Food System: A Training Manual to Accompany the Microcomputer Software Program "MSTAT"," International Development Working Paper #29, M.S.U., E. Lansing.

Greiner, T., Antonsson-Ogle, B., Kaunda, J., and Kazilimani, B., (1988), "An Assessment of the Nutrition Sector in Zambia and the Role of the National Food and Nutrition Commission November-December, GRZ, NCDP.

G.R.Z. (1989), Agricultural and Pastoral Production: Commercial Farms, 1978-1989, MAWD.

_____**(1990a)**, "Evaluation of the Performance of Zambia's Maize Sub-sector," Ministry of Agriculture and Water Development.

_____**(1990b)**, "Policy Action Plan for the Maize Sub-sector," USAID.

_____**(1990c)**, Official Crop Production and Sales Data, MAWD, Early Warning Unit.

_____**(1990d)**, Special Report of the Auditor General on the Zambia Co-operative Federation Ltd. and Provincial Co-operative Unions presented to the National Assembly, Government Printers, Lusaka.

_____**(1991a)**, Quarterly Food Security Bulletin: April-June, MAWD, Early Warning Unit.

_____**(1991b)**, "An Evaluation of the Agricultural Credit System in Zambia: Preliminary Report," Agricultural Credit Study Team.

_____**(1965)**, National Cooperative Development Plan, Ministry of Rural Development, Cooperative Department.

_____National Development Plans: First National Development Plan, 1964-1969; Second National Development Plan, 1970-1975; Third National Development Plan, 1979-1983; Fourth National Development Plan, 1989-1983.

Gsanger, Hans (1987), "Agricultural Policies as a Source of Increasing Food Insecurity in Sub-Saharan Africa" in Economics, a biannual collections of recent German contributions to the field of economic science, Vol. 35 edited by Institute for Scientific Co-operation, Tubingen, p. 42-66.

Harrison, K., Henley, D., Riley, H., and Shaffer, J., (1987), "Improving Food Marketing Systems in Developing Countries: Experiences from Latin America," International Development Working Paper #9, M.S.U., E. Lansing.

Harsh, B. S., Connors, J. L., and Schwab, D. G. (1981), Managing the Farm Business, Prentice-Hall, Inc., New Jersey.

Haveman, R. H., and Knopf, Kenyon (1966), The Market System, Introduction to Economics Series, John Wiley and Sons, New York.

Hazell, P. B. R. and Gordon, R. D., (1986), Mathematical Programming for Economic Analysis in Agriculture, MacMillan Publishing Company, New York

Heads, John (1978), "Transportation Subsidies: An Overview," The Logistics and Transportation Review, Volume 14, Number 4, p. 379-389.

Hirschman, O. A., (1981), Exit, Voice, and Loyalty: Responses to Decline in Firms, Organizations and States, Harvard University Press.

Holtzman, J. S. (1986), "Rapid Reconnaissance Guidelines for Agricultural Marketing and Food System Research in Developing Countries," International Development Working Paper #30, M.S.U., E. Lansing.

Hopcraft, Peter (1987), "Grain Marketing Policies and Institutions in Africa" in Finance and Development, March 1987.

Horne, Van, C. J., Dipchand, R. C., Hanrahan, R. J. (1985), Fundamentals of Financial Management: Canadian 5th edition, Prentice-Hall, Canada, Inc. Ontario.

Jansen, Doris (Dodge) (1977), Agricultural Policy and Performance in Zambia, Institute of International Studies, Berkeley University, California.

_____**(1988),** Trade, Exchange Rate and Agricultural Pricing Policies in Zambia: The Political Economy of Agricultural Pricing Policy, World Bank Comparative Studies, World Bank Washington, D.C.

_____ **(1990),** 'Agricultural Pricing Policy' in The Dynamics of Agricultural Policy and Reform in Zambia, eds. A. Wood, S. Kean, J. Milimo and D. Warren, Iowa State Press, Ames.

Johnson, Glenn, L. (1986), Research Methodology for Economists: Philosophy and Practice, New York, MacMillan.

Johnson, H. G. (1978), "The Market Mechanism as an Instrument of Development," in Leading Issues in Economic Development, ed G. M. Meier, Oxford University Press, New York.

Kaluwa, B. and Chilowa Wycliffe (1990), "Malawi: Food Marketing Liberalization and Household Food Security--Preliminary Results from Baseline Surveys," in Market Reforms, Research Policies and SADCC Food Security, edited by M. Rukuni and J. B. Wycoff, UZ/MSU, Harare, Zimbabwe.

Katongo, Katongo (1991), "Agricultural Policies in Zambia, 1975-85," in Adopting Improved Farm Technology: A Study of Smallholder Farmers in Eastern Province, Editors R. Celis, J. T. Milimo, and S. Wanmali, RDSB, NFNC, GRZ, and IFPRI, Washington D.C.

Kay, D.R. (1986), Farm Management, Planning, Control, and Implementation, 3rd edition, McGraw-Hill Book Company, New York.

Kmenta, Jan (1986), Elements of Econometrics, MacMillan Publishing Company, New York.

Kydd, Jonathan, (1988), "Zambia" in Agricultural Pricing Policy in Africa: Four Case Studies, Eds. Harvey Charles, IDS, University of Sussex.

Lombard, S. C., (1971), The Growth of Co-operatives in Zambia, 1914-1971, UNZA/IAS, Zambian Papers, No. 6.

Luba Consultancy and Development Ltd. (1990), Evaluation of the Cooperative Saving Scheme

Lungu, Gatian (1976), Administrative Decentralization in the Zambian Bureaucracy: An Analysis of Environmental Constraints, UNZA/IAS, Zambian Paper No.18.

Marion, Bruce and Handy, Charles (1973), Market Performance: Concepts and Measures, U.S. Government Printing Office, Washington, D.C.

Marion, W. Bruce, Mueller, F. Willard, Cotterill, W. Ronald, Geithman, E. Frederick, and Schmelzer, R. John (1979), "The Price and Profit Performance of Leading Food Chains," in AJAE, p. 420-433.

Marion, W. Bruce (1985), (editor) The Organization and Performance of the U.S. Food System, Madison, Wisconsin: NC-117

Malambo, L. M., (1987), "Rural Food Security in Zambia," a Ph.D Dissertation, Michigan State University, Dept. of Resource Development, E. Lansing, Michigan.

Marter, Alan (1978), "Cassava or Maize: A Comparative Study of the Economics of Production and Marketing Potential of Cassava and Maize in Zambia," UNZA/RDSB.

McKenzie J. and Chenoweth, F. (1991), "Zambia's Maize Policies: Consequences and Needed Reforms" a paper presented at the SADCC member countries food security conference, Victoria Falls, Zimbabwe.

Milimo, J. T., Mwila, C., Mwape, B., and Chimbwayinga, B. J. (1989), "Feasibility Study on the Formation of District Cooperative Unions (DCUs). UNZA, RDSB.

Msiska, A. (1991), 'A Study of the Problems of Marketing Agencies Due to Over-regulation of Fertilizer Marketing and Suggested Options in a Liberalized Marketing System"

Mulwanda, P. D. (1991), "Maize Transportation in Zambia: A Cost Minimization Approach," A paper submitted as partial fulfillment of requirements for Bachelor of Science degree, UNZA.

Mumeka, Lundondo (1991), "Policy Constraints on the Development of Agriculture and Small Scale Enterprises in Rural Zambia," in Adopting Improved Farm Technology: A Study of Smallholder Farmers in Eastern Province, Zambia, editors R. Celis, J. T. Milimo, and S. Wanmali, RDSB, NFNC, GRZ and IFPRI, Washington, D.C.

Muntanga, C.M. (1984), "An Evaluation of the Uniform Pricing System for Maize in Zambia," M.S. thesis, University of Manitoba.

Muyatwa, Pumulo (1989), "Agriculture Policy Reforms: Their Impact on Food Security in Zambia," a paper in partial fulfillment of the requirements of Agricultural Development Course 61.731, University of Manitoba.

Mwaba, A., (1984), "National Preparedness for Acute Food Shortages and Experiences in Tackling Food Emergencies," Addis Ababa.

Mwanaumo, Anthony (1987), "An Evaluation of the Marketing System for Maize in Zambia," a M.S. thesis, Purdue University.

Mwiinga, Jowie (1992), "State Decontrols Maize Price: Farmers to Get Fertilizer Bonus," in Weekly Post 24-30.

Mwila, C., (1989), "A Review of Experiences with Cooperatives in Zambia," UNZA, RDSB, a paper prepared for Community Forestry Strategy.

Nadeau, E. G., (undated), "A Comparison of Two Farmers Cooperative Unions in Northern Zambia: Problems of Productivity, Management and the Role of Members in Decision-Making," A preliminary report.

Nathan Robert Associates (1987), "Zambian Agricultural Sector Policy Impact Assessment," a report submitted to Bureau for Africa, Office of Development Planning, U.S.A.I.D.

N.C.U. (undated), "By-Laws"

Ndalamei, Likolo (1989), "Pricing Policy of Agricultural Produce in Zambia," Working Paper, SUAS, IRDC, Uppsala.

Ndoye, Ousseynou (1990), "Responses to Market Liberalization in Senegal: Empirical Evidence and Policy Implications," A Research Proposal for Ph.D. dissertation, Department of Agricultural Economics, M.S.U.

PIC (1990), "Liberalization of Maize Marketing and the Source of Maize Used by Lusaka Millers," GRZ, Lusaka.

Pervis, Dennis, W., (1986), Road Transportation Model for the Management of Maize Distribution: Zambia, the ZAMTRAN Model, Report No. 23, GRZ/MAWD/Planning Division.

Prager, Jonus (1992), "Is Privatization a Panacea for LDCs? Market Failure Versus Public Sector Failure," in The Journal of Developing Areas, 26, April, 1992, p. 301-322.

Quick, S. A., (1978), Humanism or Technocracy? Zambia's Farming Cooperatives 1965-1972, UNZA/IAS, Zambian Working Paper, No. 12.

Rhodes, J. V. (1987), "Cooperatives and Contestable/Sustainable Markets," in Cooperative Theory: New Approaches, ed. J. S. Royer, USDA.

_____**(1983)**, "The Large Agricultural Cooperative as a Competitor," in AJAE, Volume 65, No. 5, December, 1983.

_____**(1987)**, The Agricultural Marketing System, John Wiley and Sons, New York.

Rohrback, D., Maleka, P. and Litschauer, J. (forthcoming, 1992), "Rural Trade and Processing of Traditional Crops in Zambia".

Samuelson, A., Paul (1952), "Spatial Price Equilibrium and Linear Programming," The American Economic Review, Vol. XLII, No. 1, March, 1952, p. 283-303.

Schrage, Linus (1991), LINDO, Users Manual Release 5.0, Manual and Software, The Scientific Press.

Seeley, Janet (1988), "Poverty in Lusaka."

Sexton, Richard, J., (1990), "Imperfect Competition in Agricultural Markets and the Role of Cooperatives: A Spatial Analysis," AJAE, Volume 72, Number 3, p. 710-719.

Shaffer, J. D. (1969), "On Institutional Obsolescence and Innovation--Background for Professional Dialogue on Public Policy," in AJAE, Vol. 51, No. 2, May.

_____**(1980)**, "Food Organization and Performance: Toward a Conceptual Framework," in AJAE, May.

_____(1987), "Thinking About Farmers' Cooperatives, Contracts and Economic Coordination," in Cooperative Theory: New Approach, editor J. S. Royer, USDA.

Shawa, J. J., (1991), "Impact of Marketing and Input Supply Policies on Government," MAWD/Planning Division.

Shula, E. C. W. (1979), "Cooperatives and Rural Development Policies in Zambia: A Diagnosis and Evaluation," an M.A. thesis, The Hague, Institute of Social Studies.

Sipula, Kapola, F. (1985), "A Fertilizer Price Policy in Zambia," an M.S. dissertation, Dept. of Economics, Iowa State University.

_____(1986), " Social Economic Study of Lupili Main and Kapanda Primary Societies, NCU," RDSB/UNZA.

_____(1987), "Policy Issues for Food Security in Zambia," in Food Security Issues in Southern Africa, edited by K. Prah, Maseru, Lesotho.

_____(1988), "Impacts of Policy Intervention on Food Security in Zambia," a paper presented at the Seminar "Policy Issues in Food Security in Zambia," Lusaka.

_____**Milimo, J. T., Mendamenda, D., and Mwila, C., (1989),** "Agricultural Policy and Its Impact on Food Security: The Zambian Case," in Household and National Food Security in Southern Africa, edited by G. Mudimu, and R. Bernstein, UZ/MSU, Harare, Zimbabwe.

_____**and Maleka, Phiri (1991),** "Implications of Current Policies and Practices on Household Food Security in Zambia," a paper Presented at SADCC Member Countries Food Security Conference," Victoria Falls, Zimbabwe.

Siyandwa, Monde (1985), "An Analysis of Input Supply With Special Reference on the Purchase and Usage of Agrochemicals in Chisamba Area," a paper as partial fulfillment for Bachelor of Agricultural Science, Department of Agricultural Economics and Extension Education, UNZA.

Soderbaum, P.(1990), "Neoclassical and Institutional Approaches to Agriculture, Environment and Development," in Agricultural Restructuring in Southern Africa, edited by Csaba Csaki, Theodore Davis, Diethelm Metzger and Johan van Zyl, IAAE/AGRICONA, Swakopmud, Namibia.

Staatz, J. M. (1987), "The Structural Characteristics of Farmer Cooperatives and Their Behavioral Consequences," in Cooperative Theory: New Approaches, ed., J. S. Royer, USDA.

Staatz, J. M., Dione J., and Dembele, Nango (1988), Cereals Market Liberalization in Mali, Dept. of Agricultural Economics, M.S.U., E. Lansing.

Tefft, J. F., Weber, M., and Staatz, J. M. (1990), "Research Methods in the MSU Food Security in Africa Project: Conceptualizing and Implementing Policy Relevant Studies," International Working Papers, No. 38, Dept. of Ag. Economics, M.S.U., E. Lansing, MI.

Temba, J., Phiri, E., and Nkoloma, G. (1991), "Economics of the Hammermill Operation in Northern and Eastern Provinces of Zambia," AMAG/ZAMS.

Timmer, C. P., Walter, P. F., and Scott, R. P., (1983), Food Policy Analysis, Baltimore, The John Hopkins University Press.

Tomek, W., and Robinson, K., (1985), Agricultural Product Prices, Cornell University Press

United Nations Development Programme (1986), "Restructuring and Development in Zambia: Roles for Technical Cooperation," a report of the National Technical Cooperation Assessment and Programming Mission to Zambia, New York.

United States of America Government (1992), World Fact Book, 1992, C.I.A., Washington, D.C.

Vergroesen, A. G., (1989), "Agricultural Marketing Cooperatives, Rural Development and Food System Development in Two South East Asian Countries," a Plan B dissertation as partial fulfillment of the requirements for M.S. degree, Dept. of Agricultural Economics, M.S.U., E. Lansing.

Warrack, A. A. (1972), "A Conceptual Framework for Analysis of Market Efficiency," in CJAE, p. 9-21.

White, K. J., Wong, S. D., Whisler, D. and Haun, S.A. (1990), Shazam: Econometrics Computer Program, Users Reference Manual, Version 6.2, Mcgraw Hill Book Company, New York.

Widstrand, G. C., (1970), Cooperatives and Rural Development in East Africa, The Scandinavian Institute of African Studies, Uppsala.

Wood, A. P., (1983), "Primary Cooperative Society Development in Western Province: Progress and Potential in Six Communities," UNZA/RDSB, Lusaka.

_____(1990), "Agricultural Policy Since Independence," in The Dynamics of Agricultural Policy and Reform in Zambia, eds. A. Wood, S. Kean, J. T. Milimo, M. Warren, Iowa State University, Press/Ames.

Wood, G. P., and Shaffer, J. D. (1971), "Institutional Performance in Agricultural Development," a paper presented at the Agricultural Administration Workshop.

World Bank (1992), "Zambia Agricultural Sector Strategy: Issues and Options," Washington, D.C.

World Bank (1990), "Agricultural Marketing: The World Bank's Experience 1974-85, A World Bank Operations Evaluation Study," Operations Evaluation Dept, World Bank, Washington D.C.

_____(1986), Zambia: Country Economic Memorandum, Economic Reforms and Development Prospects Country Programs Department, Eastern and Southern Africa Region.

Yao, Xianbin (1990), "Market and Farm Household Level Impacts of Grain Marketing Reforms in China: A Case Study in Xinxiang, Henan Province," a Ph.D dissertation, Dept. of Agricultural Economics, M.S.U., E. Lansing.

Young, Roger (1988), "Zambia: Adjusting to Poverty," the North-South Institute, Ottawa.

ZCF. (1982), "Second Long-Term Cooperative Development Plan, 1983-1987," Lusaka.

___(1991), "ZCF and the Cooperative Movement in Zambia: Policies and Operations of the Zambia Cooperative Federation Limited 1990-1994," ZCF, Lusaka.