

***Explorations #1***

# **The Vegetable Industry in Tropical Asia: *The Philippines***

**An Overview of Production and Trade**

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## **About *Explorations***

AVRDC – The World Vegetable Center’s *Explorations* series seeks to inform discourse on the convergence of science, technology, and practice in vegetable breeding, production, and marketing. Envisioned as a catalyst for enterprise and research, the series enables diverse communities to explore expertise, ideas, and common frameworks.

## **AVRDC – The World Vegetable Center**

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# 1 Summary

*This report examines the role of the vegetable industry as a key asset for productivity improvement, export market development, income generation, and livelihood improvement in the Philippines.*

## 1.1 Key statistics for the Philippines

*Statistics gathered from BAS, 2007b, 2005b; FAOSTAT, 2007; FNRI, 2003; UNFPA, 2007; Wiesmann, 2006.*

<b>Land area:</b>	300,000 km <sup>2</sup>
<b>Latitude:</b>	4° 40' to 21° 10' N
<b>Longitude:</b>	116° 40' to 126° 34' E
<b>Climate:</b>	Tropical. Prone to typhoons. Mean temperature 26.5° C, Three seasons (summer, rainy, cool). Cooler highlands.
<b>Population:</b>	85.9 million
<b>Global Poverty Index Ranking:</b>	1981-22.4% > 1992-21.8% > 1997-19.6% > 2003-17.6% (Wiesmann, 2006).
<b>Refrigeration:</b>	40% households use electricity for refrigeration (2005) (Ericta, 2005).
<b>Iron and vitamin A deficiency:</b>	Dietary inadequacy of iron and vitamin A at household level: 80.6 and 71.1% respectively (FNRI, 2003).
<b>Production:</b>	5.8 million t.
<b>Area:</b>	0.6 million ha (FAOSTAT, for 2005)
<b>Availability:</b>	1996 - 130, 1999 - 117, 2005 – 128 g/ca/day
<b>Main Crops:</b>	(area) eggplant, (13.0%), yard-long bean (11.1%), tomato (10.8%), squash (9.9%), bitter gourd (7.4%), gourd (5.9%). (volume) squash (16.1%), eggplant (11.1%), tomato (10.2%), yard-long bean (8.1%), gourd (7.1%), watermelon (6.8%) (BAS, 2005a, 2005b, 2007b, 2008).

**Exports:** 44,450 t (fresh and processed) worth US\$ 42.9 million (onions, okra, garlic, asparagus) (FAOSTAT, for 2004) (38,330 t, US\$ 25.2 million for 2005, provisional).

**Imports:** 81,4401 t (fresh/processed) worth US\$ 35.4 million (garlic) (FAOSTAT, for 2004) (146,960 t, US\$ 89.2 million for 2005, provisional).

## 1.2 Industry issues

<p><i>Enhancing production and marketing</i></p>	<ul style="list-style-type: none"> <li>• Obtaining more real commitment from government to promote vegetable sector development (may require less proactive support by government for rice and maize).</li> <li>• Innovative approaches and cooperative models for accessing land need to be more widely used and house-hold and village/school production promoted, to expand vegetable cropping.</li> <li>• The rise and spread of supermarkets throughout the country, and increased vegetable imports are opportunities and challenges that require adjustments to product quality and marketing.</li> </ul>
<p><i>Expanding trade and value adding</i></p>	<ul style="list-style-type: none"> <li>• Improving access and utilization of market information, cost-containing production technologies, and adherence to Good Agricultural Practice (GAP) specifications to improve market prospects.</li> <li>• Better transport infrastructure, information access, and IT communication and utilities can underpin system streamlining and supply chain improvement to enhance trade.</li> <li>• Investment and upgrading of wholesale market infrastructure to improve cost control and reduce losses in domestic trade.</li> </ul>
<p><i>Benefiting farmers traders and consumers</i></p>	<ul style="list-style-type: none"> <li>• Policy and technology innovations that enable the vegetable sector to contribute more to remediation of climatic extremes (hurricanes), natural disasters (land-slides) and social unrest, while minimizing further deforestation.</li> <li>• More education and technical training, and community development in cropping areas and the wholesale and retail sectors, to enhance to capabilities of supply chain members.</li> </ul>

	<ul style="list-style-type: none"> <li>• More support for private-public partnerships to boost development and community opportunities for enhancing the vegetable sector.</li> </ul>
<i>Assuring quality and increasing consumption</i>	<ul style="list-style-type: none"> <li>• Stimulation of domestic consumption of vegetables and the processing and export sectors.</li> <li>• Strategies to enhance quality and diversity of vegetables while maintaining or improving affordability for urban and rural consumers.</li> </ul>

## 1.3 Recommendations for development

### *Marketing and economics*

- Enhance market analysis and modeling to improve prediction of domestic needs and identification of export opportunities.
- Diversify product range for domestic and export markets based on demand analysis and product innovation,
- Promote micro-marketing in rural areas through innovation in financing and payment systems and SME training and market development.
- Enhance opportunities and support for remote area and family unit urban production by the poor.

### *Industry development*

- Improve the efficiency and throughput of the wholesale sector.
- Stimulate the development of market-driven export markets through partnerships with foreign traders.
- Foster innovation and adjust industry production needs to improve competitiveness with imported vegetables (including smuggled produce).
- Promote consumption of vegetables for health and nutrition in urban and rural areas.
- Encourage commercial and SME vegetable processing for domestic and export markets.

### *Systems and technology*

- Enhance sustainability, productivity, and input use efficiency.
- Increase development and uptake of higher yielding varieties.
- Promote development of export-focused and protected cultivation.
- Strengthen sustainable and low-chemical use practices.

### *Collaboration and engagement*

- Foster engagement between supermarkets, suppliers, and farmers.
- Strengthen resourcing and capacity of local government units.
- Foster innovation and diversity in approaches to extension.

## 2 Introduction

Extending between 4° 40' and 21° 10' N and 116° 40' and 126° 34' E, the Philippines is the third most populous country in Southeast Asia. Once covered in rainforest, the country is a mountainous archipelago of 7107 islands with several active volcanoes. The country has a land area of about 300,000 km<sup>2</sup>, is neighbored by Borneo, the Moluccas, Sulawesi and Taiwan, and is bordered by the Celebes, South China, and Philippines Seas. With 85.9 million out of the 570.2 million people in Southeast Asia<sup>1</sup>, and a predicted annual population growth rate of 1.6% from 2005 to 2010, 64% are living in urban areas (UNFPA, 2007; Wikipedia, 2007f).

The Philippines is divided into three main island groups: Luzon (Regions I to V, NCR and CAR<sup>2</sup>), the Visayas (VI to VIII), and Mindanao (IX to XIII and ARMM) (**Figure 1**). The national capital, Manila, and the second largest city, Quezon City, are on Luzon.

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<sup>1</sup> ASEAN countries + Timor Leste (UNFPA, 2007).

<sup>2</sup> NCR = National Capital Region and CAR= Cordillera Administrative Region; ARMM = Autonomous Region in Muslim Mindanao.



Source: Wikipedia (2007f)

Figure 1. Map of the Philippines showing regions

The climate is tropical, with mean temperature of 26.5° C and three seasons: summer (hot season, March to May), the rainy season (June to November), and the cool season (December to February). A southwest monsoon comes in May–October, and another monsoon occurs from November to April, with hot, dry winds. Typhoons are frequent (average 19/year), especially in the northern half of the country. Parts of the southern Philippines are drier (Sorsogon, Baguio, Davao, and the Sierra Madre mountains) (Wikipedia, 2007f).

Political turbulence, high population growth, and endemic corruption slowed the post-war development of the Philippines as compared to some other Southeast Asian countries. But, the economy recovered reasonably well from the 1997 East Asian financial crisis (Wikipedia, 2007a), in part due to the high remittance income from Filipinos working abroad<sup>3</sup>, and now ranks 39<sup>th</sup> in global foreign exchange reserves (US\$ 25 billion) after ASEAN neighbors Brunei, Singapore, Malaysia, Thailand, Indonesia, but ahead of Vietnam (Wikipedia, 2007e). Economic conditions have eased under President Gloria Macapagal-Arroyo's current term (2004-2010), with a number of critical fiscal changes, including increased power tariffs, alcohol, cigarette, and value-added taxes (VAT to 12%, and elimination of exemptions) in 2006. However, rising oil prices and interest rates have dampened growth (ADB, 2007). Key macroeconomic issues are the fiscal imbalance, an uncertain investment climate, inadequate infrastructure, problems in land, resource, and asset management, institutional weaknesses, and geographical constraints. Other major constraints are rapid urbanization and congestion (especially in Manila), rising unemployment, and inefficient service delivery (ADB, 2007).

The Philippines follows a 6-year *Medium Term Philippines Development Plan* (MTPDP) (NEDA, 2007b) linked to presidential terms. Under the current MTPDP (2004-2010), economic development has accelerated from 5.4% in 2006 to an estimated 7% in 2007, and is forecast to rise to 9% by 2009. Focus has been on streamlining infrastructure, improving tax revenue, privatization, and increasing integration with regional and global trade. Challenges include managing foreign debt, and improving education, health care, social support, and transport, especially inter-island connections and remote area access.

Key impediments to progress are high rural poverty levels and investment competition from China and India. Three-quarters of the poor (48.6% of the rural population) live in rural areas. One-quarter live in urban areas (= 18.6% of urban dwellers). Security concerns and social volatility are hampering development, particularly in Mindanao. Poverty reduction programs focus on

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<sup>3</sup> Estimates of overseas Filipinos range from 8 to 11 million. They remitted US\$ 12.8 billion in 2006 (est. US\$ 14 billion in 2007) (Wikipedia, 2007f).

rural development (rural enterprise support, farm roads and land access for farmers and indigenous people); improving the farmers' quality of life and share of the consumer peso; and improving intervention delivery after natural disasters and economic crises (ADB, 2007).

## **2.1 Significance of the vegetable industry in Philippines Agriculture**

The economy of the Philippines is driven by agriculture. In 2006, it directly contributed 18.7%, with flow-on effects about 75% of GDP as well as 40% of market transactions, and 70% of employment (BAS, 2007d; IBON, 2007). There are 4.8 million agricultural farms covering 9.7 million ha, with 1.9 million under 1 ha, and 2 million between 1.0 and 3.0 ha (2002 census data - BAS, 2007d). Average subsistence/household farm size is 2 ha<sup>4</sup>, and a large proportion of farmers still use animal power for cultivation (IBON, 2007).

Most farms (79% = 8 million ha) are owned or partly owned, and 56% of farms (5.4 million ha) are divided into two or three blocks (BAS, 2007d). Less than one-third of landowners own > 80% of agricultural land, with around 52% of farms (= 51% of farmland) under lease or tenure (IBON, 2007). To date, land reforms have had mixed success (Ballesteros and Cruz, 2006).

In addition to land ownership, another concern is the conversion of forest into vegetable farms. The Department of Environment and Natural Resources (DENR) reported that in the Cordillera Administrative Region (CAR) alone, an average of 220 hectares of forest land is being converted every year into vegetable gardens; this represents a serious threat for the province's approximately 200,000 hectares of forests (Cariño, 2007).

The vegetable industry contributes > 30% to total agricultural production, and a major component of GDP (UNDP, 2006). Production is based on highland and lowland cropping in the wet and dry seasons. Some new enterprises are focusing on intensive cultivation and/or production under contract for export, processing, or for high-end retail and food industry markets. There are also focused initiatives to stimulate peri-urban horticulture (Holmer and Drescher, 2005; Holmer and Miso, 2006).

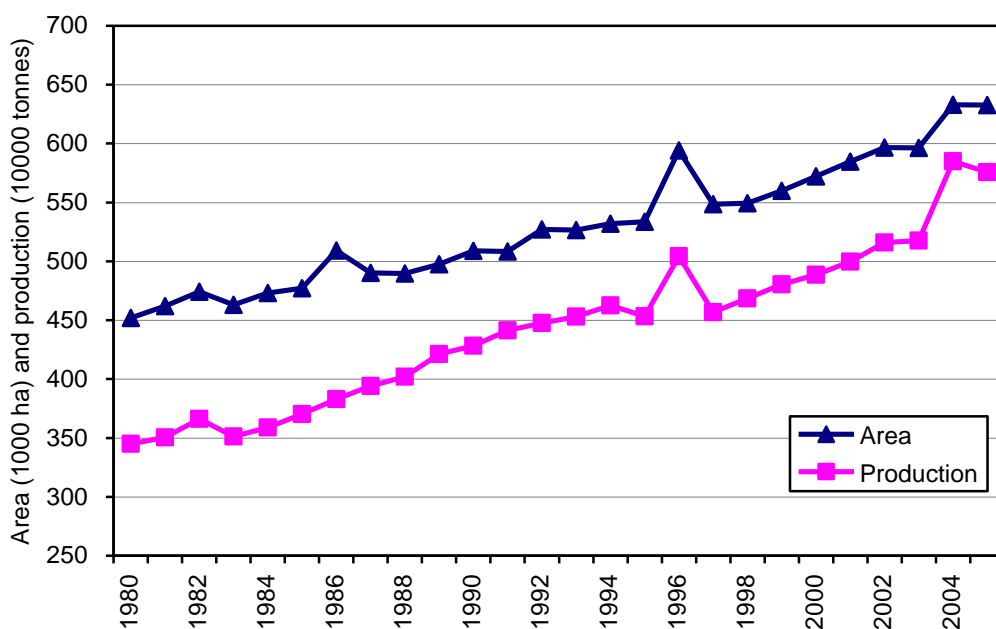
The main production areas for highland vegetables are the Cordillera Administrative Region (CAR), Northern Mindanao, and Region VII (Cebu). Major production areas for lowland vegetables are: Regions I (Ilocos, Pangasinan), III (Nueva Ecija and Tarlac) and IV (Carlabarzon). Production is

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<sup>4</sup> In 1971 it was 3.6 ha, and in 1991 it was 2.2. ha (Nagayets, 2005).

lower in those regions where poverty is most entrenched: Regions V, VI, VII, IX, and the Autonomous Region in Muslim Mindanao (ARMM). Those who are most in need lack access to productive resources (land, credit, technology, and infrastructure) and markets; as a consequence, their farming practices lack diversity and are not sustainable (NEDA, 2007b).

Between 1980 and 2005, the area of vegetables harvested grew steadily from 450,000 to 632,000 ha (1.3% annual growth) (FAOSTAT, 2007). Aside from a peak in 1996, the production volume has also grown steadily since 1980 (from 3.5 to 5.8 million tonnes (2.0% /year), compared to a 2.2% /year increase in population (Figure 2, Table 1).



Source: FAOSTAT (2007)<sup>5</sup>.

**Figure 2.** Trends in Philippines vegetable production and area, 1980-2005

Production increases reflect both yield increases and the expansion of area (Table 1, Figure 2). Increases in mean yield/ha rose from 7.6 t/ha in 1980 to 8.5 t/ha in 1995 to 9.1 t/ha in 2005. Production increases have just kept pace with population growth, with the result that vegetables may be less available and affordable for the poor. With improved technologies and germplasm, and

<sup>5</sup> Production and area data exclude starchy vegetables (sweet potato, potato) but includes melon and chili.

strategies to reduce losses and address resource and market access constraints for the poor, there is considerable scope to increase vegetable productivity in the Philippines.

### Trade

While exports have risen slowly, imports have risen dramatically (**Table 1**), displacing local production of some crops and outcompeting on price and quality.

**Table 1.** Population, area, production, and trade volume and value for vegetables for the Philippines.

	1995	1997	1999	2001	2003	2005*	Growth rate 1995-05 (%)
<b>Population</b> ('000)	68,587	71,579	74,633	77,833	81,172	84,566	2.12
<b>Area harvested</b> ('000 ha)	534	548	560	585	596	633	1.43
<b>Production</b> ('000 tonnes)	4,532	4,568	4,803	4,996	5,175	5,756	2.20
<b>Export Volume</b> (tonnes)							
Fresh	43,760	37,980	16,830	17,180	46,420	34,570	0.86
Processed	2,260	2,000	1,660	2,200	2,720	3,760	2.54
<b>Export Value</b> (US\$ 1000)							
Fresh	33,157	36,266	24,569	23,427	27,221	21,478	-1.68
Processed	3,693	3,451	3,402	3,829	4,570	3,702	0.43
<b>Import Volume</b> (tonnes)							
Fresh	880	7,820	37,820	26,860	71,330	93,130	40.74
Processed	18,830	30,800	51,060	66,320	41,090	53,830	6.44
<b>Import Value</b> (US\$ 1000)							
Fresh	3,188	2,427	9,307	4,600	21,582	33,555	18.60
Processed	17,090	26,688	46,167	31,389	41,861	55,650	5.97

\* Population and trade data in 2005 are provisional.

Source: FAOSTAT (2007)

Vegetable cropping is a priority for enhancing food security and farm incomes under the Republic Act No. 7900 (1995) However, self-sufficiency in staples for human consumption and animal feed has been an overarching priority of government policy frameworks.

Involvement in vegetable production competes for farmer attention with rice and maize, which are subsidized, produce a more easily stored and transported product, and have guaranteed markets. In addition, where land is suitable, other alternatives may be more profitable. Net returns in 2005 for mango, pineapple, coffee were respectively: P 76,634; 130,381; 13,059, compared to just P 8,311

for eggplant (BAS, 2007e), but the latter would be for one crop over a shorter period. Despite the lack of incentives from government, the advantages of vegetables like eggplant over these alternatives are the versatility and short-term nature of cropping. Vegetables can be grown as intercrops and multi-crops; they are suitable for temporary and small-area land use; and several crops can be grown per year. Vegetables also provide variety in subsistence diets. However, vegetable markets and profits are less secure than cereals.

Vegetables have been promoted as income-enhancing intercrops in coconut and cocoa growing regions (PIA, 2004), within land conservation programs on steep and degraded lands (Cramb et al., 2006), and in peri-urban areas (allotment gardens) (Holmer and Drescher, 2005; Holmer and Miso, 2006). The industry is also a key focus of provincial and local government in highland areas, some remote communities, and some private sector agencies and NGOs. Despite rising population needs, many farmers are reluctant or unable to move into vegetables unless technical support and assistance with inputs and marketing can be provided. Problems with perishability, transport, and marketing, and fewer policy or financial incentives for farmers to grow vegetables, discourage the move from cereals to vegetable cropping.

## **2.2 Vegetable demand**

Filipino cuisine is centred on rice (maize in Mindanao) and fish, with Malay, Chinese, Spanish, and American influences. Food is mostly non-spicy. Vegetables, when served, may be in a soup, although salads are becoming more popular, especially among higher income/urban groups. Overall, however, vegetables do not feature strongly<sup>6</sup>—rice, fish, and meat are considered most important, and consumption of meat and poultry is increasing (FNRI, 2003). Fast food and takeaways are a growth area (but vegetable use is often minimal except in Chinese-style foods); the Philippines ranked 7th in a 2007 global survey of takeaway food consumption frequency<sup>7</sup>, and there is a cultural tradition of afternoon tea (*merienda*) and of serving snacks to visitors. (Wikipedia, 2007b).

Provision of adequate food for the rapidly increasing (predicted at 1.6% annually from 2005-2010), and largely urban (64% - 2007) (UNFPA, 2007), population is the main driver of demand. The industry's main focus is to supply fresh produce for metro Manila and other major cities. Export and processing

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<sup>6</sup> Particularly among the young, who constitute the bulk of the population.

<sup>7</sup> Thailand topped the ACNielsen 2007 global survey, with 43 percent of respondents purchasing takeaway regularly, followed by people in China (35%), Taiwan and Malaysia (34%) (ACNielsen, 2007).

industries are underdeveloped, and do not provide the demand pull that they potentially could.

Access to basic foods (rice, fish, vegetables) is a primary priority for the poor. Rice, fish, and vegetables dominate consumption choices, but between 1978 and 2003, per capita total food availability declined by 1.2% annually (Appendix 1). Since 1978, vegetable per capita availability has declined by 23%, to just over a quarter of the WHO recommendation for consumption of fruit and vegetables, with most of the decline occurring in 1978-1987 (FNRI, 2003).

The most serious decline has been in fruit per capita availability— by 48% since 1978 (mostly since 1987), suggesting that increasing urbanization, the development of export markets, and rising prices may have made fruit unaffordable for the poor. Any strategies to develop the export and processing sectors of the vegetable industry would need to ensure domestic supplies remain affordable.

Vegetables and fruit purchase choices by the poor focus on the most affordable basics, with demand for some rising and others declining. Price estimates of selected vegetables from 1985 to 2006 are shown in **Table 2**. The average per capita food expenditure (2003) by Filipino households was P 36.03 /day, with P 10.41 spent on cereals and just P 2.80 on vegetables (FNRI, 2003). When poverty looms, Filipinos choose to cut back on fruit and vegetables—the meager portions of meat, fish, and poultry in their diets are not sacrificed, and cheap noodles are used as fillers (Aguilar, 2005).

**Table 2.** Average farm-gate prices in agriculture, Philippines, January-December, 2004–2006.

Sub-Sector	Peso per Kilogram				Price increase rate%			
	1985	2004	2005	2006	From 1985-2006	Per annum from 1985 to 2006*	From 2004-2005	From 2005-2006

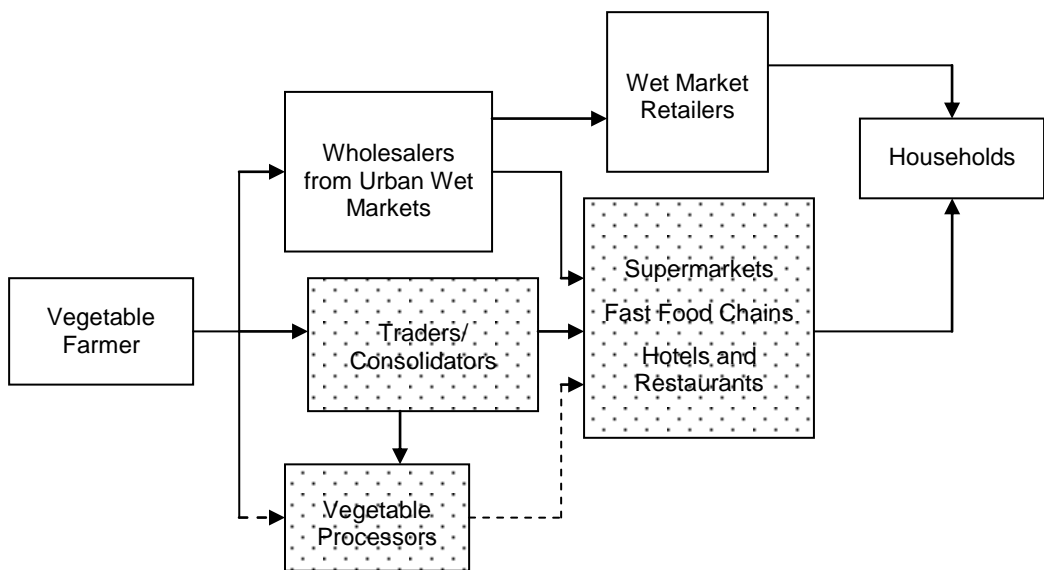
Tomato	3.55	9.18	10.41	12.40	249.30	11.9	13.40	19.12
Garlic	46.31	40.24	50.93	82.15	77.39	3.4	26.57	61.30
Onion	6.30	14.71	23.91	28.54	353.02	16.8	62.54	19.36
Cabbage	4.61	8.48	10.11	12.64	174.19	8.3	19.22	25.02
Eggplant	4.78	11.95	11.28	14.63	206.07	9.8	-5.61	29.70

\* In same period, rice rose by 10.6% / annum.

Source: BAS (2007a)

### 3 The vegetable supply chain

Sectoral involvements in traditional and modern supply chains are shown in **Figure 3**. Key elements of the chains include: difficult farm access, the road and or sea shipment from producing areas to the wholesale market, followed in some cases by road or sea shipping back to retail outlets. Supply chains are characterized by overlapping and redundant channels, inefficient produce handling, and high losses, contributing to excessive marketing costs, high retail profits due to high risks and greater market power, and high retail prices (UNDP, 2006).



Source: After Digal and Montemayor (2007); Concepcion and Digal (2006)

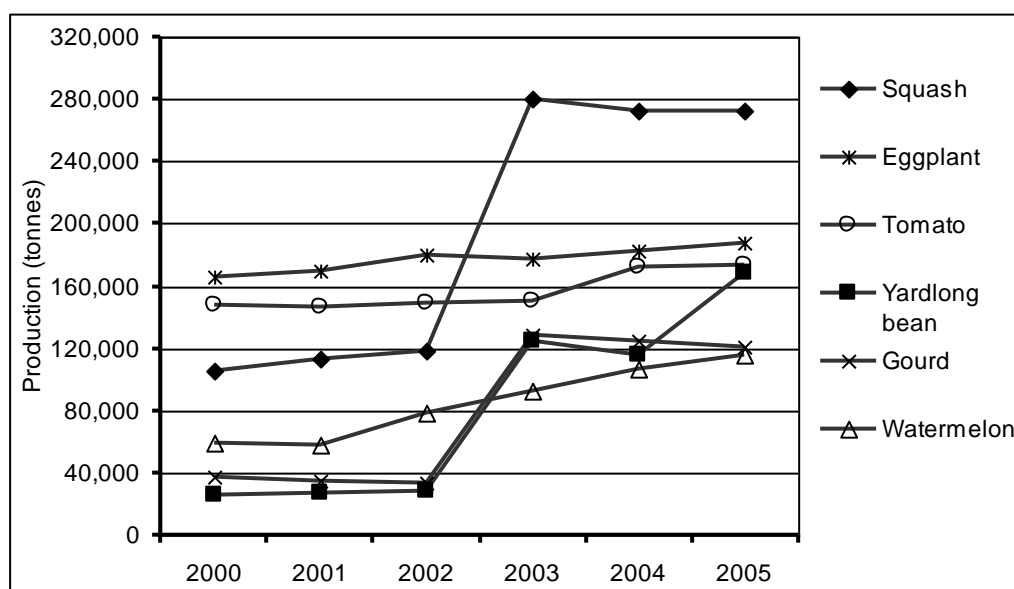
**Figure 3.** Vegetable supply chains in the Philippines: Traditional chain and modern chains (shaded boxes, dashed lines)

#### 3.1 Production sector

Librero and Rola (2000), Digal and Montemayor (2007), and Milagrosa (2007) provide comprehensive accounts of the dynamics of production, distribution, and consumption of vegetables in the Philippines. Production of highland and lowland vegetables is characterized by shortages and gluts, with corresponding

price fluctuations. For some commodities, expanding imports is cheaper than local production.

In general, total production of major vegetable types gradually increased between 2000 and 2005 (**Figure 4** and **Figure 5**). Exceptions were the production of squash, gourds and yard-long bean, which rose sharply between 2002 and 2003<sup>8</sup>. Major vegetable crops (BAS, 2007b, 2008) by production volume were squash (16.1%), eggplant (11.1%), tomato (10.2%), yard-long bean (8.1%), gourd (7.1%), watermelon (6.8%), cabbage (5.4%) and onion (4.8%); by cropping area, eggplant (13.0%), yard-long bean (11.1%), tomato (10.8%), squash (9.9%), bitter gourd (7.4%), gourd (5.9%), onion (5.4%) and water spinach (4.9%).

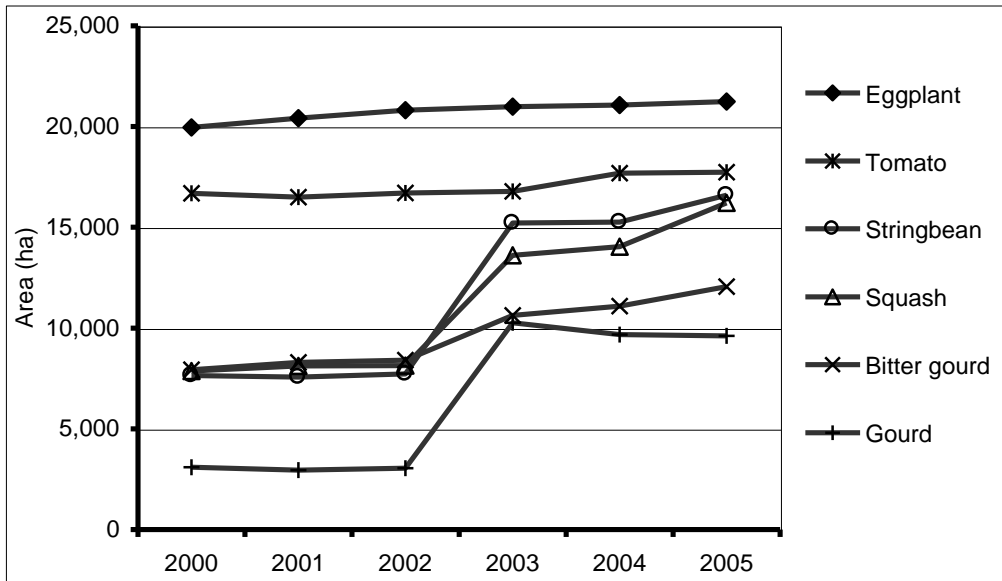


Source: BAS (2007b; 2008; 2005a; 2005b). *Note:* Data of yard-long bean in 2005 was extrapolated from previous year's data.

**Figure 4.** Production (tonnes) of the main vegetable types (excluding potato) in the Philippines 2000-2005

Generally, returns from vegetables improved in 2006 (BAS, 2007c). Eggplant, gross earnings recovered from the 2005 slump, gaining 32.4%. Increases also occurred for cabbage (24.7%) and garlic (53.1%) because of higher farm-gate prices. Onion grew at 10.6% (BAS, 2007c).

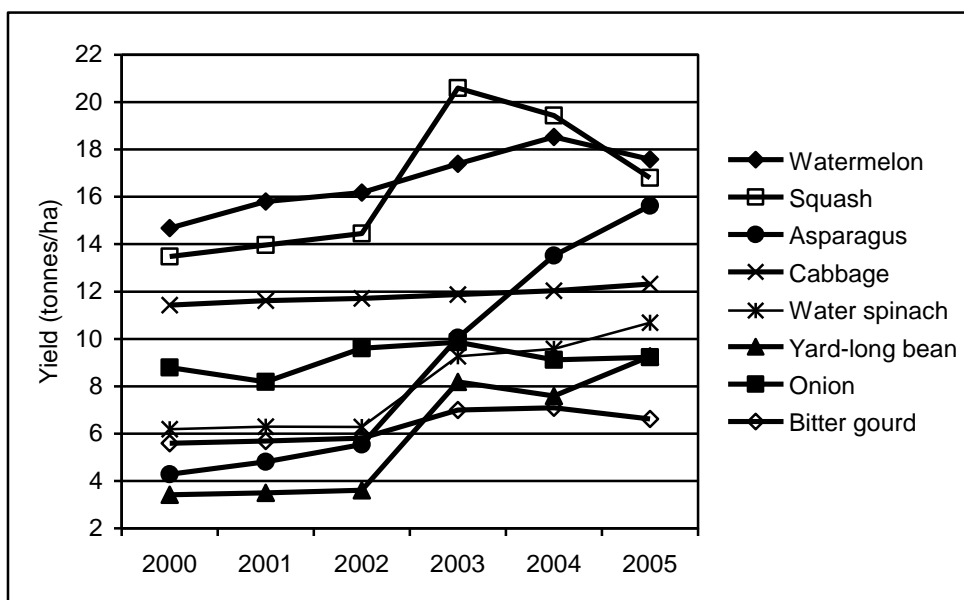
<sup>8</sup> This could reflect a change in statistic collection with more types of melon included in the data category in 2003.



Source: BAS (2005b; 2007b). Note: Data of squash and bitter gourd in 2005 was extrapolated from previous year's data.

**Figure 5.** Area (ha) of the main vegetable types (excluding potato) in the Philippines 2000-2005

For cabbage, bitter gourd, and onion, per hectare yields rose slowly between 2000 and 2005 (**Figure 6**). This suggests there has been limited uptake of improved production practices and hybrids in these crops. Yields of asparagus, water spinach, and yard-long bean have increased at a higher rate since 2002, suggesting greater adoption of improved cultivars and management. Additional production data and forward projections for production are attached as Appendixes 2, 3 and 4.



Source: Calculated from BAS (2005a; 2005b; 2007b; 2008). *Note:* With extrapolated area/production data in bitter gourd, water spinach, squash and yard-long bean from previous year's data in 2005.

**Figure 6.** Mean yield of the main vegetable types (t/ha) (excluding potatoes) 2000-2005

Vegetables are produced year-round, but production is higher from January to June, with specialized types restricted to some regions (Librero and Rola, 2000). Compared to other Southeast Asian countries, home garden and subsistence production of vegetables is less common, and farmers need more capacity building to diversify into vegetable production. Mendoza (1996) suggested that farmers failed to diversify beyond monocultures of rice, maize, or sugarcane because of lack of access to seeds/seedlings; credit support only for rice, maize, and sugarcane; familiarity with monocropping; and not owning the land they tilled. Production sectors and key trends and issues are discussed in **Table 3**.

**Table 3.** Production sectors and key issues in the Philippines vegetable industry

Production sector	Trends and issues
<b>Highland Production Areas</b>	
Specialized production	CAR is the main production area of highland vegetables, as well as the mountainous areas and highlands of South Tagalog, Cebu, Negros and Mindanao. Multiple cropping (e.g. cabbage after potato, carrot, and peas) is practiced in Banguet and Mountain provinces. Emerging crops include lettuce and asparagus. Linking vegetable production technologies to land conservation practices for degraded environments can improve uptake of land care and enhance sustainability (Cramb et al., 2006).
Village production	In remote communities, home garden and village vegetable production is being promoted to enhance subsistence diets and diversify local economies, even in areas that were rebel strongholds (Mallari, 2007). Production is also being promoted through schools (Saley, 2007). In some communities, tramline access is being provided to help communities move beyond self-sufficiency and earn more income (Estigoy, 2006).
<b>Lowland Production Areas</b>	
Vegetables after rice	Central Luzon is a major production area. Key lowland crops include eggplant, bitter melon and tomato. Ilocos is main production area of lowland vegetables, followed by Southern Tagalog.
Peri-urban production	Peri-urban production is being promoted in partnerships between local governments, international and national research agencies or universities, donors and NGOs. Focus is to develop economically and environmentally sound systems that make use of waste or temporarily vacant land, and to enhance income, nutrition and lifestyle options for the urban poor (Holmer and Miso, 2006; RPDEV, 2006; Alaminos City, 2007). Innovations such as use of grafted tomatoes can be promoted as producers gain confidence (Francisco and Ali, 2006).

Librero and Rola (2000) summarized information on growing seasons and cultivars grown for selected key vegetables (**Table 4**).

**Table 4.** Cropping patterns, cultivation time and major production regions for selected vegetables

Climatic preference	Season of cultivation	Vegetable types
Highland	Year-round	cabbage, Chinese cabbage, cucumber, shallot, climbing French beans
	Cooler months	French beans, tomato

Upland	Year-round	Bitter melon, celery, eggplant, shallot, peas, Pak Choi, squash, yard-long beans, bell pepper
	Cooler months	garlic, onion (low rainfall), winged beans (Sept-Oct)
	Warmer months	ginger
Lowland	Year-round	cucumber
	Cool season	processing tomato, tomato

Source: Summarized from Librero and Rola (2000)

Key production issues for the vegetable industry and desired outcomes for future R&D are summarized in **Table 5** (BAR, 2003).

**Table 5.** Key issues and desired outcomes to improve income and productivity

Issue affecting supply or marketability	Change needed to improve income and productivity
Production concentrated in dry season	Stabilize supply and price
Excessive pesticide use (residues)	Reduce use by 50% (while maintaining yield)
High postharvest losses (40-50%)	Reduce level by 50% (while maintaining quality)
Low export of fresh and processed vegetables	Increase volume by 20% (While ensuring adequate domestic supplies)
Low per capita vegetable availability (107 g/capita/day)	Increase level to 165 g/capita/day (still below WHO target of 200 g) while ensuring adequate intake of other food groups

Source: BAR (2003)

### 3.2 Inputs, finance, and utilities

#### *Inputs and supply chain logistics*

Input costs and quality, and logistics costs and time, are key factors affecting productivity and profitability (UNDP, 2006). The stagnation in yield increases between 2000 and 2005 (**Figure 6**) suggests farmers are not adequately benefiting from opportunities to improve productivity through use of superior varieties (hybrids) or technologies. It also may indicate that soil-borne diseases or the depletion of soil nutrients are eroding the benefits of these technologies. In marginalized environments, linking of land conservation technologies to productive technologies (such as vegetables) has enhanced the adoptability of both, provided attention is given to access and costs of inputs and marketing (Cramb et al., 2006).

### *Seed*

The seed industry in the Philippines is a key sector for the expansion and development of the vegetable industry. The Philippines vegetable seed sector is dominated by companies headquartered in other countries, with local subsidiaries or agents.

Lack of skills and knowledge about vegetable production, handling, and marketing are more significant constraints to industry development in the Philippines than in other countries in the region. The Philippines seed sector is addressing skill and knowledge deficits by providing additional extension and input services to farmers, and working with local government units where this proves advantageous to promote uptake of vegetable farming and the use of improved cultivars.

East West Seeds is the Philippines' largest hybrid vegetable seed producer, accounting for 70-75% of the local market for hybrid seed and 55% of total seed market. Other significant companies include Harbest Seed (local distributor of Known-You Seed (2007)) and Seminis Vegetable Seeds<sup>9</sup>, which are also involved in farmer extension linked to seed sales (Barcelona, 2007; Alaminos City, 2007). East West anticipates 15-20% growth in the industry over the next few years, especially as farmers realize that use of hybrid seed can provide 40-50% increased yield (Aguiba, 2005).

The hybrid vegetable industry is also benefitting from the Philippines Department of Agriculture (DA) program promoting hybrid rice and maize, with the DA encouraging farmer adoption of hybrid vegetables. However, budget constraints in DA mean that in some cases, ordinary vegetable seed rather than hybrids, are being recommended (Aguiba, 2005). Greater uptake of hybrids and the consequent increased yields could significantly enhance yields and profitability, and increase competitiveness of the industry against imports (Aguiba, 2005).

One example of the involvement of the Philippines seed sector in promoting vegetable production in partnership with local government is the Pinkabet Farm<sup>10</sup>, as part of the Ocho-Ocho program<sup>11</sup> for sustainable agriculture in

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<sup>9</sup> A subsidiary of Monsanto, Seminis Vegetable Seeds is the largest developer, grower, and marketer of fruit and vegetable seeds in the world.

<sup>10</sup> *Pinkabet* is a vegetable medley dish served throughout the Philippines, usually at lunch or dinner, with bitter melon (ampalaya) often the main ingredient.

<sup>11</sup> The Ocho-Ocho Program, part of the Agrivolution—"agriculture" + "evolution"—is the "transformation of agriculture to alleviate poverty. The program, also known as the Sustainable Bayanihan Integrated Program for Agriculture (BIPSA), was an initiative of the Alaminos City government in Pagasinan Province.

Alaminos City in Pangasinan Province. Easily accessible areas were established across the city in partnership with East West Seed, Harbest Seed, DA and Seminis Vegetable Seeds to demonstrate Pinkabet Farm in three different barangays and subsequently replicated in 12 barangays (Alaminos City, 2007). The farms are encouraged to spread risks by growing a “medley” of different vegetables to help meet the demand for vegetables in Ilocos region, and to provide local employment (10 persons/ha) (RPDEV, 2006).

### ***Fertilizers***

Fertilizers are a modest export: 410,000 tonnes worth US\$ 92 million were exported in 2005, representing respectively 22% and 38% growth over 2004. Main markets were Vietnam, Indonesia, Malaysia, and Thailand. Despite the exports, which suggest some regional and global competitiveness, costs of fertilizer to Filipino farmers are almost double world prices (**Table 6**). Imports of urea were 720,250 t in 2003, dropping to 542,890 t in 2004, and 570,290 t, worth US 104.8 million in 2005 (BAS, 2007e). High costs to farmers are possibly due to “monopolistic pricing,” the devaluation of the peso, and infrastructure and transport problems. An overhaul of the regulatory agencies is needed, as cumbersome and inefficient regulatory procedures and requirements and inefficient logistics add to costs (NEDA, 2007b).

Mendoza (1996) reported some of the factors that discouraged farmers from using more ecologically sustainable production of rice and maize. Previously, crop residues were kept as food for carabao (water buffalo used to cultivate), which provided manure that could be used as fertilizer. When farmers switched to mechanical tillage, crop residues were often burnt, causing a greater need for chemical fertilizers and a decline in soil quality.

**Table 6.** Dealers' prices of fertilizer, Philippines, 2003-2005 (P/ 50 kg)

<b>Item</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>
Ammophos (16-20-0)	464.54	626.59	748.61
Urea (45-0-0)	537.90	728.22	905.38
Ammosul (21-0-0)	314.19	482.51	534.41
Complete (14-14-14)	481.33	653.07	771.44

Source: BAS (2007e).

### ***Agricultural chemicals***

Costs are high due to the same issues that affect fertilizer pricing. Chemical residues are a concern due to overuse of pesticides. Under Memorandum Order No. 126 (President Ramos in 1993), IPM was endorsed as the standard approach for crop and pest management in rice, maize, and vegetables with widespread IPM training for farmers and local government units (Community IPM, 2007).

IPM and the development and use of disease resistant cultivars are key themes of vegetable R&D in partnership with the World Vegetable Center and other donors.

The phasing out of methyl bromide has led to the need for alternative technologies for control of nematodes and soil-borne diseases, and biofumigation methods combined with brassica cover crops are being trialed (Kirkegaard, 2007; Kirkegaard et al., 2000).

### ***Farm machinery***

Lack of access to farm machinery can hamper productivity improvement, especially when farmers do not have access to livestock for cultivation. Some donor support provides community tractors and cultivation equipment to marginalized communities (PIA, 2007).

### ***Irrigation and watering systems***

Total area under irrigation (all agriculture) is 1.43 million ha (BAS, 2007d), and recent expansion has been minimal (NEDA, 2007b). Water access during the dry season is a major constraint to vegetable production in some areas, but generally, the supply of vegetables is highest at this period.

### ***Labor***

Labor shortages are not a major constraint to productivity improvement. Unemployment and underemployment are high in rural areas (1-3 million) (NEDA, 2007b) but the ability to pay for labor and reap the benefits is a key issue. Off-farm migration contributes to labor shortages and has mixed benefits. Among rice farming communities in the Philippines, off-farm migration was not as high as in Thailand, but involved more women than men. The lack of non-farm income opportunities and the low profitability of rice, together with the desire of youth to seek better lives, underpins the trend. Most seek employment overseas, with out-migration higher from rainfed areas (Paris, 2007).

The loss of family labor is counterbalanced by remittances, which allow investment in more inputs; however, households headed by women suffer additional disadvantages and pressures in farm management. Income irregularities or sudden shortfalls encourage short-term investment choices rather than investment in the farm. Initiatives that provide training in leadership and/or assistance in accessing finance are needed to help farming communities cope with absent family members and improve farm management (Paris, 2007).

Investment in vegetable production is one option that suits short-term use for short-term return, and to pay for labor, especially when family labor is lost to off-farm migration.

### ***Good Agricultural Practice (GAP), EurepGAP (2007) and quality certification***

The Philippines has put in place the necessary legislation and regulatory frameworks to build on experiences in the promotion of Landcare, the development of organic production, and the trialing of genetically modified organisms, to introduce and regulate GAP certification (Faylon and Cardona, 2007).

The Philippines has been a partner in the ASEAN-Australia Development Co-operation Program (AADCP) initiative to develop a Good Agricultural Practice (GAP) framework for fruit in ASEAN (ASEAN GAP) (Ledger et al., 2006), but has yet to introduce the system in practice. The Bureau of Agricultural and Fisheries Product Standards has responsibility for development and monitoring of quality standards and certification, and the ASEAN GAP standard will be used as a model for the Philippines GAP (personal communication, Gilberto F. Layese, Director, Bureau of Agricultural and Fisheries Product Standards February 2007).

### ***Postharvest technology***

There are four major supply chain types: Local distribution of more perishable domestically-grown vegetables; road transport of highland vegetables to metro Manila; road and sea transport of vegetables from Mindanao and other islands to Manila; and production and transport of contract-grown export crops. Technologies to reduce handling and wastage<sup>12</sup> are needed. Pilot cool-chain handling systems have been established in Benguet (2004), and in Cebu and Mindanao (2003) (Estigoy, 2006), but access and affordability are issues (DA, 2006). For remote regions, innovative tramline systems have been established in CAR (Buguias in Benguet), Southern Luzon (Nagcarlan, Laguna), and the Visayas (Alioilo) (Estigoy, 2006).

### ***Logistics***

Farm-to-road, road and shipping transport are all vital in product and input distribution in the Philippines. Inputs such as fertilizers and pesticides pass through four distribution steps: distributor to large dealer, to small dealer, to farmer, with suppliers boosting sales through farmer demonstrations, advertising, technical advice and credit sales tie-ups, with discounts for

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<sup>12</sup> Surprisingly, average vegetable losses at household level were recorded at a relatively low 3.7% in the 2003 National Survey, but this probably reflects the general practice of buying fresh produce daily for immediate consumption (FNRI, 2003).

cooperative purchasing. The complexity of the distribution systems adds to costs (UNDP, 2006). Access and distribution deficiencies are greatest in the AARM region (Panda, 2005).

Of about 200,000 km of roads in the Philippines, 15% are national roads, maintained by the national government, 13% are provincial roads, and 11% are city/municipality roads. The remaining roads, which are mostly poorly maintained and unsealed barangay (village) roads, are the responsibility of local government units (LGUs). The poor condition of farm-to-market roads is a major impediment to efficient produce marketing. Upgrading of provincial road systems is also needed in remote and conflict-affected areas on Mindanao. (NEDA, 2007b).

As an island archipelago, shipping routes are critical for produce and goods movement. The Philippines Ports Authority operates 114 public ports, 408 private ports, and 213 fishing ports. Inter-island shipping is provided by a regular service of roll-on roll-off<sup>13</sup> (RORO) vessels connecting Luzon, the Visayas, and Mindanao. The *Strong Republic Nautical Highway* (**Figure 7**) has been established to connect Luzon, Panay, Guimaras, Negros, and Mindanao (NEDA, 2007b).

Key issues to address in improving the Nautical Highway and Ports System, and to improve domestic and export marketing, include: an overhaul of the institutions involved; greater private sector involvement in provision of infrastructure and services; and better maintenance of infrastructure (NEDA, 2007b).

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<sup>13</sup> Roll on-roll off (RORO) shipping can carry vehicular cargo (cars, trucks, trailers, train carriages) and differs from lo-lo (lift on-lift off) shipping, which uses cranes for loading cargo (Wikipedia, 2007g).



Source: After NEDA (2007b).

**Figure 7.** Nautical Highways (Central, Western and Eastern) proposed under MTPDP 2005-2007, to link major centers in the Philippines

### *Financial and utility services*

Improving access and affordability in finance and utility services are key issues for the development of the fresh and processed vegetable sector.

### *Fuel and electricity*

Supplies are generally adequate, but delivery is restricted in some areas. By 2004, 91% of barangays nationwide were electrified, but only 81% in Mindanao were connected (and just 64% in ARMM). Buffering capacity for peak demand is generally adequate, but some load-shedding occurs in the hottest weather, and reserve margin capacity needs to be increased, particularly in Mindanao. Electricity demand is predicted to rise to 5450 MW between 2005 and 2014 (NEDA, 2007b). The cost of electricity rose substantially in 2006.

### *Financial services*

Poor access to finance and indebtedness to traders are major constraints for improving livelihoods among the rural poor. Some farmers are able to access interest-free credit for inputs from traders, but this can be a disadvantage as they are then obliged to sell to the trader and have little bargaining power (UNDP, 2006). Access to microfinance has increased through the government's encouragement of the private-sector provision of microfinance, coupled with government focus on "wholesale" delivery of financial services, more market-orientated policy approaches, and the provision of more capital for lending (NEDA, 2007b).

The growth and viability of rural banks, cooperatives, and NGO lending programs have improved, but the neediest are still disadvantaged in lending schemes. A key program initiative has been to enhance the participation of local communities in barangay governance, to build their capabilities for designing, implementing, and managing local development initiatives such as irrigation facilities and farm roads, and to enhance incomes (KALAHI<sup>14</sup>-CIDSS) (Araral and Holmemo, 2007).

Further widening of microfinance providers and uptake levels could be an advantage (NEDA, 2007b). Policy options for improving rural credit access have been reviewed by Llanto and Laviña (2006).

#### *Value-adding, food processing, and provedore sectors*

The Department of Trade and Industry statistics indicate that > 90% Philippines businesses were micro-enterprises, and strengthening this sector was considered to be a key opportunity for adding value and enhancing incomes (DTI statistics, (NEDA, 2007b)). But large manufacturers dominate vegetable processing for domestic supermarket and export trades, and while ownership in the retail sector, including supermarkets, is quite dispersed, the food manufacturing sector is highly concentrated (Catelo, 2006).

Large manufacturers also have been establishing strategic relationships, with retailers taking advantage of information technology to provide details about customer preferences in produce purchases. The linkages pose risks—with better information, retailers gain bargaining power relative to wholesalers and farmers, and this may reinforce their dominance in the input and output markets (Catelo, 2006).

#### *Marketing fresh produce: wholesale and retail sectors*

Fresh produce trading occurs through the wholesale and retail sectors, with chain complexity variable and depending on the requirements and location of

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<sup>14</sup> KALAHI (= Linking Arms Against Poverty for Comprehensive and Integrated Delivery of Social Services (CIDSS)), is a donor-funded program managed by the Department of Social Welfare and Development (DSWD). It aims to reduce poverty through community empowerment, improved local governance, and provision of seed funds for community development programs. KALAHI seeks to empower communities by enhancing their participation in village-level governance, with special effort to engage and involve women and the poor (KALAHI-CIDSS, 2007).

end markets. Distribution systems are often inadequate, and this constrains trading (PAGASA, 2005). Grade standards, where used, are often subjective in size, quality, and variety, rather than based on clearly defined and uniform national standards, but the situation is improving (Catelo, 2006).

Most vegetable marketing involves a complex chain of intermediaries between farmer and consumer. In most cases, a “collector” or trader will consolidate and supply to wholesalers, who in turn supply to various tiers of subsidiary resellers and retailers. Market channels can range from:

***three layer***

farmer > wholesaler/retailer > consumer

***eight layer for domestic marketing***

farmer > agent > assembler/wholesaler >  
financier/wholesaler/shipper > wholesaler > wholesaler/retailer >  
retailer > consumer

***up to nine channels for export***

farmer > agent > assembler/wholesaler >  
financier/wholesaler/shipper > agent/wholesaler > wholesaler >  
wholesaler/retailer > retailer > exporter/consumer

Most common marketing arrangements involved five or six layers (Librero and Rola, 2000).

Farmers who have higher levels of trust/negotiation skills make better choices of trader, and are less “indebted” in terms of relationship and finance, and this enhances their marketing position (Milagrosa, 2007).

***Wholesale***

Wholesale marketing occurs at two basic levels: the local wholesale market or trading post, and the large terminal wholesale market. From these, produce moves to a range of subsidiary markets, stalls, retail outlets, etc. In the Benguet production area of CAR, a two-tier farm structure exists in terms of farm size and sales. A small number of larger farms dominate sales, while a large number of small farms share a small portion of sales. Governance in marketing is of three types; the most common is trader-based, followed by wholesaler-based and contractor-based arrangements (Milagrosa, 2007).

A large proportion of farmers are indebted to wholesalers. This reduces the time and cost associated with finding markets and obtaining finance, but reduces the

bargaining position of farmers. The level of trust between chain members is often low, and market information sharing is poor (Milagrosa, 2007).

*Trading posts:* For highland vegetables from the CAR region, farmers typically assemble produce at farm level and transport it cooperatively<sup>15</sup> to La Trinidad Trading Post, a larger assembly area for buyers and sellers. About 59% of produce from the remote Mountain Province area of CAR is supplied to Manila, with prices paid reflecting supply and demand in the major terminal markets such as Divisoria in metro Manila (UNDP, 2006).

La Trinidad hosts 39 trading booths (owned by individuals (12), cooperatives (9) and associations (3)), with a throughput of 350 tonnes of vegetables/day. In addition, about 200 traders, and a cleaning and sorting facility, handle about 80 tonnes carrots/day. Buyers travel to La Trinidad Trading Post from metro Manila and throughout Luzon to purchase vegetables for trucking to other markets and on-selling. The Trading Post has no storage or processing facilities, and nearby rental cool stores and reefer vans are underutilized due to costs (UNDP, 2006).

Prices are not monitored at the Trading Post, and farmers depend on information from metro Manila to monitor value. To improve information flows and farmers' bargaining position, the Bureau of Agricultural Statistics Media Service operates a web-based market-price reporting service for metro Manila listing regularly updated prevailing, high, and low prices at wholesale, retail (traditional), and supermarket levels for selected key vegetables<sup>16</sup> at key outlets (Table 7) (BAS Media Service, 2007). A text messaging<sup>17</sup> market information service is also accessible (Foster, 2007).

**Table 7.** Major wholesale and wet markets of the Philippines, where vegetable prices are surveyed by BAS

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<sup>15</sup> When prices are good, *harangs* (people who block the way) may intercept and purchase produce directly from farmers on their way to market, saving the farmer time and altering social interaction opportunities (e.g maybe more time to talk and socialize). The *harangs* make a small profit, and may speed up or consolidate the market chain while providing additional employment (UNDP, 2006).

<sup>16</sup> For example, on 12 July 2007 prevailing prices at wholesale, retail, and supermarket levels respectively were P 15, 30, and 29 for eggplant; 23, 40, and 33 for onion; and 13, 30, and 25 for cabbage. In most cases, reported supermarket prices were lower than retail (BAS Media Service, 2007).

<sup>17</sup> Uptake of mobile phones and their use for financial transactions is extensive in the Philippines. One company provides a service that allows users to transfer funds between accounts, and pay for goods and services from an "electronic wallet" with the phone recording all transactions and without the need of a bank account (Foster, 2007).

**Wholesale Markets**

Divisoria Market, Manila  
(Cloverleaf) Balintawak Market, Quezon City

**Retail Markets**

Obrero Market, Blumentritt, Manila  
Quinta Market, Quiapo, Manila  
Libertad Market, Pasay City  
Guadalupe Commercial Complex, Makati City  
Farmers Market, Cubao, Quezon City  
Malabon Central Market, Malabon City  
Pamilihang Lungsod ng Marikina, Marikina City  
Pamilihang Lungsod ng Muntinlupa, Muntinlupa City  
Sangandaan Market & Trading Center, Caloocan City  
Susano Market, Novaliches, Quezon City  
Mutya ng Pasig Public Market, Pasig City

Source: BAS Media Service (2007)

*Terminal wholesale markets:* Produce purchased at the Trading Post is transported to terminal wholesale markets such as Divisoria and Balintawak in metro Manila, and to institutional buyers including food chains. About 25 trucks, whose owners are members of a trucking association, deliver 250 tonnes of produce to Divisoria from La Trinidad each day (UNDP, 2006).

***Retail***

Food embodies culture and traditions, and accounts for 43% total household expenditure (Catelo, 2006). Retail sales of vegetables include: fresh, ready-to-eat, and processed vegetables sold for home preparation through a range of outlets, and the vegetable ingredients used to prepare food for caterers, takeaways, fast-food outlets, and restaurants. The retail sector includes a range of sellers: street hawkers, wet markets<sup>18</sup>, sari-sari (shop-front) stores<sup>19</sup>, groceries, supermarkets, hypermarts and convenience stores, but the sari-sari stores dominate (70% outlets), especially in rural areas<sup>20</sup> (Catelo, 2006), and account for 75% of vegetable sales (Digal et al., 2007).

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<sup>18</sup> Metro Manila has numerous *palengke*, Filipino-style open-air neighbourhood wet markets.

<sup>19</sup> Usually an extension of a home and family-run, offering convenience, familiar service, and credit.

<sup>20</sup> Retail enterprise is probably underestimated. Numerous micro-enterprises occur in the informal sector (UNDP, 2006).

But modern retailers<sup>21</sup> (mostly local companies) are preferred by consumers, and are increasing their share of the consumer's peso, especially through shopping malls<sup>22</sup>, which are continuing to expand on urban fringes and in the southern provinces. Since deregulation of retailing in 2000, foreign retailers have increased their presence, mainly through joint-ventures and franchising. Hypermarkets are also expanding, with expansion by leading retailers Super Shopping Mart Inc. and Rustan (Euromonitor, 2006). The Philippines Supermarkets Association has 116 members, with 99 members and more than a third of the country's supermarkets located in metro Manila (PAGASA, 2005).

Grocery retailers show the strongest growth (8% in 2005) in the retail sector, but non-grocery<sup>23</sup> retailers are also expanding into grocery lines to counterbalance the growth of non-grocery in supermarkets. Retail profits were reduced by high oil prices for transport and electricity in 2005. Although large food retailers appear to dominate the retail food industry, they claim to face stiff inter-chain competition, with supermarkets using "loss-leader" marketing<sup>24</sup> to maintain their market share (Euromonitor, 2006). Unfortunately for vegetable producers and traders, the "loss-leader" cost tightening erodes farmer and trader profits.

Eating out is popular and grew 15-20% annually from 1995-2005, with the fast food sector worth > US\$ 600 million in 2000 (Palma, 2005). Multinational corporations (McDonald's, KFC, Pizza Hut) have a significant stake, but are overshadowed by locals. One local company, Jolibee Food Corporation (2007) (Omaña, 2005), which does not feature vegetables strongly, is the most popular; another chain, Chowking (2007), which does feature vegetables, is also popular.

While economic growth is the main driver for the development of the retail sector, the increase in numbers of more educated consumers, lifestyle changes (longer work/travel, women working), and greater awareness of food quality and safety, are influencing retail trends. Convenience food is becoming essential for some sectors, and customers expect more choice and a variety of grades/prices, speed, efficiency, and a cool, clean shopping environment (Palma (2005) in Catelo (2006)).

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<sup>21</sup> "Modern retailers" = Supermarkets, hypermarkets, convenience stores. Usually air-conditioned, with electronic balances.

<sup>22</sup> SM Investment Corp is the largest mall developer and retailer, owning over 20 SM malls, with further plans to open four new malls in 2005 and 2006 (Euromonitor, 2006).

<sup>23</sup> A "grocery" is a retail store that sells fresh fruit, vegetables, and meat, packaged foods, household cleaning and laundry supplies, and hygiene items (soap, toothpaste, etc.) (Wikipedia, 2007d). Contrast to stores, which also specialise in non-grocery items such as drapery, haberdashery, clothing, hardware, and household goods.

<sup>24</sup> They also provide discounts to customer privilege groups, hold sales, discount and aim to expand markets share, provide larger more comprehensive stock space, and deliver quality and value (Patalinghug, 2000).

Some of the trends in policy affecting the retail sector are summarized in Table 8. Legislation affecting the retail sector includes the Price Act of 1991 (RA 7581), to control profiteering and protect consumers, and the Consumer Act of the Philippines (RA 7294), covering deceptive trade practice (inferior goods, credit fraud) and overseen by the Department of Trade and Industry (DTI).

The consumer rights movement is very active. With support from DTI, and capitalizing on the information revolution (television, cell phones, internet), consumer groups keep pressure on the retail sector to improve customer service. It may add to pressure on farmers, however, via dampening of farm-gate price, and higher expectations of variety, quality, safety, and timeliness (Digal (2001) in Catelo (2006)).

Food safety at the retail level is overseen by the Department of Health (DOH) and the Bureau of Food and Drugs (BFAD) (Palma, 2005).

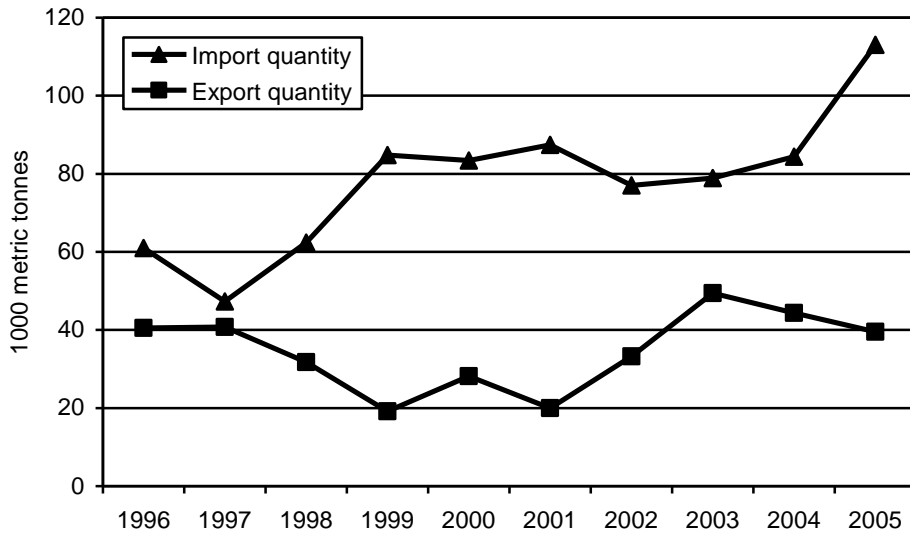
**Table 8.** Policy trends in the retail sector of the Philippines vegetable industry

<p>Marcos Era = monopolies, cronyism, excessive government intervention.</p> <ul style="list-style-type: none"> <li>• Industrialization promoted by import substitution – success rate low, traders affected by high tariffs, quotas, and overvalued peso.</li> <li>• Government depended on regulatory controls, public enterprise, investment incentives, and trade restrictions</li> <li>• Industries became concentrated, domestic markets were sheltered, and price signals distorted</li> </ul> <p>Aquino Administration (1986-1992) = most unfavorable policies removed</p> <ul style="list-style-type: none"> <li>• Foreign investment laws liberalized (<i>Foreign Investment Act of 1991</i>)</li> <li>• Implementation constrained by inadequate finances</li> </ul> <p>Ramos Administration (1992-1998) = policy of less government intervention sustained</p> <ul style="list-style-type: none"> <li>• Foreign exchange market, banking, transportation, and telecommunications liberalized</li> <li>• Build-operate-transfer schemes implemented to fill infrastructure gaps</li> <li>• Executive order advocates liberalization of retail sector</li> </ul> <p>Estrada Administration (1998-2001)</p> <ul style="list-style-type: none"> <li>• Retail Trades Nationalization Act (March 2000) (RA1180)</li> <li>• Because of dominance of food retailers RA 1180 replaced by Retail Trade Liberalization Act (2000) RA 9762.</li> </ul> <p>Arroyo Administration (2001-)</p>
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Source: Catelo (2006)

### *Trade development*

By comparison with total production, the export and import sectors are small, representing 0.7% and 2.0% of production by volume respectively in 2005<sup>25</sup>.



Source: PC-TAS ITC/UNSD (2002; 2007)

**Figure 8.** Imports and exports of vegetables (tonnes) in the Philippines, 1996-2005 (Also Appendix 5)

Between 1996 and 2005, imports have increased from 60,000 to over 100,000 tonnes, while exports have fluctuated between 20,000 and 40,000 tonnes (**Figure 8**) (PC-TAS ITC/UNSD, 2002, 2007).

**Exports**

Detailed trade statistics vary with data source and a compilation of data from several sources is shown in **Table 9**. Key issues are the recovery of exports in 2001-2003 to 1997 levels, and the slow decline in 2004-2005 (**Figure 8; Table 9**).

**Imports**

Imports of vegetables have boomed in the last few years, fostered by the liberalized trading environment under WTO and Philippine law. In addition to legitimate imports, large quantities of produce are reputedly smuggled into the

25 Based on UN Comtrade data (Table 9) and total production of 5.756 million tonnes (FAOSTAT Table 1).

Philippines (Pimentel Jr., 2004; Fresh Plaza, 2007). Imported vegetables are in demand to supply institutional buyers and high-end supermarkets because they are often 30% to 50% cheaper than some local commodities, they have superior packaging, and are usually of better quality (Macabasco, 2004). Imports have exceeded exports in volume since before 1996 (**Figure 8**). According to UN Comtrade data, import volumes for fresh and processed vegetables were almost triple the volume but roughly the same in value as exports in 2005 (**Table 9**).

**Table 9.** Import and export volumes and value for fresh and processed vegetables for the Philippines, 1999-2005

Item	1999	2000	2001	2002	2003	2004	2005
------	------	------	------	------	------	------	------

Export volume (tonnes)							
OAS <sup>26</sup>	10,720	18,841	9,762	20,960	36,562		
Fresh	16,731	25,839	17,157	29,948	45,867	42,255	37,022
Processed	2,409	2,339	2,826	3,254	3,560	2,787	2,487
Total	19,140	28,178	19,983	33,202	49,427	45,042	39,509
Export value (US\$ '000)							
OAS <sup>55</sup>	13,132	13,669	11,172	13,332	15,452		
Fresh <sup>27</sup>		23,669	21,915	23,119	27,158		
Processed <sup>56</sup>		3,548	3,587	4,749	5,462		
Fresh	21,743	23,864	22,041	23,181	27,205	24,826	27,756
Processed	3,153	3,359	3,514	4,147	4,503	3,252	4,398
Total	24,896	27,223	25,555	27,328	31,708	28,078	32,154
Import volume (tonnes)							
Fresh <sup>28</sup>	860	7,697	913	1,824	2,140		
Fresh	37,856	23,769	26,698	27,280	32,853	29,452	56,887
Processed	46,972	59,647	60,716	49,725	46,094	55,059	56,128
Total	84,828	83,416	87,414	77,005	78,947	84,511	113,015
Import value (US\$ '000)							
Fresh <sup>28</sup>	390	1,062	553	675	500		
Fresh	9,354	4,712	5,822	5,118	6,503	6,030	9,454
Processed	39,135	41,107	31,275	25,205	26,058	28,420	27,911
Total	48,489	45,819	37,097	30,323	32,561	34,450	37,365

Source: Items without superscript are calculated from classification of HS data in PC-TAS ITC/UNSD (2002; 2007) except for 2004 data, which is from UN Comtrade (2007)

Note: The data displayed here are broadly similar to, but differ from that of FAOSTAT (2007) in Table 1. This reflects difference in data classification and source.

### 3.3 Institutional framework and operational environment

#### *Policy and regulatory agencies*

<sup>26</sup> Fresh exports onion asparagus and shallot only (Rapusas, 2006).

<sup>27</sup> DTI (Favila, 2004) includes data of <sup>55</sup>.

<sup>28</sup> Carrot, celery, cauliflower, broccoli, lettuce, lettuce leaves, mushroom, leeks (BAS cited by Rapusas (2006)).

Key framework policy issues for agriculture (and the vegetable sector) encompass the Philippines' commitments as a member of the World Trade Organization (WTO, 2007), the Asia Pacific Economic Co-operation Forum (APEC, 2007), and the Cairns Group (2007). The Philippines is signatory to various international and regional agreements (such as those on water and land management), free or preferential trade agreements within ASEAN (Association of Southeast Asian Nations), between ASEAN and China, and ASEAN and the Australia and New Zealand<sup>29</sup>, the Japan (Japan-Philippines Economic Partnership Agreement (2006) (MOFA, 2007). Other agreements are also under negotiation or consideration (ASEAN-Korea, ASEAN-India, Philippines-USA) (Medalla and Lazaro, 2004). Trade agreements impact the vegetable sector largely in terms of WTO/export access and import competition, but increasingly in the future, GAP certification and Sanitary and Phytosanitary (SPS) issues will also influence outcomes.

The National Economic and Development Authority (NEDA) has responsibility for formulation, implementation, and achievement of the goals of the *Medium Term Philippines Development Plans* (MTPDP), with the National Statistics Office (NSO), the Tariff Commission, and the Philippines Institute for Development Studies as attached agencies (NEDA, 2007c). NEDA has oversight of Official Development Assistance (ODA)<sup>30</sup>. NEDA operates across government at national and provincial levels, in the development of the Comprehensive and Integrated Infrastructure Program (CIIP), and other national and regional planning and investment frameworks for implementation of the plan (NEDA, 2007a).

The National Development Office (NDO) provides technical support to NEDA for policy, program, and plan formulation. NDO also monitors macroeconomic and sectoral performance, and undertakes economic and development studies on macro-level plans and studies. Within the NDO, agriculture, trade, industry, utility, and other sector offices coordinate formulation of relevant sectoral plans, policy, and support.

While previous MTPDPs have not always set priorities, were plagued by funding deficiencies, and constrained by political influences, the current Arroyo Government has established a medium term-expenditure framework (MTEF), to

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<sup>29</sup> (ASEAN Free Trade Area (AFTA) - Closer Economic Relations (CER) Closer Economic Partnership (CEP)), (DFAT, 2007).

<sup>30</sup> Between 2000 and 2005, total ODA decreased steadily due to the government's adherence to project quality and fiscal discipline, from a peak of US\$ 13.3 billion in 2000, to US \$ 10.2 billion in 2005, with 17.7% expended in the agriculture sector (focusing on agrarian reform and Mindanao development) (ODA, 2007).

help guide the current MTPDP and investment priorities. Focus has been on outcomes rather than sectoral approaches, and agency streamlining has been proposed to improve efficiency and delivery. Key targets have been: economic growth and jobs; energy and power sector reforms; social justice and basic needs; education and youth; and corruption and governance.

If the vegetable sector received greater attention and stimulus from government, and productivity could be improved and costs contained, the industry could contribute much more significantly to the realization of the economic, employment, and basic need-provision targets.

Planning for agricultural development, including the vegetable sector, is the responsibility of the Department of Agriculture (DA), with the Department of Science and Technology (DOST) involved in R&D planning through the Philippines Council for Agriculture, Forestry and Natural Resource Research and Development (PCARRD, 2007). Other Departments are responsible for oversight of the industry, trade, and health aspects of agriculture and food (**Table 10**).

**Table 10.** Government agencies with sectoral responsibilities for policy development or implementation in agriculture and food supply in the Philippines

Philippines Information Agency – <a href="http://www.pia.gov.ph/pianew.asp?m=1">http://www.pia.gov.ph/pianew.asp?m=1</a>
<a href="#">Department of Transportation &amp; Communications</a>
<a href="#">Department of Agriculture</a>
<a href="#">Department of Education</a>
<a href="#">Department of Health</a>
<a href="#">Department of Science and Technology</a>
<a href="#">Department of Social Welfare and Development</a>
<a href="#">Department of Agrarian Reform</a>
<a href="#">Department of Trade &amp; Industry</a>
National Economic and Development Authority – <a href="http://www.neda.gov.ph/">http://www.neda.gov.ph/</a>
Philippines Institute for Development Studies
National Statistics Office – <a href="http://www.census.gov.ph/">http://www.census.gov.ph/</a>
Tariff Commission

To implement government targets in poverty alleviation, especially in rural areas, the Department of Agriculture oversees the agriculture sector contributions to national development through provision of policy frameworks, public investment guidance and, in partnership with local government units (LGUs), the delivery of industry and agri-enterprise support services (DA, 2007b).

The key strategies of *The Blue Print for Agriculture* banner program<sup>31</sup> (DA, 2007a), are: participatory planning, implementation, monitoring and evaluation in partnership with stakeholders; local government units as lead players; area-based approaches underpinned by a situation analysis of biophysical, social and industry development progress and resources of target areas; capacity building at the local level in participatory planning, research, development, education, processing, marketing, and entrepreneurship; focused targeting of programs on a people-needs basis for big and small farmers; productivity improvement with sustainable and profitable practices; and counterpart-schemes between DA the Department of the Interior and Local Government (DILG) and LGUs.

### *Research and development agencies*

Stads et al. (2007) provide a recent overview of agricultural research and development in the Philippines.

Public sector R&D for the vegetable sector development is covered under the *High Value Commercial Crops Program*, which articulates several challenges for the development of high-value commercial industries within a framework of sustainability, rural development, and responsiveness to global competition (HVCC, 2007). The 16 strategies of the program, which are all relevant to the vegetable sector development, essentially concern: germplasm and technology sustainability, access and improvement; product distribution, quality improvement and loss reduction; marketing information, planning and promotion; market access, cost and SPS risk reduction; planning and implementation strategies that strengthen farmer-finance-processor-trader-consumer links, and respond to their needs; and strengthening cooperative participation, transparency, and operational economies of scale.

In 2006, government expenditure in agriculture increased to P 27.5 billion, but this was a fall in total share of national budget to 2.61%. Conversely, agricultural loans rose to P 584.6 billion (3.3% of total loans), with credit for production reaching P168.7 billion (13.1% more than 2005) (BAS, 2007d). The private sector (business, private non-profit, and education sectors) is also a significant contributor to total R&D, providing 64% of total expenditure on R&D across all sectors in 2002 (0.11% GDP) (NEDA, 2007b). In the latest available data (2003) only 4.7% of the government's research, development and education budget was allocated to vegetables (BAR, 2003). Agencies within the

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<sup>31</sup> Ginintuang Masaganang Ani (GMA) (DA, 2007a) means *golden* (Ginintuang) *bountiful* or *abundant* (Masaganang) *harvest* (Ani) - also coined after the initials of President Arroyo (GMA - Gloria Macapagal Arroyo).

Department of Agriculture that have some role in vegetable sector monitoring or development are listed in **Table 11**.

**Table 11.** Department of Agriculture agencies or linked bodies with responsibilities relevant to the vegetable sector in the Philippines

<p><b>Department of Agriculture</b>                      Elliptical Road, Diliman                      Quezon City                      (632) 928-8741 to 65  <a href="http://www.da.gov.ph/">http://www.da.gov.ph/</a></p> <p><b>Bureau of Soils and Water Management (BSWM)</b>                      SRDC Building, Elliptical Road                      Diliman, Quezon City  <a href="http://bswm.da.gov.ph/">http://bswm.da.gov.ph/</a>  <a href="mailto:bswm@pw.ph.inter.net">bswm@pw.ph.inter.net</a></p> <p><b>Bureau of Agricultural Statistics (BAS)</b>                      Ben-Lor Bldg., 1184 Quezon Avenue                      Quezon City  <a href="http://bas.gov.ph/">http://bas.gov.ph/</a>                      Voice: Tel. no: (632)372-38-20  <a href="mailto:infobas@mozcom.com">infobas@mozcom.com</a></p> <p><b>Bureau of Agricultural Research (BAR)</b>                      RDMIC Building, Visayas Ave.                      cor. Elliptical Road, Diliman, Quezon City  <a href="http://www.bar.gov.ph/">http://www.bar.gov.ph/</a>                      Voice: +63 928-8505                      Fax: +63 927-5691  <a href="mailto:rd@bar.gov.ph">rd@bar.gov.ph</a></p> <p><b>Bureau of Post Harvest and Research Extension</b></p> <p><b>Bureau of Plant Industry (BPI)</b>                      692 San Andres St.                      Malate, Manila  <a href="http://bpi.da.gov.ph/home.html">http://bpi.da.gov.ph/home.html</a>                      Voice: (02) 525-7857 / 525-7909                      Fax: (02) 521-7650  <a href="mailto:cu.bpi@da.gov.ph">cu.bpi@da.gov.ph</a></p> <p><b>Agricultural Credit and Policy Council</b>                      3F Agustin I Bldg., Emeral Ave.,                      Ortigas Center, Pasig City  <a href="http://www.acpc.gov.ph/">http://www.acpc.gov.ph/</a>                      Voice: (0632) 634-3320; 634-3321; 634-3326                      Fax: (0632) 634-3319  <a href="mailto:acpcinfo@yahoo.com">acpcinfo@yahoo.com</a></p>	<p><b>Fertilizer and Pesticide Authority</b>                      FPA Building, BAI Compound                      Visayas Avenue, Quezon City  <a href="http://fpa.da.gov.ph/">http://fpa.da.gov.ph/</a>                      Voice: 9208573; 9200068; 9233355  <a href="mailto:fpa_77@yahoo.com">fpa_77@yahoo.com</a></p> <p><b>National Agriculture and Fishery Council</b>                      NAFC, Apacible Hall, Department of Agriculture                      Cpd                      Elliptical Road, Diliman, Quezon City  <a href="http://www.nafc.ph/">http://www.nafc.ph/</a>                      Voice: (632)9204092/(632)928-1966                      Fax: (632) 920-3992  <a href="mailto:webmaster@nafc.ph">webmaster@nafc.ph</a></p> <p><b>National Food Authority</b>                      101 E. Rodriguez Sr. Avenue                      Quezon City  <a href="http://www.nfa.gov.ph">http://www.nfa.gov.ph</a>                      Voice: 63 (2) 712-1719 / 712-1705  <a href="mailto:nfa_admin@nfa.gov.ph">nfa_admin@nfa.gov.ph</a></p> <p><b>National Nutrition Council</b>                      Villamor Interchange                      South Superhighway, Makati City  <a href="http://www.nnc.da.gov.ph/">http://www.nnc.da.gov.ph/</a>                      Voice: (632) 843-5838, (632)816-4280, (632) 818-7398                      Fax: (632) 818-7398 * 8435834  <a href="mailto:oad.nnc@da.gov.ph">oad.nnc@da.gov.ph</a></p> <p><b>Philippine Crop Insurance Corporation</b>                      3rd Floor, VAG Building, Ortigas Avenue                      San Juan, Metro Manila  <a href="http://pcic.da.gov.ph/">http://pcic.da.gov.ph/</a>                      Voice: (63)(2)-721-5461 to 65                      Fax: (63)(2)-727-1291  <a href="mailto:pcic@mindgate.net.ph">pcic@mindgate.net.ph</a></p> <p><b>Quedan Rural Credit and Guarantee Corporation</b>                      34 Panay Avenue                      Quezon City  <a href="http://quedancor.gov.ph">http://quedancor.gov.ph</a>                      Voice: +63.2.3739711 / +63.2.3739453 / +63.2.3739452</p>
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*Education:* In the Philippines, state universities play key roles in agricultural research as well as in training and development. Agriculture is a priority program in higher education, and women outnumber men in all enrolment sectors (NEDA, 2007b). The Development Bank of the Philippines, through its Industrial Guarantee Loan Fund, has earmarked funds for income generating projects of state universities and colleges, including those that may help the vegetable sector. The Land Bank of the Philippines (LBP) has linkages with eight universities through the LBP Technology Promotion Centre, which provides credit to farmers and taps technologies available in universities for use by farmers (NEDA, 2007b).

*Extension:* In the vegetable sector, the seed industry has played a key role in filling gaps in the extension of technology and improved cultivars for the vegetable industry (Aguiba, 2005). In the Philippines, effective extension to foster uptake of improved technologies and industry regulatory activities is a key challenge. In 1991, responsibilities for agricultural extension devolved under a *Local Government Code* that institutionalized systematically the allocation of power and responsibilities between local and national governments. Responsibilities were devolved as follows: villages (baranguays) – agricultural extension including collection of produce and trading centers; municipalities and cities – agricultural extension and on-site research services, community forestry and information services; provinces and cities – agricultural research extension and on-site research services, provincial infrastructure.

Unfortunately, however, resourcing strategies did not keep pace with the devolution of responsibilities, and extension is grossly under-resourced (Guevara, 2004), with most government funds consumed in staff salaries (Saz, 2005). Noting that “the angels are in the details,” Guevara (2004) suggested that it was necessary to look at the process and the diversity of local government units (LGUs) to see positive impacts of the devolution of extension. Lessons learned in LGUs where extension is functioning well could then be extended to other units. (Guevara, 2004) and a key opportunity is to work with the process, to capitalize on the strengths in location and personnel, and to target resources at the local level to stimulate the development of the vegetable sector.

*How might this occur?* Saz (2005) described the extension strategies (in a particular rice area), which are probably reflective of the broader approach in most LGUs of the Philippines. They include: coordination and complementation between agencies in farmer level project implementation; office visits by farmers, as telephone access to extension units is often difficult; farm visits by private or hired motorcycles—about 80% of extension personnel time—to provide technical advice, monitor crops, survey pests and disease, deal with

specific farm problems, and complete data forms that estimated yields, areas and problems; and training activities depending on funds and resource personnel with support services such as finance and marketing. A critical review of the strategies, resourcing, and priorities for implementation are key needs.

Under the current MTPDP, enhancement of knowledge dissemination is a priority, and there are opportunities to more effectively capitalize on knowledge networks to document and deepen knowledge bases and dissemination through use of formal and informal networks and media in business, religious groups, academic institutions, professional organizations, LGUs, and civil society. Additional attention is also needed in advocacy, training, and community planning and discussion (NEDA, 2007b). Funding and resources are needed.

Similar stimuli are needed for boosting entrepreneurship as a means of promoting farmer and farm and rural SME development (NEDA, 2007b). Incubation centers are also needed to help in microfinance and SME financing, planning, and development (NEDA, 2007b).

Another priority is to urgently review personnel and resource allocation. Saz (2005) noted LGUs operated under four banner programs – cereals/grains, livestock, fisheries, and high value commercial crops (HVCC) (where vegetables fit), with staff allocated under each banner program. But in the LGU studied (Ubay, Bohol), only one staff member each was allocated to HVCC, fisheries, and livestock; the rest of the staff were assigned to grains (mainly rice), despite the fact that most farmers already knew how to grow rice, and mostly only seek assistance for government incentive schemes. Despite the high investment of extension personnel in rice, uptake of hybrid technologies was very low, even after the LGU used a “calamity fund” of P 0.5 million to promote hybrid rice following an El Niño occurrence (Saz, 2005). Saz (2005) also noted that rice farmers had benefited from additional support in a joint National Government/ JICA funded program.

## 4 Achievements and Lessons Learned: Case Studies

The challenges for the Philippines vegetable industry, and some of the lessons learned, can be highlighted by consideration of two industry issues – supply chain improvement and strategies to increase per capita consumption of vegetables.

*Lesson 1:* Supply chain analysis can assist in identifying key issues for attention to reduce losses, improve quality management and enhance profitability.

### 4.1 Supply chain analysis and improvement for highland vegetables

#### *Highland areas*

*Production:* While remote highland communities in the Philippines have land suitable for temperate vegetable production, and are the main suppliers of vegetables for national consumption, they face serious challenges in capitalizing on the resource to improve community livelihoods because of environmental degradation, weather extremes, information and infrastructure deficits, and market access problems.

To stimulate and improve the contribution of the highland communities to the regional and national economies, several recent and current initiatives have focused on two highland areas that are the main production regions for national vegetable supply: Benguet Province in the Cordillera Autonomous Region (CAR) of northern Philippines, and the highland areas of Mindanao.

In 2002, the changes to import regulations led to a dramatic increase in vegetable imports that eroded market prices for some highland vegetables, and added additional challenges to the local economies (Tauli-Corpuz et al., 2006).

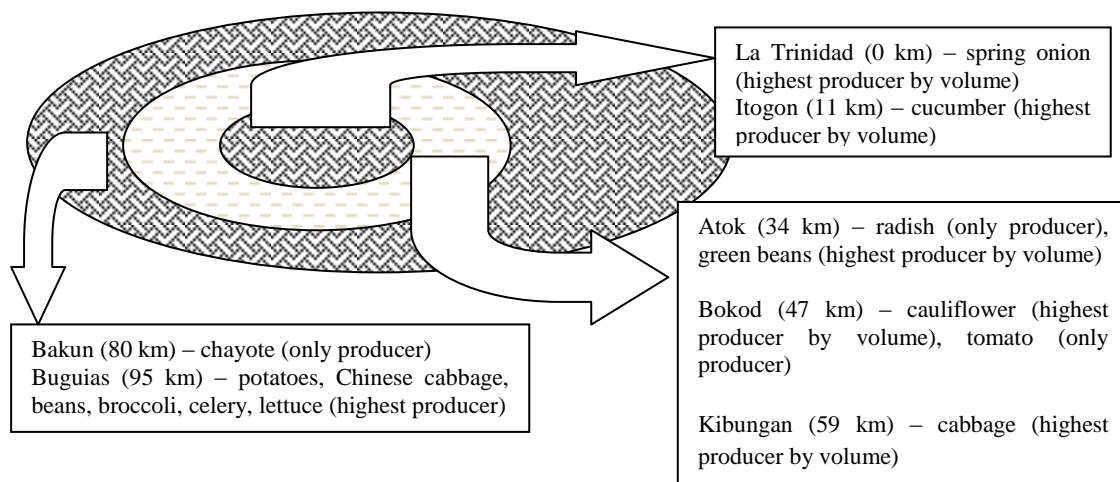
**Table 12** shows national and selected regional production figures of two highland vegetables, cabbage and carrots, with the bulk of production from CAR. Production plateaued between 2000-2005, but there has not yet been a reduction in production as a result of import competition (**Table 12**). Significantly, production of cabbages and carrots has increased in northern Mindanao (**Table 12**).

**Table 12.** National and selected regional production (tonnes) of cabbage and carrot and per-annum growth rates in the Philippines

	2000	2001	2002	2003	2004	2005	%/annum
<b>Cabbage</b>							
<b>Philippines</b>	87,576	89,542	91,368	91,982	92,782	91,439	0.94
CAR	63,580	65,704	66,875	67,583	68,838	68,979	1.61
Central Visayas	6,050	6,225	6,663	6,490	6,268	5,712	-18.60
Northern Mindanao	2,576	2,545	2,684	2,913	2,817	2,891	2.79
Davao Region	5,485	5,203	5,293	5,332	5,316	5,293	-0.30
<b>Carrot</b>							
<b>Philippines</b>	34,600	33,793	34,512	34,666	35,784	35,418	0.84
CAR	27,079	26,475	26,893	27,412	28,043	27,943	-62.35
Central Visayas	4,447	4,156	4,365	4,071	4,191	3,867	-2.10
Northern Mindanao	322	327	333	330	574	718	17.65
Davao Region	1,471	1,488	1,526	1,511	1,455	1,451	-0.42

Source: After DA (2006)

*Benguet CAR:* A third of the population of Benguet lives in poverty, with a high proportion of ethnic minorities. Road links from the region to Manila markets (“Halsema Highway”) are poor, and can be cut by landslides in the rainy season. Vegetable production is sold through a La Trinidad trading center, and transported by truck (a 7-hour trip) to metro Manila. Vegetable cropping within CAR is reflective of the distance from the Trading Post, with highest value commodities concentrated in areas closest to the Post, and low-value, more easily stored and transported commodities produced in the more distant and remote regions (**Figure 9**) (Milagrosa, 2007).



Source: Milagrosa (2007)

**Figure 9.** Cropping-supply geography around La Trinidad trading center

*Mindanao:* Mindanao is the most disadvantaged region of the Philippines<sup>32</sup>—the most distant region from the main domestic markets, least developed in terms of roads, electricity and other infrastructure, and plagued by social and political turbulence. The region is a priority focus for national funding and international donor development support, with development of high-value commercial cropping (HVCC) as a key strategy. Mindanao is outside the main typhoon belt of the country, and is growing in significance as a producer of off-season fruit and vegetables for metro Manila. The two main producing areas are the highlands of Northern Mindanao, and near Davao on the slopes of Mt. Apo in Southern Mindanao.

### ***Supply chain analysis and improvement***

Several recent R&D initiatives have focused on various aspects of production and marketing, and considered together, they provide insights on critical issues and options for improving the supply chain and profitability of the vegetable cropping in the regions. Key challenges are the improvement of product quality; market access and efficiency; and the stimulation of marketing. Overarching issues include improvement in roads, electricity, and communication, and these are a priority under National Development Programs (NEDA, 2007a). Other issues, which will be considered briefly here include cost-containment and

32 Most national planning documents (e.g. NEDA, 2007a) always put the section covering Mindanao last, as a sort of metaphor for “least important.” Perhaps future documents should put Mindanao first.

profit-share and supply chain relationships; farm productivity; quality management; land tenure and access to credit; and policy and regulatory frameworks.

- *Farm productivity.* High rainfall, sloping lands (sometimes excessive), poor soils and land fragmentation contribute to reduced productivity. But rather than being inadequate, fertilizer use tends to be excessive in Mindanao (Murray-Prior et al., 2006) and CAR production areas (Milagrosa, 2007).
- *Quality management.* Farmers and traders are focused on production and sales rather than marketing, and the general poor quality of their produce means that the wet market is often the only option (Murray-Prior et al., 2006).
- *Land tenure, access to credit.* These are complex issues and some progress is being made in both, with cooperative marketing in two-tiered arrangements offering opportunities for poor farmers working with better-off independent farmers (see *Norm Veggies*). Reduction of the incursion of vegetable farming into forests is also a major challenge (Cariño, 2007).
- *Policy and regulatory frameworks.* Aside from poor infrastructure and service support, Ruben and Pender (2004) refer to the neglect of the less favored areas by policy makers, as well as the neglect by agriculture and research extension activities. Murray-Prior et al., (2006) considered that a key benefit of improvements in farmer organization/cooperation would accrue through empowerment of their political and economic influence.

*What more can be done to improve supply chains?* Issues for action by the producing regions to reduce costs and improve profits include: improving access, timeliness and accuracy of market information services; reducing input costs flowing from improved infrastructure and transport and cooperative/bulk purchasing; reducing steps and “trimming” of vegetables (e.g. cabbages), to further reduce losses (losses of 20% are incurred in cabbages at both trader and wholesale levels); increasing direct farmer-end market links to reduce step-wise costs; “programmed planting” to reduce gluts and shortages; and enhancing local wholesale market management by involving the Department of Agriculture, LGUs, traders and farmers in the improvement of operational procedures and regulation (DA, 2006).

*How can these issues be addressed?* Most farmers have good knowledge of prices in their local markets, but farmers and (more critically) traders have poor knowledge of opportunities beyond their markets, and the challenges

supermarkets will present (Murray-Prior et al., 2006). Input-cost reduction depends upon improving industry competitiveness and infrastructure/transport, but key immediate opportunities include reduction in excessive input use, improvement of credit arrangements and costs, and cooperative bulk purchasing of inputs.

*Cost-containment and profit share may be enhanced by accessing the market for quality product.* Producers from both regions mainly supply the competitive “price-driven” wet markets, which do not give farmers incentives for quality. But some farmers also supply supermarkets, which are part of the “value-driven” agribusiness; improving access to this sector is a key opportunity for improving farmer incomes (Murray-Prior et al., 2006).

In the CAR region, farmers who produce lettuce, carrots and 2<sup>nd</sup> class cabbage, and market through the traditional trading system, receive very low rates of return on investment (10% for lettuce), while the marketing of 1<sup>st</sup> class cabbage (which are more in demand by supermarkets) gives farmers 68% return. By contrast, trader profits are significant in both bulk and quality markets, ranging from 86% for carrots, to 1150% on lettuce, achieved by low operating costs and fixed mark-ups. Wholesale rates of return were also substantial, ranging from 38% for 2<sup>nd</sup> class cabbage, to > 200% for carrots (**Table 13**) (DA, 2006).

**Table 13.** Profit margin analysis of the supply chain participants for highland vegetables in the Philippines

Supply Chain by Type of Vegetable	Production and Marketing Cost/kg	Profit Margin/kg	Rate of Return on Operating Capital (%)
<b>1st class cabbage</b>			
Farmer	3.86	2.64	68.39
Assembler	0.24	0.26	108.33
Wholesaler	3.36	2.97	88.39
Retailer	9.05	7.62	84.20
<b>2nd class Cabbage</b>			
Farmer	4.96	0.54	10.89
Assembler	0.24	0.26	108.33
Wholesaler	3.36	1.31	38.99
Retailer	9.05	16.28	179.89
<b>Carrots</b>			
Farmer	14.59	1.99	13.64
Assembler	1.34	1.16	86.57
Wholesaler	5	10.11	202.20
Retailer	3.05	0.45	14.75

Note: Costs in Pesos. Source: DA (DA, 2006)

When fixed costs are considered, farmers incur losses at peak supply periods. Comparative profit share and prices at farmer, trader, and wholesale levels reflect input and marketing costs, loss-levels, and relative risk at each stage. But they also reflect the fact that the capacity of the trading post and wholesale sectors are inadequate, which creates a marketing bottleneck and limits competition. In many countries, the development of the supermarket sector is improving competition and demand for vegetable supplies, and accessing this sector is potentially a key opportunity for the highland farmers.

*Enhancing supply chain relationships may improve farmer returns, even in the traditional chain.* While it could be considered that power relationships were unbalanced in the traditional supply chain, market-margin and relationship marketing analysis of the Southern Mindanao-Kapatagan supply chain indicated that the market was generally efficient, with buying price determining selling price, and some balancing-out between profit and product losses (Murray-Prior et al., 2006). Although traders and wholesalers had higher shares of total margins from farm to retail, and ranked second in share of handling costs, they incurred much higher product losses than retailers (Murray-Prior et al., 2006). Farmers also had some flexibility in choosing trading partners (Murray-Prior et al., 2006), but credit, indebtedness, and ethnicity were additional factors that could limit choice (UNDP, 2006; Milagrosa, 2007).

In Benguet, Milagrosa (2007) surveyed 450 farmers and 195 traders, and found that 260 of the surveyed farmers marketed through 100 commissioners (=traders), with price as the main factor determining the links, a high degree of uncertainty, and a large demand on farmer time to service the relationship. In addition, another 142 of the farmers marketed through 82 wholesalers, with price again the main determinant, but with more safeguards and transactions often locked in because of wholesaler-farmer credit tie-ups. The least common marketing arrangement was contractor based arrangements, with only 48 of surveyed farmers involved with 13 contractors, with low uncertainty but high transaction costs (Milagrosa, 2007).

Milagrosa (2007) concluded that inadequate social relations and ethnicity (such as membership in an indigenous minority<sup>33</sup>) were significant influences in hampering economic transactions. These factors affected levels of community involvement and networking, which in turn affected market awareness, information access, and opportunities for improvement. Many members of the communities surveyed considered informal networking critical, but overlooked the importance of formal associations, and Milagrosa (2005; 2007)

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33 The majority of farmers were members of one of two ethnic groups (Kankanaey and Ibaloi) (Milagrosa, 2007).

recommended use be made of existing social relationships to strengthen weaker elements detracting from farmer livelihood improvement.

*Should marketing arrangement be improved to enhance farmer returns?* Murray-Prior et al. (2006) suggested that little benefit would accrue for interventions in the marketing arrangements for vegetables going to the wet markets. Inefficiencies could more likely be addressed through production improvement and cost reduction, and they suggested that co-ops would find it difficult to compete with existing traders unless they could create new efficiencies such as reductions in postharvest losses or improved transport (Murray-Prior et al., 2006).

When it comes to supermarkets, however, there is evidence that changing marketing arrangements may enhance returns. One example of adaption by farmers to changing needs is the Northern Mindanao Vegetable Producers' Association (*Normin Veggies*).

The Northern Mindanao Vegetable Producers' Association (*Normin Veggies*) (**Table 14**) was established in 1999 by farmers supplying off-season vegetables to Manila to provide a united voice for the region, a forum where farmers could interact, increase their awareness of industry issues, and contribute more effectively to its development while optimizing use of government and other agency support. The association aims to be competitive in supplying high quality and safe vegetables using sustainable practices, and to expand and improve markets access and demand (Concepcion et al., 2006). *Normin Veggies* has representation in metro Manila and the Visayas markets to enhance connectedness and market knowledge, and has developed production protocols and handling systems, and provided training to improve out-turns. The association uses a clustering approach to achieve the supply volumes needed, and it has linked farmers with consolidators at the local (Agora), Luzon and Visayas markets, and accessed government funds to obtain infrastructure (reefer vans, chillers, cool stores) and use of a consolidation area in Cagayan de Oro (Concepcion et al., 2006).

**Table 14.** *Normin Veggies* and *Normincorp*: Structure and relationships

*Normin Veggies*

- a non-profit organization with > 85 members: (i) independent small farmer with financial resources, (ii) small farmers who need support in production and marketing, (iii) development agencies assisting small farmers, (iv) corporate firms who can vertically integrate, (v) input and service providers (e.g. seed companies) and (vi) Local Government Unit (LGUs) vegetable sector personnel.
- support from USAID (*Growth with Equity in Mindanao*) and FAO.

*Normincorp*

- an incorporated marketing group of the *Normin Veggies* lead farmers (i) W. Javier (head broccoli cluster), *Valley Fresh Farm*, (ii) H. San Juan (lettuce, tomato, broccoli), *Helms Farm* (iii) Q. Queja (lettuce), *TriQ Farm* (iv) J. Montalvan (strawberry and herbs), *Bukidnon Plateau Gardens* and (v) J Uy (lettuce cluster head; broccoli, sweet corn, backup for carrots and cabbages), *Green Haven Farm*.
- *Normincorp* manages the marketing requirements of 10 independent farmers, and a core of 50 small farmers that produce lowland vegetables
- assistance from *Kaanib Foundation* Inc. (a *Normin Veggies* member), and NGOs (Lutheran World Relief Services and Catholic Relief Services).

The bipartite structure allows more flexibility. *Normincorp* has the flexibility needed for supply chain development, and *Normin Veggies* can access development assistance. Operationally, *Normincorp* is paid a fee for its services and the association has marketing clusters, with a quality assurance plan and training for each product and designated lead farmers. Small farmers are clustered under independent farmers who help boost their performance with benefits and accountability shared and products traceable to farmer level. Farmers retain ownership of their produce up to the market.

An added advantage of the association is that some degree of production planning is occurring to reduce seasonal surpluses (DA, 2006).

*Analysis.* The impact and value of cooperative associations is best illustrated by the effect the groups are having on the rest of the sector. Farmers who are not members of *Normin Veggie* are being supported by the Department of Agriculture and LGUs (who also capitalize on training approaches used by *Normin Veggies*), to encouraging clustering, production planning, market price information (web, radio and cell phone messages and a price board at Agora Markets in Cagayan de Oro), and quality improvement (DA, 2006; UNDP, 2006). Support is also available for cooperative marketing (such as *Normin Veggies*) for accessing Ro-Ro shipping, with the various programs supported under the *Huwarang Palengke* Program of the government (UNDP, 2006).

As supermarkets expand and their vegetable supply requirements increase it is inevitable that additional supplier-farmer links will develop and more farmers will benefit.

## 4.2 Promoting vegetables for health, nutrition, and income

**Lesson 2:** Fostering greater per capita consumption, by promoting vegetable consumption at retail and community levels, and ensuring they are affordable or accessible for the poor, will enhance demand for vegetables and improve community health and nutrition.

There is an alarming incidence of vitamin deficiencies and under-consumption of vegetables in the Philippines. These trends need to be reversed for the health and well-being of the Philippines population and for the benefits that will accrue to vegetable farmers from increased demand (DOH, 2007).

*Nutrition survey findings:* Since 1993, nutrition surveys in the Philippines have reported an increasing prevalence of micronutrient deficiencies, especially vitamin A, iron, and iodine among young children and women (DOH, 2007). Increased consumption of vegetables would contribute significantly to remediation of the vitamin A and iron deficiencies, but currently intakes are inadequate. The typical daily food intake (2003) included 12.5% by weight of vegetables (111 g/capita/day, out of an average total food intake of 886 g/capita/day), and included 31 g of green leafy and yellow vegetables, and 80 g of other vegetables. This contrasts with total vegetable intakes of 145 g (34/111) in 1978, and 130 g in 1982 (37/93) (FNRI, 2003), with daily intakes declining throughout the period (FNRI, 2003).

In addition, vegetable consumption varies considerably across the archipelago along with intake of vitamin A and iron (**Table 15**). Consumption of vegetables is lowest in metro Manila (NCR), ARMM, and the Zamboanga Peninsula, with the latter two also recording the lowest levels of iron and vitamin A intake. Vegetable consumption was highest in Ilocos, Cagayan, SOCCSK, SARGEN and CAR, and vitamin A intake was highest in CAR (FNRI, 2003), which happens to be the main producer of carrots, which are high in vitamin A.

**Table 15.** Nutritional intakes and vegetable consumption levels in different regions of the Philippines

Regions (see Figure 9)	Iron adequacy (mg)	Retinol adequacy daily requirement (%)	Vegetables intake (g/capita/day)		
			Green leafy & yellow	Other vegetables	Total
<b>Philippines</b>			31	80	111
NCR	64.6	111.5	22	66	88
Ilocos	67.5	105.3	43	128	171
Cagayan	61.3	92.6	49	106	155
CAR	67.8	144.2	46	86	132
Central Luzon	62.8	74.8	19	80	99
CALABARZON	60.3	117.1	24	75	99
MIMAROPA	61.2	94.9	22	107	129
Bicol	55.9	74.2	30	88	118
Western Visayas	63.8	85.9	35	92	127
Central Visayas	52.9	70.4	43	65	108
Eastern Visayas	53.9	73.5	20	73	93
Zamboanga Peninsula	47.7	68.6	29	55	84
Northern Mindanao	59.2	79.1	42	89	131
DAVAO	61.3	89.6	39	62	101
SOCCSK SARGEN	55.6	75.7	44	95	139
CARAGA	60.8	120.7	37	84	121
ARMM	46.8	48.7	19	61	80

Source: FNRI (2003)

*How can the nutritional deficiency problems be resolved?* The government has adopted a combined approach to address micronutrient deficiencies including fortification, nutrition education, dietary supplementation, and dietary diversity.

*Fortification:* In recognition of the need to promote improved nutrition in Filipino diets, the *Philippine Food Fortification Act* of 2000 (RA 8976) makes fortification of certain staple foods mandatory. The aim is to increase dietary intake by 50%, based on standards set by the Department of Health through the Bureau of Food and Drugs (BFAD). The Act mandates fortification for: (i) rice - with iron, (ii) wheat flour - with vitamin A and iron, (iii) refined sugar - with vitamin A, (iv) cooking oil - with vitamin A, and (v) other staple foods with nutrients as may be required by the National Nutrition Council. The Act also empowers the National Nutrition Council to require fortification of processed foods, based on surveys, and makes provision for Quality Assurance, implementation, monitoring, and review of the policy, with DOH responsible for implementation, monitoring and advocacy on the use of fortified foods or food products. LGUs are required to assist in implementation and monitoring, and the food industry is required to report on fortified food production and marketing (Philippine Food Fortification Act of 2000).

*Nutrition education:* The Mag-HL (Healthy Lifestyle) Tayo Campaign was launched by the Philippine Heart Association (PHA) and the DOH in 2003<sup>34</sup>, as a five-year lifestyle/advocacy campaign, and has extended activities through links to 19 groups. Health awareness and the importance of diet are probably stronger in urban areas than rural yet, vegetable consumption in Manila is among the lowest in the country. Affordability is a key issue, and while consumption is likely to increase as incomes improve, a key immediate challenge is to improve access and affordability of vegetables for urban and rural poor.

*Dietary supplementation:* Increased consumption of vegetables is a key strategy for reducing dietary deficiencies and improving nutrition without the need for vitamin or mineral supplements. This also represents a key opportunity for the development of the vegetable industry, but to improve consumption, a better understanding of the factors that underpin low consumption levels is needed. In a study of food consumption patterns and attitudes among schoolchildren in five villages of Mindanao, Fukuta et al. (2007) found that 17.4% of children did not eat green, leafy, and yellow (GLY) vegetables, and 38.5% did not eat other vegetables on a daily basis. The most common reason for non-consumption for GLY (61.5%) and other (55.2%) vegetables was “child's dislike,” whereas the most frequent reason for non-consumption of fish, meat, dairy, and eggs was “no money to buy” and that of fruit was “out of season” (Fukuta et al., 2007). Clearly, a key challenge for increasing vegetable consumption will be to win children over to eating vegetables, especially since cost and availability may not be the key factors limiting consumption.

In Australia a recent product innovation has been to market rice with added dried vegetables; this adds value, increases flavor and vegetable intake. The practice if adopted in the Philippines for rice distribution programs would improve nutritional benefits and provide a market opportunity for vegetable processors.

*Dietary diversity:* Key challenges in promoting improved nutrition through greater dietary diversity in vegetable consumption are: sourcing, producing and marketing a broader range of vegetables; and ensuring they are acceptable and affordable for consumers. Recent research on indigenous vegetables has identified and preserved a wide range of germplasm within the Philippines, and assessed consumer attitudes to consumption (AVRDC, 2007). Another approach to extending access to diversity is to promote urban production and consumption through work with neighborhood groups and schools.

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<sup>34</sup>

<http://doh.gov.ph/healthylifestyle/healthylifestyle.htm>

In Cagayan de Oro, the capital of Northern Mindanao, an allotment garden association scheme has been established<sup>35</sup> to enable production of vegetables by the urban poor (including the city garbage collectors), with emphasis on eco-production methods (Holmer and Miso, 2006). Within the capital, vegetable production can be classified as: commercial (60 ha with average farm size of 0.5 ha); subsistence gardens (40% all households) and the allotment gardens; and school gardens (75 out of 78 public schools). The scheme has targeted subsistence, allotment, and school gardens with a focus on the most popular vegetables consumed: horseradish tree leaves (*Moringa oleifera*), eggplant, squash, tomato and yard-long beans (Potutan et al., 2000; Agbayani et al., 2001; Guanzon and Holmer, 2003).

Two years after implementation of the scheme, 25% of the production from the gardens was found to be consumed by the families involved, 7% was being given to friends and family, and 68% was being sold to “walk-in” clients who valued the freshness, convenience, and price. The gardens were a secondary occupation for most association members, but on average they represented a 20% boost to income. Most significantly, family consumption had doubled for 75% of members, which is especially significant since Cagayan de Oro’s per capita consumption of vegetables is only 98 g/ca/day. When asked what would happen if the garden scheme stopped, 81% indicated that they would consume less (Urbina et al., 2005; Holmer and Miso, 2006). Clearly facilitating more production among poor urban and rural families can be a key strategy to increase consumption.

The Cagayan de Oro city government proposes to facilitate expansion of the scheme through tax breaks and other incentives to landowners who make land available for the scheme (Holmer and Miso, 2006), and the scheme has also been extended to some schools.

*Analysis:* For the Philippines, key strategies for improving vegetable consumption may be to first develop strategies that enhance access of the urban and rural poor to affordable vegetables. This would include building on schemes that foster urban and rural home production and school-based initiatives, and to enhance education programs that encourage children, their parents and the fast-food sector to give vegetables a larger plate on the table.

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<sup>35</sup> The Peri-urban Development in Southeast Asia (PUDSEA) Network (PUDSEA, 2007), and the IWMI Resource Centers on Urban Agriculture and Food Security (RUAF) “Cities Farming for the Future” program are major vehicles to promote allotment gardening cum ecological sanitation to other urban areas in South and Southeast Asia (RUAF, 2007).

## 5 Conclusions

### 5.1 Policy and human resource issues

The overarching priorities for the Philippines are food security (rice and maize), and the export fruit sectors, with priorities and strategies for the vegetable sector (BAR, 2003; ISP, 2006; Stads et al., 2007) well-articulated, but under-resourced. The current *Medium-Term Philippines Development Plan 2004-2010* recognizes the need to improve productivity and trade in agricultural products, and has strong emphasis on improvement of transport services and infrastructure, education, information and IT communication, and utility supplies (NEDA, 2007a). All these are critical for development of the vegetable industry, and there is a special need for investment and upgrading of wholesale market infrastructure.

Continued progress in land access issues and control of deforestation are also recognized, but challenging (NEDA, 2007b). Innovation in approaches and cooperative models for accessing land and markets need to be extended (Holmer and Drescher, 2005; Holmer and Miso, 2006; Concepcion et al., 2006).

Enhanced investment in education and technical training, and in community development, particularly for the highland and lowland production areas, and the wholesale and retail sectors, will benefit the vegetable industry through a more knowledgeable, connected, and capable cadre of supply chain participants. They will be better able to access and use market information and production protocols and technologies, and adhere to quality and Good Agricultural Practice specifications (BAR, 2003; ISP, 2006). More support and innovation in health and nutrition education will also help develop a nation of more aware consumers who eat more vegetables.

## **5.2 Industry issues**

Land availability, the high growth of population and urban expansion, and nutritional deprivation and endemic poverty levels, together with the challenges of climate (typhoons), natural disasters (landslides), and social unrest, are a potent mix of challenges for development, to which the vegetable sector could be contributing more. But, the difficulties and costs of market access by road and sea throughout the archipelago hamper incentives for vegetable production, reduce supply and profitability, and exacerbate losses.

The government, research and development agencies, the private sector, and NGOs, recognize the importance of vegetable production for rural development of highland areas in particular, and for feeding the cities, but more needs to be done to improve the size and performance of the sector. Private-public partnerships have considerable potential to provide a significant boost to the industry; they are developing, but they need to be strengthened and multiplied to boost development and reach across the country.

## **5.3 Issues for focus**

The rise and spread of supermarkets throughout the country and the increase of vegetable imports are opportunities and challenges for the sector. Apparent consumption for vegetables is less than it should be per capita; the processing and export sectors are underdeveloped and face challenges from competitors. Continuing economic development and rising incomes will provide the means to purchase more, but effort will be needed to maintain affordability and promote more consumption of vegetables by urban and rural consumers. Demand-driven production targets will then need to be met by enhancing productivity and supply from highland and lowland production areas, and by boosting household, village/school gardens and peri-urban production.

The growth of modern retailing in response to demand and investment opportunities will be a key driver of industry development as urban incomes and market access from rural areas improve. Demand for improved quality and safety of vegetables will also increase, and the government will need to develop Good Agricultural Practice standards and strategies for their implementation and monitoring. Government attention to modernizing the wholesale sector is also critical, as this will improve efficiency and reduce losses.

Cooperative marketing has shown potential for enhancing farmer incomes, and it is likely that other private sector supplier models will emerge. A key will be to

provide farmers with opportunities by continuing with land reforms, and by enhancing access to finance and improved technologies. Cooperative improvement of domestic product quality and cost reductions, along with production planning, and in some cases, changes in commodity focus, will be key variables to enhance the domestic sector's capability for competing with imports.

Improvement of exports and processing offer potential for the industry, but this may require supply chain innovation to reduce costs, and more policy and tax incentives from government to attract investment that otherwise may go to Thailand, Vietnam, or China. Parallel efforts to enhance the domestic sector will improve the attractiveness to investors who can then be assured of better income from the domestic sector.

Underpinning the improvements in the sector and enhancing demand will be innovation and attention to information and communication.

## 6 Recommendations for R&D

### ***Enhance market analysis and modeling***

On-going support is needed. Data collection, ranging from export markets to district level local production/demand, should be promoted to improve prediction of domestic needs and enhance identification and access to export opportunities. Greater knowledge of current and future supply requirements by region are needed through statistic collection and modeling. Assessment of export and import market trends and opportunities will also help guide private and public sector investment.

### ***Diversify product range for domestic and export markets***

Market development should be based on demand analysis and product innovation. Containing costs through supply chain and regulatory streamlining and improvement of investment incentives may help make the sector more profitable.

### ***Promote innovation and micro-marketing in rural areas***

Innovation could be through improvements in financing, payments, and SME training. Innovation in labor payment systems may also make labor more accessible for farmers.

### ***Improve market throughputs***

Improve the efficiency and throughput of the wholesale sector and reduce losses. Investment in infrastructure, market services and e-trading/reporting is needed. Strategic investment in transport systems and streamlining of shipping and road use charges is critical.

### ***Promote export marketing***

Stimulate the development of market-driven export markets through partnerships with foreign investors.

### ***Improve profitability***

Enhance the value and quality of domestic produce, to out-compete imports or tap different markets, and develop innovative solutions to overcome problems with illegal imports.

### ***Increase consumption***

Promote consumption of vegetables for better nutrition to enhance community health and improve demand.

### ***Strengthen investment***

Encourage demand based-investment and the increase the value of commercial and SME vegetable processing.

### ***Improve sustainability and system productivity***

Enhance sustainability, productivity and input-use efficiency.

### ***Promote development of export and protected cultivation***

Research in partnership with traders and entrepreneurs could address technical impediments to production and market development.

### ***Strengthen sustainable and low-chemical use practices***

Farmers will be more willing to adopt sustainable and low-chemical practices if the technology alternatives can deliver high productivity with low losses for pests and disease. Emphasis on use of pest- and disease-resistant varieties and training of farmers in effective use of lower risk chemical treatments can be a good starting point, especially within a farmer field school approach.

### ***Foster engagement between supermarkets, suppliers, and farmers***

Closer engagement with the wholesale and retail sectors is a key opportunity for farmers and traders to enhance supply chain flows and profitability.

### ***Strengthen resourcing and capacity of local government units (LGUs)***

Traditional focus of LGUs has been on meeting national rice production targets and fostering IPM through farmer field school approaches. Capacity building and additional resourcing of LGUs are needed to strengthen their capabilities for assisting farmers to meet GAP certification requirements and produce vegetables with a market focus. This will assist the vegetable industry to broaden its production base and meet expectations for quality, safety, and GAP certification.

### ***Innovate in extension***

The new Extension Law provides a framework for strengthening links between national agency personnel and local extension efforts by LGUs. The private sector is playing significant roles in helping farmers to grow and market vegetables (e.g. seed industry, supermarket suppliers, input sellers) and their efforts could be boosted by partnership with and better resourcing of the LGU and national efforts.

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## 8 Appendixes

**Appendix 1:** Average one-day per capita food consumption: Philippines, 1978-2003

Food Group/Sub-group	Consumption (g), raw as purchased				
	1978	1982	1987	1993	2003
<b>Cereals and Cereal Products</b>	<b>367</b>	<b>356</b>	<b>345</b>	<b>340</b>	<b>364</b>
Starchy Roots and Tubers	37	42	22	17	19
Sugars and Syrups	19	22	24	19	24
Fats and Oils	13	14	14	12	18
<b>Fish, Meat and Poultry</b>	<b>133</b>	<b>154</b>	<b>157</b>	<b>147</b>	<b>185</b>
Fish and Products	102	113	111	99	104
Meat and Products	23	32	37	34	61
Poultry	7 0	10	9	14	20
Eggs	8	9	10	12	13
Milk and Milk Products	42	44	43	44	49
Dried Beans, Nuts and Seeds	8	10	10	10	10
<b>Vegetables</b>	<b>145</b>	<b>130</b>	<b>111</b>	<b>106</b>	<b>111</b>
Green Leafy and Yellow	34	37	29	30	31
Other Vegetables	111	93	82	76	80
<b>Fruits</b>	<b>104</b>	<b>102</b>	<b>107</b>	<b>77</b>	<b>54</b>
Vitamin C-rich Fruits	30	18	24	21	12
Other Fruits	74	84	83	56	42
Miscellaneous	21	32	26	19	39
Beverages	-	-	-	-	26
Condiments and Others	-	-	-	-	13
<b>Total</b>	<b>897</b>	<b>915</b>	<b>869</b>	<b>803</b>	<b>886</b>

Source: FNRI (2003)

**Appendix 2.** Volume of vegetable and spice production (tonnes), 1995-2005

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
<b>Selected Highland Vegetables</b>											
Cabbage	129,989	98,072	95,859	85,842	87,472	87,576	89,542	91,368	91,982	92,782	91,439
Asparagus	10,842	11,761	11,017	6,254	6,332	6,429	8,577	12,566	15,211	22,367	25,231
Broccoli	2,126	1,680	1,709	1,562	1,616	1,571	1,607	1,634	1,669	1,757	2,072
Carrots	31,953	34,204	33,733	32,387	33,849	34,600	33,793	34,512	34,666	35,784	35,418
Cauliflower	6,302	10,696	11,623	11,875	11,999	12,180	12,298	12,284	12,324	12,007	10,641
Lettuce	1,775	1,821	1,794	1,597	1,439	1,421	1,475	1,495	1,579	1,721	3,386
Chinese cabbage <sup>38</sup>	38,344	35,839	36,354	33,035	35,939	34,220	35,307	34,885	34,894	35,432	37,062
Pak Choi <sup>39</sup>	28,012	35,678	38,360	34,993	36,417	37,365	37,400	39,684	41,288	41,339	43,578
<b>Selected Lowland Vegetables</b>											
Eggplant	130,702	157,603	195,032	163,833	159,744	166,146	169,819	179,659	176,991	182,753	187,793
Onion	88,427	83,322	85,383	86,978	84,967	84,216	82,606	96,358	93,842	86,741	82,019
Tomato	155,823	162,644	166,353	132,984	145,362	148,101	146,031	149,259	150,055	172,344	173,740
Bitter gourd	36,198	39,754	42,201	35,367	43,489	44,366	47,124	48,847	74,256	78,640	79,794 <sup>a</sup>
Okra	28,886	30,355	31,009	24,007	25,174	25,452	25,160	25,254	22,992	24,913	25,958
Squash	117,255	119,544	120,181	107,631	110,809	106,023	113,432	117,673	280,098	272,764	272,538 <sup>a</sup>
Yard-long beans	24,571	26,598	25,709	23,903	26,617	26,172	26,489	27,938	124,642	115,774	137,534 <sup>b</sup>
Garlic	17,227	18,591	20,180	12,757	9,335	13,688	15,364	16,257	15,529	14,999	13,234
Chili	15,062	15,666	15,558	13,958	13,356	13,912	14,043	14,730	14,865	15,478	15,755 <sup>ab</sup>
Ginger	22,704	24,011	21,715	17,973	20,793	22,679	23,424	23,022	22,616	24,063	24,700
Watermelon <sup>a</sup>	82,435	71,599	66,995	72,173	63,297	59,382	58,284	78,935	92,498	107,057	115,075
Gourd	30,304	36,592	40,634	36,953	38,107	37,113	34,980	33,926	128,387	124,251	120,423
Green beans	11,289	12,361	12,440	11,900	12,138	11,757	11,603	11,847	11,549	11,856	12,049

<sup>38</sup> Chinese cabbage called 'pechay Baguio', and 'Wong Bok' in the Philippines (Kuo and Toxopeus, 1993)

<sup>39</sup> Pak Choi ( or Bok Choy) called "pechay" in the Philippines (Tay and Toxopeus, 1993; Wikipedia, 2007c).

Water spinach	25,603	26,266	24,660	25,691	27,290	27,683	27,831	27,891	63,658	68,118	75,942 <sup>b</sup>
Radish	10,870	11,090	10,983	10,266	10,364	9,815	9,548	9,724	9,707	10,041	10,052 <sup>a</sup>
<b>Total for all vegetables*<sup>40</sup></b>	61,939	67,552	69,343	63,210	63,918	62,910	63,565	99,155	98,945	101,681	1,696,774

\* Excluding root and tuber vegetables and mungbeans, including celery, chayote, cucumber, and luffa.

Source: <sup>a</sup>BAS (2008).

<sup>b</sup>Extrapolated from previous 10-years data.

Remaining is from BAS (2005b) for data in 1995-2004 and from BAS (2007b) for data in 2005.

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<sup>40</sup> Area data for celery, chayote, cucumber, and luffa were not available.

**Appendix 3.** Projected production volume of selected highland and lowland vegetables (in mt), Philippines, from 2006-2015

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
<b>Selected Highland Vegetables</b>										
Cabbage	89,732	88,242	86,777	85,337	83,920	82,527	81,157	79,810	78,485	77,182
Broccoli	2,401	2,807	3,282	3,836	4,485	5,242	6,128	7,164	8,375	9,790
Carrots	35,614	35,529	35,443	35,358	35,273	35,189	35,104	35,020	34,936	34,852
Cauliflower	14,450	15,852	17,390	19,076	20,927	22,957	25,184	27,626	30,306	33,246
Pak Choi	43,423	44,504	45,612	46,748	47,912	49,105	50,327	51,581	52,865	54,181
White potato	71,217	72,115	73,023	73,944	74,875	75,819	76,774	77,741	78,721	79,713
Celery	3,682	3,672	3,662	3,652	3,641	3,631	3,621	3,611	3,601	3,591
<b>Selected Lowland Vegetables</b>										
Eggplant	190,097	193,880	197,739	201,674	205,687	209,780	213,955	218,212	222,555	226,984
Onion	91,115	93,384	95,709	98,092	100,534	103,038	105,603	108,233	110,928	113,690
Tomato	170,754	169,968	169,186	168,408	167,633	166,862	166,095	165,331	164,570	163,813
Bitter gourd	89,210	95,009	101,184	107,761	114,766	122,225	130,170	138,631	147,642	157,239
Okra	25,058	25,131	25,204	25,277	25,350	25,424	25,498	25,572	25,646	25,720
Squash	306,305	324,591	343,969	364,504	386,265	409,325	433,761	459,657	487,099	516,178
Gourd										
Green beans										
Water spinach										
Radish										

Source: DA (2006). *P – preliminary*

#### Appendix 4. Production area (ha)

Vegetable	2000	2001	2002	2003	2004	2005	Share (%)	
							2004	2005
Asparagus	1,502	1,784	2,270	1,513	1,654	1,614	1.1	1.0
Bitter gourd	7,939	8,291	8,412	10,622	11,087	12,052 <sup>b</sup>	7.1	7.4
Broccoli	156	157	158	160	173	207	0.1	0.1
Cabbage	7,672	7,711	7,802	7,746	7,705	7,420	4.9	4.5
Carrots	3,414	3,441	3,536	3,505	3,562	3,585	2.3	2.2
Cauliflower	961	989	972	985	1,044	1,017	0.7	0.6
Chili	3,837	3,936	4,068	4,042	4,100	4,169 <sup>b</sup>	2.6	2.5
Eggplant	19,949	20,422	20,813	20,984	21,068	21,233	13.5	13.0
Garlic	5,269	5,707	5,637	5,459	5,312	4,704	3.4	2.9
Ginger	3,583	3,681	3,642	3,610	3,795	3,873	2.4	2.4
Gourd	3,091	2,954	3,040	10,269	9,675	9,606	6.2	5.9
French bean (Habitchuelas)	3,060	3,009	3,078	3,098	3,163	3,356	2.0	2.1
Water spinach (Kangkong)	4,478	4,425	4,440	6,875	7,109	7,980 <sup>b</sup>	4.5	4.9
Lettuce	207	211	210	217	252	416	0.2	0.3
Okra	2,907	2,972	3,024	3,018	3,109	3,138	2.0	1.9
Onion	9,579	10,094	10,035	9,516	9,513	8,884	6.1	5.4
Chinese cabbage	2,986	3,031	3,003	2,998	3,034	3,133	1.9	1.9
Pak Choi	6,708	6,712	6,854	7,158	6,893	7,085	4.4	4.3
Radish	1,337	1,291	1,338	1,346	1,397	1,412 <sup>b</sup>	0.9	0.9
Squash	7,865	8,128	8,141	13,604	14,033	16,219 <sup>b</sup>	9.0	9.9
Yard-long bean	7,643	7,559	7,733	15,213	15,257	18,135 <sup>b</sup>	9.8	11.1
Tomato	16,692	16,496	16,698	16,779	17,687	17,731	11.3	10.8
Watermelon <sup>a</sup>	4,046	3,690	4,879	5,316	5,779	6,545	3.7	4.0
<b>Total</b>	<b>124,881</b>	<b>126,691</b>	<b>129,783</b>	<b>154,033</b>	<b>156,401</b>	<b>163,514</b>	<b>100</b>	<b>100</b>

Source: <sup>a</sup>Data in 2005: BAS (2007b); remaining from BAS (2005a).

<sup>b</sup>Extrapolated from previous years' data.

Remaining is from BAS (2005b) for data in 2000-2004 and from BAS (2007b) for data in 2005.

**Appendix 5.** Imports and exports of vegetables in the Philippines, 1996-2005

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
<b>Export quantity (tonnes)</b>										
Onions and shallots, fresh or chilled	27,227	29,400	17,577	6,559	14,869	5,617	17,203	32,458	28,191	21,045
Garlic, fresh or chilled	253	-	35	-	-	590	4,077	4,594	4,648	5,937
Asparagus, fresh or chilled	5,660	5,105	3,236	4,175	3,986	4,156	4,664	3,601	2,623	3,118
Aubergines (eggplant), fresh or chilled	2	4	25	12	10	-	-	-	10	-
Peppers of the genus Capsicum or of the genus Pimenta, fresh or chilled	-	26	623	449	133	17	1	-	16	38
Spinach, N-Z spinach & orache spinach (garden spinach), fresh or chilled	-	-	-	-	22	-	-	-	-	-
Vegetables, fresh or chilled nes.	2,346	2,869	5,573	4,679	5,633	5,783	3,447	4,766	5,952	6,373
Melons (including watermelons), fresh	1,693	528	1,625	857	1,186	994	556	448	270	511
<b>Fresh veg.</b>	<b>37,181</b>	<b>37,932</b>	<b>28,694</b>	<b>16,731</b>	<b>25,839</b>	<b>17,157</b>	<b>29,948</b>	<b>45,867</b>	<b>41,711</b>	<b>37,022</b>
Beans, frozen	356	103	-	-	-	-	-	-	-	-
Vegetables nes & mixtures provis. presvd. but not for immediate consumption	1,064	811	450	429	614	587	763	596	409	207
Onions dried but not further prepared	109	142	31	40	117	90	132	48	0	-
Vegetables and mixtures dried, but not further prepared nes.	173	193	78	40	134	105	158	123	269	51
Fruits of the genus Capsicum or Pimenta, dried, crushed or ground	-	48	12	15	3	-	-	-	-	-
Vegetable products nes. used primarily for human consumption	3	7	51	6	68	39	21	48	22	55
Cucumbers and gherkins, prepared or preserved by vinegar or acetic acid	31	17	38	22	31	-	-	-	17	-
Veg, fruit, nut & edible prts of plants nes, prep/presvd by vin/acetic acid	106	104	75	90	104	55	103	110	83	216

Tomatoes nes,prepared or preserved other than by vinegar or acetic acid	17	1	417	3	54	-	-	-	2	-
Veg nes&mx of veg prep or presvd,o/t by vinegar or acetic acid, frozen	612	494	458	405	360	362	437	396	496	574
Peas preparad o preservd,other than by vinegar o acetic acid, not frozen	180	151	166	282	248	303	176	184	105	102
Beans nes preparad or preservd, o/t by vinegar or acetic acid, not frozen	482	478	334	578	359	468	993	1,640	967	636
Veg nes & mix of veg prep/presvd o/t by vinegar/acetic acid, not frozen	131	74	106	88	52	121	90	95	145	80
Tomato juice unfermented & not spirited, whether or not sugared or sweet	-	-	-	-	-	-	4	1	14	284
Tomato ketchup and other tomato sauces	81	199	835	411	195	696	377	319	131	282
<b>Processed veg.</b>	<b>3,345</b>	<b>2,822</b>	<b>3,051</b>	<b>2,409</b>	<b>2,339</b>	<b>2,826</b>	<b>3,254</b>	<b>3,560</b>	<b>2,659</b>	<b>2,487</b>
<b>Tot. veg.</b>	<b>40,526</b>	<b>40,754</b>	<b>31,745</b>	<b>19,140</b>	<b>28,178</b>	<b>19,983</b>	<b>33,202</b>	<b>49,427</b>	<b>44,370</b>	<b>39,509</b>
<b>Import quantity (tonnes)</b>										
Tomatoes, fresh or chilled	91	43	1	2	91	-	-	-	-	-
Onions and shallots, fresh or chilled	1,245	906	11,408	16,530	10,250	17,925	6,752	11,584	7,092	29,715
Garlic, fresh or chilled	1,651	5,501	13,855	19,428	5,113	7,599	16,911	18,975	21,222	26,165
Cauliflowers and headed broccoli, fresh or chilled	123	143	154	112	6,726	310	610	271	203	202
Cabbages, kohlrabi, kale and edible brassicas nes, fresh or chilled	2	1	5	237	3	-	-	-	2	-
Cabbage lettuce (head lettuce) fresh or chilled	8	31	28	118	151	85	171	167	99	16
Lettuce, fresh or chilled nes.	139	281	302	310	691	370	217	140	62	57
Witloof chicory, fresh or chilled	15	189	4	2	6	-	-	-	-	-
Carrots and turnips, fresh or chilled	33	87	6	18	57	36	672	1,347	353	22
Salad beetroot, salsify, celeriac, radish & edible roots,fresh/chilld nes.	21	35	13	22	4	-	-	-	26	-
Cucumbers and gherkins, fresh or chilled	33	-	-	-	-	-	-	-	-	-

Peas, shelled or unshelled, fresh or chilled	58	176	83	634	92	-	-	-	87	-
Celery, other than celeriac, fresh or chilled	213	331	21	8	17	-	-	-	12	-
Mushrooms, fresh or chilled	39	25	36	54	44	79	62	155	176	509
Truffles, fresh or chilled	-	-	-	92	153	43	8	5	2	2
Peppers of the genus Capsicum or of the genus Pimenta, fresh or chilled	10	30	43	-	-	55	-	-	-	46
Vegetables, fresh or chilled nes	374	306	71	275	313	133	1,815	175	83	125
Melons (including watermelons), fresh	1,533	3,479	114	14	58	63	62	34	-	28
<b>Fresh veg.</b>	<b>5,588</b>	<b>11,564</b>	<b>26,144</b>	<b>37,856</b>	<b>23,769</b>	<b>26,698</b>	<b>27,280</b>	<b>32,853</b>	<b>29,420</b>	<b>56,887</b>
Peas, frozen	668	968	779	794	1,454	1,668	1,571	1,416	1,697	1,313
Beans, frozen	-	14	106	31	-	-	-	-	7	
Sweet corn, frozen	-	-	-	3	107	139	233	103	173	125
Vegetables, frozen nes.	121	107	230	269	240	370	372	159	432	341
Mixtures of vegetables, frozen	20	73	130	343	357	310	565	367	415	530
Onions, provisionally preserved but not suitable f immediate consumption	130	6	12	3,571	2,282	8,699	92	104	-	78
Cucumbers & gherkins provisionally preserved, but not for immediate consumption	607	165	123	151	198	325	583	358	378	390
Vegetables nes & mixtures provis presvd but not f immediate consumption	1	1	-	285	657	1,901	1,541	170	383	1,639
Onions dried but not further prepared	919	2,433	638	889	910	1,199	1,275	1,303	1,128	897
Mushrooms and truffles dried but not further prepared	78	278	262	369	145	259	361	303	508	446
Vegetables and mixtures dried, but not further prepared nes	3,870	2,234	1,555	2,266	2,142	2,236	3,050	3,560	3,134	2,628
Fruits of the genus Capsicum or Pimenta, dried, crushed or ground	230	328	263	327	301	806	649	1,160	327	276
Vegetable products nes used primarily for human consumption	696	5,594	3,324	6,146	16,416	9,886	1,654	2,156	8,601	4,626
Cucumbers and gherkins, prepared or	37	49	249	341	409	55	116	194	470	574

preserved by vinegar or acetic acid										
Veg, fruit, nut & edible prts of plants nes,prep/presvd by vin/acetic acid	148	246	353	260	229	131	143	144	139	180
Tomatoes, whole/in pieces prepard/preservd o/t by vinegar/acetic acid	276	468	580	549	787	805	823	1,169	1,574	1,743
Tomatoes nes, prepared or preserved other than by vinegar or acetic acid	11,559	14,834	16,358	17,627	20,191	19,350	20,194	16,280	14,149	20,115
Mushrooms prepared or preserved other than by vinegar or acetic acid	3,319	2,397	3,070	5,045	6,451	5,294	7,291	6,165	8,302	8,772
Veg nes & mx of veg prep or presvd,o/t by vinegar or acetic acid, frozen	222	189	282	477	576	208	386	498	136	458
Homogenized vegetables prep/presvd, o/t by vinegar/acetic acid, not frozen	-	-	-	-	-	36	61	105	140	599
Peas prepared o preservd,other than by vinegar o acetic acid, not frozen	-	-	-	-	-	97	20	373	40	24
Beans, shelled prepared/preservd, o/t by vinegar/acetic acid, not frozen	112	126	84	78	74	72	61	85	53	93
Beans nes prepared or preservd, o/t by vinegar or acetic acid,not frozen	47	70	22	24	120	71	151	61	46	86
Asparagus prepared or preservd,o/t by vinegar or acetic acid, not frozen	246	277	296	293	333	142	462	259	134	239
Sweet corn prepared o preservd, o/t by vinegar o acetic acid not frozen	29,750	2,972	6,075	5,244	3,842	4,160	6,098	7,188	8,373	6,751
Veg nes & mix of veg prep/presvd o/t by vinegar/acetic acid, not frozen	1,926	1,119	1,048	751	831	917	845	1,024	2,145	1,840
Tomato juice unfermented & not spirited, whether or not sugared or sweet	45	75	96	142	77	186	156	142	184	230
Tomato ketchup and other tomato sauces	338	738	269	697	518	1,394	972	1,248	1,943	1,135
<b>Processed veg.</b>	<b>55,365</b>	<b>35,761</b>	<b>36,204</b>	<b>46,972</b>	<b>59,647</b>	<b>60,716</b>	<b>49,725</b>	<b>46,094</b>	<b>55,008</b>	<b>56,128</b>
<b>Tot. veg.</b>	<b>60,953</b>	<b>47,325</b>	<b>62,348</b>	<b>84,828</b>	<b>83,416</b>	<b>87,414</b>	<b>77,005</b>	<b>78,947</b>	<b>84,428</b>	<b>113,015</b>

Source: Data in 2004 - UN Comtrade (2007); remaining data from PC-TAS ITC/UNSD (2002; 2007)

## Appendix 6. Laws relevant to the Philippines vegetable industry

- Food Law 1996. <http://faolex.fao.org/docs/pdf/ins9666.pdf>
- Plant and Animal Quarantine 1992. <http://faolex.fao.org/faolex/index.htm>
- Agriculture and Fisheries Modernisation Act of 1997. (RA 8435)  
<http://www.da.gov.ph/AFMA/ra8435a.html> covers modernization of agricultural through enhancing profitability and responding to globalization.
- Barangay Micro Business Enterprise (BMBE) Act of 2002 (RA 9178), sets policy to promote the establishment of BMBEs, by providing various incentives and benefits to entrepreneurs. <http://www.business.gov.ph/SME.php> ;  
[http://www.lawphil.net/statutes/repacts/ra2002/ra\\_9178\\_2002.html](http://www.lawphil.net/statutes/repacts/ra2002/ra_9178_2002.html)
- Consumer Act of the Philippines (RA 7294) covers deceptive trade practice (inferior goods, credit fraud) overseen by the Department of Trade and Industry (DTI).  
<http://www.business.gov.ph/Laws.php?contentID=1>
- Export Development Act of (RA 7844) <http://www.business.gov.ph/Laws.php?contentID=8>
- Foreign Investment Act of 1991 (RA 8179) <http://www.business.gov.ph/Laws.php?contentID=3>
- Price Act of 1991 (RA 7581) to control profiteering and protect consumers.  
<http://www.business.gov.ph/Laws.php?contentID=2>
- Retail Trade Liberalisation Act of 2000. (RA 8762) repealed RA No.1180 as amended *Retail Trade Nationalization Law* which limited retail trade activities to Filipinos & Corporations wholly owned by Filipinos opened the Philippine retail industry to foreign investors, allowing full ownership and encourages an efficient & competitive retail trade sector between Filipino and foreign investors  
<http://www.business.gov.ph/Laws.php?contentID=7>
- An Act to Promote the Production, Processing, Marketing and Distribution of High-Valued Crops, Providing Funds Therefor (*sic.*), and for Other Purposes. (1995) (RA 7900)  
[http://elibrary.supremecourt.gov.ph/republic\\_acts.php?doctype=Republic%20Acts&docid=a45475a11ec72b843d74959b60fd7bd645d0dc3f7ffb9](http://elibrary.supremecourt.gov.ph/republic_acts.php?doctype=Republic%20Acts&docid=a45475a11ec72b843d74959b60fd7bd645d0dc3f7ffb9)
- Philippine Food Fortification Act of 2000 (RA 8976) <http://www.doh.gov.ph/ra/ra8976>