WORKING PAPER 22

MARKET PROSPECTS FOR UPLAND CROPS IN THE PHILIPPINES

Josefina M. Lantican

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The CGPRT Centre

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Foreword

To answer the growing regional concern for the market prospects of upland crop products (UCPs), the CGPRT Centre has been implementing a research project "Market Prospect of Upland Crop Products and Policy Analysis in Selected Asian Countries (MPUPA)" since November 1994, in collaboration with partners from seven countries: China, India, Indonesia, Pakistan, Philippines, Thailand and Vietnam. In all these countries, important issues regarding UCP market prospects, such as domestic demand, marketing system and future potential, were investigated with an identical research framework by national experts.

Market Prospects for Upland Crops in the Philippines is the third volume of the series of country studies. The investigation covers the major upland crops: maize, soybean, cassava and rice, as well as various kinds of fruit and vegetables. I believe that readers of the study can obtain broad and practical knowledge for improving the market of UCPs in Thailand; moreover, the information will be also useful for researchers and policy planners in other countries in the region.

I thank Ms Josephina M. Lantican of the Philippines for her intensive research and the Bureau of Agricultural Research, Department of Agriculture, for allowing her to work with us and for providing continuous support. Dr Boonjit Titapiwatanakun has ably coordinated the various complex steps in the study. I would also like to express appreciation to the Japanese government for funding the project.

Haruo Inagaki
Director
CGPRT Centre

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Quezon City, Philippines
December 15, 1995

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Executive Summary

Agriculture plays a major role in the Philippine economy. Together with fisheries and forestry, it contributes one-third of the country's gross domestic product and employs one-half of the labour force. To propel agricultural development, the programs in agriculture are geared towards increasing productivity and farm income. These are focused on rice and maize, high value crops, livestock, and fisheries.

This study presents information on domestic demand, market potential of selected upland crop products (UCPs) and recommendations for improvement in marketing efficiency. Covered in this study are major UCPs (maize, soybean, cassava, and banana), fruits (mango, papaya, soursop and passion fruit), processed fruits (banana chips and mango products), yam, cut flowers, and fresh young coconuts.

Regarding food consumption, food and nutrient intake was below the recommended dietary adequacy (RDA). Increases in intake of the majority of the food groups were noted in 1982 compared to the 1978 level, however food consumption fell in 1987 and again further in 1993. The food consumption pattern in the Philippines is affected by economic and social factors. Aside from low per capita income, the decrease in food consumption is attributed to the abnormal economic activity arising from political instability which started in 1983. Food supply, then, registered a decreasing trend from 1983 which persisted until 1987, contributing to low food consumption. From then on, food supply increased, then dropped in 1991, but recovered in 1992. Per capita consumption dropped further in 1993.

Maize is the country's second most important crop, next to rice, posting an average production of 4.7 million metric tons per year (for the 1989-1993 period). This amount accounts for 96% of the domestic requirement, necessitating the importation of an additional amount of this commodity to meet the total demand. The state-owned National Food Authority (NFA) participates in maize trading to a certain extent by buying 10-11% of the total production to prop up prices paid to farmers and to ensure low prices to consumers. Maize is mainly used in livestock and poultry feed formulation, but about one-fourth of the total maize production is used as staple food in some parts of the country. Small quantities are used in food manufacture. The demand for maize is expected to reach 5.98 million metric tons by 2000 A.D.

With respect to soybeans, the annual average production of 4,102 metric tons supplies only 8% of the domestic requirement. Soybeans are mainly used in food processing. Aside from soybeans, large volumes of soybean meal are imported for livestock and poultry feed formulation. In 1993, importation of the meal reached 822,663 metric tons valued at US$ 174.63 million. In the same year, 15,500 tons of soybean oil, valued at US$ 9.07 million, were also imported. The projected demand for soybeans and soybean meal is placed, respectively, at 132,520 metric tons and 1.81 million metric tons by the year 2000. Consumption of soybean oil is projected to reach 29,300 tons at the close of the century.

The cassava annual average production of 1.83 million tons is adequate to meet local demand. Seventy-eight percent of the total production is used in starch and glucose manufacture, while 16% is consumed as direct food. Cassava became an important crop in the Philippines in the 1970s with the establishment of additional starch processing plants. Cassava production, however, is not expected to increase significantly in the near future due to limited area for expansion and area competition with other crops. Cassava consumption is expected to grow from 1.91 million metric tons in 1994 to 2.04 million metric tons in 2000 A.D.

Banana is one of the country's most important crops, being one of the top principal exports (including industrial products). Banana exports comprise 31% of the total production, while 27% is directly consumed. A little more than 22% is processed into banana chips, catsup, and other food

products. In 1993, fresh banana exports soared to 1.15 million metric tons raking in US$ 226 million. The major constraint to banana exportation is the area limitation to 26,250 hectares set by the government on export banana growing. This policy aimed to prevent oversupply of banana in the world market, with the intention of keeping the price of the commodity at high levels. Domestic consumption of bananas is projected to grow slightly, from 2.06 million metric tons in 1994 to 5.71 million tons in 2000 A.D.

Some of the country's minor crops have been carving niches in foreign markets in recent years. The three selected crops which show bright potential are cut flowers, yam, and fresh young coconuts. The cut flower industry has good prospects of flourishing due to higher income derived from it, compared to some other crops which had been traditionally grown by farmers, not to mention the country's ideal climate for cut flower growing. The value of cut flower exports grew from US$ 73,079 in 1979 to US$ 611,117 in 1993.

As to yam (ubi), it is primarily used in the Philippines in ice cream flavoring, aside from consumption as a delicacy. The exportation of yam products was initiated in 1990 with the development of improved processing technology. In 1993, ubi exports amounted to 145 metric tons, valued at US$ 398,832. Ubi exportation is expanding, based on the number of orders pouring in.

Exportation of fresh young coconuts began in 1991 when Taiwan, together with another nine importing countries, ordered 1.9 million pieces from the Philippine. The coconuts were imported for their water or juice, which was established to have rejuvenating and medicinal properties. The coconuts are harvested prematurely (6 months), enabling growers to cash in on the crop.

Incentives given by the government to producers/exporters in the 1970s propelled the manufacture of non-traditional products for the export market. One of the processed food products which has shown an impressive performance in the export market is banana chips. The value of banana chips exports increased from US$ 1.14 millions in 1978 to US$ 14 million in 1993.

Other products which gained footholds in the international market are processed mangoes (dried, preserved, juice, and puree). Dried and preserved mangoes have been exported since the late 1970s, while juice and puree were initially exported in 1991. The exportation of juice and puree, coinciding with the health-food craze which has been sweeping many countries for more than a decade, was successful owing to promotional activities undertaken by the government and exporters and good product quality.

Soursop (guyabano) juice gained popularity in the local market in the late 1980s. The juice was well accepted by consumers due to their preference for health food drinks over carbonated types. The juice has also been exported since 1991. Guyabano juice and puree exports, then, amounted to 247 metric tons, fetching US$ 226,982.

The Philippines has been exporting mangoes, primarily to the United States and Japan. In 1973, the mango export industry suffered setbacks when the U.S., Japan, and Australia banned the entry of Philippine mangoes into their ports due to traces of fruitfly infestation in the fruits. Japan lifted the ban in 1975, but with the requirement that mangoes be treated with ethyl di-bromide (EDB) and later with vapor heat treatment (VHT). Australia allowed the importation of Philippine mangoes treated with EDB, 13 years later in 1988. The U.S., at present, continues the ban on Philippine mangoes, except those coming from the island province of Guimaras, a fruitfly-free area. The exportation of Guimaras mangoes to the U.S., however, is constrained by high air freight cost. Exportation of fresh mangoes to Europe is not done for the same reason.

Papaya has also been exported, mainly to Japan in the 1970s. Japan banned Philippine papaya from entering its ports in 1978 due to signs of fruitfly infestation. The ban became more stringent with the onset of the papaya ring virus in the major papaya growing provinces in 1981. It was only in May 1994 that the ban on Philippine papayas was lifted by Japan. Like mangoes, export papaya is required to undergo VHT before shipment to foreign markets.

The government, upon seeing the apparent market potential of passion fruit juice in both local and foreign markets, promoted its cultivation on large scale with the aim of increasing farmers'

incomes. The production of passion fruit on a commercial scale fizzled out due to low demand in both domestic and foreign markets. The low demand for passion fruit juice could be explained by the consumers' lack of awareness of the merits of the product.

The success of expanding the export market for upland crop products lies largely on good quality and price competitiveness. In this respect, it is necessary to increase the budget for research and extension with emphasis on increasing productivity and improving product quality. Such research undertakings should focus on crop improvement, control of major pests and diseases, cultural management and better processing techniques. Seed technology and the production of high-yielding varieties of planting materials should, likewise, be given importance.

There is also a need to improve market efficiency by increasing public investment in infrastructure facilities such as farm-to-market roads, storage, bulk handling and port facilities. Similarly, improvement in the market information system is imperative. Too restrictive policies should be eased, especially in the area of levying high tariffs on imported materials used in the production of packaging materials. Monetary and fiscal reforms directed towards bringing down interest rates and stabilizing the foreign exchange rates are essential to cushion the impact of appreciation of the peso. Overvaluing the peso makes Philippine products less competitive in the international market.

1. Introduction

The Philippines is composed of 7,105 islands. The major islands are Luzon, Visayas, and Mindanao (Figure 1.1). The country has a total land area of 30 million hectares, 12.6 million of which are devoted to production of agricultural crops.

Agriculture plays a significant role in the nation's economy. Together with fisheries and forestry, it comprises one-third of the country's gross domestic product and employs one-half of the total labor force. More than three-fifths of the estimated 69 million population live in rural areas.

Three-fourths of the total agricultural area devoted to agricultural crops cultivation are classified as upland. Among the crops, rice, which is the staple food, occupies the greatest area, accounting for 26% or 3.3 million hectares, followed by maize with 3.1 million hectares. Aside from the grains area, more than one-third (37.8%) of the total farm hectarage is planted to major crops, led by coconut which alone covered 3.08 million hectares. The rest (10%) of the agricultural area is devoted to the production of minor crops, composed of fibre crops (excluding abaca), vegetables, legumes, and others.

In terms of volume of production, rice and maize, expectedly, gave the greatest output, amounting to 9.43 million and 4.8 million metric tons, respectively in 1993. The value of these commodities accounted for the biggest share in the total value of agricultural crop production, posting respectively US$ 1.83 billion and US$ 787.2 million in the same year. Coconut followed next registering an output of 11.3 million metric tons, valued at US$ 772.5 million.

Production of agricultural crops grew at an average of 1.5% annually for the period 1984-1993. There were crops, however, which indicated negative growth ranging from 0.10 to 8.8% per year. The biggest reduction in output was reflected by fibercrops (excluding abaca) due to the decrease in the area planted during the last 10 years.

With respect to export performance, the value of agricultural exports grew by 3.5% in 1993 over the previous year, from US$ 1.854 billion to US$ 1.918 billion. Among the agricultural products, the top export earner in 1993 was coconut, registering an f.o.b. value of US$ 606.65 million. This was followed by shrimps and prawns with US$ 227.7 million and by banana with US$ 226 million. Other traditional top ten agricultural exports are tuna, pineapple and pineapple products, sugar, manufactured fertilizer and tobacco. These ten products raked in US$ 1.50 billion for the country during 1993.

1.1 Objectives

The general objective of the study is to determine the market prospects of selected upland crop products (UCPs) in the Philippines and in foreign markets in order to provide practical information on market opportunities and policy directions. The specific objectives are as follows:

- to analyze changes in the domestic demand and external trade of selected UCPs;
- to characterize the market prospect of UCPs to match domestic production with domestic demand;
- to examine possibilities of improving market prospects;
- to provide practical information for future policies; and
- to increase farm incomes.

Figure 1.1 Map of the Philippines.

2. Major Policies Affecting Demand for Main Upland Crops

This section discusses policy measures implemented by the Philippine government to promote, protect or regulate the production, processing, and trading of agricultural commodities with a focus on maize, soybean, cassava, and banana. The discussion centers on policies implemented during the last 15 years. Most of these policies were executed way back during the 1970s and have been continuously enforced even until now. However, some of these have been amended to veer away from a too regulated economy, as in the 1960s to the 1980s, to a more liberalized one in the 1990s.

These policies reflect a mix of strategies indicative of the government's development thrusts, and the manner in which it has responded to the forces in the domestic and world markets during the past two decades. Although past policies appear to have somehow distorted the country's economic growth, they have the merit of intending to bring economic stability during the time they were formulated.

2.1 Maize

Next to rice, maize is an important agricultural commodity. Maize is the second major staple food in the country. Maize use has shifted from a predominantly food item up to the early 1980s to the present use mainly as animal feed. In fact, recent policy studies indicate that the expansion of the country's livestock and poultry industries is linked to improvements in maize production.

Policy instruments to stimulate maize production have been formulated since the 1930s. Together with rice, this is one of the earliest forms of government intervention affecting the maize industry. These policies gave rise to the creation of the National Rice and Maize Corporation, aimed at regulating the trading and farmgate, wholesale and retail prices of this commodity. However, policies on maize, (as on rice) have the same bias in providing stable and low prices for urban consumers instead of ensuring a reasonable price to maize farmers at the same time, as intended.

Among agricultural commodities in the country, rice and maize have been the recipients of various production and marketing programs, resulting in rice and maize being dabbed as "political commodities." These programs, which were implemented in the 1970s, were designed to increase production and influence the output price. In addition, the government executed fiscal, financial and trade policies which were designed to support these production and marketing programs.

Currently, the Philippines Department of Agriculture is implementing a five-year (1993-1998) program for rice and maize, the Grains Production Enhancement Program or GPEP. This program focuses on increased systems, such as farm-to-market roads and post harvest facilities. Likewise, GPEP implements a seed subsidy amounting to one 20 kg bag of certified maize seed per hectare per cropping, a fertilizer subsidy exempting imported fertilizer grades, particularly nitrogenous fertilizers, from payment of full tariff (5%). Other program activities being undertaken are research, training, extension, infrastructure improvement, information dissemination, and policy advocacy.

Compared with the previous programs on maize, GPEP advocates a freer interplay of market forces in determining maize prices. Although the price support policy for maize initiated by

the government during the 1970s continues to remain in effect, this will be resorted to as a last recourse in case of a market/price breakdown which would make maize production unprofitable.

Maize programs in the 1970s and 1980s were centered on increasing production levels. These programs were supported by an array of policy measures designed to protect the local maize industry by lowering the cost of production and providing lower maize prices. Policies intended to lower the cost of production included credit support and stabilized pricing for fertilizer. Credit was made more affordable by subsidizing production loans, providing loan guarantees, and making more funds available for production loans. The desired effect of these terms of credit support was not realized due to the inherent risks in agricultural lending and increased transaction cost. On the other hand, subsidized pricing for fertilizer was meant to protect the local fertilizer industry by restricting the importation to only 5 firms which were then existing, tax-free importation of finished fertilizers and raw materials and providing for cash subsidies or losses incurred by the local fertilizer dealers, particularly Planters Products Inc. Studies indicated that these policies were detrimental to increased maize production due to the increased price of the input by as much as 10% over the world price. In effect, farmers applied less fertilizer, limiting maize productivity.

Since the 1970s, maize trading has been regulated by the National Grains Authority now known as the National Food Authority (NFA). This agency is responsible for implementing the price support and price ceiling policies particularly for rice and maize. While the price support policy continues to remain in effect, the NFA abandoned its price ceiling policy in 1985. Price control, however, remains a last resort option for the government in the event of a food crisis as happened during the 1989 coup d'etat and natural calamities in 1990, when the government was prompted to bring back the price control policy for basic commodities.

Recent developments in domestic and world trade motivated the government to initiate policy measures that would protect the maize industry, albeit temporarily. These include the imposition of an importation ban on maize and a tariff on maize importation whenever it becomes inevitable. Since 1986, the government imposed an importation ban on maize but allowed its importation during periods of low maize harvest as happened in 1987. Under the existing tariff structure, maize imports are taxed at a rate of 20%. Some sectors, however, are advocating an increase in maize tariff to about 125% to protect local producers. Under the General Agreement on Tariffs and Trade (GATT), however the tariff will be phased down until 3% by the year 2004.

The most common non-tariff barriers are quarantine regulations. These are necessary to prevent the entry or spread of pests and diseases which could contaminate the country’s animal and plant stocks. They are required in the importation of all plants, animals and unprocessed plant and animal products which may or may not carry diseases. For maize imports, a permit to import, a phytosanitary quarantine certificate issued by the plant quarantine service of the exporting country, and the inspection of a sample products upon arrival are required.

2.2 Soybean

Soybean production traditionally has been very limited. Most of the domestic needs, particularly as an ingredient in livestock and poultry feeds, has been imported. Only recently has a soybean production program bean initiated in the country, largely through the initiative of a private trans-national corporation. Recognizing the importance of the commodity, the government is currently implementing a five-year Accelerated Soybean Production and Utilization Program (ASPUP) in Regions II, III, X and XI.

Soybean, unlike maize, cassava, and banana, cannot be grown nation-wide. Soybean production is very dependent on a specific range of agro-climatic factors. As such, the policies formulated specifically affecting the commodity are centered on marketing. The production policies imposed on rice, and maize

generally affect other commodities including soybean. These policies govern inputs such as fertilizer and provision of credit, among others.

Until 1985, the importation of soybean was controlled by the NFA. The private sector is now given a free hand in importing soybean as part of privatization efforts initiated by the government in the importation of grains. The processing of soybean as animal feed is subject to value-added tax (VAT) of about 20%.

2.3 Cassava

The root crop sector is a minor part of the country's agricultural economy. It is estimated that root crops contributed only 3% to the total agricultural food crop production. Among the root crops, cassava contributes about 55% of the total root crop output.

Cassava is considered a subsistence crop. It is often planted in marginal areas where other crops do not thrive. Cassava production in the country is not exported, except for small quantities. However, with the establishment of cassava starch manufacturing plants during the mid-1970s, cassava is now regarded as an important commodity. Cassava is manufactured into starch and glucose, and is used as an animal feed ingredient. The increased recognition of cassava as an industrial commodity provides a lot of opportunities for it.

Despite its growing importance, cassava production is not given direct support by the government. The expansion of area planted to cassava was mainly initiated by the starch/glucose manufacturing plants through a contract growing scheme. As for soybean, policies affecting cassava were those pertinent to rice and maize production. This includes fertilizer subsidies and credit guarantees which were also applicable to other agricultural commodities.

Based on the VAT, cassava processing into starch/glucose is taxable at a rate of about 20%.

2.4 Banana

Banana is an important export crop and the country's natural tropical resources are ideally suited for its production. The popularity of banana as an export commodity is attributed to its successful penetration of the Japanese market in the late 1960s, and recently, the Korean and Middle East markets. Philippine banana exports accounted for about 10 to 13% of the world banana trade over the past decade.

One of the key factors affecting the banana industry is the hectarage limitation imposed on export banana which started in 1973. The policy was intended to control the supply of export banana which was expected to influence export price. Initially, 21,000 hectares were allotted to export bananas. This was increased to 26,250 hectares in 1979 to account for the increasing export banana market. The hectarage limit is allocated by the Board of Investments (BOI) to the Philippine Banana Growers and Exporters Association composed of 25 members, five of which are big trans-national corporations. Policy analysts indicated that the imposition of this hectarage restriction made it impossible for new firms and incremental investments to make their way into the export banana industry. In effect, it promoted inefficiency in the industry by creating a monopolistic environment. These conditions prevented the expansion of Philippine banana exports in its key markets and in the world banana trade.

A summary of government policies governing the aforementioned upland products is shown in Table 2.1 and, the present policies implemented on these products are presented in Table 2.2.

Table 2.1 Policy measures implemented by the government on selected commodities.

Policy Measures	Commodity			
	Maize	Soybean	Cassava	Banana
A. Farm level				
1. Input Subsidies				
a) Seed	Certified seed subsidy under the Grains production Enhancement Program GPEP equal to one bag (20 kg) of certified maize seed (CY1993-1998)			
b) Fertilizer	Fertilizer Subsidy under the GPEP exempting imported fertilizer grades from 5% duty (CY1993-1998) Restriction of import rights and implicit tax on fertilizer of 10% over the border price plus P10 surcharge (CY 1975-1982)	Fertilizer subsidy exempting imported fertilizer grades from 5% duty (CY 1993-1998)	Fertilizer subsidy exempting imported fertilizer grades from 5% duty (CY 1993-1998)	Fertilizer subsidy exempting imported fertilizer grades from 5%
c) Credit	Special credit assistance under the GPEP reducing interest rates on production loan of at least 25% less than prevailing market rates (CY 1993-1998)	Loan guarantee fund up to 85% of production losses (CY 1972-1995)		
	Direct all banking institutions to set aside 25% of their loanable funds for agricultural credit (CY 1975-present)	Direct all banking institutions to set aside 25% of their loanable funds for agricultural credit (CY 1975-present)	Direct all banking institutions to set aside 25% of their loanable funds for agricultural credit (CY 1975-present)	Direct all banking institutions to set aside 25% of their loanable funds for agricultural credit (CY 1975-present)
	Loan guarantee fund up to 85% of production loan losses(CY 1972 - 1985)			
2. Irrigation Systems Investment	Construction of new and rehabilitation of existing irrigation systems under the GPEP (CY 1993 - present)			
3. Public Investment	Increased public investment in research, training and extension under the GPEP (CY1993-1998) and Masaganang Maisan (CY 1977-1981) General appropriations for research and extension (CY 1950s-present)			
B. Marketing and Processing Level				
1. Parastatal Trading or Marketing Boards	Creation of national rice and maize trade regulating bodies, now the national Food Authority (CY 1951-present)	Covered by the National Food Authority (CY 1975-1985)		
2. Intervention Buying or Price Support Program	Price Support Policy (CY 1972-present)			
3. Food Subsidies	Price Ceiling Policy (CY 1972-1985), Price control were reimposed in CY 1989-1990			
4. Exercise Tax (Processing)	Valued added Tax (VAT) on maize milling	VAT on soybean as annual feed ingredient	VAT on cassava processing for starch	
5. Investment Grants/Special Tax Concession				
C. International Trade				
1. Import Tariff or Surcharge	Maize tariff of 20% (CY 1993-present)	Soybean tariff of 60% (CY 1983-1990) Soybean tariff of 44% (CY 1981-present)		
2. Import/Export Quota	Maize import restriction of 50,000 mt (CY 1987)			
3. Export Subsidies or Taxes				Imposition of 4% export tax (CY 1970-1985) Removal of 4% export tax (CY 1986-present)

Table 2.1 (continued).

Policy Measures	Commodities			
	Maize	Soybean	Cassava	Banana
4. Non-Tariff Barriers	Maize importation if produced domestically in sufficient quantities (CY 1993-present) Quarantine, registration, and licensing regulations	Quarantine, registration, and licensing regulations	Quarantine, registration, and licensing regulations	Quarantine, registration, and licensing regulations
5. Production or Acreage Controls				Restricting the hectarage allotted for exporting bananas to 21,000 hectares (CY 1973-1979) Increasing the hectarage allotted for export bananas to 26,250 hectares (CY 1979-present)
6. Compulsory Food Requisition				
7. Production Subsidy				
8. Defiency Payment				
9. Guaranteed Price				

Table 2.2 Policy measures implemented on each commodity, 1995.

Measures	Commodity			
	Corn	Soybean	Cassava	Banana
a. Farm level				
1. Input subsidies				
1. 1 Seed	+	-	-	-
1. 2 Fertilizer	+	+	+	+
1. 3 Credit	+	-	-	-
2. Irrigatioon systems investment	+	-	-	+
3. Reproduction/ hectarage controls	-	-	-	-
4. Compulsory food requisition	-	-	-	-
5. Production subsidy	-	-	-	-
6. Deficiency payment	-	-	-	-
7. Guaranteed prices	-	-	-	-
B. Marketing and processing level				
1. Parastatal trading or marketing boards	+	-	-	+
2. Interventions buying or price support program	+	-	-	-
3. Food subsidies	-	-	-	-
4. Excise taxes (processing)	+	+	+	+
5. Investment grants/special tax concession	-	-	-	-
6. Public investment	+	+	+	+
C. International trade				
1. Import traff or surcharge	+	+	-	-
2. Import/export quota	-	-	-	-
3. Export subsidies or taxes	-	-	-	-
4. Non-tariff barriers	+	+	+	+

3. Dietary Patterns

This portion examines the dietary pattern in the Philippines, the shift in food consumption, and the factors which bring about the changes in food consumption behaviour in all food groups.

Food production policies, especially in developing countries, are geared towards self-sufficiency due to the demands of increasing populations. With technological breakthroughs in production, there is a felt need to place emphasis on nutritional adequacy while at the same time sustaining increased productivity. Given this new direction in production policy, the Food and Agricultural Organization (FAO) formulated a suggested desirable dietary pattern (DDP). The DDP recommends the contribution to total calorie intake of major food groups that can provide adequate energy and other key nutrient requirements for normal growth and function, also assuring palatability and calorie density. In countries where there are no studies on recommended dietary allowance (RDA) for energy, protein and other nutrients, the FAO-WHO recommendation is adopted. The Philippines, however, makes its own recommendation based on food consumption surveys conducted by the Food and Nutrition Institute (FNRI). A revised RDA for Filipinos was prepared in 1989.

Table 3.1 Mean one day per capita food consumption by income quartile, the Philippines, 1993.

Food Group/Subgroup	1st	2nd	3rd	4th
		Consumption *		
Cereals and cereal products	343	348	332	336
Rice and products	256	296	284	295
Maize and products	75	32	22	9
Other cereals & products	12	19	26	32
Starchy roots and tubers	25	14	14	14
Sugars & syrups	14	16	20	24
Fats and oils	9	11	13	17
Fish, meat & poultry	110	134	156	194
Fish and products	90	98	106	106
Meat and products	14	25	37	62
Poultry	6	11	13	26
Eggs	5	11	14	20
Milk & milk products	15	30	48	88
Whole milk	14	25	44	61
Milk products	1	6	4	27
Dried beans, nuts, & seeds	8	8	12	11
Vegetables	103	104	104	113
Green leafy & yellow vegetables	35	31	28	24
Other vegetables	68	73	76	89
Fruits	64	63	75	110
Vitamin C-rich fruits	9	15	24	38
Other fruits	55	48	51	72
Miscellaneous	14	17	22	26
Beverages	5	6	11	14
Condiments & others	9	11	11	12
Mean per capita income (Pesos)	1,902.43	4,695.07	8,776.06	25,127.86

Source: FNRI 4th National Survey, Philippine, 1993, DOST.

* Raw, as purchased, in grams; as available in the kitchen including inedible and edible wastage.

Chapter 3

3.1 Food Consumption Pattern

The 1993 survey showed that there were wide variations in the amount of food consumed between the lowest and highest per capita income groups and in per capita per day food peso value, which refers to the cost of food items consumed by a household on the survey day, including those bought, own-produced and received, based on the prevailing prices. As presented in Table 3.1, the food group/items which progressively increased with rising per capita income were other cereals and products; sugars; fats and oils; fish, meat, and poultry; eggs; milk and milk products; vegetables; fruits; and miscellaneous foods.

Concerning the mean daily per capita food consumption vis-à-vis the various one day per capita food peso values, increases were accompanied by rising trends in the intake of other cereals and products; eggs; milk and milk products; vegetables; fruits; and miscellaneous food items (Table 3.2). Consumption of rice and products fluctuated and reached the highest level when the one day per capita food peso value increased to P25.00 - P30.00.

Table 3.2 Mean one day per capita food consumption by one day per capita food peso value, the Philippines, 1993.

Food Group/Subgroup	< 10.01	10.01-15.00	15.01-20.00	20.01-25.00	25.01-30.00	30.01-35.00	> 35.00
				Consumption*			
Distribution of households (%)	28.0	25.4	17.9	11.8	7.1	3.5	6.3
Cereals and cereal products	318	345	351	350	362	328	370
- Rice and products	229	296	316	308	321	285	309
- Maize and products	79	31	9	12	4	5	6
- Other cereals & products	10	18	27	31	36	37	55
Starchy roots and tubers	20	14	14	20	15	13	21
Sugar & syrups	11	17	21	23	28	30	35
Fats and oils	7	12	13	16	18	16	27
Fish, meat & poultry	86	127	158	194	222	252	324
- Fish and products	81	103	114	107	111	126	93
- Meat and products	3	17	32	64	73	82	163
- Poultry	1	7	12	24	38	44	67
Eggs	4	12	14	19	20	20	29
Milk & milk products	9	27	56	67	75	113	165
- Whole milk	8	24	51	57	59	75	88
- Milk products	1	2	5	10	16	38	77
Dried beans, nuts, & seeds	6	9	11	13	12	11	19
Vegetables	88	106	117	107	125	118	143
- Green leafy & yellow vegetables	32	33	31	21	25	22	25
- Other vegetables	55	73	86	86	100	96	119
Fruits	39	64	79	116	110	170	191
- Vitamin C rich fruits	7	13	21	32	35	79	72
- Other fruits	32	51	58	83	74	91	119
Miscellaneous	11	16	20	23	34	26	56
- Beverages	3	5	10	10	21	15	41
- Condiments & others	8	11	11	13	14	12	15
Mean one day per capita food peso value	7.46	12.40	17.23	22.24	27.17	32.17	47.86

Source: FNRI 4th National Survey, Philippine, 1993, DOST.

* Raw, as purchased, in grams; as available in the kitchen including inedible and edible wastage.

Table 3.3 Mean one day per capita food consumption by urbanization, the Philippines, 1993.

Food group/Subgroup	Philippines	Urban	Rural
		Consumption*	
Cereals and cereal products	340	318	361
Rice and products	282	273	290
Maize and products	36	17	55
Other cereals & products	22	28	16
Starchy roots and tubers	17	13	21
Sugar & syrups	19	20	17
Fats and oils	12	14	10
Fish, meat & poultry	147	161	133
Fish and products	99	98	100
Meat and products	34	44	23
Poultry	14	19	9
Eggs	12	14	9
Milk & milk products	44	64	24
Whole milk	35	48	22
Milk products	9	16	2
Dried beans, nuts, & seeds	10	11	8
Vegetables	106	98	113
Green leafy & yellow veg.	30	25	34
Other vegetables	76	73	79
Fruits	77	82	73
Vitamin Crich fruits	21	27	15
Other fruits	56	55	58
Miscellaneous	19	23	16
Beverages	9	12	6
Condiments & others	11	11	10

Source: FNRI 4th National Survey, Philippine, 1993, DOST.
* Raw, as purchased, in grams; as available in the kitchen including inedible and edible wastage.

In terms of urbanization, rural households where the dominant occupation is farming and fishing consumed more rice and maize and products (except other cereals and products) than urban household (Metro Manila, other cities and municipalities classified urban by the NSO). Consumption of these products was 361 grams, compared to 318 grams in the urban areas (Table 3.3). Other food groups consumed in greater quantities in the rural areas than in the urban areas were starchy roots and tubers, fish and products, vegetables, and other fruits owing partly to the fact that these crops are home-produced while fish are caught in abundance. As expected, the per capita consumption of more expensive food items such as sugar, fats and oils, meat and poultry products, eggs, milk and milk products, fruits and miscellaneous foods was greater in the urban areas. This could be explained by the higher average household income in the urban areas than in the rural areas, except for the average household income of families within the P 80,000 to P 149,999 expenditure class (Table 3.4).

3.2 Changes in food consumption

Results of the four consumption surveys of FNRI in 1978, 1982, 1987 and 1993 indicate the general pattern of food consumption in the Philippines (Table 3.5). First, from 1978 to 1982, increases in per capita intake were manifested in the majority of the food groups. Second, decreases of intake in several of the food groups were observed in 1987 and 1993 compared to 1982 levels. Third, the average Filipino diet comprises rice, fish, and vegetables. The probable reasons for the increasing and decreasing trends will be discussed latter.

Table 3.4 Total number of families, total and average family income by expenditure class, urban-rural, 1991.

Expenditure Class and Area	Total No. of Families	Average Income (Peso/month)	Average Expenditure (Peso/month)
Philippines	119,754	65,186	51,991
Under P10,000	3,808	10,498	7,831
10,000 - 19,999	21,156	19,797	15,674
20,000 - 29,999	24,710	30,184	24,839
30,000 - 39,999	17,888	42,425	34,647
40,000 - 49,999	12,724	54,202	44,700
50,000 - 59,999	8,851	66,625	54,774
60,000 - 60,999	11,131	86,684	69,171
80,000 - 99,999	6,913	112,629	89,112
100,000 - 149,999	7,423	151,135	120,105
150,000 - 249,999	3,779	257,618	184,982
250,000 - 499,999	1,077	412,500	328,734
500,000 and over	295	950,244	840,006
Philippine - Urban	59,385	89,571	70,551
Under P10,000	960	10,706	7,431
10,000 - 19,999	5,271	20,545	15,795
20,000 - 29,999	8,288	31,231	25,215
30,000 - 39,999	7,701	44,394	34,907
40,000 - 49,999	7,020	55,575	44,848
50,000 - 59,999	5,683	67,115	54,909
60,000 - 60,999	8,117	87,067	69,498
80,000 - 99,999	5,519	112,513	89,279
100,000 - 149,999	6,155	150,384	120,298
150,000 - 249,999	3,380	261,714	185,685
250,000 - 499,999	1,006	416,325	327,702
500,000 and over	283	960,067	848,597
Philippine - Rural	60,369	41,199	33,733
Under P10,000	2,848	10,429	7,698
10,000 - 19,999	15,884	19,549	15,634
20,000 - 29,999	16,422	29,655	24,649
30,000 - 39,999	10,187	40,938	34,450
40,000 - 49,999	5,704	52,512	44,518
50,000 - 59,999	3,168	65,747	54,533
60,000 - 60,999	3,014	85,654	68,293
80,000 - 99,999	1,393	113,086	88,453
100,000 - 149,999	1,267	154,782	119,169
150,000 - 249,999	398	222,840	179,016
250,000 - 499,999	71	357,952	343,453
500,000 and over	13	730,178	647,547

Source: Family Income and Expenditures Survey, 1991. National Statistics Office.

Per capita intake of cereals declined from 367 grams in 1978 to 356 grams in 1982. Cereal consumption further decreased to 345 grams and 340 grams in 1987 to 1993, respectively. The downward trend in cereal consumption was largely due to the decline in rice consumption, especially in 1993 which exhibited about a 7% decrease. Consumption of maize decreased but only minimally by 4 grams daily from 1978 to 1982 and by 10 grams in 1987 compared to 1972. Maize consumption dramatically increased in 1993, posting a 50% rise over that of 1987.

Per capita intake of fish, meat and poultry was on the uptrend, posting a large increase of 21 grams per day from 1978 to 1982, and increasing slightly by 3 grams from 1982 to 1987. It decreased however, by 6.4% in 1993. Poultry consumption, nevertheless, significantly increased by 56%. Consumption of vegetables was on the downtrend. Fruit consumption decreased slightly from 1978 to 1982, rose again from 1982 to 1987, but dropped significantly by 28% in 1993.

Intake of starchy roots and tubers fluctuated, increasing by 5 grams daily from 1978 to 1987 then decreasing by 20 grams from 1982 to 1987. This further dropped by 23% in 1993. The other

energy-rich foods sugar and syrup, and fats and oils posted increases in 1982 and 1987, only to decrease in 1993.

Fluctuations were observed for milk and milk products. Per capita intake in 1982 was up by about 2 grams daily from the 1978 level down by 1 gram in 1987 from its 1982 level, but increased again by 1 gram in 1993. Eggs showed an upward trend in 1982 to 1993.

Table 3.5 Mean one day per capita food consumption in the Philippines, 1978, 1982, 1987 and 1993

Food Group/Subgroup	1978	1982	1987	1993	Percent increase (decrease) 1987 to 1993
	grams per day				
Total food	897	915	869	803	
Cereals and cereal products	367	356	345	340	(1.4)
Rice and products	308	304	303	282	(6.9)
Maize and products	38	34	24	36	50
Cereal products	21	18	18	22	22.2
Starchy roots and tubers	37	42	22	17	(22.7)
Sugars and syrups	19	22	24	19	(20.8)
Fats and oils	13	14	14	12	(14.3)
Fish, meat and poultry	133	154	157	147	(6.4)
Fish and products	102	113	111	99	(10.8)
Meat and products	23	32	37	34	(8.1)
Poultry	7	10	9	14	55.6
Eggs	8	9	10	12	20.0
Milk and milk products	42	44	43	44	(2.3)
Whole milk	31	30	36	35	(2.8)
Milk products	11	14	7	9	28.6
Dried beans, nuts and seeds	8	10	10	10	0
Vegetables	145	130	111	106	(4.5)
Green leafy and yellow vegetables	34	37	29	30	3.4
Other vegetables	111	93	82	76	(7.3)
Fruits	104	102	107	77	(28.0)
Vitamin C-rich Fruits	30	18	24	21	(12.5)
Other fruits	74	84	83	56	(32.5)
Miscellaneous	21	32	26	16	(26.9)
Beverages	8	16	12	6	
Condiments & others	12	15	14	10	

Source: FNRI, DOST Food and Nutrition Survey: Philippines, 1993

3.3 Nutrient intake pattern

3.3.1 Energy

Based on the 1993 FNRI survey, the mean levels of energy and protein intake were significantly influenced by four underlying factors, namely i) annual per capita income, ii) one day per capita food peso value, iii) meal planner's years of schooling, and iv) household size (Table 3.6). The one day per capita food peso value has the most positive impact on the amount of energy consumed as indicated by a correlation coefficient (R) of 0.54. As shown in Table 3.7, calorie intake increased from 1,339 kilocalories to 2,413 kilocalories as the daily per capita food peso value increased by P5. The daily increment in calorie consumption ranged from 101 kilocalories to 403 calories. It should be noted that calorie intake dropped by 15 kilocalories when the one day food peso value increased to 30.01-35.00 range, but again rose by 403 kilocalories, when the food peso value increased to 35.001 and over.

Table 3.6 Correlation coefficients of per capita energy and protein intake with socio-economic factors and their means by urbanization, the Philippines, 1993.

Nutrient	Philippines	Urban	Rural
	Correlation Coefficient		
Energy Intake			
Annual per capita income	0.2039**	0.2179**	0.2047**
One day per food capita peso value	0.5396**	0.5730**	0.5303**
Meal planner's years of schooling	0.0898**	0.1203**	0.0663**
Household size	-0.2662**	-0.2857**	-0.2399**
Protein Intake			
Annual per capita income	0.2598**	0.2599**	0.2562**
One day per food capita peso value	0.6229**	0.6503**	0.5846**
Meal planner's years of schooling	0.1338**	0.1529**	0.0986**
Household size	-0.2630**	-0.2713**	-0.2575**
		Mean	
Annual per capita income (pesos)	10,131.26	12,876.53	7,539.53
One day per capita food peso value	16.11	19.18	13.18
Meal planner's years of schooling	8.13	8.75	7.53
Household size	5.99	6.00	5.98

Source : FNRI, DOST Fourth National Nutrition Survey: Philippines, 1993.
** Significant at 0.01 level.

Table 3.7 Mean one day per capita nutrient intake and percent adequacy by one day per capita food peso value, the Philippines, 1993.

Nutrient	One day Per Capita Food Peso Value						
	< P10.01	10.01-15.00	15.01-20.00	20.01-25.00	25.01-35.00	30.01-35.00	>35.00
Distribution of Households (%)	28.0	25.4	17.9	11.8	7.1	3.5	6.3
Energy							
Intake (kcal)	1,369	1,640	1,767	1,924	2,025	2,010	2,413
Percent adequacy	72.7	85.3	91.7	98.2	103.6	103.4	124.0
Protein							
Intake (g)	38.1	47.1	53.1	58.0	62.1	67.7	81.0
Percent adequacy	83.9	100.2	112.0	119.6	128.0	139.3	165.0

Source: FNRI, DOST Fourth National Nutrition Survey: Philippines, 1993.

An increase in per capita income obviously has an effect in calorie intake as shown by an R of 0.2039 (Table 3.6). As indicated in Table 3.8, an increase in annual per capita income from less than P3,000 - P5,999 range had a corresponding increase in the daily per capita energy consumption, from 1,599 kilocalories to 1,622 kilocalories, or an increase of 63 kilocalories per day. There was a rising trend in energy consumption as the annual per capita income increased.

Table 3.8 Mean one day per capita nutrient intake and percent adequacy by annual per capita income: Philippines, 1993.

Nutrient	Annual Per Capita Income (Peso)						
	< 3,000	3,000-5,999.99	6,000-8,999.99	9,000-11,999.99	12,000-14,999.99	15,000-17,999.99	≥ 18,000
Distribution (%)	22.6	25.7	16.1	10.7	7.2	4.5	13.2
Energy							
Intake (kcal)	1,559	1,622	1,680	1,725	1,746	1,822	1,956
Percent adequacy	82.6	85.0	87.2	88.7	90.3	93.7	100.0
Protein							
Intake (g)	44.0	47.0	50.2	51.8	53.9	55.7	61.6
Percent adequacy	96.5	101.3	106.6	107.5	112.8	115.3	125.2

Source: FNRI DOST Fourth National Nutrition Survey: Philippines, 1993.

The meal planner's years of schooling also influence the amount of energy taken in (R=0.0898). Meal planners who had attained higher education made better choices of the quality of food for their households, given the same constraints faced by all households (Table 3.9). However, it should be noted that meal planners who had no formal schooling prepared diets higher in energy than those who had 1-7 or 8-11 years of formal schooling.

Table 3.9 Mean one day per capita nutrient intake and percent adequacy by education of meal planners: Philippines, 1993.

Nutrient	Education of meal planners			
	No Formal Schooling	1-7 Years	8-11 Years	12 and Over
Energy				
Intake (kcal)	1,802	1,634	1,658	1,862
Percent adequacy	94.0	84.8	87.0	96.8
Protein				
Intake (g)	49.1	48.0	49.2	57.1
Percent adequacy	100.6	101.5	106.7	120.5

Source: FNRI, DOST Fourth National Nutrition Survey: Philippines, 1993.

Household size, when increased by one member, had an inverse relationship with the amount of energy consumed. When a household composed of 1-2 members is increased by one member, the daily per capita energy consumption dropped, from 2,165 kilocalories to 1,882 kilocalories. This further decreased to 1,544 kilocalories when household size increased to 9 members or more (Table 3.10).

Table 3.10 Mean one day per capita nutrient intake and adequacy by household size: Philippines, 1993.

Nutrient	Household Size				
	1-2	3-4	5-6	7-8	9 & Above
Energy					
Intake (kcal)	2,165	1,882	1,734	1,601	1,544
Percent adequacy	109.0	97.2	91.0	83.4	80.4
Protein					
Intake (g)	67.0	57.0	51.4	47.0	45.0
Percent adequacy	121.8	118.0	111.0	100.4	96.2

Source: FNRI, DOST Fourth National Nutrition Survey: Philippines, 1993

In terms of urbanization, the influence of the underlying variables on energy intake was almost the same, but the effects were slightly greater on the urban populace than on the rural.

3.3.2 Protein

The mean levels of protein consumption, likewise, were explained by the four variables considered, but the effects were slightly greater as shown in Table 2.6 (except that of household size). As exhibited in Table 2.7, there was a tendency for the amounts of protein consumed to increase as the one day per capita food peso value increased by P5.

Similarly, an increase in the annual per capita income indicated corresponding increases in the levels of protein consumed. As an income of less than P3,000 rises to the P3,000-5,999.99 range, there was an increase of 3 grams per day protein intake and further by 3.2 grams as income reached the P6,000-P8,999.99 range. The increment in protein intake tapered down as income reached the P15,000-P17,999.99 range, but the increment tended to be more as income reached P18,000 and over (as presented in Table 3.8). It is interesting to note that protein intake adequacy was met when the annual per capita income was increased to the P3,000-P6,000 range. This also held true when the one day food peso value was increased to P10-P15.

Table 3.11 Mean one day per capita nutrient intake and percent adequacy: Philippines 1978, 1982, 1987, and 1993.

					% Increase (Decrease)		
Nutrient	1978	1982	1987	1993	1978-1982	1982-1987	1987-1993
Energy							
- Intake (kcal)	1,804	1,088	1,753	1,684	.2	-3	(3.9)
- % Adequacy	88.6	89.0	87.1	87.8	-	-	
Protein							
- Intake (mg)	48.0	50.6	49.7	49.9	5.4	-1.8	(.04)
- % Adequacy	93.2	99.6	98.2	106.2	-	-	
Iron							
- Intake (mg)	10.6	10.8	10.7	10.1	1.9	(0.9)	(5.6)
- % Adequacy	88.3	91.5	91.5	64.7			
Calcium							
- Intake (mg)	0.44	0.45	0.42	0.39	2.3	-6.7	(1.3)
- % Adequacy	78.60	80.40	75	67.2			
Thiamine							
- Intake (mg)	0.73	0.74	0.68	0.67	1.4	-8.1	(1.5)
- % Adequacy	70.7	71.8	66.7	68.4			
Riboflavin							
- Intake (mg)	0.53	0.58	0.56	0.56	9.4	-3.4	0
- % Adequacy	50.9	56.3	54.4	57.1			
Niacin							
- Intake (mg)	15.3	16.4	16.3	16.1	7.2	(0.6)	(1.2)
- % Adequacy	115.5	119.7	119.9	88.0			
Ascorbic Acid							
- Intake (mg)	66.8	61.6	53.6	46.7	(7.8)*	-13	(12.9)
- % Adequacy	99.2	91.1	80.0	73.2			
Fats							
- Intake (g)	28	30	30	28	7.1	-	(6.7)
Carbohydrates							
- Intake (g)	332	327	313	302	(1.5)	(4.3)*	(3.5)

Source: FNRI, DOST Nationwide Nutrition Survey: Philippines, 1987-1993.
* Statistically significant.

The education of meal planners had a bearing on the preparation of the family diets. Meal planners who had higher education prepared food which had higher protein content. However, it should also be noted that meal planners who had no formal schooling prepared diets better than those who reached 1-7 years of formal schooling.

Households with fewer members consumed larger amounts of the majority of food groups/items, but consumption subsequently decreased when household was increased by one member. As shown in Table 2.10, the amount of protein intake decreased as the household size of 1-2 members increased by one.

With respect to urbanization, the effects of the explainable variables on protein intake were slightly greater in the urban areas than in the rural.

3.3.3 Nutrient adequacy

Following the food consumption trend in Table 3.11, nutrient intake and adequacy increased in 1982 compared to 1978, except for ascorbic acid. This general trend implied an improvement in the Filipino diet during those periods.

The improvement in the Filipino diet in 1982 took a downturn in 1987, with decreases in all of the nutrient intakes thus lowering adequacy levels. There was a general decrease in the intake of food nutrients in 1993, except for protein and riboflavin. In the same year, considerable nutrient intake decreases were noted in ascorbic acid, fats, iron, energy, and carbohydrates.

In terms of adequacy levels in 1993, protein intake was more than adequate. Niacin, energy and ascorbic acid were on the high side. The adequacy level for energy, thiamine, riboflavin, and

niacin increased in 1993, compared to the previous survey year. Among the nutrients, the adequacy levels of thiamine and riboflavin were the lowest.

3.4 Food supply pattern

An aggregate of total food supply in the Philippines can be glimpsed from the country's Food Balance Sheet. The total food supply by food group, the corresponding per capita total food consumption, and calorie and protein intake using population estimates are presented for the years 1978, 1982, 1987, and 1992 in Table 3.12. While an upward trend is observed for total food supply, the implied total food, per capita supply of calories and protein fluctuated showing lower levels in 1987 and 1992 compared to 1982. This is largely attributed to the larger rate of increases in population of the country compared to the increase in total food supply in 1987 and 1992 compared to the 1982 level. Total food supply in 1987 was only 1.2% higher than the level in 1982, while total population correspondingly increased by about 13%. Similarly, food supply in 1992 increased by 16.4% over that of 1987, but the corresponding increase in population was 28.7%. In 1983, the Philippines also began to experience abnormal economic activity which arose from political instability (Villavieja et al. 1989). The annual trend in total calorie and protein supply followed the trend of total food supply over the period 1978 to 1992 as can be gleaned from Figures 3.1-3.3. The yearly food supply is presented in Appendix 1.

The lower rate of increase in some of the food groups in 1987 compared to 1982 resulted from lower agricultural production caused mainly by typhoons and the long dry spell in the country in late 1984 which prevailed through 1985. Accounting for the effects of the population of the country, the trend in the supply of the different food groups in Table 3.12 apparently explains the downtrend in per capita consumption estimates by food groups based on FNRI surveys.

Table 3.12 Food supply in the Philippines, 1978, 1982, 1987, and 1992 (thousand metric tons).

Food Group/ Subgroup	1978	1982	1987	1992
Total food	17,804.5	21,731.6	21,989	25,589
Cereal and cereal products	5,080.5	6,459.1	7,057	8,647
Rice (milled)	3,851.5	4,776.6	5,224	5,842
Maize (shelled) and grits	517.9	790.0	860	1,034
Cereal products	711.1	892.5	860	1,759
Starchy roots and tubers	1,647.3	1,506.0	1,483	1,459
Sugars and syrups	600.7	643.2	899	1,567
Fats and oils	309.3	24.80	304	354
Fish, meat and poultry	2,307.7	2,800.2	3,325	4,168
Eggs	250.5	249.1	155	206
Milk and milk products	1,261.8	1,404.8	1,592	1,988
Dried beans, nuts and seeds	191.4	198.5	747	724
Vegetables	1,712.3	2,130.9	1,892	1,799
Fruits	2,438.2	3,147.6	3,950	4,221
Miscellaneous	2,005.1	2,944.4	2,016	2,076
Per Capita Supply/Day				
Total food (grams)	1,057.4	1,165.6	1,047.5	1,068
Energy (kcalories)	2,208.0	2,442.5	2,254.2	2,051
Protein (grams)	61.3	68.9	61.5	46.6
Population (million)	45.5	50.8	57.4	65.34

Source: National Statistical Coordination Board (NSCB).

The RDA is mainly a recommendation for consumption or intake, while the food balance sheet provides information of food supply or availability. The food balance sheet does not signify food self-sufficiency. The actual supply required to meet nutritional standards would be much higher if one considers inequality in the distribution of income and food. Accordingly, food production must be at least 25% above the RDA to satisfy nutritional requirements (Quisumbing 1987).

3.5 Macro economic indicators

The nutritional condition of the population of a country is also reflected by the quantitative measures of the economic performance of the economy, as indicated by the gross national product (GNP), personal consumption expenditure (PCE), consumer price index (CPI), and inflation and employment rates (Table 3.13). The patterns of these macroeconomic indicators are compared with the pattern for per capita food consumption presented.

3.5.1 Gross National Product

GNP measures the country's output of all goods and services for an accounting period valued at market prices. When valued at constant base prices, GDP provides an overall index of the physical volume of goods and services produced by the economy over the period. In real terms GNP in 1982 was 18% above its level in 1978; per capita national product also increased by 9.61%. In 1987, real GNP and per capita national product exhibited, respectively, decreases of 2.8% and 16.6%. As previously mentioned, the reason for the decrease in GNP stemmed largely from the dislocation of the country's economy in 1984 and 1985, manifesting its effect until 1987. The slowdown in economic activity, particularly in agriculture, put an upward pressure on the prices of commodities, especially agricultural products. The consumer price index (CPI) in 1987 soared to 368 from the 1978 base year as presented in Table 3.13. In effect, food consumption (except sugars, milk and milk products, and vitamin C-rich fruits) went down. The probable reason for the upward consumption of these relatively more expensive food items could be the widening disparity in income among the higher income and the lower income groups as shown in Table 3.14. Although per capita GNP dropped in 1987, the intake of more expensive food items among the lower income groups, which comprised the majority of the population, could have remained the same or dropped slightly below the minimal consumption levels.

Table 3.13 Selected economic indicators in the Philippines 1978, 1982, 1987 and 1993.

Economic Indicator	1978	1982	1987	1993
Real GNP (million pesos at 1985 constant prices)	528,183	646,174	605,861	756,293
Per capita Gross National Product (in pesos at constant 1985 prices)	11,609	12,725	10,312	11,291
Personal Consumption Expenditures (in pesos at constant 1985 prices)	348,441	422,067	452,386	578,589
Consumer Price Index (1978 Prices)	100.0	173.20	368.70	479.2
Inflation rate (%)	7.18	10.22	3.79	7.6
Unemployment rate (%)	9.50	9.50	11.20	8.9
Population (million)	45.0	50.78	87.36	66.58
Population growth (%)	10.92*	11.60	12.96	16.07

Source: National Economic and Development Authority.

* Population growth from the year 1974

Figure 3.1 Daily per capita food supply, the Philippines 1978-1992

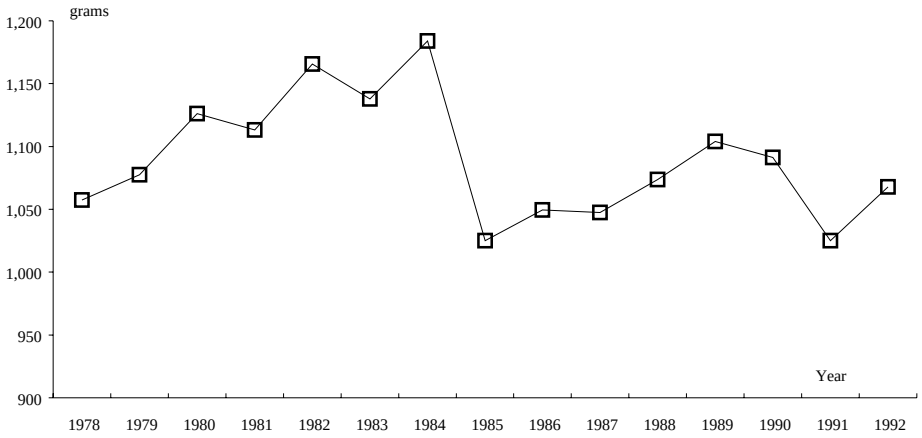


Figure 3.2 Daily per capita calorie supply, the Philippines 1978-1992

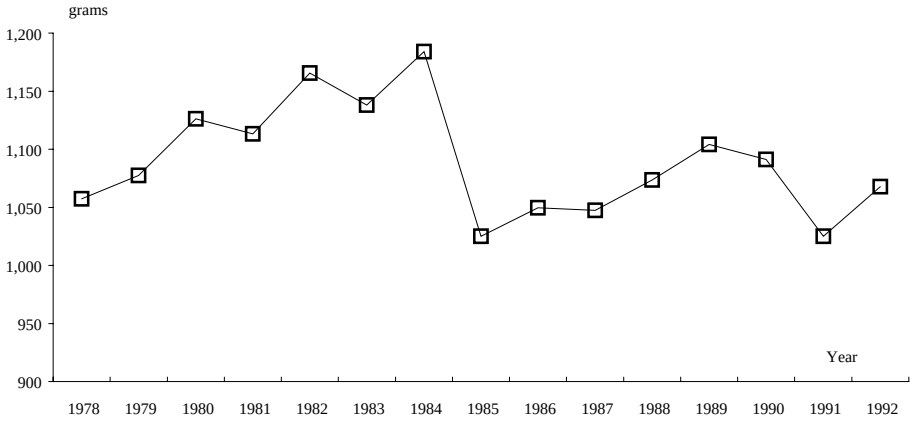
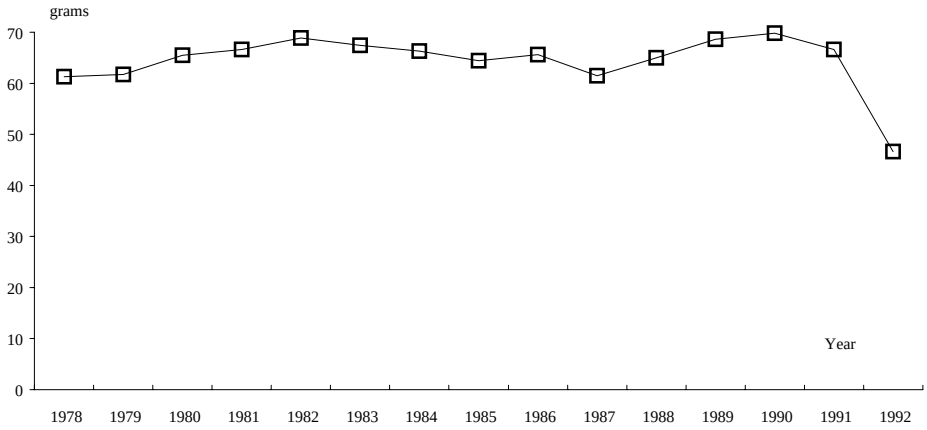


Figure 3.3 Daily per capita protein supply, 1978-1992.



In 1993, GNP dramatically went up by 25% from its 1987 level while per capita GNP rose by 9.5%. Relating the figures to the mean one day per capita food intake during the same year, food consumption decreased significantly except for maize and products, other cereals and products, poultry and eggs. Although per capita GNP increased from the 1987 level, the CPI and inflation rate increased to 479% and 7.6%, respectively. This offset the increase in per capita GNP, leading to lower food consumption.

Table 3.14 Food expenditure by income class.

Expenditures	Total	Under 20,000	20,000-29,999	30,000-39,999	40,000-49,999	50,000-59,999	60,000-79,999	60,000-99,999	100,000 - 249,000	250,000 and over
Total family expenditures (million pesos)	622,616	29,437	50,948	53,785	48,877	45,552	72,077	56,552	180,661	87,726
Food (%)	48.5	66.1	63.1	60.4	56.8	55.0	51.4	48.0	42.3	29
Food consumed at home	44.7	65.6	62.0	58.5	54.3	51.3	47.2	43.3	36.9	24.5
Cereals and cereal Preparations	14.5	30.3	26.5	22.9	19.18	17.4	14.4	12.3	8.9	5.3
Roots and tubers	0.9	21.1	1.6	1.3	1.0	0.9	0.8	0.7	0.6	0.4
Fruits and vegetables	4.5	6.2	5.8	5.6	5.1	5.0	4.7	4.4	4.0	2.7
Meat and meat preparations	7.1	4.2	4.8	5.6	6.4	7.1	7.6	7.9	8.4	6.9
Dairy products and eggs	3.5	2.5	3.1	3.5	3.8	4.0	4.1	4.0	3.7	2.5
Fish and marine products	7.1	11.7	11.2	10.6	9.3	8.3	7.4	6.5	5.2	3.0
Coffee, cacao, and tea	1.4	1.5	1.7	1.8	1.8	1.7	1.6	1.5	1.2	0.7
Non-alcoholic beverages	1.3	0.7	1.0	1.2	1.3	1.5	1.6	1.6	1.5	1.1
Food N.E.C.	44	6.3	6.3	6.1	5.7	5.4	5.0	4.3	3.5	2.0
Food regularly consumed outside the home	3.8	0.5	1.1	1.8	2.5	3.7	4.2	4.7	5.4	4.5
Non-food	55.3	33.9	36.9	30.6	43.2	45.0	48.6	52.0	57.7	71.0

Source: Family and Expenditures Survey, 1991.

3.5.2 Personal consumption expenditures.

This economic indicator reflects at the macro level the expenditures of households (in cash or in kind) on goods and services. Personal consumption of households in 1978, 1982, 1987, and 1993 showed increases. The figures, however, do not reflect the amount spent on food. Given the rise in the CPI and the inflation rate, inequality of income distribution, the level of income and the relatively high unemployment rate, it is probable that food consumption, especially by the low income group, would be adversely affected. As shown in Table 3.14, the aggregate food expenditures in 1991 were highest among the households within the P100,000 to P249,000 income class. In terms of percentage of expenditures, households with income less than P20,000 spent the most on food with cereals and roots and tubers taking most of the family food budget. A considerable portion of the budget was spent on fruits and vegetables, fish and marine products, other food (not elsewhere consumed). The percentage expenditures on food items which increased with the increase in personal income were meat and meat preparations, dairy products and eggs. The amount spent on these products, however, tended to decrease when income exceeded P249,999 (for meat and meat preparations) and P79,999 (for dairy products and eggs).

4. Food and Feed Demand

4.1 Food demand

The demand analysis for food groups/items in the Philippines was done in this study in the absence of recent studies conducted on the subject, which could be utilized as bases in projecting food consumption. As the latest cross-sectoral data on per capita food consumption in the Philippines, vis-à-vis family incomes are not readily available, historical data on net food supply per capita for direct consumption were used. These were assumed to be consumed within each year and were used in the regression analysis. The explanatory variables utilized were the yearly real prices of food items studied and the per capita Gross Domestic Product (GNPC). Attempts were made to include other explanatory variables such as own price and prices of substitutes but they appeared to be insignificant and/or have opposite signs.

The per capita net food supply (presented in Appendix 2) was taken from the Food Balance Sheets of the Philippines, 1970 - 1992, while the prices of food groups/items were gathered from publications and results of field surveys conducted by the Bureau of Agricultural Statistics (BAS). These prices were converted into prices at constant 1978 prices (Appendix 3). The data on per capita gross domestic products were taken from the Philippine Statistical Yearbook, 1990 - 1994, published by the National Statistical Coordination Board (NSCB). These data were, likewise, converted into real terms based on 1978 prices (Appendix 4). The data were processed using a computer program.

Using double log demand equations which are convenient because the estimated coefficients are themselves elasticities, the results showed that there was no strong correlation between the demand for rice and its own price nor with the GNPC (Table 4.1). This may be due to the limited number of observations (23) and/or to some discrepancies in the data used. The demand for maize, likewise, showed insignificant response to changes to its own price, the price of rice, or to GNPC. This, perhaps, could be attributed to the fact that this cereal is used as a staple by a minority of the Philippine population, such that the response of maize demand could not very well be explained by the national data on consumption and prices used in this study.

Fish consumption decreased in response to an increase in GNPC, but showed a positive reaction to an increase in its own price. The negative behaviour of fish demand to the increase in GNPC may be due to a shift in demand in favor of other food products such as meat or eggs. The positive response of fish demand increases in the price of fish than their substitutes.

As to meat, there was no significant increase in demand in relation to GNPC increase. However, expectedly, meat demand dropped as its price increased. For vegetables, consumption showed a tendency to decrease as their prices increased, but demand responded positively to an increase in GNPC. In the case of fruits, consumption significantly increased as their prices increased. This response may be the result of a growing consumption of fruits among Filipino consumers, regardless of the increases in their prices, to some extent for health reasons.

For other food groups/items, the only explanatory variable used was GNPC in the absence of historical data on their respective prices. However, the coefficients of determination (R^2) came out to be very low as shown in Table 4.1.

Table 4.1 Demand functions used in analyzing demand for food groups/items: Philippines.

Demand Functions	Estimated Coefficients using Double Log Equations				
	Log a	Log b 1	Log b 2	Log b 3	R 2
1. Rice = f(Rice P, GNPC)	5.432	-0.011	-0.112	-	0.04
2. Maize = f(Rice P, Maize P, GNPC)	4.957	0.565	1.017	-0.332	0.59
		(t = 0.5847)	(t = 1.320)	(t = -0.4269)	
3. Fish = f(Fish P, GNPC)	6.863	0.443 *	-0.506 **	-	0.29
		(t = 1.519)	(t = -2.774)		
4. Meat = f(Meat P, GNPC)	4.703	-1.175 **	0.147	-	0.36
		(t = -3.373)	(t = 0.4037)		
5. Eggs = f(Eggs P, GNPC)	-13.60	0.169	1.884 **	-	0.46
		(t = 0.8166)	(t = 6.031)		
6. Vegetables = f(Vegetables P, GNPC)	-6.087	- 0.282 **	1.204 **	-	066
		(t = 3.046)	(t = 6.031)		
7. Fruits = f(Fruit P, GNPC)	-1.127	1.258 **	0.518 *	-	0.54
		(t = 4.486)	(t = 1.469)		
8. Root Tubers = f(GNPC)	-6.643	1.225 ***	-	-	0.21
		(t = 2.386)			
9. Sugar = f(GNPC)	11.763	-1.096 ***	-	-	0.13
		(t = 1.763)			
10. Fats = f(GNPC)	-6.647	1.004 ***	-	-	0.18
		(t = 2.120)			
11. Milk = f(GNPC)	-3.778	0.843	-	-	0.07
		(t = 1.291)			
12. Beans = f(GNPC)	16.774	1.87703	-	-	0.06
		(t = 1.197)			
13. Others = f(GNPC)	2.433	0.040	-	-	0.00
		(t = 0.054			

Note: P= Price; GNPC= GNP per capita.
* Significant at 0.1.
** Significant at 0.01.
*** Significant at 0.05.

4.2 Projected food demand

Utilizing the regression coefficients presented in Table 4.1, the consumption of food groups/items was projected from 1994 to 2000 A.D. However, in cases where the correlation of food demand with the independent variables was weak, the average yearly increase or decrease in consumption of particular food group/item from 1970 to 1992 was used in the projection. This method was adopted to avoid sensitivity of the estimated demand to extreme values at both ends, i.e., 1970 and 1992.

The projected demand for each food group/item was estimated using the projected GNPC shown in Appendix 5 and the average annual increase in real price over 1970 to 1994. The average annual increase in real price was based on the moving average to take into consideration the wide fluctuations of prices within the period covered by the study. Based on an average annual growth of 0.04% in per capita consumption from 1970 to 1992, rice demand is projected to increase slightly per year, posting 6.18 million metric tons in 1994 and 7.08 million metric tons in the year 2000 (Table 4.2). Following the same method, maize consumption will be up by an average of 1.4% per year, from 1.09 million m.t. in 1994 to 1.2 million m.t. in 2000 A.D. although the average per capita consumption growth for 1970 to 1992 was -0.53%. Meat demand is seen to increase yearly by an average of 3.7%, 1.58 million m.t. in 1994 and 2.04 million m.t. in 2000 A.D. (using a double log demand equation). Milk consumption is expected to increase by an average of 5% annually, and eggs by an average of 2%. For fish, consumption will be down by an average of 0.15% per year, from 2.52 million m.t. in 1994 to 2.49 million m.t. in the year 2000.

Vegetable and fruit consumption is seen to increase significantly, by an average of 10% and 5.6% per year respectively, based on the regression coefficients presented in Table 4.1. Consumption of other food groups/items is expected to increase considerably within the same time frame.

Table 4.2 Projected food consumption, the Philippines, 1994 - 2000 (in thousand metric tons).

Year	Rice *	Maize *	Meat	Milk *	Eggs *	Fish	Vegetables	Fruits	Roots & Tubers *	Dried Beans Seed & Nuts *	Sugar *	Fats *	Others *
1994	6,181	1,092	1,585	2,071	3.33	2,521	1,995	4,309	1,554	670	1,665	405	2,068
1995	6,332	1,112	1,662	2,223	3.40	2,598	2,442	4,548	1,595	757	1,759	430	2,226
1996	6,481	1,132	1,712	2,340	3.47	2,605	2,632	4,843	1,637	856	1,857	456	2,393
1997	6,631	1,151	1,804	2,484	3.54	2,612	2,857	5,206	1,679	968	1,959	483	2,572
1998	6,780	1,165	1,881	2,686	3.61	2,564	3,164	5,539	1,722	1,092	2,066	511	2,762
1999	6,930	1,184	1,980	2,796	3.69	2,543	3,432	5,949	1,764	1,233	2,178	541	2,965
2000	7,080	1,202	2,043	2,965	3.76	2,495	3,874	6,319	1,807	1,391	2,294	572	3,182
Ave. Annual Increase (%)													
	1.96	1.38	3.69	3.82	2.04	-0.15	9.94	5.62	0.30	10.46	3.17	3.61	5.08

Note: Calculated using the regression coefficients presented in Table 4.1; or
* Calculated based on the average yearly increase (decrease) from 1970 to 1992.

4.3 Feed consumption

Commercial animal feeds in the Philippines mainly consist of maize and soybean meal. Other crops which are utilized as feeds (mostly in backyard livestock and poultry raising) are soybeans, cassava, sweet potato, taro and other root crops. Minimal amounts are supplied by soybeans (Table 4.3).

Demand for major feed ingredients (specifically soybean meal) was analyzed using their prices and volume of meat (including poultry) and eggs domestically produced as explanatory variables shown in Appendix 4. The demand analysis for fish and meat meals was not done as the utilization of these ingredients is minimal. Using the double log demand function, the results (Table 4.4) revealed that maize feed demand increased with the increase in the local production of meat and eggs. Milk production was not included as an independent variable, since local production of milk is minimal and has stagnated within the vicinity of 2000 m.t. annually. The Philippines is heavily dependent on imported milk for its dairy needs.

As to the sensitivity of maize feed demand in relation to its price, the response is negative. In the case of soybean oil meal, the demand reacted positively to the increase in meat/egg production, but negatively as its price increased. Conversely, the demand for cassava as feed tended to decrease as meat and egg production increased. The same behaviour was exhibited in relation to its own price and to the price of maize feed. The demand for other root crops likewise exhibited the same behaviour not to mention the effect of its own price.

4.4 Projected feed demand

As presented in Table 4.5, the demand for maize for feed is projected to increase by an average of 1% per year, from 3.81 million m.t. to 4.08 million m.t. by the close of the century. Soybean meal consumption is expected to grow by 2.7% per year on average, reaching 1.81 million m.t. by 2000 A. D. There is a tendency for cassava feed consumption to decrease, from 71,000 m.t. in 1994 to 56,000 m.t. in 2000 A.D. Likewise, other root crops consumption is seen to decrease by 1.7% per year. Based on the 57% average yearly increase in soybean feed consumption from 1987 to 1992, the demand for soybean feed will be up from 1,900 m.t. in 1994 to 28,700 m.t. by 2000 A.D.

Table 4.3 Consumption of major feeds in the Philippines, 1970 - 1992.

Year	Maize	Soybean	Soybean Meal	Cassava	Other Rootcrops *
1970	651	0	48.76	26.0	41.40
1971	671	0	47.96	25.5	39.30
1972	754	0	68.23	27.0	38.50
1973	684	0	32.98	30.0	43.90
1974	738	0	60.01	36.5	52.60
1975	832	0	40.62	38.7	51.0
1976	884	0	76.02	52.7	47.0
1977	1,123	0	95.64	88.6	57.6
1978	1,844	0	116.26	136.6	71.80
1979	1,833	0	113.74	122.4	66.10
1980	1,830	0	226.96	143.0	63.70
1981	1,977	0	243.92	139.0	63.37
1982	2,024	0	373.5	278.1	67.30
1983	1,880	0	274.7	173.2	49.80
1984	1,950	0	374.88	222.1	49.80
1985	2,318	0	255.78	253.5	47.31
1986	2,454	0	364.32	227.04	50.89
1987	2,396	0.15	400.73	70.93	34.40
1988	2,435	0.18	513.15	73.80	34.40
1989	2,618	0.34	538.84	72.35	34.72
1990	2,651	0.88	624.28	73.83	35.10
1991	2,673	1.30	593.04	71.28	35.10
1992	2,680	1.22	676.81	71.38	35.20

Source: Food Balance Sheets of the Philippines, 1978-1992.
* Sweet potato, taro and other root crops.

Table 4.4 Demand functions utilized for major feed ingredients, the Philippines.

Demand Functions	Estimated Coefficients using Double Log Equations				
	Log a	Log b 1	Log b 2	Log b 3	R 2
1. Maize = f(Maize P, Meat Q)	3.804	-2.023 *	0.554 *	-	0.73
		(t = 4.687)	(t = 1.615)		
2. SBOM = f(SBOM P, Meat Q)	-5.035	-1.841 *	1.582 **	-	0.77
		(t = -4.419)	(t = 2.634)		
3. Cassava = f(Meat Q, Cassava P, Maize P)	16.779	-1.968 *	-2.038 ***	-3.602 *	0.62
		(t = -3.089)	(t = -2.054)	(t = -4.706)	
4. Other Rootcrops = f(Maize P, Meat Q)	10.658	-0.678 *	-0.991 *	-	0.54
		(t = 2.622)	(t = -4.84)		

P = Price; Q = Local meat, poultry, and eggs production; SBOM = Soybean oilmeal.
* Significant at 0.1
** Significant at 0.01
*** Significant at 0.05

Table 4.5 Projected consumption of major feed ingredients in thousand metric tons, the Philippines, 1994-2000.

Year	Maize	Soybean Meal	Cassava	Other Rootcrops	Soybean*
1994	3,805	1,497	71	35	1.9
1995	3,843	1,548	68	34	3.0
1996	3,882	1,594	65	34	4.7
1997	3,921	1,646	62	33	7.4
1998	4,000	1,699	60	32	11.6
1999	4,040	1,753	58	32	18.2
2000	4,081	1,809	56	31	28.7
Annual growth (%)	1.01	2.74	-3.33	-1.72	59.35

Note: Calculated using the estimated regression coefficients presented in Table 4.3; or estimated using average yearly increase.

5. Demand and Market Potential of Upland Crop Products

This chapter focuses on four upland crops, namely maize, soybean, cassava, and banana. These four products play an important role in the country's agricultural economy by sharing 20% of the total value of agricultural crops in 1993, equivalent to US$ 1.33 billion. The area devoted to these crops covers 3.69 million hectares, representing 29% of the total agricultural crops area.

Maize is mainly utilized in livestock and poultry feed formulations, while soybean is generally used in food processing. Large volumes of soybean meal are imported to supply the needs of the livestock/poultry industry. Cassava is heavily utilized in starch manufacture for the domestic market, while fresh banana and processed products are among the major sources of foreign exchange earnings. A significant volume is consumed as food in fresh form by households.

This chapter covers the production, marketing, processing, utilization, demand projection, external trade performance, and problems/constraints in the industries vis-à-vis the four upland crop products under study.

5.1 Maize

Maize production in the Philippines accounts for only 1% of the world's total production. However, in the local scene, maize is the second most important agricultural crop in the country, next to rice, in terms of area planted and value of production. The area planted to maize showed an increasing trend from 1982 to 1990, but later decreased gradually in 1991 through 1993 (Table 5.1) partly due to the conversion of some rice/maize lands to housing subdivisions and industrial estates in Southern Luzon areas and shifting to other higher value crops, such as mango. The yield of maize, nevertheless, has been generally increasing due to improvement of productivity brought about by the government's maize production programs, in which high yielding variety seeds and other inputs are subsidized. Productivity was also enhanced through increased research and extension activities.

Table 5.1 Area planted, production and value of maize production, the Philippines, 1982-1993.

Year	Area Planted ('000 ha)	Production ('000 tons)	Yield	Value (US$ million)
1982	3,382.9	3,404.1	1.01	504.80
1983	3,132.0	3,134.1	1.00	387.68
1984	3,227.0	3,250.3	1.01	458.01
1985	3,510.9	3,862.8	1.10	572.38
1986	3,595.0	4,090.7	1.14	502.81
1987	3,682.6	4,287.1	1.16	592.13
1988	3,745.1	4,428.0	1.18	596.88
1989	3,689.2	4,522.2	1.22	578.41
1990	3,819.6	4,853.9	1.27	742.71
1991	3,589.5	4,655.0	1.30	696.81
1992	3,331.4	4,618.8	1.39	666.78
1993	3,149.3	4,798.0	1.36	796.63
Average (1989-1993)	3,515.8	4,689.6	1.18	696.27

Source: Philippine Statistical Yearbook, 1993 and 1994, National Census and Statistics Office, Manila, Philippines.

From 1989 through 1993, this commodity contributed an average of 8.6% or US$ 404 million to the total gross value added in agriculture at 1985 constant prices. In the same period, the area devoted to maize growing covered an average of 3.5 million hectares, representing 51% of the country's total grain area. Average annual production from 1989 to 1993 is placed at 4.7 million metric tons, valued at US$ 696.27 million.

The bulk of the country's maize is produced in Mindanao, the southernmost part of the Philippines. The major maize growing regions in the Philippines are Northern, Southern, and Central Mindanao which contribute 66% of the country's total maize production. These, together with the Cagayan Valley in Northern Luzon (Region II) are the top four maize-producing regions of the country.

5.1.1 Maize marketing

The marketing participants in the maize distribution system in the Philippines can be exemplified by those of Northern Mindanao. Typical of agricultural product marketing in the country, there are three main groups of intermediaries at the maize distribution level within the region. These are the grain traders, canvassers, and traders-shippers (Figure 5.1). The grain traders, classified according to scope of operation, are the barangay (village), municipal, and provincial traders. They supply the maize requirements of large traders, processors, and end users within the region (Quero et al. 1989). The grain traders offer the best maize prices to farmers in order to capture the largest portion of maize they can buy from the latter.

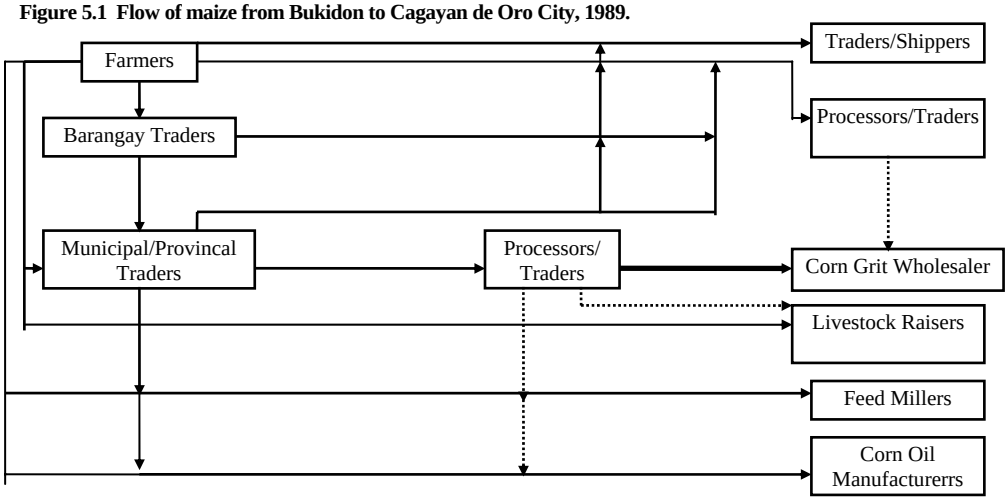
Each of the intermediaries in the maize distribution system in Northern Mindanao has a distinct or overlapping role. These traders are small market intermediaries residing in the villages, who buy maize from neighboring farmers and harvesters/traders and sell to large traders either within their municipality, province or in Cagayan de Oro (CDO) City.

The municipal traders are medium-large scale buyers of maize and other local agricultural commodities. Mostly based in the municipality's *poblacion* or town center. They usually buy maize either directly from farmers or through barangay traders in their own and/or the neighbouring municipalities. Most of them are also engaged in farming aside from operating other types of business, such as hardware store, grocery store, mill and/or agricultural supply store. A majority (80%) own trucks, used to pick up maize from the villages and transport it to Cagayan de Oro City.

With respect to provincial traders, they are large-scale intermediaries who pick up maize from municipalities throughout the province and transport it to Cagayan de Oro City. These are few in number and diverse in business interests. The intermediaries, known as canvassers are of two types, the small or part-timer and those who operate on a larger scale. The small-time canvassers meet traders coming from other municipalities of the province and lead them to the secondary traders who offer the best selling prices. Secondary traders are those who buy maize from farmers and other wholesalers. These traders (who may be barabgay, municipal or provincial traders) sell maize to large traders within their municipalities and or provinces or transport the commodity to Cagayan de Oro City. The larger-scale canvassers maintain a broad network of rural clientele serviced by price information system operating in Cagayan de Oro City.

The manner in which maize is transported from the production points in Mindanao to major trading centers can be illustrated by the case of Northern Mindanao. Based on a marketing study conducted in 1989 (Quero et al. ibid.), maize produced in Northern Mindanao was brought to its main trading center, Cagayan de Oro City. The commodity is transported by trucks from the farmers, either indirectly to CDO through various channels composed of the intermediate grain traders (i.e. barangay, municipal or provincial traders). The grain is also brought directly to CDO by the farmers themselves, by the trader/shippers and/or processors/traders/shippers based in CDO.

Figure 5.1 Flow of maize from Bukidon to Cagayan de Oro City, 1989.



Notes:

maize grits

yellow & white maize

mill by-products ("tik-tik", corn bran, etc.)

Cagayan de Oro shipped almost 53% of its marketable maize to Cebu Province (Central Visayas). Thirty-two percent was brought to Manila and 15% to other provinces in the Visayan region. Maize traded in the cities of General Santos, Cotabato and Davao (all in Region XI) is transported to Cebu, through secondary services which are marketing services provided by traders/shippers based in the cities' trading center for transporting maize to other areas such as Cebu and Manila. The flow of maize from Northern Mindanao to Manila and Cebu through types of maize traders to various users is shown in Figure 5.2.

Maize produced in Region II is brought to Manila through secondary traders.

5.1.2 Maize utilization

Maize is the secondary staple food of the country's poorer segment of the population. Eighteen percent of the total production, specifically the white maize, is used for direct human consumption (1989-1993). Cebu province, together with the other provinces of Central Visayas, is the center of demand for white maize, which is milled into maize grits and used as a staple food.

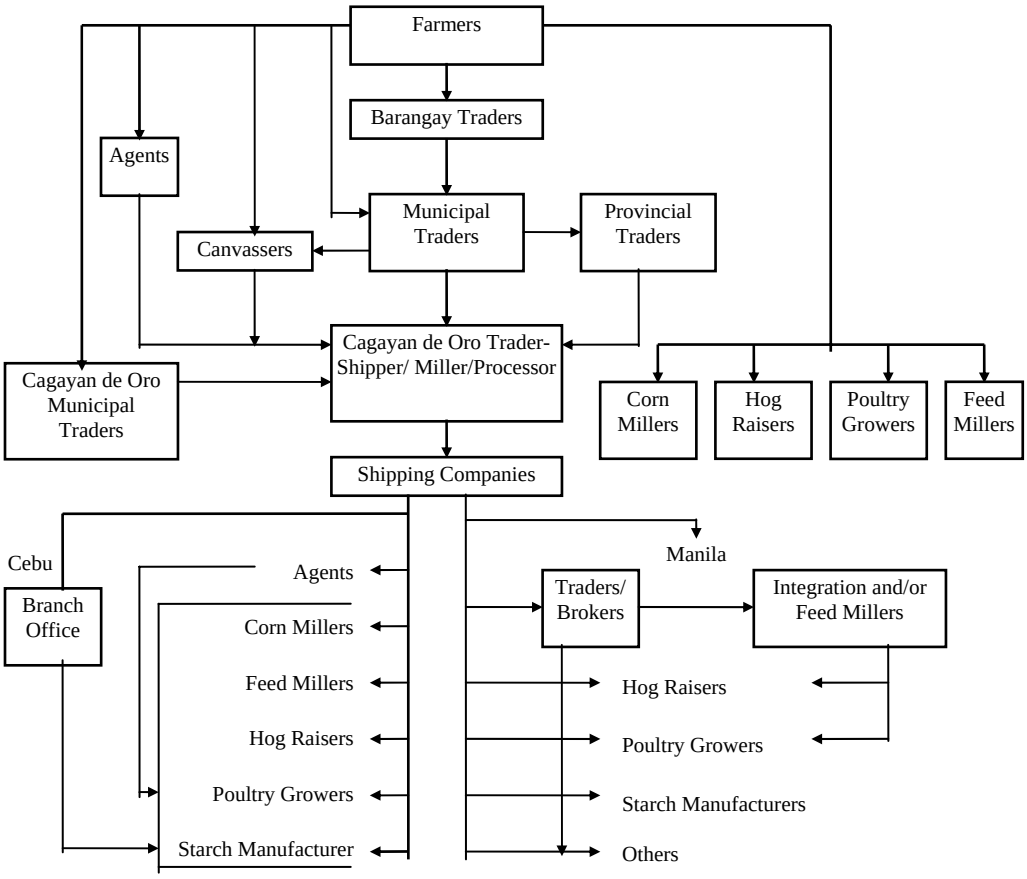
Yellow maize is mainly used in livestock and poultry feed formulation. The center of demand is Luzon, located at the northern part of the archipelago. The biggest users of yellow maize in the area are the feed millers who comprise two-thirds of the country's registered feed millers. These feed millers operate in Metro Manila and in its neighbouring regions of Central Luzon (Region III) and Southern Tagalog (Region IV). The second largest consumer of yellow maize is Cebu. Approximately, 10% of the total number of feed millers in the country are located in this province. These feed millers contributed 13% of the national mixed feed production.

5.1.3 Maize demand composition

The average annual domestic demand for maize in 1989 through 1993 averaged to 5.4 million metric tons (including imports) as shown in Table 5.2. Almost three-fourths, averaging 3.9 million metric tons goes to livestock and poultry feed formulation and waste. A yearly average of 974,700 tons of the maize national supply, particularly the white maize, is consumed as a staple largely in the southern parts of the country. A small portion of 8.5%, equivalent to 460,400 metric

tons, is processed into various food products and the rest, comprising 70,600 metric tons is utilized as seed.

Figure 5.2 Flow of maize from northern Mindanao to Manila and Cebu province by type and buyers location, 1989.



Source: Technical Report and Rapid Marketing Appraisal in the Northern Mindanao Region, 1989.

Table 5.2 Maize demand composition, 1989-1993.

Demand Composition	Annual Average Demand ('000 metric tons)	Share (%)
Feed (including waste)	3,900.00	72.14
Direct food	974.70	18.03
Processing	460.40	8.52
Seed	70.60	1.31
Total	5,405.73	100

Source: Bureau of Agricultural Statistics.

5.1.4 Maize processing

The 1993 survey of the Philippine Statistical Association (PSA) revealed that there are four main maize processing industries in the Philippines. These are feed manufacturing, wet milling, dry milling, and food manufacturing (Costalles 1995). Except for food manufacture, there are no clear

cut operations of these industries. About one-fourth of the firms engaged in dry milling were also engaged in feed manufacturing. On the other hand, about half of those engaged in wet milling were also in feed manufacture. This indicates that a proportion of these firms were engaged in the production of dual or multiple maize products. Dry milling is a process by which maize grain is cleaned, the endosperm ground into grits of various sizes, maize meal and/or flour with the germ processed into maize oil, whereas wet milling is a process by which maize is steeped in water, the endosperm separated from the germ, with starch extracted from the endosperm and oil from the germ.

Based on the PSA survey, 53% of the industrial maize grain went purely through feed manufacturing, while 15% went through the joint dry milling/feed manufacturing process (Table 5.3). Ten percent went through pure dry milling where maize grits are the main product with maize germ and maize gluten as other products. The proportion of the maize grain which went through the process of wet milling/feed milling was 8%, which approximated that of pure milling (10%). It was estimated that 75% of the total industrial maize grain went through the feed manufacturing activities of these joint process, and through pure feed manufacturing.

Table 5.3 Percentage of maize processed by types of activities, 1993.

Activities	Percentage
Feeds manufacturing	53
Joint dry milling/feed milling	15
Dry milling	10
Joint wet milling/feed milling	8
Wet milling	10
Food processing	4
Total	100

Source: 1993 Philippine Statistical Association Survey (Costales 1995).

In the wet milling process in the Philippines, the main product derived is starch. Maize oil, surprisingly, does not turn out to be a main product. The main by-products of wet milling are maize meal and maize gluten.

The use of maize grain in food manufacturing is relatively small with only 4% of industrial maize passing through the process. The main products are grits, maize chips, cornips, and canned maize. The main by-products are also maize meal and bran.

5.1.5 Projected demand for maize

The specific demand for maize by utilization was projected based on the regression coefficients presented in Appendix 6. In cases where the correlations between maize consumption and the independent variables utilized were not significant, either the simple linear regression or the demand growth rate covering 1970 to 1992, whichever was appropriate, was used in the projection. The simple linear regression analysis is shown in Appendix 7. The values of the projected demands were combined to arrive at an overall demand for maize in the Philippines.

As noted previously, maize feed use which accounts for the bulk of the total maize consumption is projected to increase by 1% yearly from 1994 to year 2000. The requirement for maize feed for the medium term is seen to grow from 3.81 million tons in 1994 to 4.08 million tons in 2000 A.D. (Table 5.4).

Although the per capita direct food consumption of maize, mainly white maize, decreased by 0.53% per year, the total maize food demand is projected to increase by 1.4% due to population increase, as presented previously.

Using a double log demand equation, the utilization of maize for processing is expected to increase by 7.6% annually from 368,000 tons in 1994 to 616,000 tons in 2000 A.D. An insignificant increase in seed requirement is expected over the period 1994-2000 as the area sown to maize has

not shown any significant expansion. The overall yearly growth in maize demand is estimated at 1.6% annually, from 5.34 million tons in 1994 to 5.98 million tons in the year 2000.

Table 5.4 Projected demand for maize by use ('000 t), 1994-2000.

Year	Direct Food*	Feed**	Processing**	Seed***	Total
1994	1,092	3,805	368	72	5,337
1995	1,112	3,843	389	73	5,417
1996	1,132	3,882	418	74	5,506
1997	1,151	3,921	454	74	5,600
1998	1,165	4,000	507	74	5,746
1999	1,194	4,040	556	75	5,865
2000	1,202	4,081	616	76	5,975
Annual growth (%)	1.39	1.01	7.64	0.78	1.63

* Estimated using average annual growth rate from 1970 to 1992.

** Estimated using double log demand equation based on the data presented in Appendices 8 and 9.

*** Estimated using the formula LnQ = a + bT, where Ln is natural log, Q is quantity demanded and T is time. Data used are shown in Table 5.5.

5.1.6 External trade performance of maize

The geographical imbalance in supply and demand for maize in the Philippines makes it more difficult to meet the timely requirements of the feed millers. The Philippines imports maize to augment its requirement, which fluctuates yearly. An average of 4.2% of its total maize demand was imported from 1989 to 1993, ranging from 176,000 metric tons to 643,000 tons (Table 5.5). The bulk of the imported maize came from the United States, which in 1993 supplied 98% of the total maize imports. As a policy until 1989, maize importation was left to the government to stabilize prices of the cereal paid by urban consumers and those paid to domestic maize farmers. The yearly pattern of maize importation was influenced by the decision of the NFA on the volume and timing of transactions. The agency had a monopoly on feedgrain importation prior to 1984 and from 1987 to 1989.

The volume of imports was determined by NFA after considering domestic demand and supply conditions in consultation with other government agencies. The imported feedgrains were then allocated to end-users by taking into account the volume requested by them, their actual needs and stock availability.

The government has reduced market intervention in the maize trade through the deregulation of feed grains importation since 1984. The licensing requirements of the NFA from the private feed millers and livestock raisers, however, limited the private sector's participation in the maize trade. Moreover, there was little interest on the part of the private sector, since importation permits were valid for only 60 days without any assurance of renewal.

Maize imports were again banned in 1986 to protect domestic producers, on the assumption that supply would adjust and respond to increased demand for feed maize. The maize import restriction in 1987 only allowed 50,000 tons of maize, way below the yearly average importation of 300,000 tons from 1980 to 1985.

The Philippine external trade scenario is expected to change with the implementation of the General Agreement on Tariff and Trade (GATT) which the government ratified in 1994. The GATT will lift quantitative restrictions (QRs) on all agricultural products (except rice). The removal of the QRs on maize, as well as on all agricultural products will be replaced with higher tariffs but to be phased down gradually to 3% within a 10 year period starting in 1994.

Table 5.5 Maize: supply and utilization accounts, the Philippines, calendar years 1978-1994 (thousand metric tons).

Year	Supply					Utilization			
	Beginning Stocks	Production	Import	Gross Supply	Export	Seed	Feed and Waste	Processing	Net Food Disposable
1978	277.00	3,073.00	106.00	3,536.00	0.00	64.00	2,002.30	464.70	1,005.00
1979	384.00	3,056.00	35.00	3,475.00	0.00	64.00	2,146.90	258.10	1,006.00
1980	258.00	3,058.00	250.00	3,558.00	0.00	64.00	2,270.40	226.60	1,005.00
1981	219.00	3,296.00	253.00	3,768.00	0.08	66.00	2,477.50	235.42	989.00
1982	236.00	3,404.00	341.00	3,981.00	0.01	68.00	2,655.30	263.69	994.00
1983	264.00	3,134.00	528.00	3,926.00	0.03	63.00	2,593.00	317.98	952.00
1984	319.00	3,250.00	182.00	3,751.00	0.11	64.00	2,555.70	181.30	950.00
1985	182.00	3,863.00	281.00	4,326.00	0.27	70.00	2,824.20	431.80	1,000.00
1986	431.00	4,091.00	0.20	4,522.00	0.14	72.00	3,358.20	241.00	850.80
1987	241.00	4,278.00	56.00	4,575.00	0.24	74.00	3,378.10	229.36	893.30
1988	230.00	4,428.00	25.00	4,683.00	0.07	75.00	3,457.40	293.13	857.40
1989	293.00	4,522.00	176.00	4,991.80	0.08	74.00	3,694.90	138.00	1,084.90
1990	138.00	4,854.00	348.00	5,340.40	0.09	76.00	3,814.60	601.50	847.90
1991	601.00	4,655.00	174.00	5,236.50	1.94	73.61	3,841.40	652.05	861.00
1992	461.30	4,618.76	401.00	5,255.20	0.04	66.60	3,982.20	460.92	971.30
1993	235.10	4,297.90	643.00	5,434.10	0.02	63.00	4,154.50	449.68	1,008.90

Source: Supply and Utilization Accounts for Selected Commodities, 1978-1991, 1992-1993, Bureau of Agricultural Statistics, Department of Agriculture.

5.1.7 Problems/constraints in the Philippine maize industry

Maize production in the Philippines in the past and at present has not kept pace with local demand. Although remarkable improvements in production have been achieved through various maize production programs, the country has not attained self-sufficiency in maize. The government participates, to a certain extent, in the marketing of maize to ensure a reasonable floor price to the producers, at the same time, maintaining a ceiling price of the commodity sold to retailers to protect the consumers from wide fluctuations in maize prices. The state-owned National Food Authority (NFA) buys about 6% to 10% of the country's total production.

The NFA buys maize from farmers at a support price which serves as the floor price at the farm level so that the farmers not sell maize to traders who would offer buying prices below the floor price. The objective of the NFA of maintaining a floor price for maize, however, has not been successful. The main beneficiary was the large maize producers and not the target group of small producers, many of whom could sell at most 2 to 3 tons of maize during each season (Daly 1992). While this scheme is still in place, the ceiling price policy, where the wholesale and retail prices of maize are set by the government, has been lifted and is only implemented during extreme cases such as in the event of a food crisis, as mentioned previously.

Another major constraint in the maize industry, which has major impact on prices of the commodity is the grossly inadequate infrastructure facilities available in the country. Farm-to-market roads are often non-existent and storage and marketing facilities are generally inadequate, resulting in large post-harvest grain losses (10% to 28%). Some improvements have been made in shipping maize from Mindanao to Manila and other parts of the country by allowing competition through the dismantling of shipping monopolies and restrictive regulations. This was done to facilitate the movement of commodities from Mindanao to various parts of the country and to minimize transaction costs. Maize, which was classified as a basic commodity, was elevated to a higher classification in which higher shipping rates were charged. Thus, maize was later given preference in terms of cargo space.

In spite of this, the lack of shipping space for maize, which is very bulky to handle, forces big traders/producers to charter tramper vessels to move the commodity from Mindanao to other parts of the country. Transport costs using trampers are negotiated between the operators and traders/producers and are usually higher than those of shipping liners. Furthermore, a day delay in loading maize is under penalty of demurrage.

In view of the foregoing, moving maize from Southern Mindanao to Central Luzon is more difficult and more expensive than importing maize from Thailand or from the US west coast. In the 1990 bumper crop harvest in Mindanao, a big proportion of maize was left rotting in the fields due to lack of storage facilities and high shipping cost in bringing the cereal to Metro Manila.

Other aggravating factors affecting improvements in the maize industry are the high cost of money due to the government's restrictive policy and low investment in maize research and development activities. The inadequacy of communication facilities reduces information flow regarding prices, supply, demand, and technology.

5.2 Soybean

The area devoted to soybean growing in the Philippines during the 1978-1991 period showed a decreasing trend. From 9,230 hectares in 1978, it dropped to 2,983 hectares in 1991 (Table 5.6). The soybean area, however, soared to 7,417 hectares in 1992 and later to 8,218 hectares in 1993. In the period 1989 to 1993, the country produced an annual average of 4,102 metric tons, representing only 8% of the total soybean requirement. Shortfalls in production are met by imported raw soybean, soybean meal, soybean oil, and soybean-based processed products. Significant volumes of soybean meal are imported, largely for the use of the livestock and poultry industries. Similarly, considerable volumes of soybean oil are imported for food and industrial uses.

Table 5.6 Area planted and volume of soybean production 1978 - 1993.

Year	Area (ha)	Production (metric tons)	Yield (tons/ha)
1978	9,230	7,099	0.77
1979	8,400	8,033	0.96
1980	9,580	8,392	0.98
1981	10,410	10,057	0.97
1982	10,900	11,466	1.05
1983	8,590	8,104	0.94
1984	7,740	7,618	0.98
1985	8,479	4,830	0.99
1986	6,860	6,487	0.95
1987	6,490	5,698	0.98
1988	6,946	5,934	0.85
1989	3,476	4,567	1.31
1990	4,054	4,946	1.22
1991	2,983	3,257	1.09
1992	7,417	3,686	0.50
1993	8,218	4,054	0.50

Source: Bureau of Agricultural Statistics, 1978-1985, 1990-1993; and Philippine Agri-business Factbook, 1986 - 1989.

Soybean production in 1993 was heavily concentrated in the Mindanao area, which contributed 91% of the total output. Southern Mindanao alone produced the bulk of the total national production, accounting for 85% (Table 5.7).

Table 5.7 Major soybean producing regions, the Philippines, 1993.

Region	Production (tons)	% Contribution
Southern Mindanao	3,437.83	85
Northern Mindanao	84.91	2
Central Mindanao	46.56	1
Central Visayas	59.80	1
Other Regions	424.60	11
Total	4,053.70	100

Source: Bureau of Agricultural Statistics.

A large proportion of the soybean area is covered by a contract growing scheme executed between farmers and Nestle, Philippines. This scheme is part of the company's long-term plan of developing indigenous raw materials for its expanding product lines. This is also in line with its involvement in the Philippine agricultural development program through continuous research aimed at developing and producing superior varieties of soybean which are made available to farmers at cost. The company also conducts other pertinent soybean research activities to generate appropriate farm technologies and further improve existing ones. These technologies are extended to farmers throughout the country through Nestle's field agronomists.

Dating back to the 1980s, Nestle's agricultural services went full-swing in 1989 when about 1,000 hectares of soybean farms tilled by 600 contract growers was covered by the contract growing scheme. In 1992, the area planted to soybean cultivated by 4,000 farmers increased to 5,000 hectares, comprising 71% of the country's total soybean hectarage. The farms are located in South Cotabato (in Southern Mindanao), Visayas, and Mindanao.

5.2.1 Soybean marketing

Soybean produced under the contract growing scheme is brought to buying stations set up by Nestle, strategically located near the production sites. The beans are shipped to Manila for processing into various food products. As to the rest of soybean produced, the farmers sold the bulk of their produce to middlemen. These middlemen were classified as wholesalers, assemblers, and wholesaler-retailers. The wholesalers played the dominant role by purchasing the bulk of the farmers' produce. They distributed their purchased volume to small processors and retailers (Figure 5.3). In some areas, the farmers brought the soybean directly to small processors and insignificant amounts were sold to consumers.

In the Mindanao area, the trading centers for soybean are General Santos City, Agusan and Butuan (all in Region XII). Soybean is transported to Manila (usually to the Divisoria market in Manila) and Cebu. The production in Region III and IV is sold to Metro Manila. In turn, Manila supplies the requirements of Regions I and II.

5.2.2 Soybean utilization

Soybean in the Philippines is mainly processed into various food products, where 97% or an annual average of 48,280 metric tons (1989-1993) was utilized for this purpose (Table 5.8). Small quantities averaging 3,880 tons annually for the same period, accounting for 8% of the total supply, went to feed and waste. Meager amounts, averaging 1,150 metric tons, were used as seed. To meet the needs of the livestock and poultry industries for feed formulations, soybean meal is heavily imported (Table 5.9). Soybean oil is also imported to supply the needs of the manufacturing sector in the production of various products.

Figure 5.3 Market flow of soybean, Negros Oriental, 1993.

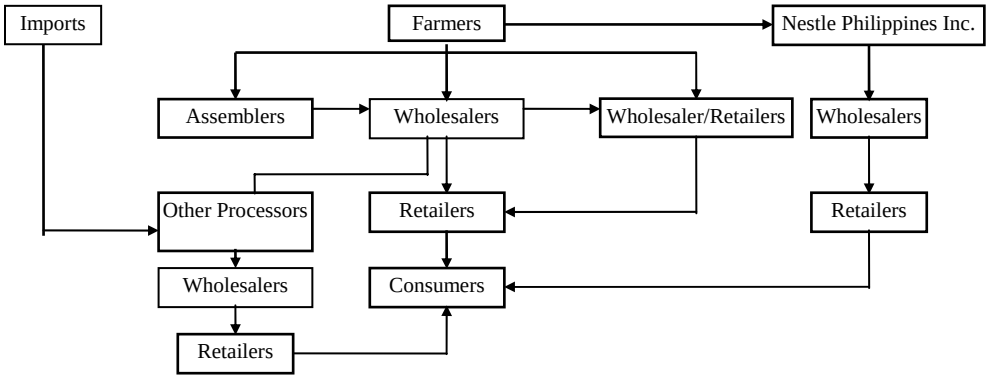


Table 5.8 Soybean demand composition, 1989-1993.

Demand Composition	Annual Average Demand ('000 tons)	% Share
Processing	48.28	91.03
Seed (including waste)	3.21	6.05
Feed	0.94	1.77
Export	0.61	1.15
Total	53.04	100

Source: Bureau of Agricultural Statistics.

Table 5.9 Soybeans: supply and utilization accounts, the Philippines, calendar years 1978-1993 (thousand metric tons).

	Supply				Utilization				
Year	Beginning Stocks	Production	Import	Gross Supply	Export	Seed and Waste	Feed and Waste	Processing	Net Food Disposable
1978	0.00	7.00	8.00	15.00	0.00	0	8.55	6.45	0.00
1979	0.00	8.00	12.00	20.00	0.11	0	10.32	9.54	0.03
1980	0.00	8.00	12.00	20.00	0.00	0	11.12	8.79	0.09
1981	0.00	9.00	20.00	29.00	0.20	0	5.89	22.73	0.18
1982	0.00	9.00	33.00	42.00	0.05	1	22.20	18.58	0.15
1983	0.00	7.00	32.00	39.00	0.02	1	19.15	19.76	0.07
1984	0.00	7.00	5.00	12.00	0.63	0	3.68	7.48	0.20
1985	0.00	8.00	6.00	14.00	1.00	0	15.81	3.06	0.25
1986	0.00	6.00	22.00	28.00	1.00	0	6.23	20.77	0.00
1987	0.00	7.00	10.00	17.00	1.00	0	0.26	15.74	0.00
1988	0.00	6.00	24.00	30.00	1.00	0	0.20	28.80	0.00
1989	0.00	4.57	29.00	33.57	0.04	1	1.04	31.49	0.00
1990	0.00	4.95	23.00	27.95	3.00	0.62	4.04	20.29	0.00
1991	0.00	3.25	63.69	66.94	0.00	1.49	4.49	60.96	0.00
1992	0.00	3.69	51.89	55.58	0.00	1.50	4.43	49.66	0.00
1993	0.00	4.05	61.57	65.62	0.00	-	5.38	60.24	0.00

Source: Supply and Utilization Accounts for Selected Commodities, 1978-1991, 1992-1993, Bureau of Agricultural Statistics; and Food Balance Sheets, 1978-1992 National Economic Development Authority.

5.2.3 Soybean processing

As part of its social responsibility, Nestle processes soybean into milk substitutes to enable the growing population to buy affordable protein-rich foods. Milk production in the Philippines is limited and costly, such that only the higher-income groups can afford to buy milk and milk products regularly. Soybean is also processed into baby food. Furthermore, soybean, particularly the

imported stock, is used in the production of cooking oil/shortening and various food products such as sauces, tausi (fermented soybean), curds, and snack foods, among others.

Imported soybean meal is mainly used in feed for livestock and poultry in the Philippines, owing to its high protein content and its lower price compared to fish meal and other available sources of protein. Soybean oil, on the other hand, is used in the manufacture of various food and industrial products.

5.2.4 Projected demand for soybean

Using a simple linear regression (refer to Table 5.9 for the basic data used), it is expected that the demand for soybean from local processors will be on the uptrend, where the annual growth is estimated at 9.4%. Future demand for processing will grow from 54,000 tons in 1994 to 101,000 tons in the year 2000 (Table 5.10). Growth in feed utilization will be on the rise, at 1,900 tons to 28,700 tons during this period (based on the 60% annual average growth rate covering 1970 to 1992). Soybean seed utilization will grow at 3.2% per year. Overall, total soybean demand is expected to reach 132.52 tons by year 2000, an overall annual growth of 12.5% for the period 1994-2000.

Soybean meal on the other hand is projected to grow at 2.7% annually, from 1.5 million tons in 1994 to 1.81 million tons by the year 2000 (Table 5.11). Soybean oil is projected to increase from 22,000 tons in 1994 to 29,270 tons by the year 2000.

Table 5.10 Projected demand for soybean by use, 1994-2000 (thousand tons).

Year	Processing*	Seed**	Feed***	Total
1994	54	2.26	1.9	58.16
1995	60	2.34	3.0	65.34
1996	66	2.43	4.7	73.13
1997	74	2.52	7.4	83.92
1998	82	2.62	11.6	96.22
1999	91	2.72	18.2	111.92
2000	101	2.82	28.7	132.52
Annual growth (%)	9.36	3.21	59.75	12.49

* Calculated using the formula LnQ = a + bT based on the data in Table 5.9.

** Calculated using compounded growth rate based on the data exhibited in Table 5.9.

*** Based on the average annual growth rate covering 1970-1992.

Table 5.11 Projected demand for soybean meal and soybean oil, the Philippines, 1994-2000 (thousand tons).

Year	Soybean meal*	Soybean Oil**
1994	1,497	21.92
1995	1,548	23.15
1996	1,594	24.37
1997	1,646	25.60
1998	1,699	26.82
1999	1,753	28.05
2000	1,809	29.27
Annual growth (%)	2.74	4.22

* Calculated using double log demand equation.

** Calculated using growth rate.

5.2.5 External trade performance of soybean

The level of soybean production in the Philippines is very low, necessitating heavy importation of soybean and soybean meal for the manufacture of soya-based food and livestock and poultry feeds. Local production of soybean averaged 4,102 metric tons (for the 1989-1993 period) annually, representing only 8% of the total domestic requirement. There has been a considerable overall increase in the importation of soybean as shown in Table 5.9.

Soybean importation was monopolized by NFA until 1985. The heaviest importation made by the agency was in 1981 through 1983. In 1986, importation of this commodity was left to the private sector, in line with the government's program of institutionalizing major policy reforms in external and domestic trade, which included liberalization. Trade liberalization in soybean, as well as in all products, was viewed as a positive step towards correcting price distortions and fostering efficiency in industries involved in processing using imported raw materials.

There has been an increase in the importation of soybean, soybean meal, and soybean oil. As shown in Table 5.9, soybean imports in 1978 to 1993 fluctuated, from a low of 5,000 tons in 1984 to a high of 64,000 tons in 1991.

Soybean imports in 1993 amounted to 61,567 metric tons. As shown in Table 5.12, 85% of the imports, equivalent to 52,509 metric tons was supplied by the U.S. A considerable amount of 5,690 tons was imported from the People's Republic of China and the rest from various soybean exporting countries.

Table 5.12 Volume of soybean imports by country of origin, 1993.

Country	Volume ('000 tons)	% share
United States	52.51	85.29
People's Republic of China	5.69	9.24
Hongkong	1.54	2.51
Others	1.83	2.96
Total	61.57	100

Source: Foreign Trade Statistics, 1993.

Table 5.13 Volume and value of soybean meal and soybean oil imports, 1978 - 1993.

	Soybean meal				Soybean Oil	
Year	Feed Use	Food Use ('000 tons)	Total	Value (F.O.B. US$ million)	Volume ('000 tons)	Value (F.O.B. US$ million)
1978	116.26	0.033	116.29	23.81	1.58	1.05
1979	113.74	0.01	113.74	22.48	3.52	2.44
1980	226.96	0.014	226.97	52.37	7.71	5.32
1981	243.92	0.029	243.95	62.40	5.96	9.32
1982	373.50	0.030	373.53	78.65	5.66	3.44
1983	274.70	0.031	274.73	59.91	10.33	5.95
1984	374.88	nil	374.88	81.92	5.39	4.37
1985	255.78	-	255.78	35.56	9.87	3.27
1986	364.32	-	364.32	64.91	9.66	4.77
1987	400.93	0.019	400.75	70.36	11.17	4.41
1988	513.15	0.009	513.16	111.18	16.91	9.49
1989	538.84	0.001	538.84	122.20	20.93	12.30
1990	624.28	-	624.28	126.79	21.61	13.31
1991	593.04	0.186	593.23	110.55	19.93	12.28
1992	676.81	-	676.81	129.66	18.32	10.49
1993	822.63	0.027	822.66	174.63	15.50	9.07

Source: Foreign Trade Statistics, 1978 - 1993.

Soybean meal had been imported for decades, reaching a peak in 1993, of 822,660 metric tons, valued at US$ 174.63 million (Table 5.13). The increasing local requirement for soybean meal stems from the significant growth of the livestock and poultry industry, brought about by the infusion of improved breeding stock and utilization of soybean which is the best cheap source of protein for feed formulations (Lumanta 1992).

Soybean meal imports primarily came from the U.S. and India, which in 1993 supplied 45% and 40%, respectively (Table 5.14). Significant amounts came from Brazil and the People's Republic of China.

Table 5.14 Volume of soybean meal importation by country of origin, 1993.

Country	Volume ('000 tons)	% share
United States	370.35	45.02
India	329.68	40.08
Brazil	70.04	8.51
People's Republic of China	49.19	5.98
Others	3.37	0.41
Total	822.63	100

Source: Foreign Trade Statistics 1993.

Aside from soybean and soybean meal, 15,500 metric tons of soybean oil were imported in 1993. In 1993, more than half (54%) of the import of soybean oil came from Malaysia. A significant amount (36%) was imported from Singapore (Foreign Trade Statistics 1993), and from Taiwan and the U.S. Small quantities of salted and fermented soybean, curd, paste and soy-based products such as soy sauce and hypoallergenic soy food were imported. Similarly, small quantities of these products were exported by the Philippines.

The importation of soybean has been left to the private sector since 1986, in line with the government's program of institutionalizing major policy reforms in external and domestic trade, which includes liberalization. Trade liberalization in soybean, as well as in all products, was viewed as a positive step towards correcting price distortions and fostering efficiency in industries involved in processing using imported raw materials.

5.2.6 Problems in the soybean industry

A national soybean program was implemented in 1976 to boost domestic production, covering suitable areas in the country. However, growing soybean was not so profitable since the yield was too low, not even reaching 1 ton per hectare on the average. Aside from this, locally grown soybean could not compete with imported soybean which was priced much lower in the market. As the bulk of local soybean is produced in Mindanao, the high cost of shipping soybean to Luzon jacks up the price of the commodity in the latter area. Soybean growing diminished as it was cheaper to buy imported soybean. While there is merit in relying heavily on imported soybean, especially meal, which is the primary source of protein for livestock and poultry feeds, the Philippines is placed in a precarious position during times of scarcity in major supplying countries. For instance, the drought that occurred in the Midwestern United States in 1989 which significantly reduced the production of soybean meal (not to mention maize) adversely affected the supply and prices of soybean in the Philippines (Lumanta 1992). The unfavourable effect could have been lessened, if not avoided, if the commodity were not scarce in the domestic market. Furthermore, the timing of importation is crucial and delays in the transit of imported materials created problems to the livestock and poultry sub-sectors. These developments ultimately affected the supply and prices of meat and meat by-products (Lumanta 1992).

To reduce the heavy dependence on imported soybean, the Philippines embarked on the Accelerated Soybean Production and Utilization Program (ASPUP) in 1993. ASPUP is being implemented in regions II, III, X, and XI, with possible expansion to other regions. Aside from

strengthening local soybean production and utilization, the program aims to increase income and employment opportunities in the rural sector and to increase the availability of protein-rich food to solve malnutrition problems.

5.3 Cassava

Cassava in the Philippines is usually planted in backyards or in mixed farming systems by small farmers and is generally utilized as a food supplement or prepared into native delicacies such as *suman* (grated cassava added with sugar and coconut milk, wrapped in banana leaf, then boiled), cake, and other snack items. Significant volumes are processed into starch. A number of large cassava plantations are also operated, mainly for starch manufacture and animal feed formulation in some major cassava growing regions of the country. There are no readily available data on the area of plantation-type cassava farms.

The area planted to cassava in 1982 through 1993 stagnated within the vicinity of 200,000 hectares (Table 5.15). Production ranged from 1.49 million tons in 1984 to 1.86 million tons in 1988. The cassava farm areas represented only 1.6% of the total area cultivated to agricultural food crops in 1989 to 1993. Cassava contributed only 3% of the total volume of agricultural food crops production.

Yield of the crop is low averaging 8.7 tons per hectare in 1989 through 1993, as small cassava farms are operated on marginal lands with minimal inputs. In commercial plantations, however, cassava yields 19.2 tons per hectare, or as high as 40 tons under ideal conditions.

Table 5.15 Area planted to cassava, volume and value of production, 1982-1993.

Year	Area planted ('000 ha)	Share in total area planted to food crops area (%)	Yield (t/ha.)	Production ('000 t)	Value (US$ million)
1982	203.4	1.56	7.52	1,530.6	
1983	175.5	1.42	6.56	1,151.9	67.93
1984	201.5	1.60	7.40	1,491.1	89.39
1985	204.6	1.57	8.24	1,686.7	105.54
1986	211.4	1.59	8.16	1,724.1	103.94
1987	209.7	1.61	8.51	1,784.3	90.24
1988	217.1	1.65	8.59	1,865.9	108.07
1989	213.1	1.62	8.67	1,846.9	124.04
1990	213.8	1.63	8.67	1,854.0	142.24
1991	211.0	1.82	8.60	1,815.7	140.05
1992	204.3	1.63	8.74	1,784.9	123.35
1993	211.4	1.72	8.72	1,844.2	138.06
Average (1989-1993)	210.7	1.64	8.68	1,829.1	

Source: Bureau of Agricultural Statistics.

Central Mindanao led in cassava production, with an output of 672,553 tons in 1990. This was followed by Western Mindanao and Bicol (Region V), which contributed 352,610 tons and 263,026 tons, respectively. Central Visayas contributed a sizeable share of 167,460 tons (Table 5.16).

Table 5.16 Area, production and yield of cassava in the Philippines, 1993.

Region	Area harvested (ha)	Production (tons)	Yield (t/ha)
Philippines	2,138,000	1,853,979	8.7
Car	280	2,364	8.4
Ilocos Region	1,800	10,729	6.0
Cagayan Valley	440	1,421	3.2
Central Luzon	1,360	8,583	6.3
Southern Tagalog	10,240	63,087	6.2
Bicol	32,120	263,026	8.2
Western Visayas	9,900	50,772	5.1
Central Visayas	20,410	167,460	8.2
Western Visayas	26,840	97,883	3.6
Western Mindanao	52,100	352,610	6.8
Northern Mindanao	15,520	118,285	7.6
Southern Mindanao	7,730	45,256	5.9
Central Mindanao	35,070	672,553	19.2

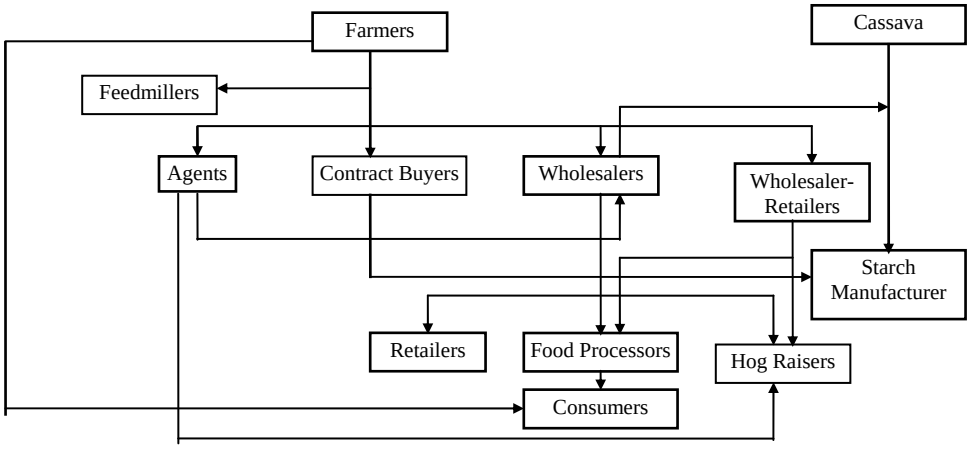
Source: Statistics on Selected Major Crops, 1981-1990, Bureau of Agricultural Statistics.

5.3.1 Cassava marketing

Few studies have been conducted on the marketing of cassava in the country. Based on a study undertaken in the late 1970s, cassava farmers sold their produce to several outlets, namely agents, contract buyers, wholesalers, wholesaler-retailers; financier-wholesalers, retailers, feed millers, and consumers (Figure 5.4). The quantities of their purchases varied from one place to another, depending on the volumes of cassava available for sale.

Farmers sold to middlemen who could offer them better options such as higher price, advance payments or pick-up purchases. Some farmers sold to middlemen who have been their regular buyers, others to any available outlet.

Figure 5.4 Market flow of cassava, the Philippines, 1993.



Source: Cabanilla 1988.

The middlemen engaged in cassava marketing also bought from other intermediaries aside from the farmers. Most of the root crops were procured within the geographical area where the middlemen were operating. The outlets of these middlemen were other middlemen, starch manufacturers, food processors, hog raisers, and other end users.

5.3.2 Cassava utilization

The largest consumers of cassava were the starch manufacturers which utilized an average of 1.4 million metric tons yearly in 1989 to 1993 (as reflected in Table 5.17), accounting for 78% of the national cassava production. For the same period, 16% or an average 288,000 tons was consumed as direct food, while some 109,000 tons per year went to feed and waste (Table 5.18).

Table 5.17 Cassava: supply and utilization accounts, the Philippines, calendar years 1978-1993 (thousand metric tons).

Year	Supply				Utilization				
	Beginning Stocks	Production	Import	Gross Supply	Export	Seed	Feed and Waste	Processing	Net Food Disposable
1978	0.00	1,716.00	0.00	1,716.00	0.05	0.00	103.00	1,442.00	171.00
1979	0.00	1,787.00	0.09	1,787.00	0.00	0.00	107.00	1,501.00	179.00
1980	0.00	1,742.00	0.05	1,742.00	0.14	0.00	105.00	1,463.00	174.00
1981	0.00	1,681.00	0.06	1,681.00	0.06	0.00	101.00	1,412.00	168.00
1982	0.00	1,531.00	0.00	1,531.00	0.20	0.00	92.00	1,240.00	199.00
1983	0.00	1,152.00	0.00	1,152.00	11.00	0.00	69.00	878.00	194.00
1984	0.00	1,492.00	0.00	1,492.00	0.08	0.00	89.00	1,090.00	313.00
1985	0.00	1,687.00	0.00	1,687.00	0.27	0.00	101.00	1,265.00	321.00
1986	0.00	1,724.00	0.00	1,724.00	11.00	0.00	103.00	1,285.00	325.00
1987	0.00	1,784.00	0.00	1,784.00	11.00	0.00	107.00	1,332.00	334.00
1988	0.00	1,866.00	0.00	1,866.00	21.00	0.00	111.00	1,384.00	350.00
1989	0.00	1,847.00	0.00	1,847.00	20.00	0.00	110.00	1,370.00	347.00
1990	0.00	1,854.00	0.00	1,854.00	8.00	0.00	11.00	1,458.00	277.00
1991	0.00	1,815.00	0.00	1,815.00	33.80	0.00	108.90	1,405.00	267.68
1992	0.00	1,784.00	0.00	1,784.00	0.30	0.00	107.00	1,406.00	270.51
1993	0.00	1,844.17	0.00	1,844.17	0.42	0.00	110.06	1,456.78	277.46
1994	0.00	1,843.37							

Source: Supply and Utilization Accounts for Selected Commodities, 1978-1991, 1992-1993, Bureau of Agricultural Statistics, Department of Agriculture.

There have been efforts by the government to prop up the utilization of cassava in the country to increase farmers' incomes. Attempts were made to use cassava in feed mixed with other ingredients to meet the nutritional requirements of livestock and poultry. This has been done successfully by a farmers' feed milling cooperative in Leyte, in Eastern Visayas, but the use of this root crop on a national scale has not been convincing. There is still high preference for the use of maize in feed formulation since utilizing cassava in combination with other ingredients, particularly soybean, costs more as it involves more time and labour in processing cassava into feed. Moreover, the feed millers prefer to use maize as there is no grade standard for cassava in the market.

Cassava is utilized extensively as a feed ingredient on a commercial scale in other countries, particularly Europe. Hence, using this root crop for commercial feed formulations in the Philippines on a large scale could also be feasible. However the economic viability of using cassava as feed would depend on the relative prices of maize and soybean meal. The government could play a crucial role in expanding the utilization of cassava in feed, through, for instance, adjustments in the tariff rates on imported maize and soybean meal.

Table 5.18 Cassava demand composition, 1989-1993.

Demand Composition	Annual Average Quantity ('000 tons)	% Share
Processing	1,419.16	78.13
Direct food	287.90	15.85
Feed (including waste)	109.39	6.02
Total	1,816.45	100

Source: Bureau of Agricultural Statistics.

5.3.3 Projected demand for Cassava

An estimation of demand for cassava for processing using the double log equation was tried, but the result showed an insignificant correlation with independent variables used (GNPC and own price). Adopting the compounded annual growth (based on the data presented in Table 5.17), cassava for processing is projected to increase slightly from 1.48 million tons to 1.51 million tons in the year 2000 (Table 5.19). Using a double log demand equation, the per capita direct consumption of cassava is placed at 3.6 kilograms in 1994 and is projected to grow to 43.8 kilograms by year 2000, accruing from the increase in GNPC (refer to Appendices 8 and 9 for the basic data). Since the 43.8 kilograms per capita per year projection seems doubtful (following the cassava consumption trend from 1982 to 1992 shown in Appendix 9), the simple linear regression using time as the independent variable was adopted instead. Hence, the demand for direct food consumption for 1994 is expected to increase by about 3.7% from 361,000 metric tons to 466,000 metric tons in 2000 A. D. Utilization of cassava for feed will decrease from 71,000 tons in 1994 to 56,000 tons during the same period. Overall, cassava consumption will increase by less than 1% per year from 1.91 million metric tons to 2.04 million metric tons during the seven-year period under study.

Table 5.19 Projected demand for cassava by use, 1994-2000 (thousand tons).

Year	Processing*	Direct Food**	Feed and Waste**	Total
1994	1,475	361	71	1,907
1995	1,483	377	68	1,928
1996	1,490	393	65	1,948
1997	1,497	410	62	1,969
1998	1,503	428	60	1,991
1999	1,508	447	58	2,013
2000	1,513	466	56	2,035
Annual growth (%)	0.36	3.71	-3.33	0.93

* Estimated using the average annual growth covering 1970 to 1992.

** Estimated using the formula $LnQ = a + bT$, based on the data in Appendix 14.

5.3.4 Cassava processing

There are 13 registered cassava starch manufacturers operating in major cassava producing areas of the country. Based on the Food Balance Sheet data covering 1990 to 1992, an average of 241,740 metric tons of starch and flour are produced yearly. Forty-eight percent of starch produced is utilized in food industries and 52% in non-food industries (Appendix 10). As food, starch is utilized as a food binder and further processed into coffee creamer and various snack items. As non-food, it is used in the glucose manufacture and in plywood, paper and other industries.

5.3.5 External trade performance of cassava

The country is self-sufficient in cassava and was able to export considerable amounts from 1983 to 1991 in fresh and pellet forms. Annual cassava shipments to the world market ranged from

50 kilograms in 1978 to 33,734 tons in 1991 (Table 5.17). However, in 1992, the volume of exports dropped to 300 tons, and increased slightly to 420 tons the following year due to the decreases in production and increasing domestic demand. Insignificant quantities of cassava flour and meal were also shipped abroad.

5.3.6 Problems/constraints in the cassava industry

Production of cassava involves small patches of scattered landholdings, usually making it difficult to regularly supply the feed millers. The dispersed farms and their far distances from the demand center push marketing costs higher than normal. Other problems encountered in cassava marketing are the lack of farm-to-market roads or bad condition of the roads, low farm-gate prices, lack of standard scale units, limited number of buyers, and lack of price and market information.

The growth of the country's cassava industry is constrained by the closing of land frontiers in 1970, compounded by area competition with other agricultural crops. It is only by improving productivity that the cassava industry could expand considerably.

The development of cassava and of other root crops is handled by the Philippine Rootcrops Research and Training Center (PRCRTC), established by the government in 1977. The PRCRTC conducts research and extension activities on the major root crops growing regions of the country. These activities cover varietal improvement, pest and disease control and other areas aimed at addressing major problems in cassava growing. To promote production, the Center undertakes other activities covering post-harvest handling and storage technologies, product diversification and design of processing machines and equipment geared towards encouraging investment in root crop-based business activities.

The high protection rates given to domestic fertilizer manufacturers resulted in a high cost of fertilizer, preventing farmers from using the recommended rates of fertilization. The minimal application of fertilizer ultimately results in low productivity, thus limiting cassava output. The impact of the fertilizer subsidy granted by the government on crops, including cassava through exemption of imported fertilizer grades from 5% duty, starting in 1993, remains to be seen.

5.4 Banana

The Philippines is the world's third largest banana producer, after India and Brazil. In 1992, it produced 8% of the world's banana production of 49.63 million metric tons (Table 5.20). The area planted to the crop in the country has been gradually increasing, from 283,000 hectares in 1982 to 325,800 hectares in 1993. Banana production, however, fluctuated from a low of 2.91 million tons to a high of 3.36 million tons (Table 5.21). The value of the average annual production for 1989 to 1993 ranged from US$ 225.7 million to US$ 406.30 million.

Table 5.20 World's leading banana producers, 1992.

Country	Production ('000 tons)	% Contribution
India	7,000	14
Brazil	5,650	11
Philippines	3,900	8
Ecuador	3,600	7
Indonesia	2,500	5
Other countries	26,980	55
Total	49,630	100

Source: FAO Production Yearbook 1992.

Table 5.21 Area planted to banana, volume and value of production, 1982-1993.

Year	Area ('000 hectares)	Quantity ('000 tons)	Value (US$ million)
1982	282.6	3,364.3	289.35
1983	277.7	3,015.7	284.59
1984	285.7	3,058.3	279.55
1985	289.8	3,127.1	275.25
1986	292.7	3,192.6	251.93
1987	298.9	3,157.4	234.92
1988	294.6	3,007.3	225.70
1989	295.5	3,190.3	230.42
1990	300.2	2,913.2	297.60
1991	311.3	2,951.1	347.77
1992	321.4	3,059.2	406.30
1993	325.8	3,110.2	404.04
Average (1982-1993)	310.7	3,044.8	337.23

Source: Philippine Statistics Yearbook 1994.

Like most agricultural products, the bulk of banana production comes from Mindanao which produced 70% of the national output in 1993. Southern Mindanao led by contributing 41% to the country's total production. The rest of the total production was shared by the different areas of the Visayas and Luzon (Table 5.22).

Table 5.22 Banana production in the Philippines by region, 1993.

Region	'000 tons	% Contribution
Southern Mindanao	1,246	41
Central Mindanao	285	9
Caraga (in Mindanao)	273	9
Northern Mindanao	197	6
ARMM*	154	5
Western Visayas	235	8
Southern Luzon	158	5
Other regions	521	17
Total	3,069	100

Source: Bureau of Agricultural Statistics.
* Autonomous Region of Muslim Mindanao.

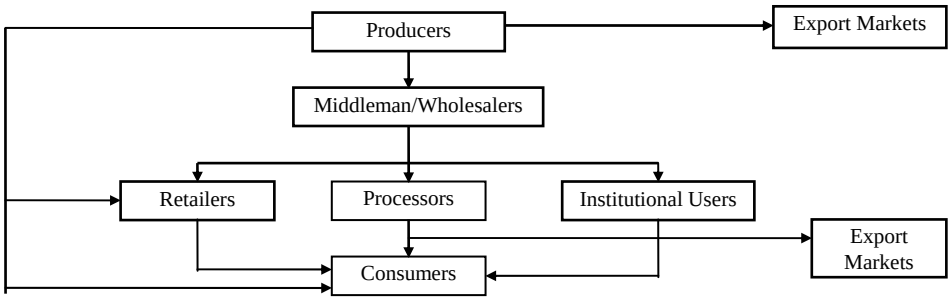
Large banana plantations in the Philippines are operated by five transnational corporations and 20 local companies. These corporations/companies, which are members of the Philippine Banana Growers and Exporters Association are given area allocations by the government for banana growing. In 1990, the allocated areas totalled to 24,260 hectares, but the actual planted area was only 18,357 hectares as three of the local companies ceased operation. Most of the planted areas were below the authorized area. In 1990, a combined banana production of 775,401 tons was produced from these plantations. This constituted 27% of the national banana production for that year.

5.4.1 Banana marketing

The marketing of bananas in the country involves many key participants. The local market for fresh banana is dominated by several middlemen and traders. These are composed of contract buyers, assembler-wholesalers, wholesalers, wholesaler-retailers, retailers, and processors (Figure 5.5). The assemblers, wholesalers, and retailers predominate in the banana trade in the Philippines. As to the middlemen's manner of transaction, the assemblers purchase the farmers' produce, usually in small quantities. Since they shoulder the cost of assembling and transporting, they usually dictate

the farmgate prices. The farmers prefer to sell their harvest to the middlemen as their volumes of production are small, rather than incur added cost in transporting their produce to the market. This system is prevalent in small scale and backyard banana production. The products, which may be graded, are sold at much higher prices to wholesalers by the assemblers. The assemblers are the contract buyers for the wholesalers.

Figure 5.5 Generalized Domestic Marketing Channels for Banana, Philippines, 1988.



Source: Valmayor 1988.

Aside from buying produce from assemblers, the wholesalers purchase directly from farmers, in some cases. The transactions between these two middlemen are often bound by buying contracts. The wholesalers provide cash advances to assemblers who negotiate, assemble, pack, and transport the commodity. As the marketing system involves many key players, competitive pricing is the main procurement strategy used by big growers. The wholesalers, aside from selling bananas to retailers and processors, also sell to institutional users such as hotels, restaurants, and supermarkets.

The retailers, who are generally the final link in bringing the produce to the consumers, procure directly from the farmers-assemblers, and wholesalers. They sell the produce in small quantities and bear the bulk of post-harvest losses.

5.4.2 Utilization and processing of banana

The share of banana utilization by users was estimated, using the banana supply and utilization accounts prepared by the Bureau of Agricultural Statistics (Table 5.23). Of the average production of the commodity covering 1989 to 1993, 31% went to the export market, while 26% was directly consumed (Table 5.24). A considerable amount (24%) was processed into banana chips and other banana products, while 19% went to feed and waste. Other major food products derived from banana are banana catsup and baby food, which contribute a fair share each in the food market. Minor products are canned banana slices mixed with other fruits, jam, jelly, wine and vinegar.

Table 5.23 Banana: supply and utilization accounts, the Philippines, calendar years 1978-1993 (thousand metric tons).

	Supply				Utilization				
Year	Beginning Stocks	Production	Import	Gross Supply	Export	Seed	Feed and Waste	Processing	Net Food Disposable
1978	0.00	2,961.00	0.00	2,961.00	778.00	0.00	593.00	740.00	850.00
1979	0.00	3,069.00	0.00	3,069.00	859.00	0.00	614.00	767.00	829.00
1980	0.00	3,283.00	0.00	3,283.00	923.00	0.00	657.00	821.00	882.00
1981	0.00	3,201.00	0.00	3,201.00	868.00	0.00	640.00	880.00	813.00
1982	0.00	3,364.00	0.00	3,364.00	927.00	0.00	673.00	841.00	923.00
1983	0.00	3,016.00	0.00	3,016.00	643.00	0.00	603.00	754.00	1,016.00
1984	0.00	3,058.00	0.00	3,058.00	800.00	0.00	612.00	765.00	881.00
1985	0.00	3,127.00	0.00	3,127.00	789.00	0.00	625.00	782.00	931.00
1986	0.00	3,193.00	0.00	3,193.00	856.00	0.00	638.00	798.00	901.00
1987	0.00	3,157.00	0.00	3,157.00	775.00	0.00	631.00	789.00	962.00
1988	0.00	3,067.00	0.00	3,067.00	867.00	0.00	613.00	768.00	819.00
1989	0.00	3,190.00	0.00	3,190.00	851.00	0.00	638.00	797.00	904.00
1990	0.00	2,913.00	0.00	2,913.00	781.00	0.00	582.00	728.00	763.00
1991	0.00	2,951.00	0.00	2,951.00	840.00	0.00	590.00	737.75	628.00
1992	0.00	3,059.24	0.00	3,059.24	995.00	0.00	559.00	783.00	895.00
1993	0.00	3,068.99	0.00	3,068.99	1,153.47	0.00	560.00	562.00	793.00
1994		3,202.14							

Source: Supply and Utilization Accounts for Selected Commodities, 1978-1991,1992-1994, Bureau of Agricultural Statistics; Food Balance Sheet of the Philippines, 1990-1992, NEDA.

Table 5.24 Demand composition of banana by use, 1989-1993.

Demand Composition	Annual Average Demand ('000 metric tons)	% Share
Direct food	796.6	26.24
Processing	721.7	23.77
Feed (including waste)	585.8	19.29
Export	932.3	30.70
Total	3,036.4	100

Source: Bureau of Agricultural Statistics.

Table 5.25 Projected demand for banana by use, 1994-2000* (thousand metric tons).

Year	Direct Food*	Processing*	Feed & Waste**	Total
1994	577	906	581	2,064
1995	701	956	578	2,235
1996	884	1,007	574	2,465
1997	1,197	1,094	570	2,861
1998	1,825	1,187	563	3,575
1999	2,517	1,288	560	4,365
2000	3,759	1,397	556	5,712
Annual growth (%)	30.70	6.38	-0.63	15.65

** Calculated using double log demand equations.

** Estimated using the formula LnQ = a + bT. (Regression analysis is presented in Appendix 8).

5.4.3 Projected demand for banana

The demand for banana for direct food consumption and for processing was projected using double log demand equations, based on the data exhibited in Appendices 8 and 9. Utilizing the regression coefficients shown in Appendix 6, banana food demand in fresh form is expected to increase significantly from 577,000 metric tons in 1994 to 3.76 million metric tons in the year 2000, an increase of 31% annually (Table 5.25). The increase in banana direct food consumption could be attributed to a rise in demand, in view of the increases in GNPC and the Philippine population. The average annual increase in the real price of banana, however, was minimal (based on the moving average from 1970 to 1994). The demand for food processing is expected at 906,000 metric tons in

1994 and to grow to 1.4 million metric tons in 2000 A.D. The utilization of banana as feed and waste is expected to decrease slightly. The total demand for banana is projected at 2.06 million metric tons in 1994 to 5.7 million metric tons in the year 2000, registering an increase of 16% per year.

5.4.4 External trade performance of banana

Banana is one of the Philippines' top agricultural exports. In 1993, fresh bananas ranked 8th among the top principal earners (including non-agricultural products). The value of exports was then placed at US$ 226 million (F.O.B.).

The Philippines' first shipment of banana to the Japanese market in 1962 gave impetus to a robust banana industry, trouncing the large suppliers from Latin America. Endowed with natural tropical resources suited for banana growing and located close to the lucrative Japanese market for banana, local growers were able to deliver the best bananas to Japanese consumers. Philippine bananas, since then, swamped the Japanese market, capturing the lion's share of 80-90% of its total banana imports.

Over the last decade the export trend of the Philippine bananas to the world market was marked with ups and downs as shown in Figure 5.6. But in 1993, export dramatically increased to 1,153,000 tons, posting an increase of 40% over the previous year (Table 5.26).

Philippine bananas are exported to 14 countries, led by Japan which imported 65% of the total local banana exports in 1993, equivalent to 745,337 m.t. This was followed by the United Arab Emirates with an importation of 155,068 tons, representing 13%. Other countries with considerable amounts of import were South Korea, Saudi Arabia, Hongkong, and Kuwait (Table 5.27).

Figure 5.6 Export trade of fresh bananas, 1978-1993.

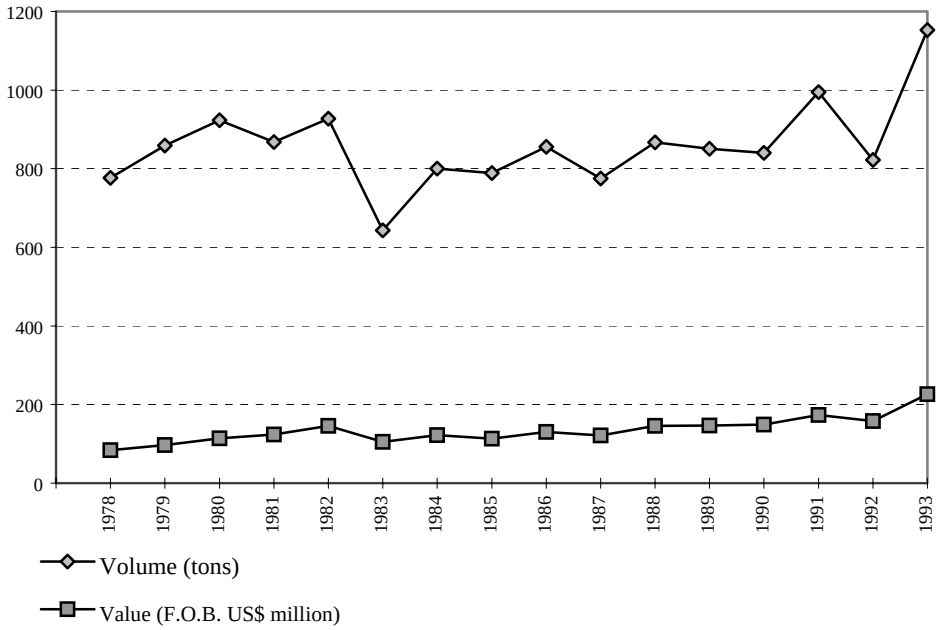


Table 5.26 Export of fresh bananas Philippines 1978-1993.

Year	Volume (tons)	Value (F.O.B. US$ million)
1978	777	84.13
1979	859	96.68
1980	923	114.18
1981	868	124.02
1982	927	146.11
1983	643	104.72
1984	800	122.26
1985	789	113.49
1986	856	130.22
1987	775	121.24
1988	867	146.01
1989	851	146.19
1990	840	149.28
1991	995	173.00
1992	822	157.73
1993	1,153	226.07

Table 5.27 Volume of Philippine banana export by country of destination, 1993.

Country	Volume ('000 tons)	Percent Share
Japan	745,337	64.62
United Arab Emirates	155,118.68	13.45
South Korea	105,068.04	9.11
Saudi Arabia	80,912.74	7.01
Hongkong	40,025.10	3.47
Kuwait	7,770.12	1.16
Others	19,236.20	1.18
Total	1,153,468.20	100

Source: Foreign Trade Statistics 1993.

5.4.5 Problems/constraints in the banana industry

The hectarage devoted to banana growing was limited to 21,000 hectares by the government in 1973 but later increased to 26,250 in 1979. The aim of this limitation was to promote the industry by preventing gluts in the banana world market in which the Philippines was deemed to have price influence. The limitation shut out new firms and incremental investments in the export banana industry. The restriction limits competition, leading to the market's inability to naturally select the more efficient from competitive group of existing firms.

The hectarage limitation restricted banana export expansion, thus preventing the country from taking advantage of opportunities in the world market. This led to a decline in the country's market share in the banana world market. During the 1982-1989 period, the country's market share in the banana export market declined by 1.4% while world demand grew by 3% (Table 5.28). The Philippines could have got a share in the expanding world market, if there were no hectarage limitation on the growing of export bananas. The restriction was contrary to what it intended to attain for the country (De la Pena 1993). The Philippines shared only 10 to 13% of world banana exports over the 7-year period under review. The actual area planted by the companies in 1990 was short of the area allocations given by the government. This could be an indication that banana export was not so lucrative compared to the cultivation of other crops grown by these companies, such as pineapple and other fruit crops.

Another problem in the banana industry is pests and disease infestation which significantly reduces yield. As the use of chemicals to minimize the destruction of insects and fungi is too expensive, producers adopt proper cultural practices to contain the problem, as well as to prevent the widespread incidence of diseases. The cultural practices adopted by producers, such as proper seed

selection, paring and treatment, regular removal of leaf sheaths, digging up and drying up of old corms, etc. are added production costs, which obviously push up the farm gate prices of bananas.

As in the other crop sub-sectors, the other major problems in the banana industry are the inadequacy of farm to market roads and post-harvest technologies. This significantly increases post-harvest losses considering the high perishability of the fruit. Another problem is the high cost of shipping bananas from Mindanao to Manila for processing.

Table 5.28 Philippine export share in the banana world market, selected years, 1982-1989, (in thousand metric tons).

Year	World Imports	Philippine Total Exports	Share in World Market
1982	6,759.71	926.88	13.71
1985	7,132.44	855.75	11.06
1989	8,225.96	839.78	10.34
% Growth rate (1982-1989)	2.84	-1.40	

Source: FAO Trade Yearbook, 1983, 1986, and 1990; and Philippine Trade Statistics, 1982-1989.

6. Emerging Products and Markets

The promotion of agricultural crop production in the Philippines is undertaken by the Agri-business Division of the Department of Agriculture (DA). This division introduces agri-business opportunities to farmers to promote enterpreneurship in agriculture. The DA's Market Information Division, on the other hand, facilitates product marketing by bringing the producers and buyers together. It also disseminates market information through a computer network.

The two divisions are assisted by the Agri-Business System Assistance Program (ASAP). ASAP is a joint undertaking of the DA and the United States Agency for International Development (USAID). An ad hoc organization, which was initiated by the DA's Bureau of Agricultural Research (BAR) for the commercialization of available technologies, ASAP was established in 1992 and will end in 1996. It maintains a special fund which provides counterpart funding to private entities for various activities, namely:

- policy research on agri-business issues and reform advocacy,
- technology transfer and training,
- product promotion, and
- other market development activities.

Export promotion of agricultural products is enhanced by ASAP in collaboration with the Center for International Trade Expositions and Missions (CITEM) of the Department of Trade and Industry (DTI).

6.1 The cut flower industry

Cut flowers are among the high value crops given priority attention by the government in its medium term development plan. Before the government promoted cut flower production, many farmers had shifted to cut flower growing or planted cut flowers in a mixed production system, since it is more profitable than the cultivation of crops they had traditionally grown. The cut flower industry in the Philippines, once a backyard hobby, has been becoming a promising money-making business, with full potential for growth. The steady growth of the cut flower industry is evidenced by the increasing number of major producing provinces in the main islands, namely, Luzon, Visayas, and Mindanao. In 1990 alone, the number of cooperatives dealing in cut flowers swelled by 70%. On a national scale, the area planted to cut flower production increased to 966 hectares in 1993 from 846 hectares in 1989 (Table 6.1). In 1992, production increased by 26% over the previous period, and a further 14% in 1993.

Table 6.1 Area harvested and volume of production of cut flowers, Philippines, 1989-1993.

Year	Area Harvested (hectares)	Production* (dozen spikes)
1989	846	3,122,896
1990	845	3,098,256
1991	897	2,757,825
1992	900	3,465,223
1993	966	3,959,406

Source: Bureau of Agricultural Statistics.

* Includes anthurium, orchids, roses, chrysanthemum, gladiola, daisies, baby's breath, azucena, aster, and statice.

Cut flowers possess high potential as a non-traditional export product with ready markets. Taking into consideration backyard cut flower production, the quantity of production in 8 leading provinces alone registered a total of 8.52 million spikes. The breakdown of the aggregate production, by species, is presented in Table 6.2.

Table 6.2 Production of cut flowers by species, 1994.

Cut flower Species	Production* (dozen spikes)
Orchids (dendrobium and vanda))	375,000
Anthurium	766,000
Roses	5,800,000
Chrysanthemum	814,000
Gladiola	768,000

Source: Philippine Daily Inquirer, April 6, 1995, Manila.
* Includes selected provinces only.

6.1.1 Foreign demand for cut flowers

Exports of cut flower in 1989 through 1993 increased rapidly, posting a 539% increase over the period. From US$ 73,079 in 1989, the value of exports grew to US$ 611,117 in 1993, as shown in Table 6.3. In 1993, 96% of the cut flower exports were shipped to Japan. Small quantities were exported to Hongkong, Taiwan, South Korea, Finland, Netherlands, United Arab Emirates, Singapore, and Guam (Foreign Trade Statistics 1993).

Table 6.3 Volume and value of cut flowers exports 1989-1993.

Year	Volume (metric tons)	Growth (%)	Value (F.O.B. US$)
1989	19.88	-	73,079
1990	32.94	65.69	174,712*
1991	29.47	-10.53	141,765
1992	50.48	71.29	340,589
1993	126.97	151.52	611,117

Source: Foreign Trade Statistics, 1989-1993, NCSO.
* Includes dried flowers.

6.1.2 Domestic demand for cut flowers

The domestic market for cut flowers also has high potential since supply is always short of the demand during the peak months of May and November. In 1992, sale of flowers in Manila and Cebu alone reached 9.36 million dozen spikes, where the biggest consumers were institutional buyers, particularly hotels and banks. The country has to import flowers from Thailand, Malaysia, and Germany to meet the domestic requirement. Importation registered US$ 47,192 in 1991, a significant growth from US$ 1,338 in 1989.

The country's cut flower industry is perceived to develop into a viable industry as it is able to respond to the increasing demand in both the foreign and domestic markets for the following reasons:

- ideal climate conditions which range from tropical to semi-tropical temperatures, making it possible to raise a variety of horticulture crops, which in temperate countries require intensive capital to maintain greenhouses and controlled environments;
- cheap and trainable labour is easily available;
- strategic location of the Philippines: its proximity to the Asia-Pacific market where the major importing countries include Japan, Hongkong, Australia, and Singapore;
- land availability with a wide range of altitudes to choose from; and
- high biodiversity of indigenous plants that have yet to be developed.

6.1.3 Problems in the cut flower industry

The Philippine cut flower industry, although painted as a rosy business, is marred by a number of problems. Foremost among these are the high import duties and restrictive government regulations specifically imposed on planting materials. Further growth of the industry will depend greatly on the availability of additional good quality planting stocks that can be secured from neighbouring countries. The productivity of cut flowers is adversely affected by the deteriorated varieties used by growers. Rose and chrysanthemum growers have been cultivating the same planting stocks for the past two and a half decades. This problem is worsened by a complicated system of import and export procedures. The perishability of cut flowers has not yet been well considered by customs officials, especially for shipments arriving outside regular office hours. Another problem is the limited and inappropriate post-harvest technologies and facilities used by growers/traders which result in huge losses.

The industry is also adversely affected by the perennial problem of inadequate and insufficient infrastructure and transportation facilities, which delays deliveries of flowers from the point of origin to the destination. Unfortunately, cut flowers are the main crop for the wet season where unpaved roads are in their worst condition. Another problem is the lack of technical capabilities among growers in the proper diagnosis and control of plant pests and diseases, which hampers productivity.

Market information is also inadequate, so that growers usually have to depend on traders for information on prices. Hence, traders control the prices. Information on preferred varieties and quantity needed by the market is also inadequate. Although some of the necessary information is available, often it comes too late. Other major constraints are limited access to credit, lack of new technology, and inadequacy of planting materials.

6.1.4 Addressing the problems of the cut flower industry

There is no collaborative effort between the government and private sector aimed at promoting the cut flower industry. It is necessary that the government lay down policies conducive to the cut flower industry's growth while the private sector provides the needed information for policy-making. The high tariff rates and freight charges are too restrictive, and it is essential to expedite the processing of shipment documents at the airport.

A more effective market information system covering proper cultural management of the plants, post-harvest handling technologies/practices, and market demand in both local and foreign markets should be installed. The lack of proper coordination among concerned government agencies in generating and disseminating data on prices at all market levels should be given attention. The intensification of research and implementation of development programs with the participation of both government and private institutions is necessary. As to credit schemes, the loan packages offered by the state-owned Land Bank of the Philippines should be further expanded, especially those short-term credits with low interest rates.

The government, together with the private sector, constantly provides technical training and marketing assistance. This helped in priming the cut flower industry to meet world demand in terms of efficiency, quantity and quality. But there is still a lot of work to be done to overcome the difficulties encountered in the industry as stated earlier. The government should give support in terms of expediting customs procedures, and provision of marketing and production techniques, among others.

6.2 Processed ubi

Ubi or yam, prepared into jams or sweets, is one of the country's favorite delicacies. The purple variety of yam (*Dioscorea alata*) is most preferred by consumers due to its attractive color and good taste although its binding property is low. Aside from being prepared into sweets, it is processed into puree or powder. When powdered, it has a shelf life of two years. Ubi is the largest selling flavoring in the local ice cream market. The biggest ice cream company in the Philippines uses ubi as flavoring for 60% of its local ice cream production. Ubi products are mostly sold in upper class and tourist markets. Orders for ubi products from foreign markets, including ubi-flavored ice cream, are increasing.

6.2.1 Production of ubi

The area planted to ubi from 1989 to 1993 averaged 4,656 hectares In 1991, the area planted to ubi almost doubled to 5,335 metric tons from that of the previous year, which could have been brought about by increasing demand in the export market. The country's total production during the 1989-1990 period rose, from 22,357 metric tons in 1989 to 26,572 metric tons in 1993 (Table 6.4). Production in 1990, however, declined slightly by 2.4% from the previous year, arising from the effect of a drought which hit the country that year. Most of the yam in 1993 was produced in Central Visayas, which is known to produce the best quality yam in the Philippines. Other regions with considerable volumes of production are the Cordillera Autonomous Region, Bicol, Eastern Visayas, Northern Mindanao, Southern Mindanao and Central Visayas (Table 6.5). These areas contributed a combined production of 6,265 metric tons in 1993, representing 24% of the total output.

Table 6.4 Area planted to yam (ubi) and volume of production, 1989-1993.

Year	Area (hectares)	Production (metric tons)
1989	3,565	22,357
1990	3,588	21,824
1991	5,335	25,468
1992	5,315	24,856
1993	5,475	26,572
Average	4,565	24,215
Annual compounded growth (%)	8.96	3.51

Source: Bureau of Agricultural Statistics.

6.2.2 Price of ubi

In 1993 and 1994 the processing companies bought ubi at a price ranging from 36.70 to 51.38 cents per kilogram, depending on the season of the year. During lean months (March to October), the buying price by processors went as high as 55.04 cents per kilo. Retail prices in the predominantly ubi-producing area in 1994 varied from 34.62 to 50 cents per kilo, which was slightly lower than the Manila price of 50 to 62 cents per kilo, for the ordinary purple variety.

6.2.3 Domestic demand for ubi

Ubi is mainly consumed as food, accounting for 85% of the total gross supply. Ten percent is used for seed while 5% goes to feed and waste. The biggest buyers of ubi in the domestic market are the food manufacturers which process the root crop into powder or puree to supply the requirements of the ice cream companies. Other ice cream producers are direct buyers of the root crops.

There are no national data on the requirement for ubi by big processors and ice cream makers. The volume required is apparently large as indicated by the volume required by the biggest food processing company in the Philippines. The volume of ubi required by this company is 1,000 to 5,000 metric tons per year which is mainly used for ice cream flavoring. Individual households are also substantial consumers of ubi products.

Table 6.5 Yam (ubi) production by region, 1993.

Region	Production (metric tons)	Share of Total Production (%)
Cordillera Administrative Region (CAR)	1,042	3.92
Ilocos	41	0.15
Cagayan Valley	72	0.27
Central Luzon	49	0.18
Southern Luzon	499	1.88
Bicol	572	2.15
Western Visayas	1,220	4.59
Central Visayas	19,479	73.31
Eastern Visayas	864	3.25
Western Mindanao	165	0.62
Northern Mindanao	1,050	3.99
Southern Mindanao	618	2.33
Central Mindanao	890	3.35
Total	26,572	100

Source: Bureau of Agricultural Statistics.

6.2.4 Export markets for ubi

Ubi was introduced into the export market in 1990. The export of ubi started when processors adopted storage and processing techniques developed by PRCRTC. Ubi, in fresh, dried and powdered forms is now exported to 27 countries. The major buyers in 1993 were the United States and Canada, which imported 76% and 13% respectively of the total export. The rest was shipped to Australia, Japan, and other countries in Asia and the Pacific, Europe and the Middle East. There is a growing demand from abroad for ubi products, which the ubi exporters can barely meet. As shown in Table 6.6, exports of fresh and dried ubi for 1990 to 1993 averaged 98 metric tons annually. Exports of processed ubi amounted to 39 metric tons per year on average. These amounts of yam exports are not too high, but the growing interest in the foreign markets for the products signals a bright market potential for ubi.

Table 6.6 Export of yam (ubi) products, 1990-1993 (tons).

Year	Fresh and Dried	Value (F.O.B. US$)	Powder/ Meal	Value (F.O.B. US$)
1990	101.78	192,150	20.36	126,453
1991	78.72	151,222	20.97	143,886
1992	88.22	168,524	91.27	143,617
1993	122.15	238,178	23.67	160,654
Average	97.72	187,718	39.07	103,529

Source: Foreign Trade Statistics, 1990-1993 Manila, Philippines.

6.2.5 Problems/constraints in the ubi industry

The ubi industry has the potential to develop fully, owing to the product's aroma and delicious taste which appeal to both domestic and international consumers' palates. However, there are many problems facing the industry which should be addressed immediately to propel its development. For one, technology transfer on ubi growing should be accelerated as many farmers practice extremely poor production and management systems. There is also a need to step up research and development activities with a focus on the production of quality planting materials and on post-harvest technologies to minimize post-harvest losses. Equally important is the establishment of nurseries to increase the supply of viable planting materials which has always been limited and costly. Productivity should also be improved to increase farmers' income and volume of output.

Another problem encountered by ubi farmers is the seasonality of production which peaks only from November to February, resulting in wide fluctuation in price. The government should give farmers' access to post-harvest facilities and encourage them to venture into semi-processing of ubi to prolong its shelf-life, thereby minimizing price fluctuations and post production losses.

6.3 Fresh young coconuts

The Philippine coconut industry occupies a prominent position in the agricultural sector, next to maize, in terms of value of production which is placed at an annual average of P20.5 billion equivalent to US$ 810.42 million in 1989 to 1993 (Appendix 11). However, the area planted to coconuts has been diminishing (Table 6.7) because of (i) the insufficiency of supply of coconut high-yielding varieties for replanting, (ii) the peace and order situation which has deteriorated in some areas of the country, and (iii) implementation of the land reform program in which landowners are obliged to sell some areas of land to their tenants, retaining only 7 hectares. These dampened the farmers' initiative to plant or rehabilitate their coconut farms. Nevertheless, the rehabilitation of coconut farms is still a priority in the development agenda of the government for the medium term.

Various products used for food and non-food manufacture are derived from coconuts. In the Philippines, coconuts are generally processed into cooking oil/shortening and into raw materials for the manufacture of soaps, shampoos and other detergents. As traditional exports, the dominant products are coconut oil, copra cake/meal and desiccated coconut. These coconut products combined lead the country's agricultural exports. In 1993, the value of coconut product exports reached US$ 486.65 million (F.O.B.) as shown in Appendix 12.

Table 6.7 Area planted, volume and value of coconut production, 1989-1993.

Year	Area (hectares)	Quantity ('000 tons)	Value (US$ million)
1982	3,203.7	13,145.7	718.10
1983	3,201.3	12,368.3	729.30
1984	3,222.9	11,737.6	723.18
1985	3,270.3	12,827.8	952.29
1986	3,284.0	14,334.9	599.49
1987	3,251.6	13,730.5	727.79
1988	3,221.8	12,481.8	912.51
1989	3,221.8	12,481.8	884.26
1990	3,110.4	11,810.4	920.61
1991	3,112.0	11,940.4	669.43
1992	3,093.3	11,290.9	732.35
1993	3,076.7	11,404.9	845.43

Source: Philippine Statistical Yearbook 1993 and 1994.

6.3.1 Export markets for young coconuts

Fresh young coconuts from the Philippines were first shipped to foreign markets in 1991, when 1.9 million nuts worth US$ 1.1 million (F.O.B.) were sold (Table 6.8). These were exported to nine countries. The quantity of young nut exports reached 2.7 million pieces in 1992, but slid to 2.4 million pieces in 1993.

Table 6.8 Volume and value of exports of fresh young coconuts, 1991-1993.

Year	Volume ('000 Pieces)	Value (F.O.B. US$)
1991	1,925.30	1,108,760
1992	2,673.96	1,502,924
1993	2,433.12	1,332,272

Source: Foreign Trade Statistics 1991-1993.

In 1993, fresh young coconuts were exported to eight countries, primarily to Taiwan which imported 1.78 million pieces. Japan was the second biggest buyer, importing a considerable share of 19%, equivalent to 454,690 pieces (Table 6.9). The United Sates and South Korea imported 96,390 pieces and 79,800 pieces, respectively. Small quantities went to the United Arab Emirates, Canada, Thailand, and Guam.

Table 6.9 Philippine exports of fresh young coconuts by country of destination, 1993.

Country	Quantity (thousand pieces)	% share
Taiwan	1,782.67	73.27
Japan	454.69	18.69
United States	96.39	3.96
South Korea	79.8	3.29
Others	19.39	0.79
Total	2,433.12	100

Source: Foreign Trade Statistics, 1993.

Young coconuts are exported before the pulp has developed, when they are six months old. The foreign demand started in 1991 when Taiwan placed orders for the nuts, which were consumed for their water or juice. Coconut water was established to have rejuvenating and medicinal properties. It was found to have a very high vitamin E content and to prevent and control gallstones.

One advantage of selling young coconuts is that it takes a shorter period for them to be converted into cash and they command higher prices than mature nuts. In the province of Batangas (in Southern Luzon), for example, young coconuts fetch a farmgate price of P3.00 (11.54 cents) per piece, while mature ones are sold at roughly P1.00 per piece (3.84 cents). The coconuts are mostly bought by traders.

There is little problem in exporting young coconuts, except that the farmers have to meet quality standards strictly required by the importers. The quality standards cover regularity of size and shape and freedom from blemishes.

7. Successful and Failed Production/Market Promotion Attempts

The case studies present six selected products, three successful attempts (banana chips, processed mango and soursop) and three failed attempts (fresh mango, papaya, and passion fruit). These case studies focus on production (for fresh fruits), market performance, and on the reasons for their success or failure in export and local markets.

Information on these products was gathered from production statistics prepared by the Bureau of Agricultural Statistics, foreign trade statistics of the National Statistics Coordination Board (NSCB), and other publications. Some of this information was validated through interviews with a number of farmers, processors, traders, and government personnel knowledgeable on the products, who were also the source of other relevant information.

The shipment of non-traditional products gained momentum in the 1970s when the government provided incentives aimed at promoting the export of agricultural and industrial products. The incentives included technical assistance (research, training, and consultancy) to producers/exporters and lowering of tariff rates on raw materials and on machinery and equipment used in the manufacture of export products. To further encourage production for the export market, an export levy of 4% imposed on all export products was abolished in 1986. Moreover, primary agriculture and export products were exempted from payment of the 10% value added tax implemented in 1993.

7.1 Banana chips

In the Philippines, plantain the or cooking variety of banana, which accounts for 40% of the country's total banana production, is largely processed into banana chips, catsup, dried bananas and flour aside from boiling or frying it for snack. The most common banana products are the chips and catsup.

Table 7.1 Volume and value of banana chips exports, 1978-1993.

Year	Volume (metric tons)	Value (F.O.B. US$)
1978	886.31	2,130,008
1979	1,510.07	4,814,961
1980	3,718.78	8,362,317
1981	6,181.03	6,206,820
1982	4,877.44	6,177,899
1983	5,988.62	7,177,899
1984	8,113.06	10,108,011
1985	9,276.02	10,125,576
1986	11,380.66	9,634,510
1987	10,380.66	9,129,062
1988	15,135.87	15,739,486
1989	12,985.64	12,708,366
1990	10,218.85	10,482,806
1991	13,649.48	15,485,800
1992	12,230.94	13,820,294
1993	14,922.74	14,639,467

Source: Foreign Trade Statistics, 1978-1993.

7.1.1 Export trade in banana chips

Banana chips are among the country's non-traditional exports which gained a foothold in the export market in the 1980s. They are consumed as a snack and as breakfast food. This product made an impressive performance in the export market when the volume of shipments rose significantly from 1978 to 1981, posting an increment ranging from 66% to 146% annually. The volume of exports, nevertheless, dropped by 21% in 1984, but continued an upward trend except in 1987, 1989, 1990, and 1992 (Table 7.1). For the period 1989 to 1993, banana chip exports averaged 12,802 metric tons annually, valued at $ 13.4 million. In 1993, the chips were exported to 38 countries around the world. The biggest importer was the United States, which imported 5,222 metric tons or 35% of the country's total banana chip exports in 1993 (Table 7.2). The United Kingdom and Northern Ireland followed next with combined purchases of 1,864 tons representing 12%. Germany, Hongkong, and Japan imported significant quantities, ranging from 1,328 tons to 1,560 tons.

Table 7.2 Volume of exports of banana chips by country of destination, the Philippines, 1993.

Country	Volume (metric tons)	% share
United States	5,221.93	34.99
United Kingdom & Northern Ireland	1,864.03	12.49
Germany	1,599.13	10.72
Hongkong	1,568.37	10.51
Japan	1,327.75	8.90
Others	3,341.53	22.39
Total	14,922.74	22.39

Source: Foreign Trade Statistics, 1993.

7.1.2 Problems encountered with banana chips

There are 16 major banana chip processors, most of which are also engaged in the processing of other exportable agricultural food commodities. The processing plants are mostly located in Metro Manila close to Manila's international shipping port where cargo and container shipping facilities are available. Although a number of processors have branches in Mindanao and/or in the Visayas, they were left idle. Processors prefer to operate in Luzon. In spite of the fact that the prices of bananas in Mindanao are lower (8.46 to 8.85 cents/piece), compared to those in Luzon (13.46 cents), the high cost of shipping bananas to the latter island ultimately makes their prices higher. The processing of bananas in Mindanao or in the Visayas and exporting the finished products to Manila is constrained by inadequate shipping facilities in those areas. This poses a limitation to increasing the volume of banana chip production for the expanding foreign demand.

One apprehension faced by the processors is the increasing price of sugar used in chip sweetening, which had risen by $7.69 to $9.62 per 50 kilogram bag. This is compounded by the high cost of cartons used as packaging material. The high tariffs imposed on the input components used in the manufacture of packaging materials, which is meant to protect domestic producers, increase the prices of the export products. Packaging materials constitute 20% to 50% of the total price of the products.

7.1.3 Reasons for success of banana chip exports

Banana chips (as well as of other export products) successfully penetrated the export market with the help of the promotional activities undertaken by the government. These activities involve the conduct of trade missions and participation in trade fairs abroad, in cooperation with the Philippine Food Exporters Association (Philfoodex). The success of these promotional efforts, however, rests largely on the good quality of products promoted. Good quality encompasses proper hygiene, packaging standards, eating preferences, etc. required by the importing countries.

Aside from the foregoing standard requirements, banana chips continue to sell successfully in the export market due to the ability of local processors to adequately meet demand throughout the year, which is made possible by pooling their products via Philfoodex, which is composed of 194 member processors-exporters. The ability to supply the quantities ordered by importers is essential to maintain foreign market access. Although banana chips have been exported for more than a decade, they are still considered a novelty in Europe and are well in demand especially during the cold season. The other reasons for the continuing success of banana chip exports, and of other products, in general, are the abolition of the 4% export tax in 1986 and the exclusion of export products from payment of 10% valued added tax implemented in 1993.

7.2 Processed mango

Processed mangoes, specifically dried mangoes, are among country's non-traditional products which have carved a niche in the export market. These have been exported for almost two decades, during which the volume sold gradually grew from 37.36 metric tons in 1978 to 760 tons in 1993 (Table 7.3). The volume of annual exports from 1991 to 1993 averaged to 704 metric tons valued at US$ 4.42 million. Dried mangoes are sold to 37 countries in Asia and the Pacific regions, Middle East, Europe, North America, and the Southern Hemisphere. Other forms of mango products, specifically puree and juice, got their first share in the export market in 1991. Aside from these, frozen, salted and glazed mangoes are also exported. The combined value of the country's processed mango exports in 1993 was US$ 15.7 million.

Table 7.3 Volume and value of mango product exports, 1978-1993.

Year	Volume (metric tons)				Total Value
	Dried Mango	Juice	Puree	Others*	(F.O.B. US$)
1978	37.36	-	-	127.39	313,662
1979	75.20	-	-	150.36	397,787
1980	78.18	-	-	166.95	445,787
1981	117.89	-	-	69.26	673,899
1982	163.95	-	-	87.64	951,625
1983	202.46	-	-	18.09	1,101,609
1984	193.99	-	-	44.41	976,191
1985	182.47	-	-	136.13	1,014,175
1986	256.75	-	-	92.93	1,589,568
1987	308.10	-	-	40.34	1,718,830
1988	417.54	-	-	26.85	2,491,381
1989	483.45	-	-	7.06	2,489,842
1990	547.75	-	-	18.54	3,086,582
1991	617.22	3,099.80	4,275.13	290.04	13,262,418
1992	736.04	2,217.48	7,129.60	388.34	16,001,022
1993	760.02	994.00	8,009.45	284.93	15,746,002

Source: Foreign Trade Statistics, 1978 - 1993.
* Frozen, salted, and glazed.

The biggest importer of processed mango products (dried, juice and concentrates) is Hongkong, which in 1993 accounted for 52% of the Philippine total mango products export, amounting to 5,095 metric tons. China and the United States purchased considerable quantities during the same year (Table 7.4).

Table 7.4 Volume of exports of mango products by country of destination, the Philippines, 1993.

Country	Volume (tons)			% Share
	Dried Mango	Juice & Concentrates	Total	
Hongkong	428.16	4,667.16	5,095.32	52.19
China	-	1,311.64	1,311.64	13.43
United States	132.74	1,114.48	1,247.22	12.77
Taiwan	25.09	460.05	485.14	4.92
Malaysia	-	286.94	286.94	3.96
Others	174.03	1,163.57	1,337.60	12.73
Total	760.02	9,003.84	9,763.86	100

Source: Foreign Trade Statistics, 1993.

7.2.1 Problems in the mango processing industry

One of the problems encountered by the country in the processing of mango is the inadequacy of fresh mango supply during the off season. Although mango trees are made to bear fruit during off season by using a flower inducer, the supply of mango cannot meet the volume required by the processors. This situation increases the price of mango, forcing mango processors to stop operation temporarily until adequate amounts of fruit can be supplied by producers at a reasonable price level. Another problem is the keen price competition posed by other mango product exporting countries. Philippine mango products in the world market cost more than those exported by its counterparts, due to the high farm/wholesale price of fresh mangoes in the local market and the high exchange rate of the peso against the dollar, among others.

7.2.2 Reasons for success of processed mango exports

The significant growth in volume of processed mango exports is partly attributable to the promotional efforts of the government and the processors. In spite of keen competition in the world market, these products survived due to their high quality. The success of these products in penetrating foreign markets is largely due to the growing interest in tropical fruits, especially in Europe, and to the health food craze which has been sweeping many countries around the world. Mango products are rich in beta-carotene which was found to prevent cancer.

7.3 Guyabano juice

The guyabano plant (soursop) belongs to the family Anonaceae, believed to have originated in South America. The plant thrives in a wide range of soil types, making its cultivation suitable in various parts of the archipelago. However, guyabano is generally grown as a backyard crop since the tree bears few fruits and is, hence, not a very viable source of income for farmers. In view of this, farmers do not devote their farms to intensive guyabano growing.

Guyabano cultivation covered a little more than 2,000 hectares in 1993 (Table 7.5). The volume of production averaged 3,124 metric tons per year for the period 1989 to 1993. The plant is grown in various provinces of Luzon and the Visayas. Considerable volumes of production are shared by the provinces of Leyte (Central Visayas) and Pangasinan (Northern Luzon), contributing 20% and 17%, respectively (Table 7.6).

Table 7.5 Production and area planted to guyabano, 1989-1993.

Year	Area (hectares)	Production (metric tons)
1989	1,888	3,050.94
1990	1,912	2,787.45
1991	1,888	2,991.40
1992	1,923	3,006.96
1993	2,009	3,784.09

Source: Bureau of Agricultural Statistics.

Table 7.6 Leading provinces in guyabano production, 1993.

Province	Production (metric tons)	Percent Share
Leyte	758.27	20.04
Pangasinan	638.64	16.88
Iloilo	187.11	4.94
Mindoro	125.16	3.31
Cavite	103.54	2.74
Quezon	97.68	2.58
Cebu	92.40	2.44
Western Samar	91.86	2.42
La Union	87.36	2.31
Others	1,602.07	42.34
Total	3,784.09	100

Source: Bureau of Agricultural Statistics.

7.3.1 Guyabano juice processing

Guyabano in the Philippines used to be eaten fresh until the 1970s when techniques for juice extraction and pulp preservation were developed and introduced to homemakers. The small scale production of the juice for the domestic market later proliferated. The supply of the juice in the local market increased in the latter part of the 1980s with the entrance of big food manufacturers in guyabano juice processing.

Aside from processing into juice, guyabano is made into puree and preserved in jams, candies, frozen guyabano pulp, and ice cream flavoring. The pulp contains 80% water, 1% protein, 18% carbohydrate, and small quantities of vitamins B_1, B_2, and C. The preservation and processing of guyabano fruits have been expanding, because of its increasing acceptability not only in the domestic market, but also in foreign markets. Guyabano concentrates and juice are also emerging products for the export market. These products were initially exported in 1991 at a combined quantity of 157 metric tons, increasing to 201 metric tons in 1993. Although these quantities are not considered very large, the number of foreign buyers (14 countries) is encouraging.

7.3.2 Reasons for success of guyabano promotion

As guyabano fruit is highly perishable like most tropical fruits, the government in the 1970s encouraged value added processing among farmers to minimize fruit post production losses and to increase farm income. The development of tropical fruit processing and preservation techniques was undertaken by the DA's Bureau of Plant Industry (BPI) and a number of state agricultural colleges. The techniques were disseminated to farmers through demonstrations and free training to farmers' households via extension workers. The transfer of these technologies was accelerated with the establishment of the Technology Resource Center, now the Technology and Livelihood Resource Center (TLRC), of DTI in 1977 aimed at promoting small and medium scale enterprises. TLRC is mandated to support the creation of livelihood opportunities by promoting the utilization and commercialization of appropriate technologies in line with the government's national socio-economic development thrusts.

TLRC also provides information, training, information technology and funding services to national and local government agencies, small and medium scale enterprises, non-government organizations, cooperatives, entrepreneurs, housewives, and to other interested parties.

The demand for guyabano juice, as well as for other tropical fruits, quickly picked up in the late 1980s, when it was supplied by one of the country's biggest food manufacturers known for its quality products. The rise in demand could also be attributed to the then increasing preference of health conscious local consumers for fruit juices over carbonated drinks. Various brands of guyabano juice then emerged in groceries and supermarkets all over the country, which indicated that the product was (and still is) well in demand.

7.3.3 Problems in guyabano processing

The main problem in guyabano processing is the difficulty of procuring substantial volumes of the fruits in one locality due to the dispersed guyabano farms. Processors have to go from one place to another in order to buy enough volume for their processing requirements. Because of this situation, the processors suggested that the government should classify crop areas into fruit, vegetable or grain areas in order to facilitate the identification of supplying areas and encourage even small backyard farmers to pool their produce and bring it to nearby market outlets.

To sustain the supply of guyabano to meet the increasing demand, high yielding and pest and disease resistant varieties of the plant should be developed. The government should extend support to farmers and processors covering low interest credit, wider market information dissemination, and lower tariffs on the importation of materials used as inputs in the manufacture of packaging materials.

7.4 Mango

Mango was introduced into the Philippines from India in the early 15th century by Chinese and Arab traders. It is one of the major crops grown in almost all parts of the Philippines. The country is the fifth largest mango producer in the world, with an average annual production of 336,000 metric tons in 1989-1993 (Table 7.7). Mango is one of the priority high value crops which is being given support by the government for the medium term, 1995-2000.

The area planted to mango has been gradually increasing. From 51,200 hectares in 1982, the area grew to 57,700 hectares in 1993, an increase of 6,500 hectares. The total area planted to mango represents 7% of the 817,000 hectares total fruit crops area. Of the total production, an average of 6.2% or 21,430 metric tons annually was exported to the different countries of Asia and Australia in 1989 through 1993.

The volume of mango exports fluctuated during the years 1978 through 1986 (Table 7.8). Export of mango started to pick up in 1987 and grew by 147% in 1993. The surge in demand was brought about by increasing mango consumption in mainland China, where Philippine mangoes were imported through Hongkong, the Philippines' biggest importer of the fruit. Hongkong and Japan imported 63% and 32% of the country's total mango exports in 1993 (Table 7.9).

Table 7.7 Area planted, volume and value of mango production, 1982-1993.

Year	Area ('000 ha)	Quantity ('000 tons)	Value (US$ million)
1982	51.2	311.6	185.79
1983	52.0	303.3	156.08
1984	52.7	339.3	184.27
1985	53.7	355.7	153.15
1986	54.4	372.9	202.32
1987	55.5	367.1	191.73
1988	55.7	361.1	235.19
1989	56.4	370.1	174.68
1990	56.9	307.0	155.78
1991	57.2	330.0	169.32
1992	57.2	330.0	172.06
1993	57.7	334.4	175.98

Source: Philippine Statistical Yearbook, 1992-1994.

Table 7.8 Volume and value of mango exports, the Philippines 1989-1993.

Year	Volume (tons)	Value (F.O.B. US$)
1978	9,000	4,342,345
1979	7,000	4,887,228
1980	9,000	6,482,613
1981	7,000	8,913,660
1982	10,000	8,142,585
1983	9,000	8,667,167
1984	8,000	7,191,628
1985	9,000	7,480,001
1986	8,000	6,956,359
1987	13,000	12,492,571
1988	14,000	17,250,312
1989	14,346	17,114,871
1990	12,964	15,323,558
1991	22,426	24,377,165
1992	27,124	28,669,153
1993	30,303	26,631,179

Source: Foreign Trade Statistics, 1978-1993.

Table 7.9 Volume of exports of fresh mango by country of destination, the Philippines, 1993.

Country	Volume ('000 tons)	% share
Hongkong	19,214.35	63.41
Japan	9,817.14	32.40
Singapore	842.37	2.78
Others	428.22	1.41
Total	30,302.08	100

Source: Foreign Trade Statistics, 1993.

7.4.1 Constraints to mango export

Some 58 to 81% of the country's export mango is shipped to foreign markets in the months of February to June, as they are the peak months of mango production. The rest of the fruit is exported in July through January (Table 7.10). The low supply of Philippine mangoes in the export market during these months prompts importers to buy from other exporting countries, replacing the Philippines as the traditional supplier. In Singapore, for example, Philippine mangoes were replaced

by those from Australia and Pakistan from 1991 to 1993. This accounted for a decline of 52% in export volume, from 1,611 metric tons in 1991 to 843 metric tons in 1993 in that market.

To ensure the availability of the supply of mangoes during lean months, traders enter into agreements with growers, in which the former induce artificial flowering through chemical application during the off season and pay the latter in advance before the mango trees bear fruit. This practice, however, results in low quality of the fruit as the growers do not take care of the trees once they have been paid.

Another constraint to increasing the volume of mango exports is the keen price competition with other supplying countries. Although the Manila super mango is recognized as the best in the world, it is priced higher, such that it cannot compete with inexpensive ones supplied by other countries. The higher price set on Philippine mangoes could be attributed partly to the fact that the VHT facilities for disinfecting mangoes are located in Manila, necessitating the shipment of export mangoes grown in all parts of the country to Manila. This entails higher costs in bringing the produce to the export market in the process. It was only in late 1994 that VHT was established in Davao City (in Southern Mindanao). Moreover, the high cost of packaging materials which comprise 40 to 50% (for fresh fruits and vegetables) of the f.o.b. price, poses a problem in the export of mangoes.

Table 7.10 Monthly export volumes of Philippine fresh mango, 1991-1993 (percentage of total exports).

Month	1991	1992	1993
January	6	5	5
February	14	12	7
March	23	21	18
April	23-81	20-81	58
May	15	19	18
June	6	9	15
July	4	5	7
August	3	2	3
September	2	1	3
October	3	1	2
November	3	1	1
December	4	1	1

Source: Agri-business System Assistance Program, 1995.

7.4.2 Reasons for failure of mango in U.S. and European markets

The Philippines exports significant volumes of mangoes to some parts of Asia, but could not successfully penetrate other markets, particularly the United States and countries in Europe. Philippine mango suffered many setbacks in the U.S. market, as well as in Japan and Australia. The mango export problem started in 1973 and lasted more than two decades. The importation of Philippine mangoes by these countries was banned in 1973 due to traces of fruitfully and alleged mango weevil infestation. In 1975, however, Japan lifted the ban on Philippine mangoes, but required that they be treated with ethyl di-bromide (EDB). The use of EDB treatment on mangoes and other tropical fruits and vegetables was banned later by the country in 1986, as it was believed to carcinogenic. The 1988, the ban on Philippine mango was lifted when the use of VHT on mangoes was instituted in the Philippines and was accepted by Japan as an effective means of eradicating fruitflies which could be borne by the fruit.

The importation of Philippine mangoes was banned by Australia in 1973 for the same reason. While Japan allowed the entry of Philippine mangoes treated with the EDB in 1975, Australia continued to bar the entry of fruit into its ports. It was only 13 years later (in 1986) that Philippine mangoes were allowed to be imported when Australian quarantine officials were convinced of the efficacy of EDB treatment on fruitflies. In 1988, however, the ban was reimposed

due to environmental and health hazards associated with EDB. The ban stayed on as the country's quarantine officials doubted the effectiveness of VHT which was used then in the Philippines on mangoes. It was only in 1993 that the ban was lifted and mangoes treated with vapor heat became acceptable to Australia. The export of Philippine mangoes to Australia was resumed but in minimal amounts as that country has already been growing and exporting its own mangoes.

In the United States, the ban on Philippine mangoes lasted for 20 years in spite of several requests made by Philippine trade officials to allow importation of the fruit. The ban was lifted in 1993, but only mangoes from the island province of Guimaras (in Western Visayas) which was declared by the Bureau of Plant Industry (BPI) of DA as fruit a fly free area were allowed entry.

As a result of the continuous ban imposed by major importing countries in the past, the country's share in the mango export market was taken over by other mango-supplying countries. It is now difficult for the Philippines to expand exports of the fruit due to the very keen price competition posed by other mango exporting countries. It is only in Hongkong and Japan that the Philippines was able to expand its mango export due to its ability to compete in terms of prices due to lower air freight cost incurred by virtue of geographical proximity to those markets.

Although the Philippines wants to expand mango exports to other countries, other than those in Asia and the Pacific, the perennial problem of high transportation cost, by land (in the domestic movement) and air, serves as a stumbling block. The Philippines, for instance, is not exporting Guimaras mangoes at present to U.S. due to the prohibitive cost of transport, compounded by high cost of packaging materials, among others. The European market was tapped, but export is prevented by the same reasons, aside from the fact that Europeans are not very familiar with mangoes.

Other nearby countries may be explored but these are already being supplied with mangoes from other exporting countries. It is difficult to compete in this market as mangoes supplied by these countries are less expensive, although those from the Philippines are of better quality.

7.5 Papaya

Papaya is generally cultivated as a backyard crop in the Philippines. In commercial papaya growing, 50% of the farms are within the size of 0.5 hectares to 3 hectares. Papaya is usually planted under coconuts, intercropped with banana trees, or grown in a variety of mixed systems, combined with other perennial crops (e.g. pineapple, coffee and cassava).

There has not been much expansion in the area planted to papaya for the last 14 years except in 1989. The area devoted to papaya growing in 1980 through 1988 stagnated within the range of 2,854 hectares to 3,509 hectares (Table 7.11). The hectarage then increased by 39%, to 4,888 hectares in 1989. Although the area planted to papaya considerably increased, the total production of the fruits, more or less, remained the same. This could be attributed to the aftermath of the papaya ring virus infestation which occurred in Southern Luzon in 1981, especially in the province of Cavite in Luzon which then led in papaya production. The virus has not been eradicated at present, but phytosanitary measures are strictly instituted to prevent the spread of the disease. At present, papayas are mostly grown in Mindanao and in the Visayan Island.

7.5.1 Processing of papaya

Like most tropical fruits in the Philippines, papaya is processed through various methods, such as canning, freezing, drying and fermentation. The most common process used is dicing and preserving papaya in syrup in cans in combination with other tropical fruits in the form of fruit cocktails.

Table 7.11 Area planted and volume of papaya production, 1980-1993.

Year	Area (hectares)	Production (metric tons)
1980	3,693	94,150
1981	4,135	104,520
1982	3,524	89,840
1983	2,854	75,560
1984	3,635	92,680
1985	3,486	93,390
1986	3,374	92,010
1987	3,435	93,500
1988	3,509	94,560
1989	4,888	97,219
1990	5,182	96,172
1991	5,456	94,138
1992	5,332	95,334
1993	5,458	93,241

Source: Bureau of Agricultural Statistics.

7.5.2 Papaya marketing

Only small quantities of fresh papayas were exported in 1978 through 1986. The export volume of the fruit started to pick up in 1987 and surged in 1990 when 1,072 tons were shipped to foreign markets, registering a growth rate of 174% over the previous year (Table 7.12). This increased furthermore by 111% the following year. The average value of papaya exports in 1989 to 1993 was US$ 603,576 (F.O.B.) annually. The primary market for Philippine papaya was Hongkong, which imported 98% of the total papaya exports in 1993, amounting to 2,038 metric tons. Small quantities were exported to United Arab Emirates and Singapore.

Aside from fresh papaya, the fruit is exported in dried form, where 288 to 444 metric tons per year were shipped abroad in 1991 through 1993. The biggest buyers of the Philippine dried papaya in 1993 were Australia and the U.S. which imported 60% and 38%, respectively. Small amounts were exported to Japan, Taiwan, and a number of countries in Europe.

Table 7.12 Volume and value of papaya exports, 1978-1993.

Year	Volume (metric tons)		Value (F.O.B. US$)	
	Fresh	Dried	Fresh	Dried
1978	0.70	-	100	-
1979	5.60	-	980	-
1980	-	-	-	-
1981	1.78	-	1,000	-
1982	0.30	-	180	-
1983	5.63	-	699	-
1984	4.57	-	2,114	-
1985	4.30	-	2,014	-
1986	9.18	-	4,307	-
1987	43.33	-	20,997	-
1988	83.39	-	27,466	-
1989	390.80	-	194,274	-
1990	1,072.22	-	494,644	-
1991	2,261.94	443.51	944,863	433,509
1992	1,268.14	319	499,785	272,506
1993	2,084.10	288.38	884,314	398,558

Source: Foreign Trade Statistics, 1978-1993.

7.5.3 Reasons for failure of papaya in the Japanese market

Papaya suffered the same fate as mango when Japan closed its doors to Philippine fresh papaya in 1978. The entry of this fruit (solo variety) to Japan was banned due to signs of fruitfly infestation on papaya. The ban was prolonged by the papaya ring virus attack and continued on for 21 years, until May 1994. Although the ban was lifted, all Philippines papayas for export to Japan are required to undergo VHT prior to shipment to avoid the danger of transmitting fruitflies to the recipient country.

Local farmers have not responded to the opening up of this new opportunity. This could be explained by the fact that it is not easy for many of them to shift readily to planting papaya. The success of exporting this fruit to Japan in large quantity remains to be seen, due to keen competition with the traditional papaya-supplying countries.

7.6 Passion fruit

Passion fruit is a perennial herbaceous vine belonging to the genus Passiflora. It includes 400 different species, mostly native to Central and South America. In the Philippines, the fruit is primarily grown as ornamental in the lowlands and for its fruit in the highlands. Several species, namely *P. edulis, P. edulis L. flacicarpa, P. lawrifolia, and P. quadrangularis* are grown locally.

Passion fruit has very aromatic and acidic juice and may be eaten fresh. It has excellent flavor and good blending quality, making it a good material for making juice. The pulp is made into jams and jellies, and the juice is extracted and can be processed as ice cream flavoring. Passion fruit is highly nutritious, containing several vitamins, minerals and other nutrients, including sodium, magnesium, sulphur and chloride. The fruit is very rich in vitamin A.

Passion fruit is a minor crop in the Philippines. The area grown to passion fruit occupied only 113 hectares in 1989 but later more than doubled to 238 hectares in 1991. The planted area again diminished to 190 hectares in 1992 and further to 144 hectares in 1993 (Table 7.13). In spite of the decline in area grown to the crop, production exhibited a rising trend stemming from improved productivity. From the 322 metric tons in 1989, it increased by 50% or to 484 metric tons in 1993. The production of passion fruit in the country is mostly handled by large exporters or by contract growers who supply these exporters.

Table 7.13 Area planted and passion fruit production, 1989-1993.

Year	Area (hectares)	Production (metric tons)
1989	113	332
1990	164	357
1991	238	438
1992	190	461
1993	144	484

Source: Bureau of Agricultural Statistics.

7.6.1 Promoting passion fruit growing

The production of passion fruit was promoted in 1990, when the Department of Agriculture (DA) in the Philippines, upon perceiving the potential of selling passion fruit juice in foreign and local markets, encouraged farmers to grow the fruit to augment their incomes. The first passion fruit growing project was launched in Sampaloc, Quezon Province (in Southern Luzon), where 47 farmers participated. Passion fruit was to be grown under existing coconut trees. The DA supported farmers, who were then organized, by extending to them low interest loans (at 12% interest) for the construction of trellises, procurement of planting materials and inputs and for the payment of

premiums to the Philippine Crop Insurance Corporation. The DA linked the participating farmers to a big food company through a buying contract. The company, on the other hand, extended technical assistance to the farmers. As provided for in the contract, the company would buy all the farmers' produce at a stipulated price.

The total area involved in the project then was 54.5 hectares. A production of 15,000 kilograms per hectare annually was projected for the first year of operation or a total of 817,000 kilograms for the entire project area.

A similar project involving 84 farmers tilling 300 hectares was launched in 1990 in Lucban, also in Quezon Province. The farmers then delivered 2,000 kilograms of passion fruit weekly to the same contracting company. However, the company could not absorb all the fruit from the contract growers due to the inability of the company's existing machine to produce the double-strength juice (concentrate) demanded by foreign markets. The puree that the company produced was mainly used for the domestic market. The company's original demand for passion fruit was only from 200 hectares, but contract growers were over-supplying the fruit, since the planted area expanded to 750 hectares. The Lucban farmers sued the company for breach of contract and asked the latter to pay them the value of the passion fruit delivered worth P12 million (US$ 492,300). The farmers won the case, but the company severed its tie-up with them. The farmers entered into a buying contract with another firm. However, the firm had to cut down on its passion fruit processing due to a decline in the price of passion fruit juice in foreign markets.

It should be noted that this 750 hectare area grown to passion fruit is way above the 164 hectares reflected in Table 7.13. This could be explained by the fact that the BAS, which was the source of the data, does not include farms less than 1,000 square meters in their production surveys.

Similarly, a passion fruit growing project was implemented in the same year in Iloilo province (in Western Visayas). The farmers were to supply the requirement of the same company which had a processing plant in the neighboring island province of Guimaras. However, this arrangement was aborted, since the island was declared by the BPI as a fruitfly-free area. Thus, no fruit, including passion fruit, which were suspected of being potential carriers of fruitflies, were allowed entry to the island.

7.6.2 Processing of passion fruit

At present there are only two big fruit processors engaged in passion fruit processing, but the volume of the passion fruit juice produced has been drastically reduced. As to other forms of processed passion fruit, one small processor interviewed reported that the fruit is made into marmalades, jams, and jellies. Its major source of raw materials is the Divisoria wholesale market in Manila. The rest is brought from the neighboring provinces of Zambales (also in Luzon), which is about 250 kilometers from Manila.

One of the constraints in passion fruit processing encountered by small processors is the volume inadequacy of the fruit that can be procured in one contiguous area. Another is the rising cost of sugar which constitutes 55% of the operating cost. The high cost of freight in bringing the products to Europe and the United States is also perceived to be a problem confronting export. As previously mentioned, local consumers are not familiar with the passion fruit juice, such that production should not have been encouraged, unless intensive product promotion had been successful.

7.6.3 Passion fruit marketing

Passion fruit is usually marketed in puree form, sold mainly to local hotels, restaurants, and high-priced establishments. The volume demanded is minimal since the juice is rarely drunk pure. The juice or puree can rarely be found in supermarkets.

As to foreign markets, passion fruit puree is mainly exported to Europe. The export to Europe, however has significantly decreased due to the fall in the price of the juice. With regard to the small processor interviewed, small quantities of juice, marmalades, jams and jellies are produced and exported exclusively to the U.S., Japan and Hongkong.

7.6.4 Reasons for failure of passion fruit promotion

The government was successful in encouraging the growing of passion fruit among farmers on a commercial scale during the initial stages of the projects. Assuming that the contract growing between the farmers and the processors, mentioned earlier, had not been aborted, it is still apparent that the growing of the passion fruit in large volumes would not be sustained in view of the low demand in both the local and foreign markets. But with the fruit's aromatic flavor and nutritive value, there is no doubt that growth in local demand could have been induced if only vigorous promotional efforts were undertaken.

7.7 Reasons for market success and failure

7.7.1 Successes

Banana chips and processed mangoes share common reasons for their emergence in the export market. The shipment of non-traditional products gained momentum in the 1970s when the government provided incentives aimed at promoting the export of agricultural, as well as industrial products. The incentives included technical assistance (research), training, and consultancy services to producers-exporters and reduction of tariff rates on raw materials, machines and equipment used in the manufacture of export products. To further encourage production of exportable products, an export levy of 4% imposed on all export products was abolished in 1986. Moreover, primary agriculture and export products were exempted from payment of the 10% value added tax implemented in 1993.

Furthermore, the government exerted vigorous efforts in product promotion by holding food fairs and participating in such activities abroad with producers-exporters. However, the underlying factor for the acceptability of banana chips and processed mangoes (together with other food products) is good product quality in terms of palatability, nutritional value, and sanitation. The foreign demand for these products was enhanced by the health food craze occurring world-wide and the attraction of novelty products for consumers.

With respect to guyabano, processed product development was initiated by the government in the 1970s with the aim of promoting the establishment of value added processing industries among small farmers. Fruit product processing developed with the provision of support by the government in the form of product research and free training. Although intended for small processors, the processing techniques were obtained and adopted by big food manufacturers.

Guyabano juice processing gained popularity through product promotion undertaken by the food manufacturers. The juice was easily accepted by consumers due to their preference for fruit juices over drinks of low nutritional value.

Although banana chips and processed mangoes performed well in the world market, the sustainability of producing them in the long run is uncertain. There are interlocking problems/issues which affect the economic viability of production. These are the lack of regular supply of raw materials, the high cost of transporting raw materials from points of production to processing plants, the high cost of packaging materials, and the high exchange rate of the peso. These problems result in higher prices of export products, narrowing their competitive edge in the international market. These problems could jack up the price of guyabano juice to a point where it is no longer be affordable to ordinary consumers.

Table 7.14 Summary of market performance and key issues for failed market attempts.

Market Performance	Reasons for Failure	Key Issues
1. Fresh Mango		
a. Only 6.2% of total production exported. Of this 63% goes to Hongkong and 32% to Japan	a. Continuous ban on import of Philippine mango by traditional importing countries due to traces of fruitfly and fruit weevil/attack	a. High cost of transporting export mango from points of production to ports where vapor heat treatment (VHT) facilities are available
b. Wide fluctuation in the volumes of export of the fruit prior to 1987 due to ban on Philippine mango import imposed by Japan (1973-1975, 1986-1988), Australia (1973-1988) and United States (1973-1993)	b. Very keen price competition with other mango-supplying countries	b. High cost of packaging materials
c. Export of mango for 1987 to 1993 on the uptrend due to rising imports of Hongkong and Japan	c. Only mango produced in Guimaras Island province are allowed entry in the U.S	c. High exchange rate
d. No export to U.S. which used to be the traditional buyer of Philippine mango	d. Prohibitive cost of air transport in bringing mango to U.S. and Europe	
2. Fresh Papaya		
a. 98% of production exported to Hongkong	a. Continous ban on Philippine papayas in Japan due to traces of fruitfly attack in 1978 and to papaya ring virus emergence in 1981. The ban was lifted in 1994	a.The success of penetrating the Japanese market is still uncertain due to keen competition of other traditional papaya-supplying counties
b Exports on the uptrend due to rising foreign demand in Asian countries except Japan		b. Papaya needs to undergo VHT, entailing higher cost of transporting the fruit from farms to ports c. High cost of packaging materials
3. Passion Fruit		
a. Demand is very low in both domestic and foreign markets	a. Local consumers not familiar with passion fruit juice	a.Vigorous product promotion in the domestic market should have been undertaken before encouraging intensive growing of the passion fruit crop
	b. Drop in passion fruit juice price in the export market, forcing local processors to cut down on production or shut down plants	

7.7.2 Failures

The Philippines exports only 6% of its total mango production. The country's fresh mangoes could have taken a sizeable share in the export market if not for the presence of fruitflies in the country. As summarized in Table 7.14, the underlying reasons for the failure of mangoes to break into the U.S., as well as into Europe, after the lifting of the importation ban is the prohibitive cost of transport. The prices of Philippine mangoes in foreign markets are very uncompetitive due to the very high cost entailed in bringing the fruit from various points of production to either of the two VHT facilities located in Luzon and Mindanao, instead of bringing them directly to the nearest international airport. The high cost of air transport in bringing mangoes to final destinations further jacks up the price of the product.

With regard to fresh papaya, it took a very long time for the Philippines to get entry into Japan. The restriction on fresh papaya from the Philippines imposed by Japan was, likewise, due to the isolated presence of fruitflies in the country and the papaya ring virus attack. Like mangoes, the high cost of transport constrains the resumption of export of papaya to Japan.

As to passion fruit juice, the main reason for its failure to successfully sell in the domestic market was the lack of product promotion. Not being an indigenous fruit to the Philippines, it was practically unknown to consumers. It was essential that a vigorous promotional effort be undertaken before the government encouraged extensive growing of the fruit. As to the expansion of passion fruit juice export, it is constrained by a decline of passion fruit juice prices in the international market.

8. Conclusions and Policy Implications

One of the factors inhibiting the penetration of agricultural products, such as fresh mango and papaya, into foreign markets was a natural cause. As discussed, the entry of these fruit to the said markets was banned due to traces of fruitfly attack found on the fruit rinds. In order not to suffer another setback on the export of mango and papaya, as well as of other tropical fruit caused by destructive insects, it is imperative to institute constant monitoring of these pests. This system will facilitate the early detection of pests, leading to the timely adoption of measures to prevent their spread.

The conduct of research on the control of plant pests and diseases should be given paramount importance, not only for the purpose of passing the quarantine regulations of importing countries, but also to minimize losses. Of equal importance is research on increasing productivity at optimum cost in order to have an adequate supply of reasonably priced fruit to meet the growing demands in both domestic and foreign markets. It is also necessary that the number of VHT facilities be increased and located in strategic places to reduce domestic transportation costs.

The promotion of export products in the Philippines, which coincides with the health food craze sweeping many countries, contributed to the rise in their demand. Moreover, with the improvement of processing techniques, Philippine products easily penetrated various markets which could not have been entered by fresh fruit due to strict phytosanitary regulations and other restrictions. Owing to longer shelf life, these products could be shipped to many parts of the world with less risk of spoilage.

The government played a catalytic role in the emergence of non-traditional processed products in the export market. This was made possible through the provision of a favorable policy environment and other forms of government support. The sustainability of producing these products, however, relies on the economic viability of production and marketing. Production sustainability will depend on the ability to address the problems in production of raw materials and in the marketing system. While the conduct of research and development is an imperative in increasing farm productivity, improvements in the marketing system deserve equal attention.

Market efficiency in the Philippines is adversely affected by the inadequacy of the infrastructure such as farm-to-market roads, and postharvest and port facilities. This results in significant losses, especially in the case of perishable commodities. The inadequacy of the port and bulk handling facilities adds to the delay in moving products to the points of demand. This situation is a major concern in the Philippines, considering its archipelagic characteristics and the geographic imbalance in the supply and demand. Generally, the bulk of production of most agricultural products is concentrated in Mindanao, while the heaviest demands are in Luzon and some parts of the Visayan island. This situation necessitates the efficient operation of port facilities to promote spatial integration of the economy (Garrido 1993).

Another important element which should be addressed by the government is the telecommunication facilities. These should be improved to promote a more integrated economy by disseminating and receiving market information through various media.

The shipping and port regulations/restrictions in the past served as impediments to smooth market operation. These were dismantled by the government as part of major reforms in the domestic shipping services. Such a move was viewed by economists as having the strongest impact on prices of many commodities. The abolition of the monopoly in ports and handling services allowed healthy competition in stevedoring and arrestre services. This improved service delivery and decreased port service costs. Such reforms were adopted in November 1990 by deregulation of the fare structure for refrigerated fruit and livestock cargoes. Moreover, the basis for fare estimation for “Basic Commodities” was updated the same year. Rice, palay, maize, maize grits, fruit and

vegetables, which were classified as "Basic Commodities" were elevated to Class C. Before this, as a matter of policy, lower freight costs were charged on "Basic Commodities", and they were thus given the lowest priority in the allocation of shipping space. Such a system significantly increased the storage and handling losses for these goods.

Another change introduced in the ports and shipping sector was the deregulation of entry into shipping routes/links to eliminate monopolies in the trade. Furthermore, the "Vessel Voyage Clearance Procedure" in the country was consolidated by setting up a Port Integrated Office in major ports of the archipelago. This facilitated issuance of the required clearances from various concerned agencies, considerably reducing transaction costs of traders.

The other policies which greatly affect the prices of export products are those governing sugar and imported inputs for the production of packaging materials. Sugar constitutes a big proportion of the cost in the processing of sugar-based food products. The government imposition of a sugar market quota significantly affects the price of domestic sugar. The allocation system (for domestic use, U.S. market, world market, and reserve) results in limited domestic supply, keeping the price of local sugar almost the same as that in the U.S. quota market, which was consistently above the world price. While this may be advantageous to the sugar industry, it penalizes food processors, narrowing their competitive edge in the world market.

With respect to product packaging, the tariff restrictions in the importation of input components used in the manufacture of packaging materials jack up their prices resulting in higher prices of export products, since packaging materials make up 20 to 50% of the f.o.b. price of export products. A policy such as that governing sugar should be reviewed and adjusted by the government. Such adjustments should be made within the context of promoting the best interests of exporters and suppliers of production inputs. It would be a welcome move if such were done at the earliest possible time, instead of phasing the tariff rates down within the 10-year period as provided for by the General Agreement on Tariff and Trade (GATT), to which the Philippines is a signatory.

In time with the implementation of GATT provisions, it becomes imperative for the government to push safety measures for export products, as follows:

- Support to the development of agricultural and marketing cooperatives: This is necessary to enable farmers to operate with economic scale and gain leverage in the marketing of their products, as well as in the procurement of agricultural inputs. Organizing the farmers will also give them better access to credit as the state-owned Land Bank of the Philippine extends agricultural loans to cooperatives and not to individual farmers.
- Monetary and fiscal reforms to bring down interests rates as well as to provide cheap credit for production, post-harvest facilities, trade and marketing activities: The high interest rate of 12-18% charged to farmers is exorbitant, preventing farmers from borrowing to finance their production/marketing operations.
- Correct distortions of the value added tax law: Primary agricultural products are exempt from payment of the 10% value added tax (VAT). However, once these products undergo processing, they become subject to the 10% VAT, and another 10% is levied if they further undergo upstream processing.
- Provide more budgetary support for research and development, trade promotion and market information activities: Budget appropriated to research in the Philippines is too low at 0.23% of the gross value added in agriculture (GVA). This is way below the recommended 1% for developing countries for research to have substantial impact to agriculture. Trade promotion should also be stepped up to expand the market for agricultural products. Moreover, the market information system should be made efficient for the benefit of farmers, processors, and traders. This could best be achieved with the use of state-of-the art equipment.

- Achieve a balanced agro-industrial development and correct the bias against agriculture by allocating more public investment in agricultural development: The bias against agriculture had been voiced by policy makers and producers in the agricultural sector. However, most of the government support has been extended to the industrial sector in its desire to accelerate development of the national economy. Since the Philippines is agricultural-based, public investment in agricultural development, particularly farm-to-market roads, storage, and port and handling facilities, should be given priority.
- Make the necessary moves to stabilize the foreign exchange rate and reverse the drastic and painful appreciation of the peso: The present exchange rate of P26 per U.S. dollar is considered unrealistic by exporters. This rate is said to artificially overvalue the peso, making Philippine export products less competitive in the world market in terms of pricing. The value of the peso should be allowed to seek its own level for the benefit of exporters and at the same time to keep the prices of imported products at reasonable levels. The Philippines is still largely dependent on imported industrial and other agricultural products, so the exchange rate should strike a balance between the values of exports and imports.

9. References and Bibliography

Anonymous. Ubi - an industry profile, Agribusiness Information Division, Agri-Investment Information Service Group, Department of Agriculture (DA), Manila, Philippines.

Anonymous. 1988. Australia lifts band on Philippines mangoes. Greenfields 18(5):18-22.

Anonymous. State-of-the Art and Abstract Bibliography, Series No. 14/1988: Papaya Research, PCARRD, DOST and Rainfed Rural Development Program, USAID, Los Banos, Laguna, Philippines.

Anonymous. 1989. Bulletin Today. October 31. Manila, Philippines.

Anonymous. 1989. Importers like banana chips. Agriscope (3)8, May. Manila, Philippines.

Anonymous. 1990. The DA Launches P1.7 million passion fruit production project. Agribusiness Monitor, 5(2):9, February. Manila, Philippines.

Anonymous. 1990. Mangoes up to export. Agribusiness Monitor, May. Manila, Philippines.

Anonymous. 1990. Guyabano: an industry profile. Animal Husbandry and Agriculture Journal. September. Manila, Philippines

Anonymous. 1990. Passion fruit, an industry profile. November. Marketing Assistant Service, Department of Agriculture, Quezon City, Philippines.

Anonymous. 1993. Guyabano or Soursop production. Greenfields, March. Manila, Philippines.

Anonymous. 1993. Philippine Star. Manila, Philippines.

Anonymous. 1993. Policy Update Newsletter. November. APRAAP, CPDS, CEM-UPLB, Los Banos, Laguna, Philippines.

Anonymous. 1994. Business World, September 10. Manila, Philippines.

Anonymous. 1995. Business World, April 27. Manila, Philippines.

Anonymous. Nationwide Food and Nutrition Survey: Philippines Summary Report, 1978, 1983, 1987 and 1993. Food and Nutrition Research Institute (FNRI), DOST, Manila, Philippines.

Anonymous. 1995. Cutflower industry: booming and blooming. Philippines Daily Inquirer, April 6. Manila, Philippines.

Anonymous. 1994. Policy Update, Agricultural Policy and Advocacy Assistance Program (APRAAP) 2(1,2). Centre for Policy and Development Studies-College of Economics and Management (CPDS-CEM), University of the Philippines at Los Banos (UPLB), College, Laguna.

Anonymous. Powdered ubi a hit abroad. 1991. Animal Husbandry and Agricultural Journal (25)5, July-August. Manila, Philippines.

Bondad, N.D. 1989. Mango - a chronology of major events. Animal Husbandry and Agriculture Journal (23)9, November. Manila, Philippines.

Cabanilla, L.S. 1991. Policy issues on cassava. *In* Rootcrops in the Philippines: Studies, Potential and Policy Issues, ed. Librero, A.R., and Paloma, M.R. Books Series No. 111. Philippines Council for Agriculture. Forestry and Natural Resources research and Development (PCARRD), Los Banos, Laguna.

Chupungo, A.R. 1991. Agricultural price and marketing: some policy issues. *In* Agricultural Policy in the Philippines: An Analysis of Issues in the Eighties. ed. Librero, A.R., and Rola, A.O., UPBL and PCARRD, Los Banos, Laguna.

Costales, Aquiles. 1994. Industrial use of corn in the Philippines. Philippine Statistical Association (unpublished). Manila, Philippines.

Daly, Rex, F. 1992. Corn-livestock sector assessment. Working Paper Series No. 92-01, October. Manila, Philippines.

De La Pena, B. A. 1993. Survey of policies affecting agribusiness. Agribusiness System Assistance Programme (ASAP) Policy Studies. (unpublished).

Espino, R.C. 1993. Growing passion fruit. UPLB Technology and Livelihood Resources Centre. Los Banos, Laguna. Philippines.

Garrido, J.R.R. 1993. Philippine infrastructure and options for reducing and livestock marketing and distribution costs. May. ASAP Publication No. 2.06, ASAP-Chemonics International Consulting Division, USAID, Philippines.

Javier, Arod, B. 1993. Cutflower industry needs more care. Policy Update Newsletter, October. APRAAP, CPDS, CEM-UPLB, Los Banos, Laguna, Philippines.

Lumanta Isaias, C. 1992. Alternative to imported soybean oil meal and corn. *In* Livestock and Poultry: Policy Considerations and Strategies for their Increased use and Development, pp. 172-197. APRAAP, Centre for Policy and Development Studies (CPDS), College of Economics and Development (CEM), University of the Philippines at Los Banos (UPLB), December. Los Banos, Laguna, Philippines.

PCARRD. 1986. The Philippines Recommends for Soybeans. PCARRD Technical Bulletin Series No. 14-A, Philippine Council for Agriculture, Forestry and Natural Resources and Development National Science Technology Authority (NSTA), Los Banos, Laguna, Philippines.

PCARRD. 1991. The Philippines Recommends for Grain-Legume Post Production Operations. PCARRD Philippines Recommends Series No. 73, Philippine Council for Agriculture, Forestry and Natural Resources and Development, Department of Science and Technology-DA National Postharvest Institute for Research and Extension (NAPHIRE), Los Banos, Laguna, Philippines.

Quero, Rachel, et. al. 1989. The corn marketing system - a rapid marketing appraisal in Northern Mindanao Region, Accelerated Agricultural Production Project, Department of Agriculture-United Agency for International (DA-USAID), Manila, Philippines.

Ranilo B.P. 1990. Demand for Guyabano is Up. Weekly Agribusiness, 4(12), March 21-23. Manila, Philippines.

Stuart, Raoul, U., 1994. Market development and opportunities for domestic and export marketing of Philippines horticultural crops, DA-ASAP. Manila, Philippines.

Tacio, H.D. 1990. Papaya's export potential, Animal Husbandry and Agricultural Journal, 24(27):32, September. Manila, Philippines.

Tacio, H.D. 1991. Yam in great demand for ice cream and export. Agriscope, p. 35, Vol. 4, July-August. Manila Philippines.

Tumbali, Gumersindo G.; and Cabuguia, Wilfredo, G. 1990. Review of Government Agricultural Policies. Australian Centre for International Agricultural Research-International Service for National Agricultural Research (ACIAR-ISNAR) Project Papers No. 23, October, Canberra, Australia.

Valmayor, Ramon, V. 1988. Banana and plantains in the Philippines. Proceedings of the Regional Consultation on Banana and Plantain R and D Networking, November 20-24. UNIBAP, Philippines.

Villavieja, G.M. et. al. 1989. Trends in Philippines nutrition situation in relation with some development indicators. Food and Nutrition Research Institute (FNRI). Department of Science and Technology (DOST), Manila.

Appendices

Appendix 1 Available per capita food, calories, and protein supply: the Philippines, 1978-1982.

Year	Total Supply ('000 tons)	Per Capita Supply/Day		
		Total Food (grams)	Calories (kilocalories)	Protein (grams)
1978	17,804.50	1,057.40	2,208.00	61.30
1979	18,650.00	1,077.50	2,255.70	61.70
1980	19,867.90	1,126.20	2,373.70	65.50
1981	20,224.90	1,113.10	2,374.70	66.60
1982	21,731.60	1,165.60	2,442.50	68.90
1983	21,730.20	1,137.90	2,320.50	67.40
1984	23,192.70	1,183.90	2,373.60	66.30
1985	20,530.10	1,025.10	2,246.00	64.40
1986	21,516.30	1,049.60	2,308.30	65.60
1987	21,989.00	1,047.50	2,284.20	61.50
1988	22,980.00	1,073.60	2,414.60	65.00
1989	24,221.00	1,104.10	2,500.20	68.60
1990	25,052.00	1,091.20	2,561.00	69.80
1991	24,033.00	1,025.10	2,406.10	66.60
1992	25,589.00	1,067.90	2,051.00	46.60

Source: Food Balance Sheets, the Philippines, 1978-1992.

Appendix 2 Retail prices of food items at constant 1978 prices, 1970 - 1994 (peso/kg).

Year	Rice	Maize	Meat	Fish	Eggs*	Fruits	Vegetables
1970	2.25	1.44	13.96	6.21	0.58	1.65	2.31
1971	2.41	1.91	13.54	7.14	0.68	1.66	2.74
1972	2.74	2.13	12.48	7.07	0.62	1.85	2.84
1973	2.26	1.63	11.50	6.57	0.56	1.84	2.49
1974	2.50	1.70	12.84	7.35	0.61	1.99	2.50
1975	2.54	1.91	13.19	7.41	0.58	2.28	3.28
1976	2.29	1.71	12.36	7.23	0.55	2.12	3.51
1977	2.26	1.69	12.69	7.40	0.55	2.30	2.48
1978	2.10	1.58	12.49	7.26	0.52	2.09	2.29
1979	1.84	1.35	12.42	7.22	0.50	2.11	2.44
1980	1.69	1.22	11.38	6.79	0.45	2.06	2.20
1981	1.64	1.27	10.95	6.73	0.43	1.99	2.55
1982	1.65	1.27	10.50	6.45	0.40	2.23	2.40
1983	1.59	1.18	11.20	6.49	0.38	2.04	2.19
1984	1.32	1.00	11.10	7.06	0.43	1.89	1.83
1985	2.05	1.38	10.41	6.28	0.45	2.02	1.76
1986	1.97	1.23	10.54	6.80	0.45	2.19	1.82
1987	1.91	1.25	10.92	6.52	0.44	2.26	1.80
1988	1.96	1.24	10.71	6.52	0.41	2.47	1.99
1989	1.96	1.31	10.68	7.35	0.39	2.42	2.09
1990	1.97	1.28	10.41	6.53	0.35	2.45	2.04
1991	1.76	1.06	10.26	6.47	0.36	2.36	1.75
1992	1.69	1.12	10.88	6.58	0.35	2.33	1.75
1993	1.74	1.04	9.81	6.43	0.32	2.28	1.56
1994	1.86	1.08	10.33	6.94	0.33	2.36	1.69

Source: Retail Indices Price of Agricultural Food Basket, 1980 - 1989, Bureau of Agricultural Statistics, Dept. of Agriculture, Quezon City.

* Peso per piece.

Appendix 3 Net per capita (kg/capita/year) food supply by food group/item, 1970-1992.

Year	Rice	Maize	Meat	Eggs	Fish	Vegetables	Fruits	Roots and Tubers	Dried Beans, Seeds and Nuts	Milk and Milk Products	Sugar and Syrup	Fats
1970	94.0	31.2	15.6	3.0	37.7	28.9	48.8	29.6	5.8	15.8	16.5	3.0
1971	98.8	31.6	15.3	3.2	37.7	28.5	36.3	21.2	5.4	15.7	18.0	3.1
1972	89.2	31.1	15.8	3.4	39.2	28.1	36.1	24.0	5.4	17.2	18.8	3.6
1973	93.2	31.9	15.7	3.8	35.6	30.8	40.8	31.1	4.2	27.3	18.7	4.4
1974	97.7	36.1	17.6	3.9	36.0	32.0	43.8	36.2	4.0	27.4	22.3	4.2
1975	87.6	37.8	23.6	3.4	39.4	29.2	74.5	35.7	5.6	27.0	20.7	3.9
1976	83.3	38.5	20.3	3.3	39.0	28.5	78.6	38.2	4.7	27.3	26.9	4.7
1977	89.4	35.6	23.4	6.2	41.0	35.1	59.6	55.3	7.2	27.9	22.4	6.6
1978	85.6	11.4	19.4	5.6	31.6	37.8	53.8	36.4	7.0	27.5	13.3	6.8
1979	87.2	13.4	16.1	4.7	30.3	40.0	62.6	36.7	6.2	27.3	14.4	5.6
1980	93.5	14.9	20.1	4.7	31.1	42.3	64.7	33.6	6.6	27.7	13.1	6.0
1981	93.8	14.7	21.2	4.9	32.2	42.8	51.6	34.6	6.1	27.3	11.0	5.4
1982	95.0	15.7	21.7	5.0	34.6	42.4	62.6	30.0	6.5	27.6	12.8	4.9
1983	83.3	16.5	21.5	5.1	36.8	38.0	67.3	22.4	5.9	27.4	12.0	4.4
1984	94.9	14.6	26.1	4.8	35.0	35.3	61.5	23.8	3.4	27.3	13.6	3.9
1985	94.4	12.4	18.7	4.1	32.6	34.6	53.2	23.2	4.9	27.4	10.5	4.1
1986	93.9	14.8	20.4	4.1	33.0	36.4	52.0	22.9	3.5	23.1	10.8	4.4
1987	91.0	15.1	21.5	2.7	36.4	33.0	63.6	25.8	9.1	2.8	15.7	5.3
1988	90.7	16.9	23.2	2.8	37.9	32.0	66.8	27.5	8.5	2.3	17.8	5.5
1989	94.1	18.6	25.0	2.9	38.6	32.2	67.7	24.7	10.5	2.6	19.8	5.4
1990	95.6	16.4	26.5	2.9	38.4	30.8	62.7	25.6	10.7	2.7	22.5	5.4
1991	83.0	16.1	25.6	2.9	37.1	30.7	58.5	22.8	8.0	2.8	21.3	5.3
1992	90.0	16.0	27.5	3.2	36.7	30.6	65.0	22.5	8.0	2.8	22.8	5.5

Source: Food Balance Sheets, the Philippines, 1970-1992.

Appendix 4 Independent variables used in regression analysis for feed ingredient utilization in the Philippines, 1970 - 1994 (peso/kg at constant 1978 peso)

Year	Wholesale Prices of Feeds & Ingredients			Production of Poultry	GNP Per Capita
	Yellow Maize	Soybean Oil Meal (F.O.B. price)	Cassava	Meat and Eggs ('000 tons)	(pesos)
1970	1.10	1.62	0.66	708.3	3,327
1971	1.66	1.66	0.53	751.3	3,331
1972	1.38	1.66	0.56	765.7	3,161
1973	1.35	2.67	0.56	1,008.4	3,331
1974	1.43	2.12	0.50	727.8	3,393
1975	1.41	1.65	0.54	741.3	3,534
1976	1.44	1.76	0.53	768.2	3,639
1977	1.27	2.36	0.51	574.6	3,750
1978	1.22	1.51	0.49	760.7	3,936
1979	1.00	1.25	0.54	762.3	4,047
1980	1.02	1.25	0.60	850.7	3,996
1981	1.01	1.28	0.53	859.5	3,937
1982	1.01	1.04	0.49	871.4	3,851
1983	0.93	1.28	0.47	922.0	3,862
1984	1.02	1.27	0.45	859.6	3,550
1985	0.99	0.80	0.42	849.0	2,934
1986	1.03	1.03	0.50	940.0	3,996
1987	1.07	1.00	0.42	1,006.0	3,169
1988	1.11	1.17	0.41	1,106.0	3,395
1989	1.07	1.23	0.51	1,231.0	3,414.3
1990	0.85	1.11	0.50	1,358.0	3,492.6
1991	0.98	0.80	0.48	1,308.9	3,284.6
1992	0.84	0.79	0.38	1,362.9	3,189.5
1993	0.86	0.82	0.46	1,429.9	3,224.7
1994	0.96	-	0.55	1,527.8	3,420.3

Source: Statistical Handbook in Agriculture National Data, 1985, Bureau of Agricultural Economics, Min. of Agriculture and Food, Quezon City; Bureau of Agricultural Statistics; and Philippine Statistical Yearbook, 1985-1994.

Appendix 5 Projected population and per capita gross national product: the Philippines, 1993-2000.

Year	Population (million)	Per Capita GNP (in pesos at constant 1978 prices)	Per Capita GNP Growth
1993	66.98	3,225	0.2
1994	68.62	3,267	1.3
1995	70.27	3,365	3.0
1996	71.90	3,496	3.87
1997	73.53	3,692	5.62
1998	75.15	3,947	6.92
1999	76.78	4,200	6.40
2000	78.41	4,494	7.01

Sources: Philippine Statistical Yearbook, 1994; and Medium-Term Philippine Development Plan, 1993-1998, NEDA.

Appendix 6 Regression analysis for selected crops: the Philippines.

Demand Function	Estimated Coefficients (using double equations)			
	Log a	Log b 1	Log b 2	R 2
Cassava DF = f (Cassava P, GNPC)	-63.41	-2.274	-7.828 *	0.32
		(t = 1.23)	(t = 3.042)	
Banana DF = f (Banana P, GNPC)	-35.94	-3.328 *	4.4841 *	0.29
		(t = 2.38)	(t = 1.591)	
Maize Pr = f (GNPC, Maize P)	-8.355	-1.2179 **	-2.055 ***	0.50
		(t = 1.136)	(t = 4.209)	
Cassava Pr = f (GNPC, Cassava P)	-32.31	3.8649 **	-4.552 *	0.22
			(t = 1.375)	
Soybean Pr =f (GNPC)	-1.3516	0.02	-	0
			(t = 0.09)	
Banana Pr = f (GNPC)	-5.055	0.944 ***	-	0.49
			(t = 3.510)	

Source: Food Balance Sheets of the Philippines, 1970 - 1992; Retail Price Indices of Agricultural Food Basket, 1980 - 1989, Bureau of Agricultural Statistics, Department of Agriculture, Quezon City; and Bureau of Agricultural Statistics.

* Significant at 0.05; ** Significant at 0.10; and *** Significant at 0.01.

Note: DF = Direct food consumption; P = Price; GNPC = GNP per capita; and Pr = for processing.

Appendix 7 Regression analysis for the selected upland products.

Products	Estimated Values*			Significance Level
	a	b	R2	
Maize				
Direct Food	4.02	0.03	0.55 (4.02)	0.01
Seed	4.16	0.007	0.24 (2.1)	0.01
Rice	5.76	0.02	0.51 (3.82)	-
Soybean				
Processing	1.87	0.12	0.39 (3.13)	0.01
Seed	0.74	0.07	0.09 (1.12)	-
Soybean Oilmeal	4.88	0.12	0.86 (9.31)	0.01
Cassava				
Direct Food	5.17	0.04	0.52 (2.96)	-
Processing	7.17	0.0	0.01	-
Banana				
Direct Food	6.82	0.01	0.11 (1.34)	-
Processing	864.4	6.8(3.0)	0.05 (0.40)	-
Feed and Waste	643.2	6.5	0.32 (2.59)	-

* Estimated using the formula: Ln Q = a + bT, where Ln is natural log, Q is quality demanded, and T is time. Figures in parentheses are T-values.

Appendix 8 Prices of cassava and banana at constant 1978 prices: the Philippines, 1970 - 1994 (pesos/kg).

Year	Cassava *	Banana **
1970	0.66	1.24
1971	0.53	1.11
1972	0.56	1.14
1973	0.56	1.24
1974	0.50	1.31
1975	0.54	1.35
1976	0.53	1.26
1977	0.51	1.28
1978	0.49	1.28
1979	0.54	1.30
1980	0.60	1.29
1981	0.53	1.24
1982	0.49	1.28
1983	0.47	1.99
1984	0.45	1.25
1985	0.42	1.12
1986	0.50	1.37
1987	0.42	1.61
1988	0.41	1.71
1989	0.51	1.88
1990	0.50	1.96
1991	0.48	1.81
1992	0.38	1.68
1993	0.46	-
1994	0.55	-

Source: Statistical Handbook in Agriculture National Data, 1985, Bureau of Agricultural Economics, Ministry of Agriculture and Food; Retail Price Indices of Agricultural Food Basket, 1980 - 1989, Bureau of Agricultural Statistics, Department of Agriculture; and Bureau of Agricultural Statistics, Quezon City.

* Wholesale price; ** Retail price.

Appendix 9 Utilization of selected upland crop products by use: the Philippines, 1970-1992 (kg/capita/year).

	Direct Food Consumption		Processing			
Year	Cassava	Banana	Cassava	Maize	Soybean	Banana
1970	0.5	N/A	3.29	1.88	0	N/A
1971	0.5	N/A	10.13	1.84	0	N/A
1972	4.4	N/A	6.56	1.70	0	N/A
1973	9.4	N/A	2.08	1.81	0	N/A
1974	11.0	N/A	2.92	2.02	0	N/A
1975	12.1	N/A	2.29	2.20	0	N/A
1976	16.7	N/A	2.25	2.19	0	N/A
1977	30.0	N/A	0.36	7.35	0	N/A
1978	46.3	18.78	31.86	10.27	0.14	16.35
1979	40.1	17.83	33.29	5.55	0.21	16.50
1980	44.4	18.47	30.64	4.75	0.18	17.20
1981	43.7	16.58	28.79	4.80	0.46	17.94
1982	5.7	18.36	24.66	5.24	0.37	16.93
1983	3.3	19.71	17.03	6.17	0.38	14.63
1984	4.3	16.67	20.63	3.43	0.14	14.48
1985	4.6	17.02	23.13	7.89	0.06	14.30
1986	5.8	16.09	22.95	4.30	0.37	14.25
1987	8.4	17.76	23.21	4.00	0.27	13.75
1988	8.6	13.95	23.58	4.99	0.49	13.08
1989	8.2	15.04	22.80	2.30	0.52	13.26
1990	8.0	12.57	24.02	9.91	0.33	11.90
1991	7.6	9.86	22.06	10.24	0.95	11.59
1992	7.4	13.70	21.52	7.05	0.76	11.98

Source: Food Balance Sheets of the Philippines, 1970 - 1992.

Appendix 10 Cassava starch and flour production and utilization in the Philippines, 1980 - 1992 (metric tons).

Year	Production	Import	Export	Total Supply	Utilization	
					Food	Non-Food
1990	247,316	820	7	248,129	123,255	124,874
1991	236,783	-	8	236,775	113,901	124,874
1992	239,119	157	6	239,270	114,396	124,874
Average	241,739	488	7	241,391	117,184	124,874
%				100	48.40	51.60

Source: Food Balance Sheet of the Philippines, 1990 - 1992.

Appendix 11 Volume and value of coconut exports, 1989 - 1993*.

Year	Coconut Oil			Dessicated Cococnut			Copra Oil/Cake Meal		
	Quantity	Value	% Volume	Quantity	Value	% Volume	Quantity	Value	% Volume
1989	736.49	376.80	-	-	94.52	75.76	477.12	53.58	-
1990	1,134.54	360.75	48.68	75.34	60.68	-2.68	643.45	54.81	34.96
1991	839.89	298.53	-25.97	80.74	66.24	7.17	612.45	54.88	-4.89
1992	882.22	481.16	5.04	87.56	9.53	5.55	539.69	52.54	-11.88
1993	859.20	357.61	-2.61	93.34	83.74	9.53	488.49	45.30	-9.49

Source: Agricultural Foreign Trade Development, Bureau of Agricultural Statistics, 1990 - 1993.
* Quantity in '000 tons; value F.O.B. in million US $; % volume is percent change in quantity from previous year.

Appendix 12 Peso per dollar exchange rate, 1970 - 1993.

Year	Exchange Rate (P/US $)
1970	5.863
1971	6.432
1972	6.671
1973	6.756
1974	6.788
1975	7.248
1976	7.440
1977	7.403
1978	7.366
1979	7.378
1980	7.502
1981	7.900
1982	8.54
1983	11.121
1984	16.698
1985	18.590
1986	20.403
1987	20.564
1988	21.065
1989	21.738
1990	24.375
1991	28.003
1992	25.901
1993	27.250

Source: National Economic and Development Authority (NEDA).