ISSUES SURROUNDING THE ESTABLISHMENT OF FEED-GRAIN PROCESSING CENTRES IN THE SOUTHERN ISLAND OF THE PHILIPPINES

by

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Abstract

The purpose in this study is to examine the production, consumption and trade of corn in the Philippines. The nature of interregional trade between spatially and temporally separated markets is analysed, i.e. from the Mindanao region where the majority of corn is produced to Luzon where corn is consumed mainly as livestock feed.

Locally produced semi-processed corn landed in Luzon cannot compete with low cost imports from Thailand. In this study the issues surrounding the question, if further processing of corn is undertaken in Mindanao, will the value added product be more competitive is addressed? While a solution to this question is not provided, enough issues are raised which would warrant further investigation and the construction of a model of the grain trade in the Philippines.

1. Introduction

In this study the corn trade in the Philippines will be examined. As the country is made up of 7100 islands, in some regions shipping is the only means of moving agricultural commodities from one region to another and even from one province to another within a region. This market is typical of many other markets in archipelagic countries, where the cost of inter-island freight may hinder the development of specialised regions of production within a country. The problems faced by island countries make the goal of self-sufficiency implausible.

A critical feature of corn supply in the Philippines is its seasonality and other temporal factors involved with the regional transportation of corn. The southern producing regions have a surplus of grain which is too costly for traders to store and transport to the northern consuming regions when they are experiencing a shortage. Despite these temporal variations in regional production, inefficiencies in the trade of this commodity have led to the need to import corn from Thailand.

The purpose in this paper is to identify the factors that hinder an increase in the use of domestically produced corn in the Philippines and reduce the reliance on imports. In undertaking this task an assessment of the existing corn production, consumption and trading patterns in the Philippines will be undertaken. A preliminary assessment of the costs of processing and transporting corn is also undertaken.

2. Inter-regional Corn Trade in the Philippines

Tomek and Robinson (1981) suggest that three factors are crucial in assessing economic problems. First, a detailed knowledge of theory is required. Second, an understanding of techniques and tools is needed. Finally, an analyst must have detailed knowledge of the sector that is to be assessed. The purpose in this section is to satisfy the last of these requirements.

2.1 The Corn Marketing System in the Philippines

Corn is grown in geographically dispersed islands of the Philippines. Corn farmers are concentrated in the regions of Southern Tagalog, the Cagayan Valley, the Central Visayas and Mindanao where the agroclimatic conditions favour growing corn. Details of the geographic dispersion of corn production and consumption areas are presented in Figure 1. The corn producing and consuming regions and their representative centres are presented in Table 1.

Corn production differs across provinces as planting periods depend on rainfall distributions, which differs between the producing regions in the Philippines. Farmers in Region 11, Bukidnon and South Cotabato usually plant in the second and third quarters whilst those from Region 2, Isabela and Nueva Viscaya plant in the second and fourth quarters of the year. Those from Davao, (Region 11) plant in the first and fourth quarters. Corn has a growing season of over six months. Minor harvests of corn occur between January and June, followed by major harvests during the July to September period. Feeds and grits (semi-processed corn) can be stored for only a month or two before serious deterioration occurs. Corn can only be stored in the long-term by converting it to starch.

After putting aside corn for home consumption, seeds and feed uses, the marketable surplus at the farm level is generally small. Hence, the advantages farmers may gain from drying, storing and transporting corn are not great as the total volume of marketable surplus at the farm level is small. In addition, wet weather conditions at harvest time often make corn drying and storage difficult and costly. The marketable surplus of corn is, however, expected to exceed current levels in line with an increase in demand for meat resulting from anticipated increases in per capita income of Filipinos (IFPRI, 1992).

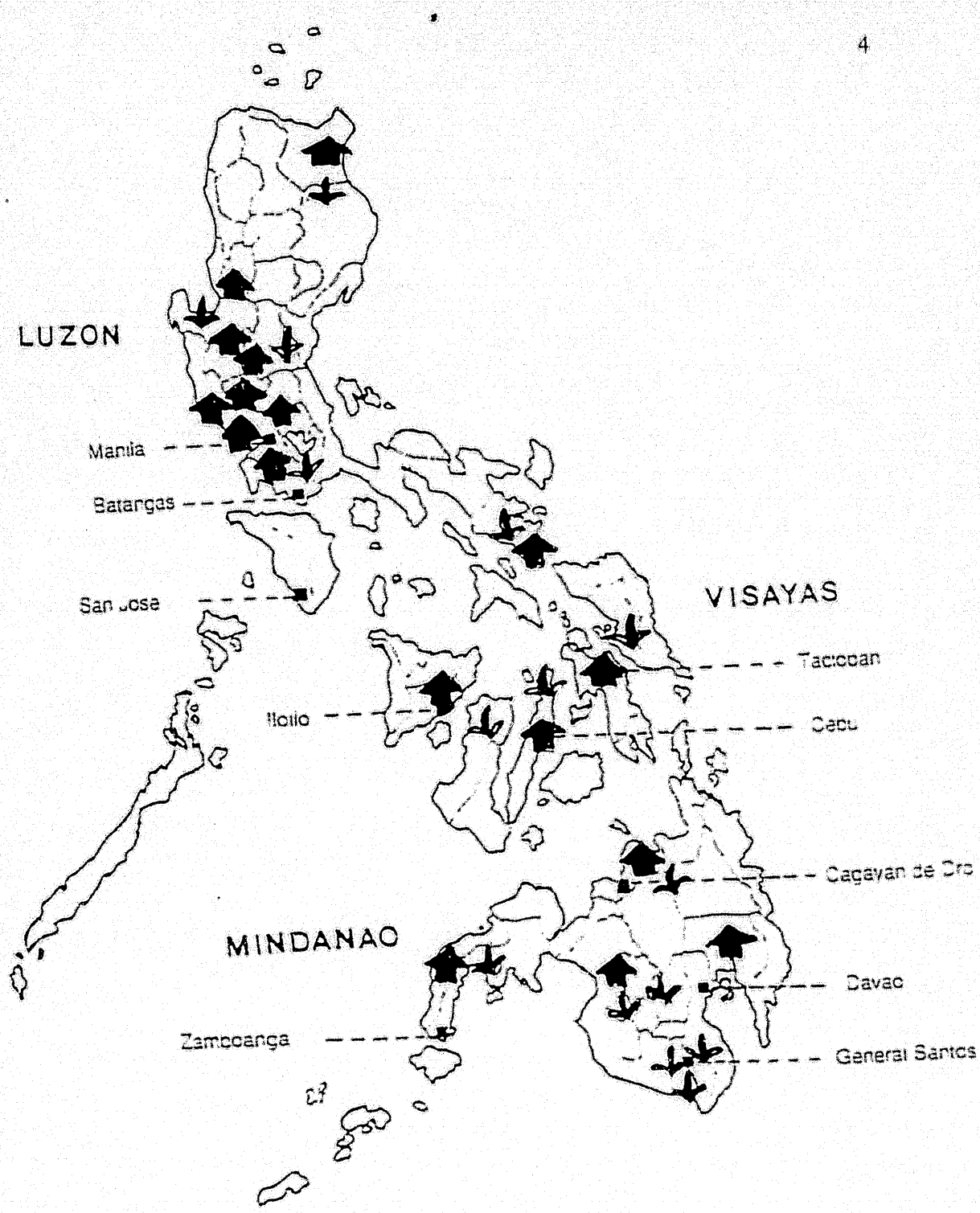

Figure 1. Geographical Distribution of Major Corn Production and Consumption Regions in the Philippines

Table 1. Corn Producing and Consuming Regions and their Representative Centres

Major Island Group	Region	Province	Representative Centre(s)
Luzon	Region 2	Cagayan Valley	Isabela & Nueva Viscaya
Luzon	Region 4, NCR	Southern Tagalog Metro Manila	Metro Manila Batangas San Jose, Mindoro
Luzon	Region 5	Bicol	Legaspi City Caramoan
Visayas	Region 7	Central Visayas	Cebu & Mandaue City
Mindanao	Region 10	Northern Mindanao	Bukidnon & Cagayan de Oro
Mindanao	Region 11	Southern Mindanao	Davao, General Santos & South Cotabato
Mindanao	Region 12	Central Mindanao	Lanao del Sur Wao

In a study by IFPRI (1992) it was found that on average, farmers are situated approximately 14 km from local market outlets. Some 75 per cent of the surveyed farmers were situated between one and 11 km from a market outlet or a corn buyers. More than ten per cent of producers were between 12 and 30 km of a trader and 16 per cent were located further then 31 km from markets. According to farmers, access to alternative higher priced urban markets is limited by poor farm-to-market roads and inadequate local transportation facilities, which was reflected in high transportation costs.

Most farmers sell to wholesalers, wholesale-retailers and local assemblers and commission agents. Traders tend to be located in two or more municipalities and buy corn directly from farmers. There is a high degree of price competition among buyers. On average, a corn trader handles approximately 250 metric tons of corn a year. The majority of traders do not sell corn to the millers, as the prices offered by millers tends to be lower than what traders are prepared to pay for the same quality. Millers tend to enforce a stricter standard of grain grading with large price discounts applied to grains with low moisture content (IFPRI, 1992).

Transportation services and packing materials are generally provided by traders. Competition among corn buyers does not only hinge on prices but also on services extended by traders to farmers. Traders are a major source of credit and farm inputs, ie. fertilisers, seeds and farm chemicals.

Most traders are fairly diversified, trading a range of agricultural commodities, farm inputs and general consumer goods. Other traders operate their own corn mills, extend credit to farmers and non-farmers within their area. Many own moderately sized transportation facilities, drying and storage facilities, which are often rented out to other traders or farmers. Some corn traders have alternative sources of income, thus allowing them to augment the income they derive from corn trading and to mitigate possible income losses from any sharp decline in corn prices.

Large provincial and regional traders cover wider geographical boundaries and are dependent on inter-island shipping. These traders handle larger volumes and tend to be better equipped and financed. Many traders also own trucking facilities, warehouses, drying facilities and employ hired labour to carry out the tasks related to the marketing activities. Corn is milled and sold by these traders to the livestock sector, in the form of grits.

2.2 The Geographical Flow of Corn

Production and consumption points are linked through the arbitration of traders. Inter-regional trading occurs if regional price differences exceed the cost of moving products between regions. The efficiency of arbitrage between markets ensures that prices between trading regions are aligned, after the cost of transportation is accounted for.

The IFPRI (1992) analysis of the corn market indicates that a degree of spatial integration of regional corn markets exists in the Philippines. Manila and Cebu are major corn consumption markets . Most of the corn produced in the Visayas and Mindanao regions is transported, via inter-island shipping to Manila and Cebu. The majority of the corn produced in Luzon is sold in Manila.

The largest demand for yellow corn comes from the National Capital Region, hereafter the NCR, surrounding Manila and including the Metro Manila, Central Luzon, and Southern Tagalog provinces. Most of the feedmillers and commercial livestock farms are concentrated near the NCR. Costales (1989) showed that only the NCR had a commercial feedmilling capacity relative to livestock feed consumption ratio of greater than one. The Visayas and Mindanao regions had a feedmilling capacity-livestock feed consumption ratios of only 0.22 and 0.23, respectively .

Table 2. Regional Distribution of Commercial Feedmilling Capacity, Estimated Commercial Livestock Feed Consumption & Corn Production, Philippines, 1987

Related	Related capacity	Poultry Feed consump't	Hog Feed consump't	Total Feed consump't	Corn Pro-duction	Capacity feed consump't ratio	Capacity corn prod'tion consump't ratio
	(mt/year)	(mt)	(mt)	(mt)	(mt)	(mt)	
I	23712	14127.1	238153.7	252280.8	95969	0.09	0.25
II	8424	7636	168626.2	176262.2	438167	0.05	0.02
II, NCR,IV	1606020	559419	411702.6	971139.6	246937	1.33	6.5
V	10577	13222.1	170912	184134.1	138093	0.06	0.08
Total Luzon	1684733	594404.2	989412.5	1583817	919166	1.04	1.83
VI	21000	8902.4	332884.4	341786.8	59537	0.06	0.35
VII	126672	41431.5	202029.1	243460.6	286041	0 52	0.44
VIII	5616	1740	108377.1	110117.1	219455	0.05	0.02
Total Visayas	153288	52073.9	643290.6	695364.5	565033	0.22	0.27
IX	4680	2907.8	131757.5	134665.3	241438	0.03	0.02
X	67200	8629.1	139050.8	147679.9	355347	0.46	0.19
XI	30498	34411.5	186821.2	221232.7	1283523	0.14	0.02
XII	37440	2887.5	107512	110399.5	1063444	0.34	0.03
Total Mindanao	139818	48835.9	565141.5	613977.4	2943752	0.23	0.05
Philippines	1941839	695314	2197845	2893159	4427951	0.67	0.44

Source: Animal Feed Control Division, Bureau of Animal Industry, 1988.
Board of Investments, Department of Trade and Industry, 1988.

From: Costales, 1989.

In terms of feedmilling capacity relative to corn production, the regional ratios further indicated a more skewed distribution. The NCR feedmilling capacity to corn production (supply) ratio was 6.50 in 1987. In Luzon the ratio was only 1.83; while in the Visayas it was 0.27 and in Mindanao (which produces the most corn), the feedmilling capacity-corn supply ratio was only 0.05 (refer to Table 2). From this skewed distribution, it can be implied that there is great potential to expand feedmilling production activities closer to corn-livestock producing regions (IFPRI, 1992).

2.3 Temporal Variations in Regional Corn Production

Market prices guide the decisions of market agents to buy and sell corn at a point in time. The arbitration activity by traders tends to even out supply and demand imbalances in temporally separated markets (Mendoza and Rosegrant, 1992). Depending on the available supply of corn, prices may vary widely from month to month. Prices tend to be depressed during the harvest months of October through to December and highly volatile during the lean months of January through to March. Positive returns from storage may be earned by buying cheap corn during the harvest months of July to December and selling corn during the lean months of January to June when prices are high.

The variability of corn prices in lieu of its sesonality is also of concern to the industry. The bumper harvest in the first half of 1991 (up 23 per cent) caused farmgate prices to fall as low as P2.50 per kilo in Luzon. In Southern Mindanao, prices dropped from P9.80 per kilo (in July 1992) to P2.30 (in August 1992). Some discouraged farmers shifted production to other crops while others reduced their use of hybrid seeds. The low prices of corn in peak harvest seasons seriously reduced farmers' incomes, increasing their exposure to debt and eventually inviting lower productivity.

A nine month drought in 1991-92 resulted in a shortage in corn supply during June and July 1992. Prices rose from P5.50/kilo to P11.50/kilo (landed in Metro Manila). Livestock and poultry producers, who use 70 per cent of corn output in the Philippines, appealed for the government to lift the ban on corn imports and the government complied with this wish. To protect the farmers, the tariff on corn imports was raised from 30 per cent to 75 per cent in November 1992. The tariff will be scaled down over a ten-year period by which time domestic corn producers should be able to compete with forign producers. Import duties for corn were reduced to 60 per cent in July 1993 and are scheduled to be set at 50 percent between July 1994 and July 1996.

To ensure a more stable price and to sustain farmers' productivity, some 3500 corn farmers of the Southern Mindanao Federation of Agricultural Cooperatives, Inc. (hereafter SMFACI) entered into a contract marketing scheme with the National Hog Raisers Group, Inc. (hereafter NHRGI). Under the contract, NHRGI agreed to purchase 100 000 mt of corn from

SMFACI at a guaranteed (farmgate) price. The price ranged from P4.30 /kg. from August to October and P4.50/kg. from November to March. It is hoped that the SMFCI action will be duplicated by other farmer groups.

3. Conceptual Tools for Assessing the Trade in Corn - A Spatial - Temporal Equilibrium Model

In order to investigate the issues raised in this paper, it is necessary that some logical economic analytical framework be adopted which is capable of describing and analysing price and quantity relationships between both spatially and temporally seperated markets. This task is made easier as conceptually the spatial and temporal frameworks are similar. Tomek and Robinson (1981) observed that; "...such models enable one to determine the optimum or `least cost' trading pattern, given supply and demand conditions..." within each region or time period.

Much of what follows in this section was taken from Dwyer and Davidson (1989) who analysed a similar problem in the Australasian dairy market. This commentary puts the model in a spatial framework. In using a spatial equilibrium model the relevant areas of trade theory which need to be investigated, such as equilibrium prices, the nature of the supply and demand curves in each region and the transfer costs incurred in trading between the regions, are highlighted. To assess the temporal problems it is necessary to convert the regions to time periods and the transport costs to storage costs.

Under a spatial equilibrium framework, equilibrium is achieved when the price differential between the two regions just equal the cost of transferring the commodity between the regions. If trade does not exist, the price differential will be less than the transfer costs. In a similar manner, equilibrium in a temporal framework is achieved when the price differential between the two time periods is equal to the costs of storage and the associated processing which allows corn to be stored. If the commodity is not stored then the costs of processing and storage will exceed the price differential.

A schematic representation of the Philippine corn trade is presented in Figure 2. In each region there are supply schedules for corn (S_f) at the farm gate and a demand curve for corn at the retail level (D_r). The supply of corn in both regions is determined by agroeconomic factors that evolved prior to production. As a consequence the supply of corn is fixed in any one year and as such is assumed to be perfectly inelastic. From these curves derived farm level demand (D_f) and retail level supply (S_r) of corn can be drawn, assuming that the elasticities of supply and demand are equal to their primary counterparts. In the pre-trade situation, Q^1_p and Q^2 is produced in region 1 and 2, respectively. Price P_r being charged at the retail level and producers receiving P_f, in each region. The difference between the retail price and the farm gate price is equal to the marketing margin for corn, which includes the cost of processing. If trade is allowed between regions, and it is assumed that such transfers do not occur at the farm level, excess supply and demand schedules can be drawn in the trade sector.

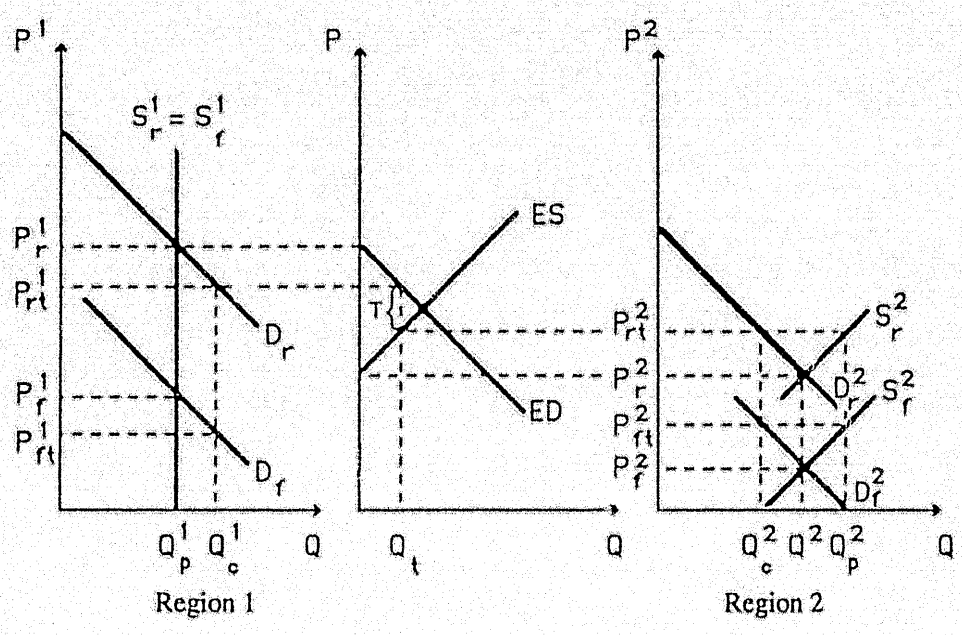

Figure 2. A Two Region Spatial Equilibrium Model of Corn Trade in the Philippines

The prevailing retail prices in each region (i.e. P^1_{rt} and P^2_{rt}) are differentiated by the cost of transferring corn between the regions, (i.e. mainly transport and additional processing costs). The quantity of corn produced and consumed in each region is given by Q_p and Q_c (respectively). The quantity traded Q_t, is equal to the amount of corn exported from region 1 (i.e. Q^1_c Q^1_p), which is equal to the amount of corn imported into region 2 (i.e. $Q^2_p Q^2_c$). To reiterate, to assess the temporal problems it is necessary to convert the regions to time periods and the transport costs to storage costs, a task which is not undertaken here.

Three general conclusions of relevance to this study can be drawn from the model presented above. First, it is necessary to have a clear understanding of the nature of the supply and demand functions of the commodity in all trading regions and during each time period. In particular, a knowledge of their elasticities is essential for the correct point estimation of the price quantity relationships. Second, the price differentials must be quantified, (both before and after trade and storage) between the regions and market levels, before any trade feasibility assessment can be made. Thus, the costs of transferring the commodity between regions and storing it over time are important determinant variables in the establishment of

the spatial - temporal price relationships in the market. Third, the benefits of trade and storage to consumers and producers in the two regions can be identified and quantified through the use of consumer and producer surplus concepts. The first two conclusions identify the relevant elements of a intra-regional corn trade which needs to be investigated in order calculate the direction and magnitude of price and quantity changes resulting from trade and storage in the commodity, whilst the third conclusion will assist in any exploratory policy analysis.

The next logical step may be to estimate a model of the Filipino corn trade between Mindanao and the NCR, along the lines outlined above. The data needed to perform these calculations are the derivation of the supply and demand schedules, the marketing margins, transport charges, storage costs and processing costs. However, this task is not undertaken due to a shortage of data. Rather, in the rest of this paper the issues surrounding the spatial and temporal trade in corn are detailed.

4. Issues Surrounding the Storage and Processing of Corn

Storage allows the allocation of available supply of seasonally produced corn and extends the marketing season from one harvest time to the next. Due to the seasonal nature of corn production, storage becomes a critical component in the successful development of the poultry/livestock industry of the country. Most farmers surveyed by IFPRI (1992) reported of disposing of their corn two to six days, on average, after harvest. The decision by farmers to sell corn immediately is commonly prompted by their need for cash to repay their credit and the high cost or unavailability of warehouses to store corn. Many farmers also cited waiting for a better price as reason for storing corn. A large quantity of corn produced in Mindanao is not consumed and ends up rotting. It can not be stored and used at some period in the future as the facilities to achieve this end do not exist. The purpose in this section is to discuss the issues surrounding the storage and processing of corn.

The major reason for not storing and processing corn in Midanao is the poor distribution of capital. In Table 3 data on the regional distribution of registered commercial mixed-feed manufacturers is presented. Of the 173 registered commercial feed mills in the Philippines, 143 are located in Luzon, while 18 are located in the Visayas and only 12 are to be found in Mindanao. Feed millers in Luzon account for more than 80 per cent of total mixed feed production. The 1989 total mixed feed production for the NCR and its surrounds is 775.3 ('000) mt. Mindanao alone produced only 52.8 ('000) mt of mixed feed. Although the majority of the corn is grown in Mindanao, only 6 per cent of the total registered commercial feed mills are located in the region.

Expansion of corn value-adding activities (eg. hog raising, corn milling, starch manufacturing during peak season for corn) was one method that has been suggested to create additional local demand for corn (PCCI-FAF &

FRLD, 1992). Corn starch is a primary ingredient in noodles and corn snack foods. In 1991, the Philippines imported 4.93 million kg. of corn starch worth nearly $US 1 million from Germany, the United States and China to support the local noodle industry. However, the Philippine Council for Agriculture and Natural Resources Research and Development reported that the country is dependent on the supply from foreign corn millers who produce cheaper and better quality corn starch and flour.

Table 3. Regional Distribution of Registered Commercial Mixed-feed Manufacturers and Total Production in the Philippines, CY 1989.

	No. of Manufacturers	Total Production (in '000 mt)
Total Philippines	173	962.5 mt
Total Luzon	143	779.5 mt
Region 1	6	0.16
Region 2	4	0.24
Region 3	37	202.7
NCR	54	435.6
Region 4	36	137
Region5	6	3.8
Total Visayas	18	130.1 mt
Region 6	6	8
Region 7	11	122.1
Region 8	1	0
Total Mindanao	12	52.8 mt
Region 9	4	1.40
Region 10	2	12.3
Region 11	5	0
Region 12	1	39.1

Source: Bureau of Animal Industry (1990)

A regular supply of corn all year round is required because corn is a major input in operation of feedmillers and large scale poultry and livestock raisers. The lack of regularity in corn supply and the unavailability of cheaper energy substitutes for corn from domestic sources emphasises the critical role of storage in balancing inter-temporal variations in the supply of and demand for corn.

The seasonality of corn production needs effective storage facilities in order to ensure a sufficient and continuous supply during the off-seasons of the year. Poor storage and handling causes grain losses. Moulds in corn grains produce "aflatoxin" which is a toxic metabolic substance which can cause liver cancer in humans and retarded growth and death to corn-fed livestock and poultry. Aflatoxin contamination, insect pests and rodents, sanitation and pest control measures related to grain and climatic conditions, storage structures and design, pose serious losses to stored grains.

Reduction of moisture content of sun-dried corn in the cob is generally slower and less efficient than for corn dried in its shelled form. The rainy season during harvest time makes solar drying difficult. During the rainy season, corn is oftentimes not dried and is sold as "wet" corn.

Corn sold directly from the farm is generally of poor quality. The high cost of renting mechanical dryers and drying spaces are one of the main reasons why farmers opt not to use them. Improper handling of corn during drying is a problem. If corn is dried at 14 per cent moisture content and kept in properly managed storage warehouses, corn may be stored for two to three months or longer. Due to poor storage, crop losses are reportedly high. Up to 25 per cent of corn can be lost during storage due to moulding of improperly dried grains, grain shrinkage, pilferage, rats and weevil infestation.

In a nutshell, the improper handling and post-harvest practices have resulted to losses, poor quality and irregular supply corn. The location of production areas relative to the processing and livestock and poultry farms requires a balance of inter-temporal and spatial variations in supply and demand for corn. The expansion of value-adding activities and horizontal diversification in corn is also recommended to create additional demand and regularity in supply within the country. Consequently, this would minimise foreign exchange expenditure by government on importation of better quality corn starch and flour.

5. Issues Affecting Corn Transportation

The difficulties experienced in domestic transportation of corn are discussed in this section.

The cost of marketing and distribution of corn in the Philippines is 70 per cent higher than in Thailand (IFPRI, 1992). The high cost of marketing and distribution in the Philippines relative to Thailand is partly explained by natural agro-climatic factors. Corn farms in the Philippines are geographically dispersed and predominantly small, farming an area of just 3 hectares. The surplus volume of corn at the farmgate is small, hence, the per unit costs of marketing tend to be higher. It is cheaper to transport corn from Thailand to Manila than from Mindanao to Manila.

The lack of adequate farm to market roads in producing areas has led to the inefficient transportation of corn. Infrastructure deficiencies worsens during the rainy seasons when washed out roads and bridges lead to delays in hauling of grains from the production areas.

To provide for a low cost sea transportation of corn, the Philippine Port Authority assigned corn and other food commodities a much lower freight classification. However, some commercial shippers who usually allot 30 per cent of freight space to basic commodities, refused to haul them. Traders are forced to use costly charter vessels, otherwise the grain would have been stranded at the port and stored again exposing the corn to a higher percentage of damage and weight loss.

In the Philippines, efficient inter-island shipping and port facilities can provide greater market access of corn and livestock products across regions. The relative unprofitability of the shipping industry due to the high cost of credit financing, high tariffs on spare parts and restrictive government route regulations, among other problems has led to fewer shipping vessels operating among the islands (Clarete, 1991).

A presidential task force is currently analysing policy alternatives which will lead to improved efficiencies in the inter-island shipping industry. Traders (including the National Food Authority) complain of the unavailabilty of vessels to transport corn from Mindanao to Manila, especially during the peak of harvest season. Shipping companies complain about government intervention in rice and corn freight charges. It is not profitable for shippers to transport grains relative to the value of the cargo as they are compelled to collect questionably low freight charges for rice and corn.

In a study of the impact of the shipping industry on the corn marketing system in South Cotabato, Mindanao, Revilla (1988) found that the provincial capital of General Santos had three ports, of which one was owned by the government and two were privately owned. The nationalised port could accommodate four ships at any one time. An average of 78 domestic and 13 foreign vessels called or docked at the port per month. There are two main classification of vessels that service the port, notably containerships and tramping vessels (which include bulk, break bulk and barges). Containerships follow more regular routes than tramps and tend to make complete round trips to and from General Santos, unlike the tramp ships.

Of all the corn shipped out of General Santos 95 per cent was loaded on to tramp ships while the remainder was loaded on to containerships (Revilla, 1988). Total shipment charges for container vessels from General Santos to Manila were P0.042 per kilogram of corn carted less than those charges by tramping vessels. Although shippers were willing to load their corn on to container vessels, they could not do so because vans were already allocated to regular customers/shippers.

Rola (1991) conducted research on transportation of rice in the Philippines. She argued that rational traders would select the route that would give them the cheapest transportation costs. Transportation cost is positively related to distance, therefore, the further the route, the higher the transportation cost. In general, transporting by sea was found to be cheaper than by land. There were fixed inter-island freight rates for rice, corn and other agricultural commodities shipped from one port to another. In trucking, transportation cost are computed on the basis of distance. The high cost of fuel and maintenance associated with trucking business, result to higher transport rates for trucking and land transportation of rice. Hence, traders who are confronted by these two choices, commonly opt for sea rather than land transportation. Rola concluded that a policy of imposing price restrictions has the effect of lowering production levels and increasing consumption levels. The policy of taxing shipments from surplus regions, has the effect of generally increasing prices and production levels, but decreasing consumption levels in all regions of the country.

Cabanilla (1991) conducted an appraisal of the corn transportation situation in the Philippines. Transport costs are an important component of total transactions cost between the farm and final market. In a study of the South Cotabato and Bicol corn markets it was found that transportation cost can be as high as 84 per cent of the price margin between the farmgate and the wholesale market.

Since the early 1980's, price differentials across regions have become more extreme. Theoretically, price spreads are determined by the cost of transactions between the farm and the final selling points. Assuming all things being equal, the price spreads are high when transactions costs are high. Low transport costs resulting from more efficient transport systems would redound to smaller price spreads. This may mean higher farmgate prices and lower consumer prices.

6. Policy Solutions

To reduce the cost of transport, a logical recommendation is to increase the number of mixed-feed manufactures and processing centres strategically located between producing and marketing areas in the Mindanao region. Value- adding on corn processes will make the product a more attractive option transport to importing regions such as the national capital region, Brunei and nearby countries in the southern region of Asia. Regional planners envisage Mindanao as the "backdoor" exporting centre of the Philippines for raw and processed commodities (per. comm. NEDA, 1993).

The policy of regulating sea freight has made the total disposable transport cost 74 per cent lower than the unregulated (tramping) rate. Sea freight comprises a considerable proportion of the total transportation cost from the farm gate to the final consumption point in Manila. The under regulated

rates the total transportation cost of corn is 28 per cent lower. The General Santos-Manila route is 30 per cent lower than the regulated rate.

The policy of regulating freight rates resulted in the discrimination by shipping companies against rice and corn cargoes, especially during heavy traffic conditions. More often, large traders who regularly transact business with shipping lines are given priority in cargo booking. This results to imperfect market in grains trade. The smaller traders are eased out of the market leaving only a few large traders who can afford to transact the minimum volume of load required to charter tramping vessels. Likewise, large traders get high priorities in booking their cargoes with liner vessels.

In Mindanao, the unavailability of vessels forces small traders to sell to regional traders in General Santos. The supply of corn from the region which forms a sizeable proportion of the total marketable surplus nationwide, is in the control of a few large traders. Trading is not as competitive as in the Luzon area.

The NEDA training and development issues project survey indicates that William Lines (which has franchise to ply the route from San Jose, Occidental Mindoro to Manila) had to abandon the route allegedly because of deficient port facilities. This led to the operation of one cargo vessel catering solely to the needs of Valiant Mills, the largest in the area. Small traders then had to ship grains to Manila via Batangas City Port. As a result, their total disposal cost is twice higher than under the direct route using then regular liner vessel. The total transportation cost from farmgate to Manila is 52 per cent higher (Cabanilla, 1990).

Data on average basic running costs of reconditioned trucks and vessel operating expenses indicates that fuel comprises the largest cost item in land and sea transportation. It accounts for 40 per cent of the total running costs of trucks and 50 per cent of vessel operating costs. It follows that pricing policies on fuel play an important role in determining the cost of transportation of grains. Private cost are higher than the economic cost by as much as 28 per cent. This implies that actual transport costs are higher by 28 per cent due to the government's implicit and explicit taxation on major inputs such as fuel and spare parts.

Across regions, trucking rates are relatively higher in areas which have lower quality roads. Reports on losses during transportation indicate some correlation between the magnitude of losses and the type of road traversed. Cabanilla (1990) found that in routes traversing cement or gravel or earth surfaced roads, losses can be as high as one per cent of the volume transported. Under better road conditions, the reported losses are much lower.

The deficiencies in road infrastructure have jeopardised the production potential of important corn producing areas such as Wao and Lanao (in Mindanao) and Caramoan and Bicol (in Luzon). The circuitous routes

between these centres incur high transportation cost. Luzon traders in small municipal trading centres do not have to sell to regional traders. Land transportation facilities are readily available (this includes trucks which deliver goods from Manila to Cagayan Valley. Corn is usually accepted as back loads at a lower freight rate.) If municipal traders find the reference price of regional traders low they decide to sell directly to Manila.

7. Concluding Comments

With more restrictive trade policies on rice and corn commodities, domestic transportation becomes critical. Domestic production of corn needs to fill all of the annual shortfalls stemming from the lack of supplies from abroad. The traditional corn producing areas in Mindanao and Cagayan Valley will now have to increase their output to supply the growing requirements of feedmills in Manila.

The unavailability and high cost of transportation services inhibits the full development of the potential of domestic corn production. Great difficulties were reportedly experienced in moving corn harvested in Mindanao to Manila due to the shortage of shipping vessels and poor port facilities.

Corn produced in far flung areas could not be moved over land to trading centres because of bad road conditions. This resulted in very low framgate prices, thereby creating disincentives to farmers to produce.

Cabanilla's review and evaluation of government policies affecting agricultural transportation reveal that two policies stand out to be the most important. These are the regulation of sea freight rates and road infrastructure investments. Freight rates on rice and corn have been controlled at artificially low levels. This has some social merits, but it also exacerbates the shortage of cargo space.

Discrimination by shipping companies against rice and corn cargoes, especially during heavy traffic conditions, inevitably resulted from this policy. Often, large traders who regularly transact business with shipping lines were given priority in cargo bookings. Due to the artificially low freight rates, large traders buy cargo space in advance, effectively eliminating competition from small traders. Regulated freight rates for grains were adjusted in May 1989. Under the new adjustment, rice and corn freight costs are now 10 per cent lower than the class C rate.

In some instances, spatial movement of grains is not optimal due to road infrastructure deficiencies. It is in the best interest of rural development that the government address these infrastructural problems immediately . Road construction have been located in areas with higher population concentration. Agricultural production potential (i.e. rice and corn) have been given lower importance. In the light of the government's emphasis on rural development, more funds should flow to the rural areas.

Studies by Cabanilla (1991), IFPRI (1992), Rola (1991), Costales (1990), Unnevehr (1983) and Bouis (1982) provided insights in solving the problems in grain marketing in the Philippines. These studies underscored the efficiency gains to industry with improvements to infrastructure and distribution facilities such as quality roads, bulk handling and postharvest facilities, adequate transportation and shipping ports. The apparent bias against the rural sector for road infrastructure development is a particularly important focus for reform. Rural infrastructure will not only serve agriculture but also encourage rural industrialisation in the long term. It will make the marketing system work more efficiently and will also serve to counteract the effects of other macroeconomic policies (eg. exchange rate) which produce biases against agriculture.

Further research using the spatial-temporal equilibrium model determines the optimum trading pattern between regions. The model describes the nature of demand and supply curves in each region and incorporates temporal factors in production, storage, transport and processing. The proposed methodology equates the marginal cost of arbitrage with the price differentials in the market which occur across time and space. This analytical tool may be used to investigate the effects of such policy intervention as the improvement of infrastructural efficiencies, restrictions on commodity shipments and transportation from the surplus regions and establishment of strategically located feed-mix processing centres in the surplus region. Furthermore, the model may calculate the benefits and losses to producers and consumers under various policy scenarios.

References

Bouis, H.E. 1982. 'Rice policy in the Philippines", Ph.D. Dissertation, Stanford University, California.

Cabanilla, L.S. 1990. *Transportation of Agri-products, Impact of Government policies on Agricultural Transportation in the Philippines: The Case of Rice and Corn*, NEDA, Manila.

Costales, A. 1989. *The Feedmilling Industry in the Philppines: A Description of the Market Structure.* University of the Philippines at Los Banos.

Costales, A. 1990. "Integration of Corn and Livestock Markets in the Philippines: A Derived Demand Model." Unpublished Ph.D. Dissertation, University of the Philippines at Los Banos.

Clarete , R. 1991. : " Sequencing Deregulation in the Philippine Livestock Sector." Paper presented in the Annual Convention of the Philippine Agricultural Economics and Development Association. Dept. of Agricultur, Diliman, Quezon City.

Dwyer G.M. and Davidson, A. B. 1989. A Trans-Tasman Trade in Market Milk - A Spatial Equilibrium Approach, Paper presented to the 33rd Annual Conference of the Austrailan Agricultural Economics Society, Christchurch, New Zealand, February 1989.

MacAulay, T.G. 1985. Spatial Equilibrium Models in Agricultural Economics Research, seminar paper presented to the Department of Agricultural Economics, Manchester University.

Mendoza, M.S. and Rosegrant, M.W. 1992 " Marketing of Corn in the Philippines: Market Integration and Dynamics of Price Formation," in the International Food Policy Research Institute Report submitted to the Dept. of Agriculture.

Philippine Chamber of Commerce and Industry and Foundation for Resource Linkages and Development. 1992. "State of the Grains", Madrid Digest, The Agribusiness Magazine, August 1992, Vol. 3, No.3

Revilla, S.M. Y. 1988. Shipping Industry Impact on the Corn Marketing System in South Cotabato, Philippine Chamber of Commerce and Industry, *"The Corn Marketing System: A Rapid Marketing Appraisal in Southern Mindanao Region"*.

Rosegrant, M. and Gonzales, L. (IFPRI) 1992. The Philippine Corn and Livestock Sector: Performance and Policy Implications, APAP II Collaborative Research Report No. 328, Agency for International Development, Washington D.C.

Rola, M.F. 1991. A Spatial Equilibrium Model of Rice Trade in the Philippines, M.Ec. dissertation, UNE, Armidale.

Taurus Management Corporation, 1990. Feasibility study on Establishment of Feed Mill in Region 1, Department of Agriculture and National Agricultural and Fishery Council, Manila.

Tomek, W.G. and Robinson, K.L. 1981. *Agricultural Product Prices*, 2nd ed, Cornell University Press, Ithaca.

Unnevehr, L.J. 1983. 'The effect and cost of Philippine Government intervention in rice markets', Working Paper No. 9 Rice Policies in Southeast Asia Project. A joint project of IFRPI, IRRI and IFDC.