

## Development and Constraints of Food Industries in the Philippines

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### Abstract

As in many Asian countries, food in the Philippines is generally associated with rice, which is the staple of over 80% of 70 M Filipinos, followed by white corn grits, a staple food of close to 20% of the population. Other foods that give a feeling of food security among Filipinos include fish (16%), vegetables (13%), meat (11%), fruits (9%), and poultry (2%). The per capita consumption for selected food items is as follows: rice-103kg, fish-36kg, vegetables-14kg, pork-8kg, and poultry-5kg. Though the country is basically agricultural, its annual food production is not sufficient to satisfy the national requirement, resulting in the importation of politically sensitive food items.

With the country's participation in GATT-WTO, investment in food industry is increasing while establishment of fastfood stores proliferates, thereby introducing alternative food consumption patterns like the taste of processed, pre-cooked or ready-to-eat foods. This is common among urban centers where negative income elasticity for rice and positive income elasticity for processed food are observed.

Food technologies in the Philippines may be described as intermediate and some may even be considered as falling below the global standards set forth in the GATT like the quality and phyto-sanitary components. However, the progressive sectors of the food industry (mostly food conglomerates and exporters) are currently upgrading the technologies by trying to adopt modern techniques and facilities or equipment, including those which are imported like mechanical dryers, cold chain and other food-processing facilities.

For constraints in food grain industry, the increase in production in the past 20 years has not kept pace with the rapid growth of the population. The inability to supply the national food requirement is attributed to unavailability/low level of use and high costs of inputs, lack of credit and financing assistance, lack of infrastructure and ineffective government intervention in marketing. For the non-grains food industry (crops, fisheries and livestock) constraints include poor farm-to-market roads, inefficient marketing and distribution systems, lack of financing and low cost availability, unavailability of superior varieties, high cost of inputs, limited postharvest technologies, ineffective quarantine measures, depletion of fish habitats, excessive fishing activities and inadequate training, extension and research.

Finally, the paper outlines government banner programs to address the issue of food self-sufficiency as well as the adjustments and/or safety nets being promoted in conjunction with globalization issues.

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## **Philippines : an introduction**

Stretching over 1,839km north-to-south off the southeastern coast of Asia, the Republic of the Philippines has a total land area of 300,000km<sup>2</sup>. Its 7,107 islands comprise one of the largest island groups in the world.

Close to 70 million Filipinos make up the population, 55% of which occupy the largest island of Luzon. Filipino is the national language; English is used for commercial and legal transactions. Literacy rate is as high as 94%.

The Philippines is a tropical country with an average temperature of 32°C (80°F). March to June are hot and dry (36°C) months; rains and typhoons abound from July to October; November to February are pleasantly cool (around 23°C) and dry months. In the mountainous regions, temperatures dip to about 15°C.

The country is divided into 15 regions, 73 provinces and 60 cities. The economy consists basically of light industry and agriculture—the major products being rice, corn, coconut, pineapple and sugarcane. The country has well-developed industries in food processing, textile, clothing and home appliances, with fast-growing aquaculture, microcircuits and furniture.

The Philippines has an extensive coastline stretching over 34,600km. Its chief ports are located in Manila, Batangas, Bataan, Cebu, Iloilo, Iligan and Davao.

The monetary unit is the peso, divided into 100 centavos. As for communications, over one million television sets, 2.3 million radios and more than a million telephones are in use nationwide. There are 32 daily newspapers, over half of which are published in English and the rest in various dialects.

## **Philippine food industry: an overview**

As a third world economy, Philippine food industry is often equated to agriculture. Foods are cooked and eaten in fresh or semi-processed form. Food accounts for about 50% of the expenditures of the average Filipino household (Table 1). Foods that are normally consumed are rice, fish, vegetables, meat, fruit and poultry, in that particular order (del Mundo, 1997). The variety of foods is however, sacrificed during food shortage. For breakfast, rice with dried salted fish and coffee without milk are consumed. In the absence of rice, bread or root crops, corn or cooking bananas are used. For lunch and supper, rice and fish, or rice and vegetables are consumed. From these, it is very evident, that the viand can be sacrificed but not the staple (rice). Meanwhile, major meat consumption (fresh and processed) ranges from 8.5kg to 40.5kg per capita per year depending on the income level of the household.

Based on Filipino household food expenditures (Table 1) major food industries in the Philippines include cereals (rice and corn), fish products (fish, prawns, shellfish, etc.), meat products (pork, beef, carabeef and poultry), fruits (pineapple, banana, mango, etc.), vegetables (potato, eggplant, tomato) and others. While the eating habit of the Filipino households and the preference for fresh or minimally processed food products are deeply entrenched into their system, there is an increasing popularity for eating out in a restaurant and fastfood stores as a result of the changing life style reinforced by the mushrooming of multinational/American franchise food chains like Jollibee, McDonald's and Chowking. The major segments of the

fastfood sector include hamburgers, pizza, fried chicken and doughnut (PAFM Factbook, 1996). The sector caters mainly to the upper quartile of the Philippine society where prices are generally high, thereby limiting the customers to the high income bracket.

Triggered by the country's participation in the General Agreement on Tariff and Trade

**Table 1 Food expenditure breakdown by regional group, Phils. (in million Pesos)**

Item	NCR	Luzon	Visayas	Mindanao	Total
Total number of families (In thousand)	1,766	5,355	2,779	2,855	12,755
Total family expenditure	244,414	340,568	136,265	141,761	863,008
Total food expenditure	98,499	168,869	71,335	73,474	412,177
Cereals	18,820	52,067	26,638	28,007	125,532
Root and tubers	1,222	2,351	1,123	1,428	6,123
Fruits and vegetables	9,043	14,961	5,566	6,653	36,223
Meat products	19,309	26,098	7,306	7,099	59,812
Dairy products	7,821	11,997	4,407	4,417	28,644
Fish products	11,487	23,482	12,488	11,757	59,214
Coffee, cocoa, tea	2,200	4,884	2,104	2,062	11,250
Non-alcoholic beverages others	2,933	3,887	1,861	2,173	10,853
Eating out	8,554	15,695	6,320	6,643	37,212
Ave food expenditure per family	16,620	13,094	3,501	3,305	36,520
	55,786	31,538	25,665	25,732	32,315

Source: Family Income and Expenditure Survey, 1994.

**Table 1-a Personal consumption expenditure by purpose (As of January 1997)**

Expenditure group (At Current Prices)	In million Pesos				
	1992	1993	1994	1995	1996
Personal consumption expenditure	1,019,209	1,122,528	1,258,750	1,411,904	1,595,346
Food	535,848	587,098	662,903	746,972	843,443
Beverages	24,177	25,707	27,567	30,493	33,905
Tobacco	28,243	30,441	32,678	34,678	36,761
Clothing and footwear	37,524	40,987	44,222	46,978	49,789
Fuel, light, and water	42,030	46,586	51,570	56,659	63,508
Household furnishing	26,709	28,696	30,589	32,600	34,498
Household operations	111,418	126,818	143,491	165,386	190,400
transportation/communication	50,430	51,817	54,697	57,585	63,839
Miscellaneous	162,830	184,378	211,033	240,553	279,203

Table 1—a (Cont.)

Expenditure group (Real Growth Rate)	In percent				
	1992	1993	1994	1995	1996
Personal consumption expenditure	3.26	3.04	3.72	3.81	4.62
Food	4.04	3.58	3.92	3.55	4.60
Beverages	1.92	0.49	4.03	5.01	4.11
Tobacco	0.56	(0.27)	1.48	1.86	1.38
Clothing and footwear	1.50	1.84	3.49	2.48	2.59
Fuel, light, and water	2.81	3.39	4.01	6.04	6.63
Household furnishing	0.99	3.07	2.30	4.32	4.29
Household operations	1.52	3.35	3.57	3.38	4.00
Transportation/communication	3.23	3.08	4.21	5.00	6.13
Miscellaneous	3.41	2.06	3.53	4.50	5.30

Source: National Statistical Coordination Board

(GATT) and its membership of the World Trade Organization (WTO), food industries in the Philippines are currently being upgraded for global competitiveness. Attempts are made to improve the quality of the products to satisfy international standards. Hence, use of modern technologies like mechanical harvesters, mechanical dryers, food osterizers, "cold chain", cold storage and dehydrators is beginning to appear.

As for food exports and imports, the top exports include coconut oil (crude and refined), shrimps and prawns (frozen), bananas (fresh) and pineapple (prepared and preserved). Top imports are wheat and meslin (unmilled), oilcake and other residues of soyabean and milk (solid form).

Finally, the GATT which was ratified in 1995 signaled a change in domestic market access, price supports and export subsidies. As a result, among others, within 10 years all non-tariff barriers to imports of agricultural products must be "tariffied"-reduced by an average of 24%. For any specific commodity, there will be a minimum of 15% reduction on tariffs. Initially, member nations are allowed trade access of 3% of 1985 to 1990 average domestic consumption which will rise to 5% in the tenth year. And with this scenario, Philippine food industries are bracing-up to cope with the impending global trade liberalization. Certainly, Filipino consumers will have wide choices of quality food products at affordable prices and customer-friendly services. However, it will be a mixed blessing for the food producers: expanded market if the product is globally competitive or decline.

## Rice industry

Filipinos are generally rice eaters. To them, rice is life, economics and politics. It is the essence of food security in the Philippines.

Rice technology has advanced tremendously in recent years. High-yielding varieties and

Table 2 Phil. rice requirement, actual production and utilization

Year	Food Use		Production		Utilization		Surplus / (Deficit)	Population (No. of persons)
	Total	Per capita (kg)	Seeds	Feeds & wastes	Total Use (Metric Ton)	Production		
1970	3,013,546	81.77	142,070	211,021	3,366,636	3,246,475	(120,161)	36,852,392
1975	3,832,641	90.69	170,199	259,246	4,262,086	3,988,400	(273,686)	42,258,849
1980	4,453,344	92.17	169,196	323,080	4,945,621	4,970,457	24,836	48,317,444
1985	5,153,027	95.06	162,190	374,344	5,689,562	5,759,122	69,560	54,210,912R
1990	5,948,374	97.66	162,790	396,175	6,507,339	6,095,731	(411,608)	60,909,733R
1995	6,550,756	95.84	183,244	445,357	7,179,357	6,851,616	(327,741)	68,353,005P
1996	7,230,058	103.37	192,628	476,743	7,899,429	7,334,528	(564,901)	69,946,205P

R - Revised

P - Preliminary

Note: Figures are rounded.

the packages called for have been widely adopted. Improvement of technology in terms of higher physical grain quality, protein content, resistance to pests and diseases and yield has been outstanding, especially in the light of growing global concerns like population growth and dwindling resource base (e.g. conversion of agricultural land into industrial estates).

The estimated rice requirement, actual production and its various types of utilization are presented in Table 2. The trend in rice production (milled rice equivalent) relative to domestic consumption shows that from 1970 to 1996, there were more years when consumption exceeded production which could be attributed to the population factor. With a population close to 70 million and per capita consumption of 103kg, the total rice requirement is 7.9 million MT, and at the current 65% milling recovery, this translates into 7.3 million MT or a deficit of 0.6 million MT. Hence, the country resorted to rice importation in previous years to cope with the increasing domestic demand. The key constraints in Philippine rice industry are as follows (FAP Vol. XIII (3) 1996):

- low productivity: caused by low adoption of good seeds, low fertilizer use, and inadequate irrigation
- high postharvest losses: caused by lack of postharvest facilities, poor road network, inadequate handling and transport services, and unfavorable weather conditions during peak harvest
- high cost of distribution: caused by high assembly and transport costs, postharvest losses and fragmented transport systems
- inadequate market intelligence: caused by inadequate communication system and road network, lack of good and timely information access, and unorganized and fragmented producers
- relatively high cost of money and limited access to long-term financing
- lack of well-trained workforce in the various segments of the food chain
- increasing cost of land and labor

- conversion of rice farms into housing and industrial estates

## Corn industry

Corn is the second most important crop in the Philippines because of its economic and political impact on the farming sector and on the food and livestock industries. About 20% of the population (notably in Cebu and part of Mindanao) consumes corn (in the form of corn grits) as staple food, while about 30% of Filipino farmers are engaged in corn production and most of them are smallholders. Generally, there are two varieties of corn produced locally: the white corn for food which accounts for 30% of the total production and the yellow corn (70%) which serves as an important input to livestock industry through feedmills. Corn comprises 60-70% of traditional feed formulations which in turn make up about 70% of the cost structure in raising hogs and chickens. Corn is also used in manufacturing value-added food products such as corn starch, corn oil, glucose, noodles and snack food.

The major issues in the Philippine corn industry are as follows:

- the perennial shortage of domestic corn supply during the lean months relative to the year-round steady demand for feeds by the livestock industry
- the inefficient corn distribution system due to the geographically dispersed supply and demand areas within the archipelago
- the continuing subsistence level of the majority of corn farmers despite substantial efforts of the government to improve farm productivity and profitability
- the high aflatoxin level of corn unacceptable to feedmillers and livestock producers.

**Table 3 Supply-and-demand profile of corn from 1992 to 1997 (in 1,000 MT)<sup>a</sup>**

Year	1992	1993	1994	1995	1996	1997
<b>Supply</b>						
Beginning stock	138.5	219.4	173.0	185.0	170.0	271.0
Production	4,811.0	5,026.0	4,533.0	4,323.0	4,217.0	4,395.0
Imports <sup>b</sup>	401.0	401.0	646.0	994.0	171.0	1,047.0
Total	5,350.5	5,646.4	5,352.0	5,502.0	5,558.0	5,713.0
<b>Demand</b>						
Food	997.0	997.0	735.0	764.0	782.0	848.0
Seeds	66.6	62.0	60.0	55.0	56.0	56.0
Feeds	2,865.0	3,158.0	3,258.0	3,432.0	3,576.0	3,511.0
Others <sup>c</sup>	1,202.6	1,256.5	1,134.0	1,081.0	1,081.0	1,098.0
Total	5,131.2	5,473.5	5,167.0	5,332.0	5,495.0	5,513.0
Ending stock	219.4	173.1	185.0	170.0	271.0	200.0

<sup>a</sup> Source: NFA, 1998.

<sup>b</sup> Include corn substitutes.

<sup>c</sup> Include wastes @ 20% of total production (estimated).

Table 3 presents the supply and demand profile of corn in the Philippines. It indicates the increasing trend in the use of corn for animal feeds and other industrial products, resulting in a corresponding decrease in the use for food. The country continuously imported corn but with a decreasing trend from as high as 7.5% in 1992, to as low as 2.6% in 1997. If the trend prevails, the Philippines will become an exporter. A study showed, however, that about 70% of all stocks of corn in both private and government warehouses were contaminated with aflatoxin well above the allowable safe level of 20 ppb.

## Fishery and aquaculture industry

Fish and similar food products are one of the most popular components of the Filipino diet. In 1991, the UN-FAO reported that the Philippines was the 11th largest fish producer in the world. There are three sectors of fish production in the Philippines: (1) Commercial fishing—beyond municipal water boundary (e.g. 15km from coastal area) as provided by law, (2) Municipal (marine or inland) fishing—within municipal water boundary, and (3) Aquaculture fishing—including fishpond fishing, use of cages and nets. Fishpond production can be categorized into (a) brackish water fishponds, (b) freshwater fishponds, and (c) fishcages and fishpens.

Of these fishing sectors, municipal marine and inland fishing generally accounts for the largest combined volume while aquaculture fishing ranked last (Table 4). However, in terms of monetary value, aquaculture fishing ranks first followed by municipal marine and by commercial value.

There are wide species of aquatic food resources in the Philippines. For inland municipal fishing, tilapia (all species) predominate followed by carp (*Cyprinus* spp.), tawilis (*Harengula*

**Table 4 Fish production by sector**

	Year				
	1991	1992	1993	1994	1995
<b>Volume</b>	<b>Thousand Metric Tons</b>				
<b>All sectors</b>	<b>2,599</b>	<b>2,626</b>	<b>2,647</b>	<b>2,686</b>	<b>2,740</b>
Commercial fishing	760	805	845	885	927 (34%)
Municipal marine fishing	914	855	803	787	786 (29%)
Municipal inland fishing	233	230	227	223	202 (7%)
Aquaculture fishing	692	736	772	791	825 (30%)
<b>Value</b>	<b>Million Pesos</b>				
<b>All sectors</b>	<b>90,034</b>	<b>65,443</b>	<b>71,058</b>	<b>81,229</b>	<b>83,862</b>
Commercial fishing	15,245	16,801	18,365	21,130	23,743
Municipal marine fishing	19,614	19,444	20,118	22,327	24,336
Municipal inland fishing	2,519	3,212	2,067	2,492	2,448
Aquaculture fishing	22,656	25,986	30,508	3,580	33,335

Source: Bureau of Agricultural Statistics.

*tawilis*), biya (*Glossogobius guirus*) and dalag (*Ophicephalis striatus*). Among the crustaceans, shrimp (*Plalaenon atya*), talangka (*Orapsus* sp.) and alimango (*Scylla serrata*) commonly occur. And for molluscs, suso (snails), tulya (*Corbicula manilensis*) and kuhol (*Ampularia luzonica*) are the common catches.

For brackish water fishponds, the species commonly produced are tiger prawns or sugpo (*Penaeus monodon*), milkfish (*Chanos chanos*), endeavor prawns and mud crabs or alimango. For freshwater fishponds, fishcages and fishpens, the common species produced are tilapia, milkfish and carp.

For mariculture, the species commonly produced are oyster, mussel and seaweed.

For marine fishing, tuna (*Thunnus and Katsuwonus spp.*) is the major species caught which accounts for about 16% of total catches. Annual tuna catch is estimated at 300,000 tons both in commercial and municipal fishing. The product is exported in canned, fillet, fresh/chilled and frozen forms.

The major constraints in the fishery and aquatic resources industries are overfishing, resulting in depleted resources and environmental degradation, poor fishing/fish port and postharvest facilities, illegal fishing methods, sedimentation and siltation, high cost of inputs (aquaculture), lack of milkfish fingerlings, and the low productivity of grow-out operations. Lack of information and technology on crab culture is another constraint for this crustacean food. In aquaculture, constraints include lack of capital/financing, lack of high-value fish species and polluted waters.

## **Livestock and poultry industry**

In the Philippines, meat consumption is directly related to income levels. For those with an income of P3,000/month or less, per capita consumption is only 8.5kg/year while for those earning P7,500 to P13,000/month, 28.2kg, and those earning over P13,000/month, 40.5kg. The types of meat consumed are pork (45%), chicken (37%), beef (15%) and carabeef (3%). Urban areas, with about 44% of the population account for about 65% of the total market.

Similarly, egg and processed meat consumption increases as income increases. The average per capita consumption for egg is 65 pieces/year while for processed meat, the average household spent P3,130/year or roughly P260/month (1994 Survey). Processed meat covers hotdog, canned meat, tocino, longganiza, sausage, corned beef, tapa, ham, chorizo, bacon, salami, etc.

Processed meat industry grew at the rate of 20% per year. This increase can be attributed to higher income levels and increased consumer spending on non-basic food items. In 1996, hotdogs registered a record growth of 30%, while ham, bacon and cold cuts registered a lackluster growth as a result of limited availability of raw materials for manufacturers (FABM, October 1997).

On the production side, Table 5 lists the number of farms and animals reared. Chickens in terms of number of head rank first, followed by ducks, hogs, carabaos and goats.

Some of the constraints in the livestock industry include insufficient support facilities like well-equipped stock farms and breeding centers, inadequate quarantine stations and diagnostic laboratories, and nurseries. Post-production and marketing facilities like transportation and



handling, auction markets, abattoirs, dressing and processing plants are likewise inadequate.

**Table 5 Number of farms and animals reared (as of December 31, 1991)**

Crop	Number of farms	Number of head reared
Carabaos	1,810,937	2,766,405
Cattle	899,353	1,991,022
Horses	212,226	287,742
Hogs	2,551,789	7,478,577
Goats	867,999	2,402,993
Other livestock	12,658	55,571
Chicken	3,627,762	87,297,919
Ducks	561,977	10,354,964
Quails	13,905	1,792,087
Geese	40,018	253,797
Turkeys	85,772	471,312
Pigeons	48,304	622,548
Other poultry	6,272	444,165

Source: Census of Agriculture, NCSO.

## Fruit and vegetable industry

Aside from rice and corn, the major traditional crops grown in the Philippines which significantly contribute to the Gross Value Added (GVA) in agriculture include coconut, sugarcane, banana and other crops (Table 6). While coconut and sugarcane have a socio-economic and political significance in the Philippine economy, they are not a direct part of Filipino diet but rather a source of raw materials for processed foods. Coconut main products are desiccated coconut, coconut oil and copra. Other by-products are fresh coconut, coco chemicals and nata de coco. Meanwhile, sugarcane is the main source of sugar in the Philippines. Sugar and its by-products are commonly used in ingestible products like candies, sweets, breads and softdrinks. It is also consumed as table sugar and can be used to produce solvents, plastics, plasticizers, fiberboards, building materials, surfactants, additives and fuel.

Banana is one of the most important fruit crops in the Philippines. It is the country's top fresh fruit export. There are about 227 known local banana cultivars. Table banana cultivars include Cavendish, Bungulan, Lakatan and Latondan while Saba banana is usually processed into crackers, puree, flour and powder. Mainly grown in commercial plantations, banana is also a popular backyard crop.

Pineapple is another important exotic fruit produced in the Philippines mainly by big companies-exporters like Del Monte and Dole which have integrated operations from production, processing and marketing. Philippine pineapple and its products are under serious threat in the world market. Competition is posed by Thailand and Indonesia which, with their low production cost, had invaded traditional Philippine markets offering generous price cuts and

**Table 6** Gross value added in agriculture, fisheries, and forestry by industry group  
(as of January 1997)

Industry (At current prices)	In million Pesos				
	1992	1993	1994	1995	1996
Agriculture	288,159	312,976	367,737	409,451	468,648
Agricultural crops	158,259	174,378	209,198	243,396	283,942
Palay	35,761	42,167	51,079	63,894	80,486
Corn	18,547	18,484	18,757	21,750	22,752
Coconut	20,352	18,489	23,400	27,330	26,426
Sugarcane	9,301	9,538	12,036	11,971	15,329
Banana	9,074	9,554	11,236	10,941	11,317
Other crops	65,223	76,046	92,690	107,510	127,629
Livestock	38,729	39,441	45,019	48,476	55,488
Poultry	26,365	27,221	30,765	28,130	31,692
Agricultural activities & services	13,174	14,503	16,895	19,243	21,261
Fisheries	51,633	57,533	65,860	70,206	76,265
Forestry	6,763	5,570	4,770	2,746	1,693
Agriculture, fisheries & forestry	294,922	318,546	372,507	412,197	470,341

**Table 6** (Cont.)

Industry (Real growth rate)	In per cent				
	1992	1993	1994	1995	1996
Agriculture	0.75	2.62	2.97	1.72	3.46
Agricultural crops	(1.16)	2.28	3.47	0.17	3.79
Palay	(5.63)	3.34	11.71	0.02	7.05
Corn	(0.76)	3.87	(5.82)	(8.65)	0.57
Coconut	0.25	0.18	0.06	8.04	(1.50)
Sugarcane	4.84	7.92	1.31	(25.57)	20.76
Banana	3.64	0.32	1.36	(0.99)	(0.36)
Other crops	0.45	0.92	1.88	4.97	1.91
Livestock	0.79	4.66	4.79	5.20	6.59
Poultry	10.87	6.19	2.62	5.25	11.27
Agricultural activities & services	4.23	0.74	1.49	3.55	2.34
Fisheries	1.17	1.37	1.14	1.98	(2.71)
Forestry	(11.54)	(16.46)	(15.04)	(48.60)	(41.06)
Agriculture, fisheries & forestry	0.39	2.13	2.60	0.85	3.07

Source: National Statistical Coordination Board.

Table 6-a Census of agriculture : number of farms and area planted, temporary crops, 1991

Crop	Number of farms	Area planted (Hectares)
Palay	2,367,084	4,009,126
Corn	1,774,618	2,737,131
Other cereals	4,113	2,813
Leguminous plants	689,981	76,080
Tubers, roots and bulbs	1,396,237	240,491
Leafy vegetables, stems and flowers	427,954	14,661
Fruit-bearing vegetables	1,023,098	43,164
Pineapple	211,521	58,600
Other fruit-bearing crops	29,812	9,686
Sugarcane	208,618	296,528
Peanuts	129,933	32,345
Other industrial temporary crops	95,573	26,690
Tobacco	99,527	52,557
Other temporary crops N.E.C.	11,621	3,617

special offers.

Other Philippine fruits which are of economic importance are mango, citrus and calamansi, lanzones, guava, jackfruit, papaya and durian (Table 6-b).

Triggered by high demand in the global market, Philippine mango industry is now perking up with major buyers from Japan (53%), Hongkong (42%) and Singapore (2.6%). It is traded in fresh or processed (dried or puree) forms. The bulk of mango comes from backyard growers (2-5) trees, thus creating supply gaps, quality problems and postharvest handling losses. While the fruit can now be produced throughout the year, its availability remains seasonal due to the high transport cost, poor roads and backyard growers located in inaccessible areas. The lack of technical knowledge of growers, cultivars with outstanding genetic traits, appropriate and effective technology, proper pest management and postharvest technology reduces yield and affects quality. Government help is also needed to expand potential markets and obtain market intelligence. These constraints generally affect other major Philippine fruits.

For vegetables, Filipino per capita consumption is dramatically low (10 to 18 kg/year) compared to most Asian countries, 50kg and developed countries, 80kg (Ramos, 1996). Production of vegetables in the Philippines is of three types: (1) for home consumption, (2) as a secondary crop after rice or corn, and (3) full scale specialized basis. As vegetable production areas are generally small and non-contiguous, marketing requires the consolidation of small production volume thereby involving numerous intermediaries or middlemen to facilitate the distribution to consumers. A popular vegetable trading system in the Philippines is the "pakyaw" system, whereby the whole crop is bought in bulk by the trader who shoulders the cost of harvesting and sorting of the product. Alternatively, the farmer can harvest and sort the product himself and then sell it to a roaming trader. Traders at the farm are usually agents

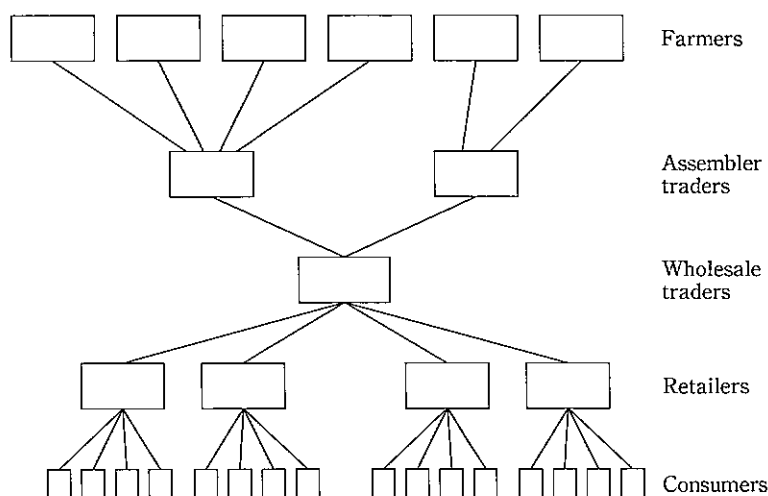
**Table 6-b Census of agriculture : number of farms and trees planted, permanent crops, 1991**

Crop	Number of farms	Area planted (Hectares)	No. of productive trees/Vines/Hills
Fruits			
Anonas	19,224	88,995	59,143
Atis (Custard Apple)	221,801	1,825,060	1,545,571
Avocado	653,395	2,294,455	1,628,075
Balimbing	115,781	231,047	191,094
Banana	3,258,942	175,703,358	138,873,895
Calamansi	113,430	370,162	265,920
Chico	123,610	356,849	278,573
Duhat	138,616	399,930	304,677
Durian	94,185	602,333	316,262
Grapes (Ubas)	5,489	109,527	67,385
Guava (Bayabas)	1,033,759	6,174,287	6,065,091
Guyabano	531,117	2,140,577	1,400,471
Jackfruit	1,372,597	7,214,864	5,145,899
Kalamansi	323,703	8,284,796	5,483,565
Kamachili	81,610	229,868	183,328
Kamias	126,183	259,029	216,878
Lanzones	259,568	3,465,067	2,220,759
Lemon	97,217	673,083	474,138
Lime (Dayap)	14,098	86,684	68,773
Malunggay	807,813	4,454,504	3,933,381
Mandarin (Dalanghita)	97,845	4,447,666	2,448,118
Mango	1,565,340	7,621,847	4,782,084
Mangosteen	12,191	110,879	86,933
Marang	73,440	1,044,603	796,076
Orange (Dalandan)	92,859	909,235	527,847
Papaya	880,608	5,158,571	4,050,444
Pomelo (Suha)	276,069	867,889	624,560
Rambutan	64,026	633,169	331,677
Rimas	29,050	89,744	69,324
Santol	737,548	22,551,403	1,667,689
Siniguelas	129,161	529,793	456,324
Starapple (Caimito)	853,637	2,362,619	1,826,488
Strawberry	11	13	4
Tamarind (Sampaloc)	281,925	601,505	486,016
Tiesa	189,730	405,520	292,538
Other fruits	268,664	1,317,474	874,849

Table 6-b (Cont.)

Crop	Number of farms	Area planted (Hectares)	No. of productive trees/Vines/Hills
<b>Spices</b>			
Achuete	61,156	580,749	349,254
Black pepper	27,277	3,635,489	2,757,829
Laurel	1,129	7,525	6,037
Other spices	40,431	295,599	248,384
<b>Edible nuts</b>			
Coconut	2,742,425	327,997,917	283,865,621
Cashew	108,113	4,263,380	3,262,147
Pili	62,646	321,875	254,048
Other edible nuts, N.E.C.	8,492	108,033	85,936
<b>Coffee</b>			
Cacao	479,239	22,203,441	18,057,759
Coffee Arabica	191,608	27,297,636	23,685,390
Coffee Robusta	179,089	67,615,468	60,170,118
Coffee Excelsa	39,001	7,270,300	6,249,776
Coffee, other varieties	176,245	24,425,082	21,199,694
Tea	2,230	132,384	95,605
<b>Fiber</b>			
Abaca	90,710	48,657,005	43,244,426
Kapok	57,159	243,139	197,437
Kenaf	489	18,304	14,530
Maguay	5,396	1,321,872	1,206,015
Pina	11,618	937,035	543,447
Ramie	2,360	20,278,838	18,765,352
Sisal	494	72,461	38,658
Other fiber crops	16,883	2,165,585	1,888,905
<b>Industrial</b>			
Bamboo (Kawayan)	444,018	3,887,480	3,022,612
Falcata	22,698	4,345,595	2,381,930
Herbal/medicine plants	16,238	264,735	174,722
Ipil-Ipil	307,727	27,889,846	
Lumbang	2,298	37,340	22,786
Mulberry	3,061	314,688	223,701
Palm Tree	19,547	1,410,777	1,319,863
rubber	32,188	17,682,381	12,765,951
Other industrial permanent crops	268,858	24,425,662	10,952,272

or assembler traders, who collect fresh products from several producers and sell in bulk to wholesalers, usually located in urban centers. Wholesalers in turn sell on to retailers and retailers eventually sell on to consumers (Fig.1). Needless to say, every time a product is “handled” (that is loaded, unloaded, packed, repacked, etc.) it loses some of its quality. Similarly, the total time elapsed between harvesting and the final acquisition by the consumers, influences the freshness and final quality of the product. This loss of quality which is referred to as postharvest loss could exceed 60%, including weight loss, removal of outer leaves, rotting of product, etc. Postharvest losses need to be compensated for by consumer prices; and consumers pay for the actual product plus for the lost product, including all the handling cost. Inevitably, a product cannot end up in a consumers’ hands as fresh and unblemished as it is picked up in the farm, but a lot can be done to preserve the quality and reduce postharvest losses.



**Fig.1 Typical trading chain for vegetables in the Philippines**

Source: Usapang Gulayan, Vol.III (1), East-West Seed Company Makati City, Philippines, March 1998.

## Fastfood industry development

The Filipino habit of eating out started in the 1970s and has since gained momentum owing to the rapidly changing life style of the people. Early fastfood establishments were mostly American franchise chains, but because of the lucrativeness, local and other foreign investors have been lured into entering the business in recent years, hence the mushrooming of local food chains all over the country. Restaurants, on the other hand, have been known to Filipino much earlier and can be traced to small “carinderias” and eateries along side streets and wet markets, which eventually became establishments for fine dining.

In restaurants, customers place their orders with waiters and have their orders served on their table. Fastfood chains are self-service outfits where customers fall in line at each counter to make orders and pay upon receipt of the ordered food. The fastfood segments dominating

the industry are hamburger (60%), pizza (20%), fried chicken (15%) and doughnut (5%) (Phil. Agribusiness and Food Market Factbook, 1996).

While restaurants mainly cater to the upper quartile of Philippine society and are appealing to the older and more mature crowds, fastfood encompasses a wider market and practically appeals to all ages. It is more oriented toward the young market as manifested in promotion, as the young has rapidly changing tastes and could easily adapt to new menu offerings.

In terms of performance, restaurant and fastfood industry grew by an average of 30% per year from P8.6 B in 1989 to P10.8 B in 1993 gross revenues. In terms of net income, the industry grew by 38% each year.

The fastfood chains popularly patronized are Jollibee (68%), McDonald's (8%) and Chowking (7%). Others which registered top-of-mind awareness among consumers include Burger Machine, Wendy's, Cindy's and Shakey's (Food and Agribusiness Monitor, 1997).

By socio-economic class, Jollibee was patronized most by both Class ABC and Class D followed by McDonald's (Fig.2). Weekends were the most preferred time for eating. Afternoon snack was the most preferred mealtime followed by lunch. Chicken was the most preferred order (45%), followed by hamburger (37%), and french fries (27%) and mojos (27%). Amount spent on eating out ranges from P30 to P75 per person per meal. Take-out covers mainly chicken, spaghetti, french fries and mojo potatoes.

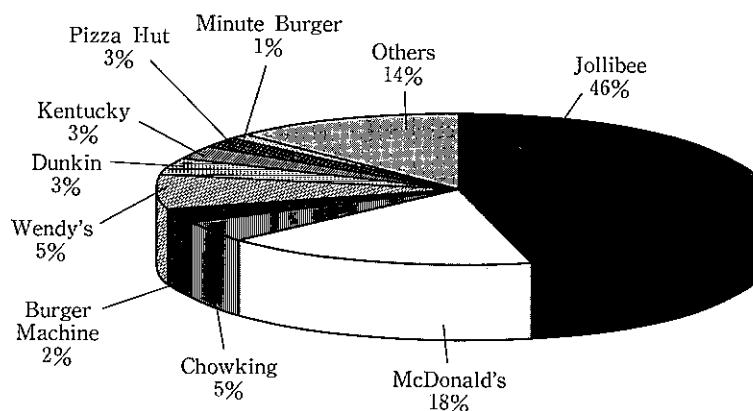


Fig.2 Fastfood outlets patronized by socio-economic classes

The industry is expected to continue its double-digit growth which will be sustained by the rapidly changing Filipino life style brought about by : changes in consumer income and expenditure trends, worsening urban traffic, increasing number of shopping malls, increasing number of working wives and the addition of new services that boost sales. Growth in eating out spending is projected to reach 7.5%-8.5% by the year 2000 (PAFM Factbook, 1996). Demand for food is continuous and the rising income levels will enable more people to afford eating out. Furthermore, innovations in the food industry like delivery services, remain unsaturated presently.

## By-products utilization in the food industries

For rice, the major food crop in the Philippines, the following by-products are used as follows :

- 1 Rice straw—at least 10 million MT produced annually are used as substrate materials for mushroom and vermiculture; paper and pulp production for newsprint, fiber board and straw board; feeds for cattle, buffalo, carabao and goat; roof materials for house of domestic animals and grain stores; biomass energy for fuel in cooking and parboiling; weaving material for mats; packaging materials for fruits, vegetables, eggs, porcelain and ceramic; as direct organic fertilizer; for mulching of garlic and onion growers; food synthesis for single oil protein synthesis; composite elements as bedding for litter and poultry and; as clay composite for reinforcement of irrigation canal walls.
- 2 Rice husk or hull (accounting for about 14-26% of the paddy weight)—about 2 million MT of hull per year could be used for energy generation. As fuel, hull is used for simple fuel for domestic stove as well as for steam power generators. On a limited scale husk is made into briquette materials as fuel, and can also be used as a suitable substitute material for wood in charcoal manufacture. Moreover, it is utilized as fertilizer, packing material, feed ingredient, brick component and board.
- 3 Bran—in the Philippines, bran, together with polished rice which accounts for about 10% of paddy weight, is primarily utilized as feed, food, and pharmaceutical materials. On a limited scale, oil is extracted from it which can be used for the production of oryzanol and sitosterol. From deoiled bran, inositol and calcium phytate can be produced.
- 4 Broken rice—used for rice noodles, malt sugar, beer and spirits, flour, feed components and as coffee substitute.

Other secondary by-products of rice include char, ash and producers' gas derived from rice husk distillation, rice-based food products such as noodles, flour, flaked rice, puffed rice, fermented rice, biscuits, cakes and rice wine. Processing is already being carried out in the country on a limited scale.

For corn, the major by-product is the cob which is being utilized in the country as fuel especially in the rural areas. There are commercially available cooking stoves so-designed for rice hull and crushed cobs. Corn stalks are also used as forage for farm animal feeds. There is an on-going study on the utilization of rejected aflatoxin-contaminated corn in the feed industry into a sort of binder for board-making. The initial results however, have not yet been conclusive.

In the livestock industry, by-product utilization is based on biogas technology using animal wastes especially from piggeries. The Bureau of Animal Industry (BAI) is actively promoting low-cost biogas using a tubular polyethylene digester (Fig.3).

Utilization of other by-products in the food industries includes production of Cashew Nut Shell Liquid (CNSL), a high-grade oil from cashew shell which has various industrial uses; upholstery and stuff materials from coco-husk and feed ingredients from fish and shell-fish by-products, among others. The potential of these by-products, however, has not yet been fully utilized locally.



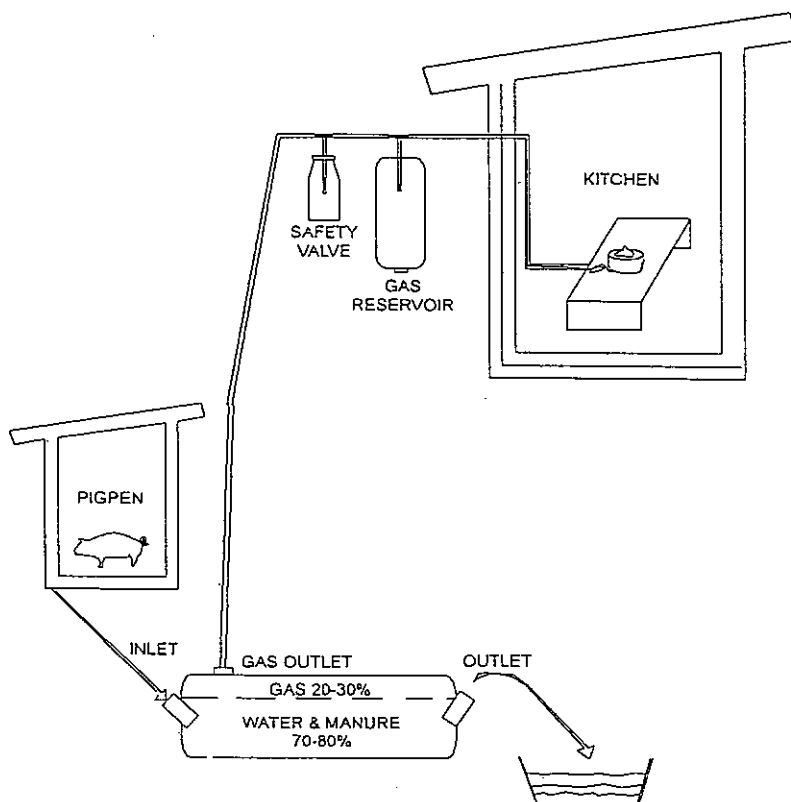


Fig. 3 Schematic diagram of TPED biogas plant

## Current government interventions in the food production and industries

In view of the foregoing situation of the Philippine food industries, the government through the Department of Agriculture launched a Medium-Term Agricultural Development Plan (1992-1998) which aimed at developing not only the local food industries but also making Philippine food products competitive in the world market.

Dubbed as Gintong Ani (or Golden Harvest) Program, there are 5 component programs namely: (1) rice and corn, (2) fisheries, (3) livestock, (4) high value commercial crops and (5) marginal and poverty-stricken areas.

These programs are outlined as follows:

### *Gintong Ani* for high value commercial crops (HVCC) program components

- 1 **Legislative and Policy Reform and Advocacy Agenda** aims at recommending legislative and policy measures to catalyze the development of the commercial and high-value crop sector. Policies that will promote greater private investments in the sector will be advocated to ensure that the policy environment is consistent with the country's commit-

ments under the WTO-GATT, APEC, and AFTA.

- 2 **Market Development and Financing** aims at enabling farmers and processors to produce commodities that are at par with market requirements, the only way for an enterprise engaged in commercial crops to become profitable. Key activities under this component involve :
  - Market reconnaissance and assessment
  - Market linkage/encounter
  - Market information systems and networking
  - Local and international agri-aqua and agro-industrial trade fairs
  - Niche market development
  - Local and international trade and agribusiness missions
  - Quarantine, sanitary and phyto-sanitary services
  - Food safety and sanitation
  - Strengthening of farmer cooperatives and industry associations
  - Producer-buyer linkage
  - Financing for integrated production, marketing and processing
- 4 **Technology Promotion and Commercialization** aim at disseminating technology packages that have been found to produce profitable results, through media and various modes of interpersonal communication, like training courses, seminars and technology demonstration by farmers and small-scale entrepreneurs.
- 5 **Research and Development** cover assessment of policy directions, pattern and trends in world and domestic markets, and accessing of technologies to meet the changes in the consumers' preferences. This program will involve studies on industry prospects and competitiveness, and development of market-led technologies, emphasizing environmental soundness and market needs.
- 6 **Rural Infrastructure** will involve making representations with the appropriate agencies to ensure priority attention to infrastructure projects that will support the development of commercial crop industry, including building or rehabilitation of roads linking production areas to ports and markets. This program also includes designing and testing of irrigation systems, promotion of private investments in postharvest, industry processing, bulk handling and cold chain facilities supported by appropriate technical and financial packages.
- 7 **Communication and Information Generation** involves the transmission of program messages to clientele in order to generate concrete actions and support from them. It also involves program monitoring and evaluation.

### ***Gintong Ani* for livestock program components**

- 1 **Production** involves the increase of the population of poultry and livestock, namely: cattle, carabao, small ruminants like goats, and swine. Toward this end, support services will be provided in coordination with local government units. These services include the introduction of genetically improved stock, upgrading of current herds, provision of animal health services, and training and extension education. Existing support services facilities will be maintained, such as diagnostic laboratories, forage nurseries in stock farms, and provincial

and municipal nurseries.

- 2 **Post-production and Marketing** aim at increasing the value of production, and ensuring quality and safety of products to make them more acceptable to consumers. This component covers transportation and handling, processing and marketing of livestock and livestock products. Under this component, livestock auction markets will be set up and the construction of abattoirs, dressing and meat processing plants will be facilitated. Market support will be provided through market matching activities, packaging of specific market assistance services, and exploration of export markets.
- 3 **Farmers Organizations** shall be the primary beneficiaries of the program. Assistance and support under the program shall be channeled primarily to organized groups. This will ensure the sustainability of projected gains.
- 4 **Research and Development** will be strengthened and focused on applied aspects where current issues and questions will be addressed. The DA's regional integrated agricultural research stations will be the focal sites of the theses studies. **Credit Support Services** aim at giving financial assistance to needy but qualified livestock farmers. The program will primarily utilize the existing Multi-Livestock Development Loan Program as mechanism for animal distribution.
- 5 **Monitoring and Evaluation** involve the documentation of program inputs, outputs, problems and levels of success or failure. The resulting database will guide implementors in undertaking future actions.

### ***Gintong Ani* for rice and corn program components**

- 1 **Production Support Services and Adaptive Research** involve the generation of appropriate rice technologies and the continuance of varietal improvement research. Techno-demo farms showcasing location-specific technologies will be developed. Integrated pest management will be promoted. Through accredited seed growers and other sources of quality seeds, farmers will be provided adequate supply of registered and certified seeds. Combined use of inorganic fertilizers, and the judicious use of pesticides shall be promoted. A soil fertility map indicating recommended fertilizer application shall be prepared.

Farm mechanization, involving the use of hand tractors, floating tillers, reapers and strippers, shall be pursued.

- 2 **Training and Extension Services** will largely involve upgrading the capability of agricultural technicians through continuous training.
- 3 **Irrigation Infrastructure Development** will be expanded and intensified by constructing new national systems and rehabilitating existing ones. Shallow aquifer sources shall be tapped through shallow tube wells. Small water impounding dams shall continuously be developed. Cloud seeding will be conducted when needed. Finally, farm-to-market roads will be constructed and rehabilitated.
- 4 **Credit Delivery Services** involve the twin-action of phase out of grants or subsidies on seeds, fertilizers, irrigation and postharvest facilities and the expansion of farmers' access to formal credit. It likewise refers to the provision of loans to farm groups at 25% less than commercial credit cost, conduits other than farm groups shall likewise be developed, the

Department of Agriculture and Land Bank of the Philippines shall pool a credit fund at a 1 : 1 ratio (the former has put up some P380 million). Financing shall cover production including certified seed purchase, irrigation and postharvest equipment and facilities, and market facilitation.

- 5 **Postharvest Development** involves increasing investments in postharvest and market-related infrastructure and commercialization of postharvest technologies, facilities and equipment.
- 6 **Public Information Campaign** uses the tri-media on the basic message “Dadami ang palay, giginhawa ang buhay”.
- 7 **Marketing Assistance** refers to the provision of an efficient marketing system that influences price behavior and favors both farmers and consumers. It also involves support to upgrade the capabilities of farmers’ organizations to undertake marketing functions, and provision of support services, like an extensive market information system. Activities to be conducted in this regard are: the continued “palay” procurement by the NFA, the expansion of “quedan” financing, the acceptance of payment for irrigation services, support to enable farmers’ organizations and cooperatives to purchase produce from their few members and strengthening of the DA’s Marketing Service and the BAS’ market information capabilities.

### ***Gintong Ani* for fisheries program components**

- 1 **Research and Development** involve the pursuit of an integrated approach that includes a unified, updated, area-based and client-responsive R & D within the framework of the National Fisheries and Aquatic Resources Research Agenda. In aquaculture and inland fisheries, this program deals with the intensified implementation of existing programs involving milkfish broodstock development; “Operasyon Sagip Sugpo” which aims at rehabilitating the prawn industry; the Nationwide Assessment, Management and Seed Production of Crab Resources and the Resource Assessment and Development of Lake and Marshland Resources. Under marine fisheries, the specific programs fall under three general classifications, as follows:
  - 1) Fishery resources assessment program composed of a stock assessment project, monitoring of the red tide toxin, coral reef survey, and regional training workshops on the implementation of Convention for the International Trade of Endangered Species (CITES) in the country
  - 2) Fishing technology studies focused on environment-friendly fishing technologies
  - 3) Studies on postharvest technology and processing, including the development of value-added products from fish, shellfish and seaweeds; standardization of seaweed production; village-level agar processing; and chemical and micro-biological examination of fishery products for export and import.
- 2 **Training and Extension Network** involves a human resource development program that aims at upgrading technical skills and extension communication in the fisheries sector. The program assumes a partnership among government agencies, the Southeast Asian Fisheries Development Center (SEAFDEC), and the LGUs.

- 3 **Marketing Assistance** aims at providing a system that will promote efficiency and improve profitability of the sector. This program includes market-matching activities, capability-upgrading of fishing cooperatives and other organizations, provision of postharvest facilities and other type of infrastructure, like roads, ports and communication, and the establishment of quality product standards.
- 4 **Credit Delivery and Rural Savings Mobilization Services** aim at promoting lending to the sector by realigning seed fund for priority projects, strengthening community organization and awareness development activities and promoting continuing reforms to rural finance policy and the provision of institutional framework and support service systems, including social preparation and business management schemes, to encourage greater private sector participation.
- 5 **Public Information Campaign and Communication Support** involves a mixed-media approach to disseminate program information and messages, with the basic theme "Maunlad na pangisdaan, Matatag na kinabukasan".
- 6 **Data Base and Management Information System** aims at strengthening fisheries information and statistical data base as well as monitoring and evaluating activities through the full implementation of the Philippine Fisheries Information System.

### ***Gintong Ani* for marginal and poverty-stricken areas program components**

- 1 **Legislative and Policy Reform and Advocacy Agenda** involves the formulation and facilitation of adoption of policy reforms and legislation to enhance human capital, increase investments, and promote research and development in marginal and poverty-stricken areas. This should be consistent with the country's commitments to the Rome Declaration on World Food Security and World Food Action Plan, Agenda 21 of the United Nations Conference on Environment and Development, the GATT and the APEC. The plan of action involves studies on agricultural land policy, securitization of land under agrarian reform, and poverty alleviation in upland and resource-poor areas. This program will be implemented through consultative meetings, workshops and fora with various stakeholders.
- 2 **Soil and Water Conservation Research and Technology Development** seeks to address the dearth in research on marginal agricultural areas in the country. These studies are needed in the formulation of and integrated approach to development and the promotion of management technologies for this special concern. The plan of action includes the inventory, mapping and evaluation of marginal and poverty-stricken areas, participatory research and development, community mobilization, technology promotion and commercialization, and the development of a strong linkage with DAR on ARC development and DENR on community-based forestry and agroforestry, watershed rehabilitation and reforestation, among others.
- 3 **Training and Extension** involve capacity building among program implementors, agricultural technicians, and program beneficiaries through local and foreign training on new technologies relating to marginal lands.

- 4 **Small-scale Irrigation and Indigenous Power Infrastructure Development** involves site-specific infrastructure development for marginal areas, including small water impounding projects, small farm reservoir, diversion dam and wind power system.
- 5 **Farm-to-Market Roads** involves the identification of roads for rehabilitation. It also includes plotting locations of needed roads, infrastructure and other facilities needed to support productivity in the target areas.
- 6 **Balanced Fertilizer Nutrition Assistance** involves the organization of farmer training courses on appropriate mix of fertilizer nutrition, particularly the production and use of organic fertilizers.
- 7 **Agrobiodiversity Support Services** involve the establishment of nurseries for genetically improved stocks essential to crop diversification. This program will also cover local breeding and use of native scions whenever beneficial.
- 8 **Rural Financing and Savings Mobilization** involves the provision of financing through the Land Bank, cooperative and rural banks, which shall likewise serve as agents for savings mobilization. This program shall be supported by an expanded Philippine Deposit Insurance Corporation coverage and the broadening of credit delivery base through the strengthening of other financial intermediaries.
- 9 **Postharvest Development Services** aim at facilitating farmer access to postharvest facilities and equipment in order to lower losses during postharvest and marketing operations. Toward this end, farmers will be encouraged to use indoor dryers, outdoor storage systems and moisture meters.
- 10 **Marketing and Packaging Assistance** involves the promotion of trade fairs and market caravans as venues for learning about markets and for the conduct of market matching to link producers and buyers. Also, a private or public marketing entity shall be in charge of buying farmers' produce.
- 11 **Advocacy and Public Information Campaign**
- 12 **Program Monitoring and Evaluation**

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