Vietnam's Rice Economy: Developments and Prospects

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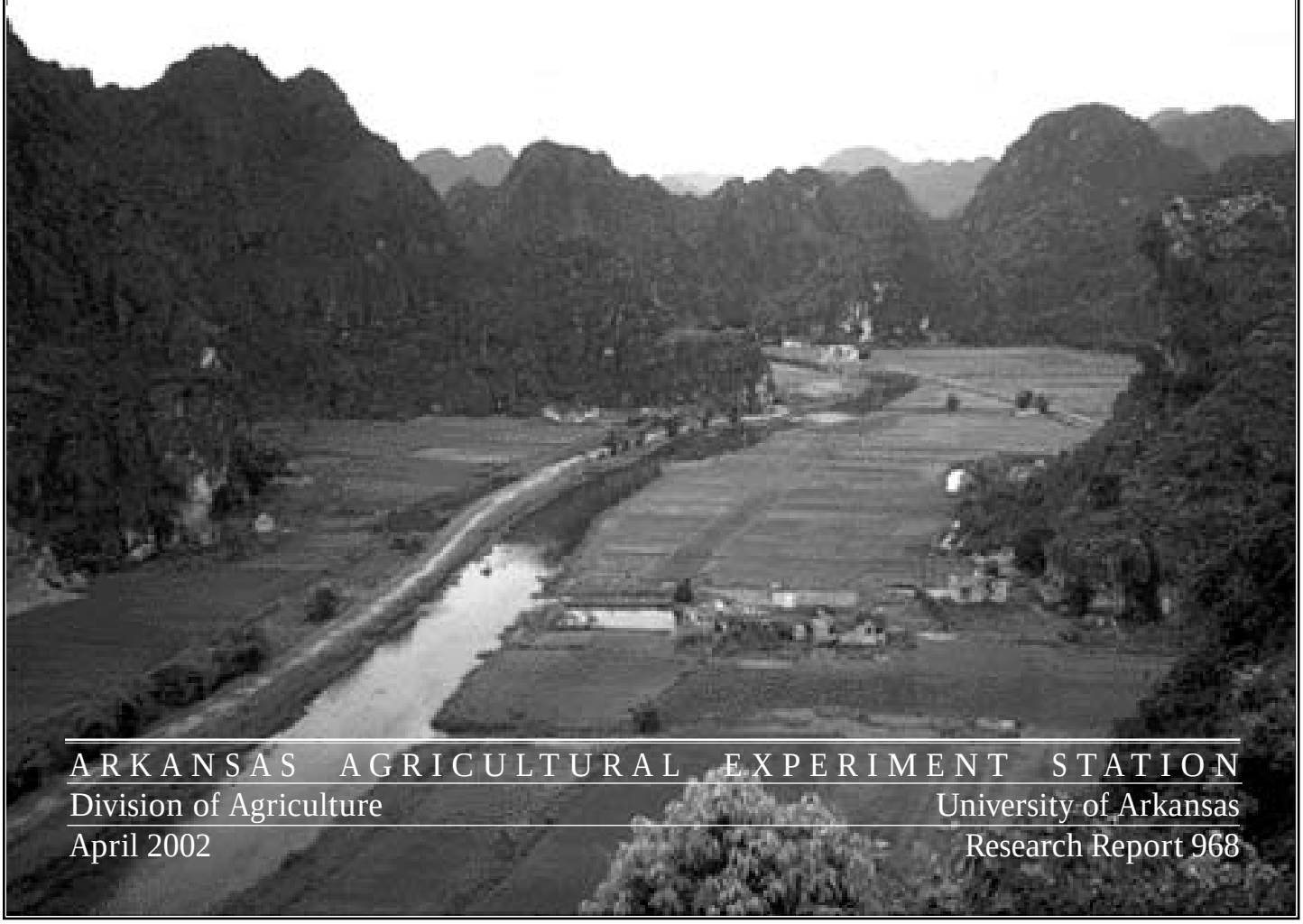

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Cover photo of rice production area in karst terrain near Ninh Binh, Vietnam, by Geoff and Lauren Slater


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PREFACE

Vietnam shifted rapidly from being a net rice importer prior to 1987 to become the second largest world rice exporter by 1995. Net rice exports have leveled off at about 3.8 million metric tons from 1997 to 1999. The world rice price has dropped dramatically in 2000 to barely cover the rice production cost in Vietnam, and net rice exports are expected to fall to 3.4 million mt because of the poor import demand in 2000.

This report reviews the policy adjustments that led to the rapid growth in rice production and evaluates the prospects for Vietnam to continue as a major rice exporter.

Keywords: Vietnam, rice, economy, production, consumption, trade, prices

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Vietnam's Rice Economy: Developments and Prospects

Kenneth B. Young, Eric J. Wailes, Gail L. Cramer,[1] Nguyen Tri Khiem[2]

1. INTRODUCTION

Vietnam's food crop sector, comprising more than 85% rice, is the most important sector of the economy. The food sector contributed about 70% of the total agricultural GDP from 1989-95 (Khiem et al., 1996). More than 70% of the rural population depends on food production for their primary source of income. On the average, the value of gross agricultural output - including animal and fishery products - contributes 49% of GDP and 42% of current export earnings. Rice alone contributed half of all employment and one sixth of national income in 1990 and about 25% of the total export value from 1994 to 1996.

The 1981 and 1988 economic reforms in Vietnam's agriculture sector have been widely recognized as the underlying factors behind the boost in rice production and exports in the 1990s (Pingali and Xuan, Bautista). Following the Vietnam War, paddy yield per hectare (ha) and total paddy production stagnated over the period 1976-80. Following the reforms, paddy yield increased 3.23% annually in the period 1981-87 and 2.80% annually in the period 1988-95. Total rice production increased 3.14% annually in the period 1981-87 and 5.19% annually in the period 1988-95. Annual per capita paddy (rough) rice output was unchanged at about 217 kilograms (kg) in the period 1976-81. Over the following twenty years, per capita output has nearly doubled (Table 1.1). After rice self-sufficiency was attained in 1989, Vietnam shifted rapidly from importing rice to become the second largest world rice exporter, second only to Thailand. In 1999, Vietnam exported 4.6 million metric tons compared with Thailand at 6.7 million mt, India at 2.8 million mt, China at 2.7 million mt, the U.S. at 2.6 million mt, and Pakistan at 1.8 million mt (USDA, Foreign Agricultural Service).

Economic reforms in Vietnam's agriculture sector consisted first of a shift from a collectivized agricultural production system to an individual-oriented contract system. The second phase of reform was liberalization of input and output markets. Economic liberalization allowed individual farm households freedom to make their own decisions on resource allocation, crop choices, and crop management. Marked increases in rice productivity over the period 1982-87 and the rice export boom starting in 1989 reflect the dramatic response by farmers to market price signals and policy changes. Although Vietnam has made significant progress in moving from a planned economy to a market-based economy, the industrial sector remains burdened by noncompetitive state-owned enterprises (SOEs) that the government is unwilling or unable to privatize. Continued government intervention in the rice sector through export quotas and licences reduces the earnings from rice for producers, including the share received from rice exports.

Climatic and soil conditions, as well as the level of development, differ substantially among major rice production regions in Vietnam. Climate varies from humid tropical in the south to temperate in the north (Fig. 1). Rice is the main food crop produced in all regions but its contribution to regional total food-crop output varies. For example in 1998, the northern mountains and midlands, the northern central coast, the central highlands, and the southeastern regions had an annual per capita total food-crop output below 914 kg; whereas the corresponding figure for the Mekong River Delta (MRD) was 914 kg. Rice is planted on about 7.6 million ha and accounted for more than 94% of the total grain output in the year 2000.

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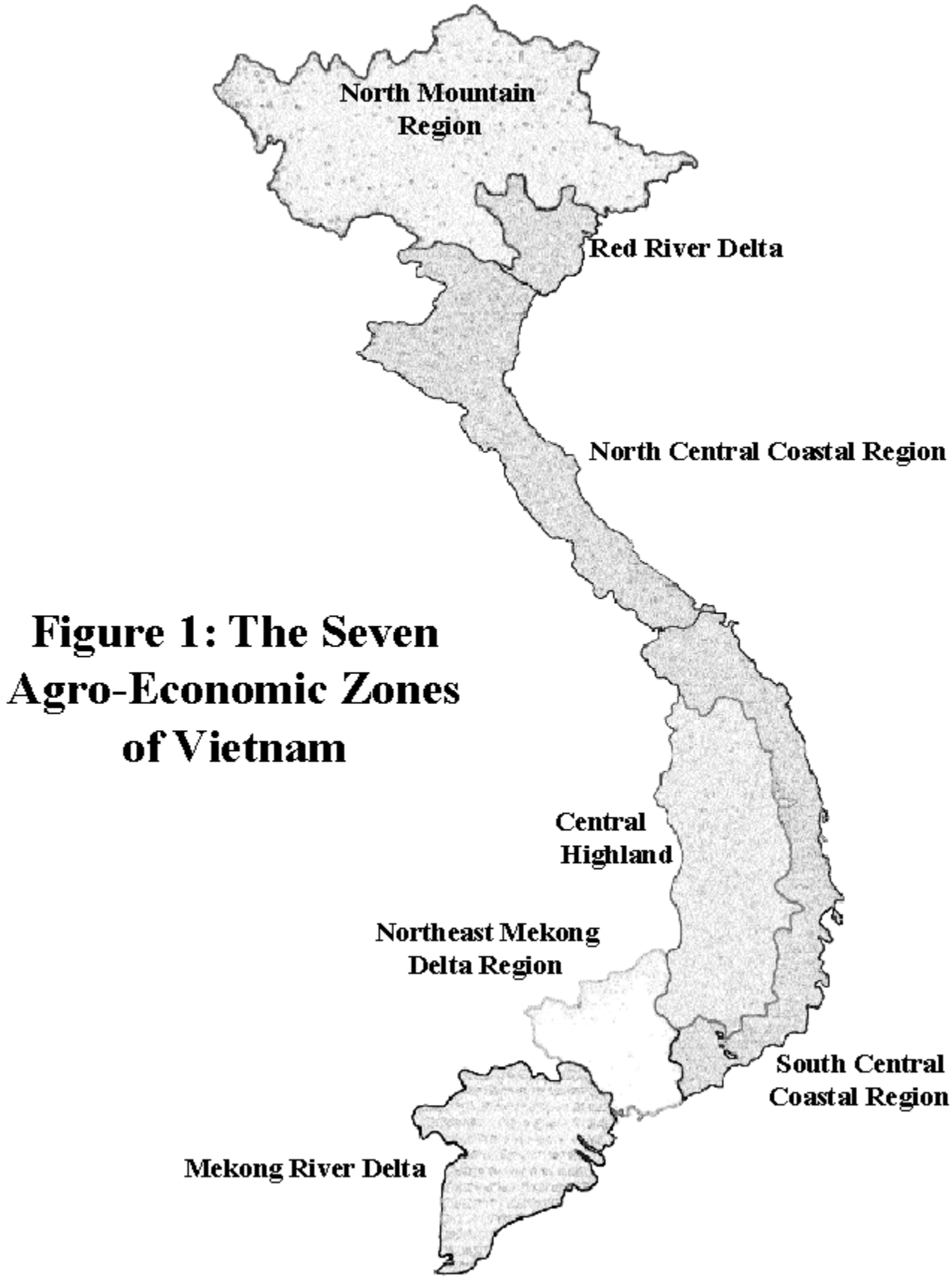


Figure 1: The Seven Agro-Economic Zones of Vietnam

Table 1.1 Vietnam staple food production and food availability, 1976-2000.

	Total production			Per capita production		Rice imports	Rice exports	Food grain imports	Per capita availability	
Year	Grain	Paddy	Population	Grain	Paddy				Grain[1]	Rice[1]
	1000 mt	1000 mt	mil.	kg.	kg.	1000 mt	1000 mt	1000 mt	kg.	kg.
1976	13,493	11,827	49.2	274	241	148	0	634	194	159
1977	12,622	10,597	50.4	250	210	196	0	1,096	188	158
1978	12,265	9,790	51.4	239	190	285	0	1,395	187	129
1979	13,984	11,363	52.5	267	217	320	0	1,576	209	146
1980	14,406	11,647	53.7	268	217	210	33	890	194	144
1981	15,005	12,415	55.0	273	226	12	0	452	185	146
1982	16,829	14,390	56.2	300	256	197	0	370	204	169
1983	16,986	14,743	57.4	296	257	42	0	85	194	167
1984	17,800	15,506	58.7	303	264	140	0	359	205	171
1985	18,200	15,875	59.9	304	265	336	59	422	209	176
1986	18,379	16,003	61.1	301	262	482	125	528	210	176
1987	17,563	15,103	62.5	281	242	323	120	469	193	160
1988	19,583	17,000	63.7	307	267	465	91	464	212	179
1989	21,516	18,996	64.4	334	295	55	1,420	183	198	170
1990	21,489	19,225	66.2	324	290	20	1,624	168	189	164
1991	21,990	19,622	67.8	324	289	6	1,033	255	199	172
1992	24,215	21,590	69.3	349	312	2	1,950	302	203	174
1993	25,501	22,836	71.0	359	321	1	1,722	394	214	185
1994	26,198	23,528	72.5	361	324	0	1,983	373	213	184
1995	26,141	24,963	73.9	354	338	11	1,988	474	210	193
1996	27,933	26,396	75.2	371	351	0	3,500	477	201	181
1997	29,174	27,524	76.4	382	360	0	3,575	419	207	187
1998	30,757	29,145	77.6	396	376	1	3,700	609	218	196
1999	33,146	31,394	78.7	421	398	5	4,600	688	224	201
2000	34,483	32,554	79.8	432	408	0	3,370	700	247	223

Source: General Statistics Office, Hanoi, 1976-1995, and FAO FAOSTAT 2001, and USDA, Foreign Agricultural Service Grain Circular, 2001.

[1] Milled equivalent.

The two most important rice production regions include the Red River Delta (RRD) in northern Vietnam occupying 16% of the total rice area and contributing about 15% of national paddy output, and the Mekong River Delta (MRD) in the south occupying 45% of the rice area and contributing about 50% of output (Fig. 1). The Central Coastal Region occupies 19% of the rice area and contributes 17% of total output. The remaining rice produced in Vietnam is rain-fed lowland or upland rice in the mountainous and highland areas.

The importance of rice consumption in the diet also differs across the different production regions. While rice is the staple food for all Vietnamese, the share of other food crops in the diet varies across regions. Households in the northern mountains, the midlands, and the northern central coast have traditionally used more corn and other root crops to supplement their daily diet, especially during slack seasons between rice harvests. The relationship in Vietnam between income levels and the corresponding level of rice consumption implies that when household incomes grow, a small fraction of the population in the higher income group will consume less rice while the more numerous low-income households will increase rice consumption by substituting rice for low-value staples.

The major objective of this bulletin is to evaluate the development and potential for further growth in Vietnam's rice economy. Vietnam's status as a major world rice exporter is evaluated in regard to its production potential and trend in domestic rice consumption. The report is organized as follows. First, a general introduction to the Vietnam rice economy is presented. The second part summarizes regional production systems and cost data. The third part describes utilization and marketing of rice in Vietnam. Analysis of past policy reforms is provided in the fourth section. The fifth section presents a baseline projection and alternative scenarios of future growth in the rice sector and conclusions regarding the future of Vietnam's rice economy.

2. RICE PRODUCTION

2.1 Trend in Rice Production

Table 2.1 summarizes the growth rate of cultivated area and yield of paddy rice in four time periods from 1976 to 1999. Although the rice cultivated area increased during the period 1976-80 at an annual rate of 1%, total production stagnated at 11 million mt. Rice production in the period 1981-

87 was marked by a sharp increase in both yield and output. Total rice production increased 5.19% yearly in the period 1988-95, of which farmed area accounted for 46% and yield 53% of the production growth rate. Paddy production has continued to increase in the most recent years from 25 million mt in 1995 to 31.7 million mt in 1999; however, the annual growth rate of production slowed to 3.75% (Table 2.1).

Table 2.1 Vietnam paddy production performance, 1976-99

	Growth Rate (% per year)		
Period	Cultivated Area	Yield Per Ha	Total Production[1]
1976-80	1.02	-0.55	0.46
1981-87	-0.09	3.23	3.14
1988-95	2.39	2.80	5.19
1996-99	2.00	1.75	3.75

Source: Agricultural Statistics, General Statics Office, Hanoi.
[1] Actual production data are shown in Tables 1.1 and 2.2.

Production of rice occurs in three cropping periods. The winter-spring crop is the largest while Lua Mua (10th month rainy season) and summer-fall periods are equally important (Table 2.2). Table 2.3 shows the increased use of modern rice varieties from 1976 to 1995. Expansion of rice areas came mainly from the conversion of single to double rice cropping in the MRD with the use of shorter season varieties. Reclamation of marginal land in the MRD from 1975 to 1996 increased arable land by only 10%, but the area planted to short duration, high-yielding rice varieties increased more than three times. Rice area in the MRD increased 583 thousand ha from 1987 to 1992. The area increase included 183 thousand ha from clearing new land and 400 thousand ha were from shifting the cropping practice to two or more rice crops per year.

The distribution of rice areas and rice-growing environments in the seven agro-ecological regions of Vietnam are depicted in Figure 1. Trends in rice areas and yield are different for each region.

Northern Mountains and Midlands: This vast mountainous and hilly region occupies an area of 9.8 million ha or 29.7% of the total land area of 33 million ha. Inhabitants of this region are composed of many ethnic minorities that are widely dispersed with a density of about 102 persons per square kilometer (km). The ethnic minorities living in the small tribes in the mountains practice slash-and-burn farming. The region contains about 555 thousand ha of rice land or 13% of the national total production. Rice-sown area and total rice output of this region increased about 1% and 1.7% per year, respectively, during the period 1976-90 and 1990-94. On average from 1996 to 1999, rice was harvested on 799 thousand ha producing 2.9 million mt. Average yield from 1996 to 1999 was 3.6 mt per ha.

Red River Delta: This region contains 1.7 million ha of lowland composed mainly of degraded riparian alluvium soil. Land holdings of this delta are the smallest in the country, and the region has the highest population density of about 844 persons per square km. There are about 626 thousand ha of rice land or 14.8% of the country total with a total harvested area of 1.04 million ha producing 5.1 million mt of paddy in 1999. The rice-sown area of the RRD has remained at almost the same level since 1960. Rice yield increased 2.6% per year during the period 1955-70, 3% in the period 1970-76, -4.7% in the period 1976-80, 3% in the period 1980-87, and 6.5% in the period 1987-92. Average yield from1996 to 1999 was 4.8 mt per ha.

Northern Central Coast: This region has a climate similar to the northern part of Vietnam. Physical features include partly denuded and moderately-eroded hills and mountains and sandbars along the coast. Population density is about 167 persons per square km with concentration in small deltaic areas along the coastline. This region has 446 thousand ha of rice land or 10.5% of the country total of rice land area. The rice-sown area declined from 700 thousand ha in the period 1978-85 to 670 thousand ha in the period 1986-90. Rice yield increased from an average of 1.6 mt per ha in the period 1976-81 to 2.2 mt per ha in the period 1982-90. Average rice yield from 1996 to 1999 was 3.25 mt per ha. Paddy production was 2.1 million mt in 1999 from 657,000 harvested ha. This region has traditionally had the largest sown area of sweet potatoes, comprising 118 thousand ha in 1990 or 36.7% of the country total.

Southern Central Coast: The climate of this region is similar to the remaining southern part of Vietnam except for some extremely dry locations during the dry season (e.g. Phanrang has only 800 mm rainfall per year). Alluvial deltas are suitable for rice production and many other cash crops. The region has 282 thousand hectares of rice land or 6.6% of the country total. In 1999, the total rice harvested area was 527 thousand ha with an output of 1.8 million mt of paddy. The rice-sown area increased steadily at a rate of 1.5% per annum during the period 1976-90. Paddy yield increased from an average of 2.2 mt per ha in the period 1976-81 to an average of 3.0 mt per ha in the period 1982-90. Average yield for 1996 to 1999 was 3.6 mt per ha. Rice production is difficult in this region because of the poor soil and lack of irrigation in the dry season.

Central Highlands: The mild temperature and humidity of this region is suitable for growing high value crops. A large part of the region is still not cultivated. Population density is about 45 persons per square km, composed of a combination of lowland Vietnamese and ethnic minorities. This region has high potential for industrial crops such as rubber, tea, coffee, fruit trees, and high-value vegetables. Rice land accounts for only 3.4% of the country total (143 thousand ha) but 3.4 million ha of forest land are found in the region (34.7% of the country). The rice-sown area increased about 1.1% and production grew 4% per annum during the period 1976-90. The average from 1996 to 1999 was: harvested area (164,000 ha), production (462,000 mt), and yield (2.8 mt per ha).

Southeastern Region: The harvested rice area of this region accounted for about 267 thousand ha (6.3 % of the country total) from 1976-90 with a total sown area of about 300 thousand ha, which had remained at almost the same level

Table 2.2 Vietnam rice production performance by seasons, 1976-2000[1]

Year	Areas planted (1000 ha)				Yield (1000 kg/ha)				Production (1000 mt)			
	W-S	Lua Mua	S-F	Total	W-S	Lua Mua	S-F	Average	W-S	Lua Mua	S-F	Total
1976	1,394	3,279	615	5,288	2.7	2.0	2.5	2.2	3,703	6,566	1,531	11,800
1977	1,538	3,314	617	5,469	2.1	1.8.	2.2	1.9	3,278	5,983	1,336	10,597
1978	1,619	3,156	687	5,462	2.2	1.6	1.6	1.8	3,559	5,131	1,100	9,597
1979	1,746	3,212	681	5,639	2.2	2.0	1.9	2.0	3,899	6,170	1,294	11,363
1980	1,707	3,212	618	5,537	2.3	1.9	2.3	2.1	3,874	6,180	1,594	11,647
1981	1,638	3,395	618	5,652	2.6	2.0	2.4	2.2	4,173	6,753	1,489	12,415
1982	1,623	3,384	704	5,711	2.8	2.3	2.8	2.5	4,526	7,905	1,959	14,390
1983	1,650	3,287	674	5,611	3.1	2.3	3.2	2.6	5,134	7,415	2,194	14,743
1984	1,658	3,220	797	5,675	3.4	2.3	3.3	2.7	5,560	7,313	2,632	15,506
1985	1,765	3,082	856	5,704	3.5	2.2	3.3	2.8	6,191	6,828	2,855	15,875
1986	1,828	2,945	914	5,688	3.4	2.3	3.4	3.0	6,974	6,647	3,379	17,000
1987	1,840	2,856	892	5,588	3.0	2.5	2.8	2.7	5,499	7,074	2,529	15,103
1988	1,882	2,850	994	5,726	3.7	2.3	3.4	3.0	6,974	6,647	3,379	17,000
1989	1,992	2,763	1,140	5,896	3.8	2.7	3.6	3.2	7,539	7,394	4,063	18,996
1990	2,074	2,738	1,216	6,028	3.8	2.6	3.4	3.2	7,846	7,269	4,110	19,225
1991	2,160	2,760	1,383	6,303	3.1	2.9	3.4	3.1	6,788	8,116	4,717	19,621
1992	2,279	2,748	1,448	6,475	4.0	2.7	3.4	3.2	9,153	7,527	4,110	20,790
1993	2,316	2,684	1,549	6,549	3.9	3.0	3.6	3.5	9,036	8,168	5,633	22,837
1994	2,381	2,640	1,577	6,599	4.4	2.8	3.6	3.6	10,504	7,395	5,629	23,528
1995	2,421	2,602	1,742	6,766	4.4	3.0	3.7	3.7	10,737	7,726	6,501	24,964
1996	2,683	2,479	1,883	7,045	4.8	3.0	3.5	3.8	13,000	7,309	6,300	26,609
1997	2,717	2,542	2,118	7,377	5.0	3.1	3.6	3.9	13,611	7,788	7,540	28,931
1998	2,888	2,387	2,300	7,575	4.9	3.3	3.7	4.0	14,036	7,829	8,602	30,467
1999	3,001	2,394	2,265	7,660	5.1	3.5	3.6	4.1	15,155	8,283	8,267	31,706
2000	3,010	2,341	2,154	7,505	5.0	3.5	3.6	4.1	15,050	8,194	7,862	31,106

Source: Nguyen Sinh Cuc. Agriculture of Vietnam 1945-1995, Statistical Publishing House 1996; Vietnam Year Books 1996. Data for 1996-99 were reported by the Foreign Agricultural Service, March 2000. Data for 2000 are estimates USDA, FAS.

[1] W-S = winter-spring, S-F = summer-fall, Lua Mua=10th month or rainy season crop.

Table 2.3 Total harvested rice production by traditional and modern varieties of the Mekong River Delta and Vietnam

Year	Mekong River Delta					Vietnam total
	Modern varieties		Traditional varieties		Total	
	Total	%	Total	%		
	Thousand metric tons		Thousand metric tons		Thousand metric tons	
1976	631.0	31	1,431.6	69	2,062.6	5,297.3
1977	719.1	34	1,375.2	66	2,094.3	5,468.7
1978	808.9	39	1,253.6	61	2,062.2	5,462.5
1979	870.3	42	1,215.8	58	2,086.0	5,485.2
1980	890.5	39	1,405.7	61	2,296.1	5,600.2
1981	754.8	34	1,491.6	66	2,246.6	5,651.9
1982	801.4	35	1,474.1	65	2,275.4	5,711.4
1983	828.0	38	1,373.8	62	2,201.9	5,611.0
1984	929.6	41	1,323.9	59	2,253.5	5,675.0
1985	1,042.1	46	1,208.7	54	2,250.8	5,703.9
1986	1,146.5	50	1,144.9	50	2,291.4	5,688.6
1987	1,139.9	52	1,066.7	48	2,206.6	5,588.5
1988	1,278.0	55	1,035.8	45	2,313.8	5,726.4
1989	1,514.7	62	930.0	38	2,444.8	5,895.8
1990	1,660.1	64	919.9	36	2,580.0	6,027.7
1991	1,878.5	67	928.5	33	2,807.0	6,302.7
1992	2,047.0	70	877.7	30	2,924.7	6,475.4
1993	2,185.1	73	808.0	27	2,993.1	6,559.4
1994	2,261.4	74	776.5	26	3,037.9	6,598.5
1995	2,433.3	76	757.3	24	3,190.6	6,765.6

Source: General Statistical Office and National Institute for Agricultural Planning and Projection, Hanoi, 1991; Agricultural Statistics 1985-93, General Statistical Office, Hanoi.

Note: In the Mekong Delta, the "Lua Mua" rice crop is mainly of traditional old varieties that are being replaced by modern varieties with two or more crops grown per year.

over the previous 15-year period. Rice production increased at a rate of about 2.3 % annually from 1982-90. In the Central Highlands and the Southeastern Region, industrial crops and higher value cash crops are competing with rice for land and investment capital. In recent years, these two regions have had a rapid expansion of areas planted to coffee, tea, rubber, maize for feed, and vegetables. The Southeastern Region averaged 365,00 harvested ha, 976,000 mt production, and 2.7 mt per ha yield from 1996 to 1999. Both the Southeastern Region and the Central Highlands have physical and weather conditions better suited for industrial crops (coffee, rubber, and tea), corn, and high-valued vegetables than for rice. The economic return is also better for non-rice crops.

Mekong River Delta: The monsoon rains combine with the high flow of the Mekong river during September-October causing annual flooding over the entire delta. In low elevation areas, the annual monsoon flood may reach 80 to 200 cm deep while the backswamps behind the coastline are inundated to about 50 cm. In contrast, during the dry season the water table moves deep into the soil profile, causing localized drought. The Mekong delta soils are young alluvium, about 40% of which are characterized as acid sulfate soils and seasonal saline soils. This region is the rice bowl of Vietnam with 45.3% of all the rice land found in the country (1.923 million ha). The paddy sown area in 1994 was 3 million ha with an output of 12 million mt. The growth rate of the rice-sown area in the region during the period 1978-90 was 1.9% per annum while the growth rate of rice output of this period was 6.7%. Yield increased 4.6% per year during this period. The MRD has 73 thousand ha or 1.4% of the total rice area in rice triple cropping, and nearly a million ha in rice double cropping. This is a region that has good potential for shifting to greater double cropping. This region averaged 3,692,000 harvested ha, 15,007 mt production, and 3.8 mt per ha yield from 1996 to 1999.

The rice production performance observed for two groups of rice farmers in the RRD and the MRD are presented in Table 2.4. Sample rice farms were monitored after the start of liberalization policy in 1989. Yield trends from farm data conform with observed regional trends. Rice prices in the RRD have typically exceeded those in the MRD as the MRD is the major rice surplus region in Vietnam Areas planted to rice in the RRD have remained at the same level during the last twenty years while shifting from traditional rice to modern varieties. The shift from single to double or triple cropping in the MRD has resulted in rapid expansion of rice-sown areas. Overall in Vietnam, the average from 1996 to 1999 was 7,249,000 ha total harvested area, 27,943,000 mt of paddy production, and a weighted average yield of 3.85 mt per ha for the Lua Mua, winter-spring, and summer-fall crops.

Table 2.4 Rice production performance, sample farm data, Red River Delta and Mekong River Delta, 1989-92

	Red River Delta			Mekong River Delta			
	1990	1991	1992	1989	1990	1991	1992
No. of farms							
Wet season[1]	207	167	171	100	90	100	102
Dry season[2]	184	158	158	102	85	102	104
Average yield (mt/ha)							
Wet season	3.70	3.98	3.74	4.02	4.08	3.96	4.53
Dry season	4.43	2.40	4.42	4.91	5.18	5.40	5.68
Average land area per household (ha)	0.25	0.25	0.25	1.00	1.20	1.24	1.20
Rice cropping intensity (# of plantings/year)	1.59	1.66	1.66	1.47	1.74	1.84	1.85
Rice production per household (kg/year)	2,033	1,595	2,040	8,920	9,260	9,360	10,210
Rice sold per household (kg)	95	112	162	2,659	5,918	5,475	7,555
Farm gate price (US$/100 kg)							
Wet season[1]	9.20	14.60	9.80	5.80	7.50	8.30	8.60
Dry season[2]	9.70	16.90	11.40	8.10	9.70	8.80	779.50

Source: Farm survey 1989-93, International Rice Research Institute, Los Banos, Philippines, Can Tho University and Hanoi Agricultural University.

[1] Wet-season Lua Mua rice is subject to flooding near the end of the season, i.e. September/October in the north and December in central coastal and southern regions.

[2] Dry-season spring-harvest rice is subject to drought. It is planted after harvest of the Lua Mua crop.

2.2 Production Systems

2.2.1 Irrigated Lowland Rice and Irrigation Systems. Irrigated lowland rice currently accounts for about 80% of Vietnam's current total rice area. The irrigated lowland rice area is concentrated in the two deltas, the RRD in the north and the MRD in the south. Rice output of the two deltas accounts for about 69% of the country output. About 80% of the rice areas in the RRD are irrigated compared with only 40% in the MRD. Irrigated lowland rice currently accounts for most of Vietnam's total rice area. Major constraints are flooding at the end of the rainy season and drought in the dry season. The rainy season or southwest monsoon extends from April to September/October in the north and from July/August to December in central coastal regions.

Government investment in irrigation constitutes the largest outlay of total public investment. About one half of the outlay is borne by the central government and another half comes from provincial government budgets. In addition from 1988 to 1992, foreign aid provided about 45 million US dollars for irrigation projects, equivalent to approximately 50% of the government irrigation budget for the period 1986-90. As of 1996, Vietnam had an irrigation system to support 2 million ha of year-round agriculture and 400 thousand ha for one crop per year. About 850 thousand ha are serviced by drainage schemes and 450 thousand ha are drained by electric pumps. Of the irrigated land, 20% is in the RRD and 40% is in the MRD. On the average, the irrigated area increased 122 thousand ha per year in 1976-80, 62 thousand ha in 1981-85, 70 thousand ha in 1986-90, 50 thousand ha in 1991-95, and about 50 thousand ha in 1996-99. A further 40 thousand ha of land per year were brought into cultivation through drainage projects (Table 2.5). Of the total of 6 million ha sown with rice in 1990, 5 million ha were irrigated. The irrigated area included 2 million ha of winter-spring rice, which is a dry-season crop, 1.1 million ha of summer-fall rice, and 1.9 million ha of the main wet-season Lua Mua rice crop.

The drainage system has been particularly important in the RRD, which is more prone to excessive rainstorms than the MRD. Although the RRD drainage system is well developed, 100-150 thousand ha are still subject to flooding during heavy rainfall periods. The Red River irrigation system is a network of high dikes to hold back monsoon floods, plus pumping stations and canals to drain excess waters in the wet season and to provide irrigation in the dry season. This system enables two crops of rice to be grown in most of the RRD. However, much of the irrigation and drainage system in the RRD is old and suffering from degradation, which requires costly repairs especially for the system of pumping stations.

The existing system in the MRD operates mainly as an irrigation source, with transport of water to the fields being the responsibility of the farmer. The irrigation supply canals serve a dual purpose as an irrigation-drainage system and for transport. After 1975, a plan was developed to build a series of large pump stations similar to the scheme used in the RRD; however, these stations soon became inappropriate. A new MRD system of canals and dikes to supply irrigation water and to control flood water is being developed. Farmers in the MRD construct minor canals and dikes to control water in their fields. The opportunities for a substantial increase in irrigation infrastructure are limited in both the RRD and the MRD (Khiem et al. 1996). In the RRD, there is little land suitable for irrigation that has not already been developed. Land available for reclamation usually suffers from poor drainage, and requires pumping. Subsidies for electric power for pumping also are being phased out, making the further reclamation of inferior land unprofitable (IBRD, 1993).

Table 2. 5 Expansion in rice irrigated area in Vietnam, 1976-95

	Irrigated		Drained	
Year	Total additional area	Average annual increase	Total additional area	Average annual increase
	(Thousand ha)			
1976-80	608.3	121.7	244.6	48.9
1981-85	309.8	62.0	186.3	37.3
1986-90	352.5	70.5	203.5	40.7
1991-95	253.0	50.6	149.0	29.8
1976-95	1,523.6	76.2	783.4	39.3

Source: Statistical data on irrigation development. Ministry of Irrigation and General Statistical Office, Hanoi.

The priority for irrigation development in the RRD will be mainly for the rehabilitation of existing systems rather than adding new areas of development. The small farms and scattered land parcels per farm restrict labor productivity in the RRD. However, new irrigation investment of over US $200 million from 1996-99 has increased the rice planted area by over 0.5 million ha in the MRD.

In the case of the MRD, the expansion of irrigated area is constrained by prolonged and extensive flooding in the southern parts of the Delta and the prevalence of acid sulphate soils. Most of the formerly deep-water rice areas have been converted to double cropping of short-duration and high-yielding varieties (Fig. 2). The opportunities for further expanding irrigated rice production are in the tidal saline areas by preventing salinity intrusion. A series of embankments along the southern coast of the MRD is being constructed to increase the area protected from salinity intrusion to 300 thousand ha in 2001. Further expansion of double rice cropping area into these fragile ecosystems is constrained by growing environmental concerns and by the relatively higher profitability of rice-aquaculture systems that typify flood-prone environments.

Central Vietnam has the largest potential for expansion in irrigated area. The government estimates that 400 thousand ha of rice lands can be irrigated through the development of gravity irrigation systems. However, the developmental and environmental costs of such projects are substantial (IBRD, 1993).

The irrigation fee paid by farmers varies greatly across regions and across irrigation stations. The average fee collected by district irrigation stations operating electric pumps was 140 kg of paddy rice per ha in 1996. If the irrigation station only provides the water source and the task of bringing water to the fields is left to farmers, the average fee is 63 kg of paddy rice per ha. The average fees collected by provincial irrigation companies are much higher, 212 and 137 kg of paddy rice per ha, respectively. Irrigation costs paid by farmers vary significantly across different regions depending on the type of system, e.g., gravity versus pumping.

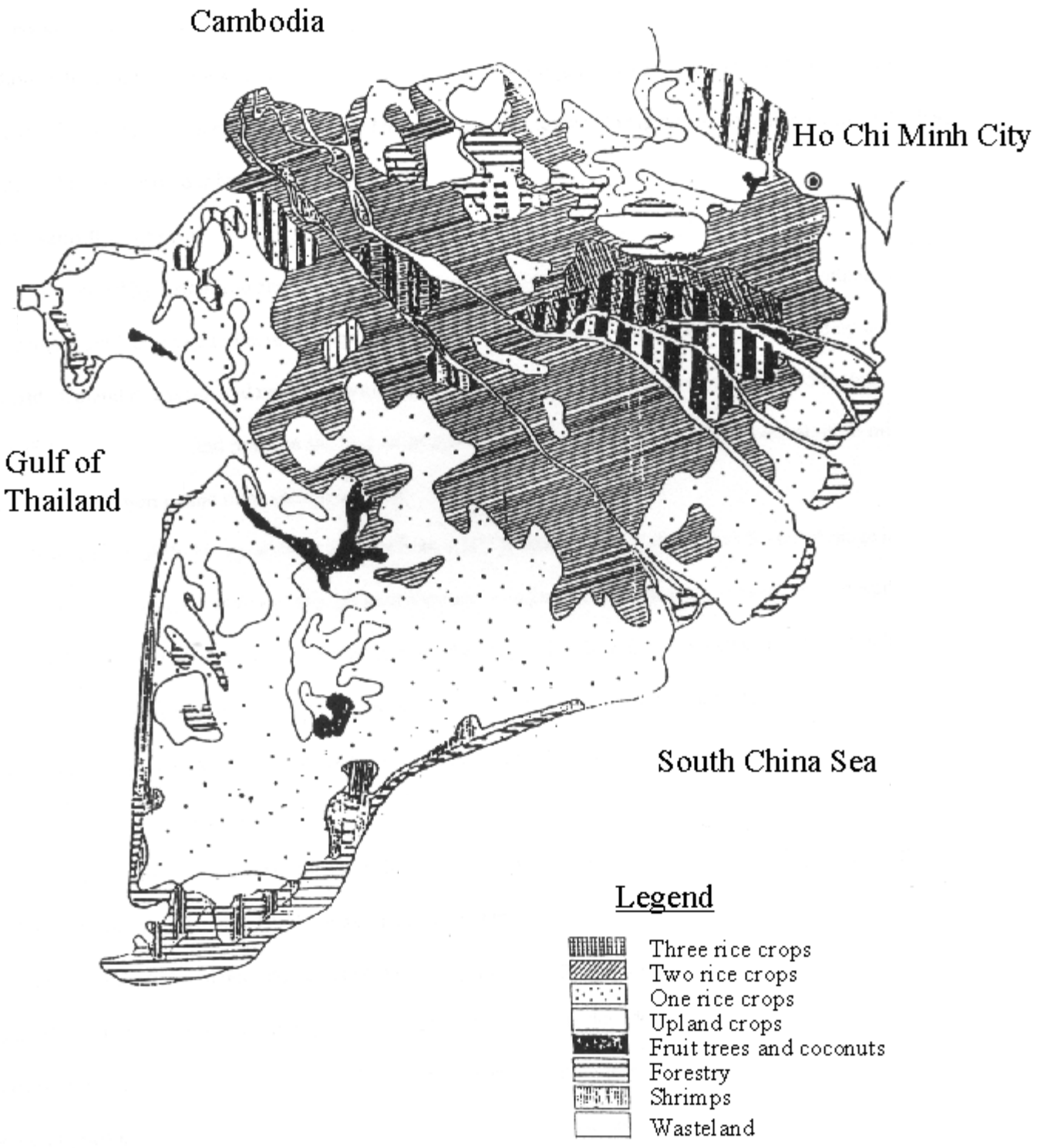
2.2.2 Upland Rice System. As reported by Arraudeau and Xuan (1995), upland rice represents about 450,000 ha or about 2% of the world upland rice area, and about 7% of the rice area in Vietnam. Upland rice is planted mainly as a major food crop in the humid forest zones by some 54 ethnic groups, many of whom are practicing various forms of swidden (shifting cultivation) on their upland plots. The total affected area represents about 8 million ha where more than 3 million ethnic minorities are living. About 20% of the population is composed of minorities and 80% are ethnic Vietnamese (also called the Kinh people). Minorities include 2 million Tay in the north.

The annual rainfall in upland areas varies from 1,300 to more than 2,000 millimeters (mm), but the usual range is 1,400 - 1,800 mm. Rainfall is very erratic and droughts are common in upland areas. As described earlier, the rainy season starts in April - May or even as late as early June, generally peaks in July - August, and ends in October - December. Rainfall is more uniform in the central and southern regions, but varies greatly in the north even over short distances, where a range in elevation of 1,000-2,000 meters over a few kilometers can be found.

Slash-and-burn shifting cultivation is the widely predominant traditional system. In the past, the fallow period was usually 12-15 years or more; however, it is now only 3-10 years because of increasing population pressure. Land degradation is an increasingly serious problem almost everywhere, but particularly in the north.

The major yield-limiting factors for upland rice reported throughout Vietnam are poor soils and drought, weeds, diseases, and pests. Insects that damage rice often involve different species in different areas, making them difficult to control. Long-term development of upland rice will depend largely on effective implementation of the government's policy and initiatives on reforestation, development of barren hills, and restricted migration. The government-sponsored resettlement programs represent an important source of forest degradation. Among the programs to support the resettlement policy, the one with the largest implication for forest degradation and soil erosion is the Fixed Cultivation and Sedentarization Program. The main objective of this program is to stabilize the cultivation by ethnic minorities and encourage socio-economic development and improved income-producing activities targeted toward a population of approximately three million shifting cultivators in the hill and mountain areas. Other parallel programs include sponsored resettlement through the Central Highland Region's land allocation program granting long term use rights (30-50 years) for agro-forestry and financial assistance in development of new blocks of land. However, land degradation in upland areas is still a serious problem in Vietnam.

Figure 2: Mekong River Delta Land Use



2.2.3 Rain-fed and Flood-Prone Ecosystems. The lowland rain-fed rice ecosystems have large variation in terms of areas and production and cropping patterns. A single wet-season Lua Mua rice may be grown annually or rotated with other crops. In Long An Province of the MRD, the practice of dry seeding to make use of early rains during the first crop and transplanting during the second crop make it possible for two crops of rice to be grown under rain-fed conditions. Attracted by higher income potential, rice-fish and rice-shrimp farming systems are fast developing in the flood plain along the coast where there are about 600,000 ha of medium-deepwater rice area with flood water depths of 30-100 cm. The major flood season from September to October makes triple rice cropping difficult in the MRD.

2.2.4 Seasonal Rice Production. From 1976 to 1999, the area planted for the winter-spring rice crop has doubled while the summer-fall crop area has more than tripled (Table 2.2). Area planted to the Lua Mua (10th month) rainy season crop has declined from 3.3 million ha in 1976 to 2.4 million ha in 1998. The highest yield is obtained from the winter-spring crop. Total paddy rice production increased from about 12 million mt in 1976 to 27 million mt in 1996. Estimated total paddy production in 1999 was 30 million mt with an average yield per ha of 4.06 mt (FAS, 2000). The continued rise in paddy production is largely due to improved irrigation, new rice varieties, new rice technologies, and increased triple cropping in the MRD. Further irrigation investment in the MRD of over US $200 million from 1996-99 has increased the planted area by over 0.5 million ha. Although the winter-spring crop has the highest yield, there has been increased salt water intrusion in the MRD, occurring annually at the end of each dry season (usually March to May), which is lowering the yield in some areas. The salt water intrusion is due to lower water levels in the Mekong River (Figure 2). Unusually dry conditions in the spring of 1999 reduced the flow of the Mekong River, causing the deepest penetration of salt water in 30 years (FAS, 1999).

2.3 Varieties

Modern high-yielding rice varieties (HYVs) were rapidly adopted in the irrigated rice bowls of Asia starting in 1966 (Herdt and Capule, 1983). Vietnam was included in the general Asian trend of rapid and widespread adoption of HYVs for irrigated rice production, particularly in the MRD irrigated rice areas. By 1975, approximately one million ha of rice lands were planted in HYVs. By 1993, 2.1 million ha of irrigated and rain-fed land in the MRD were under HYVs, of which about a third is double or triple cropped (General Statistical Office, 1994). The new varieties grown in the MRD are similar to those grown in the irrigated rice bowls of the Philippines and Indonesia. At this stage in the MRD, the opportunities for substantial productivity growth through a switch in varieties are mainly confined to deepwater rice areas that have the potential to be converted to irrigated double rice cropping.

Modern varieties also spread in the RRD but at a slower pace. The adoption of the short-statured varieties was constrained in the RRD by the high submergence risk in the wet season caused by the high incidence of uncontrolled flooding of the Red River. In the dry season, use of modern varieties spread rapidly, replacing longer duration traditional varieties. In 1990, modern varieties accounted for over one million ha of dry-season rice and about 50% of the wet-season Lua Mua rice in the RRD (MAFI, 1990). Further opportunities for expanding the area under modern varieties in the RRD are limited, although the possible adoption of hybrid rice from China could increase the productivity of existing lands grown to modern varieties.

IRRI breeding lines and their crosses were released as improved varieties in Vietnam. There have been 50 varieties released nationwide and 72 varieties released to be adopted in specific localities (MARD, 1996). Modern variety adoption has increased land productivity by increasing rice yield per ha and by making possible an increase in cropping intensities. In areas of the MRD and RRD with adequate irrigation and drainage infrastructure, the cropping intensities are comparable to similar environments in Southeast Asia. The primary constraint to increasing the area under a second or third crop in the MRD has been the lower level of irrigation or drainage investment relative to the other rice bowls in the region. In the RRD, intensification of rice cultivation is constrained by cold temperatures in the early dry season and by submergence and flooding problems in the wet season. The deep-water areas of the MRD offer the best opportunities for increasing the areas under double and triple cropping (Khiem et al. 1996).

2.4 Fertilizer Use

Chemical fertilizer use grew at a rapid rate during the period 1981-88 (Table 2.6). However, the aggregate consumption has varied widely in the last three decades depending on the prevailing political climate, donor support, and foreign exchange reserves. The former Soviet Union was the dominant fertilizer supplier until 1990 when this source of supply was drastically reduced. In 1990, about 80% of the 1.5 million mt of imported fertilizer came from the FSU (Government Statistics Office, 1992). About 400 thousand mt of phosphate fertilizers were produced annually as of 1998. Imported chemical fertilizers have recently accounted for about 85% of total fertilizer supply. Approximately 70 to 75% of all chemical fertilizers imported and locally produced are applied to rice. Aggregate data on fertilizer use for crops other than rice are not available.

Chemical fertilizer application in rice production increased at a rate of 11% annually from 1976 to 1995. The rate was much higher for the period 1981-90 when the expansion in sown area of modern varieties in the MRD was more rapid.

The national average rate of chemical fertilizer use on rice was 40 kg urea equivalent per ha in the period 1976-81, increasing to 100 kg per ha in the period 1983-85, and to 150

Table 2.6 Chemical fertilizer application for Vietnam rice production, 1976-1994

Year	Total fertilizer use (1000 mt)	Fertilizer use in rice (1000 mt)	Rice area (1000 mt)	Rice production (1000 mt)	Fertilizer use in rice (kg/ha)	Paddy per kg fertilizer (kg)
1976	416	217	5,297	11,827	41	55
1977	432	249	5,469	10,597	46	43
1978	377	183	5,463	9,790	33	53
1979	396	184	5,485	11,363	34	62
1980	436	195	5,600	11,647	35	60
1981	484	221	5,652	12,415	39	56
1982	726	407	5,711	14,390	71	35
1983	931	622	5,611	14,743	111	24
1984	897	595	5,675	15,506	105	26
1985	932	622	5,704	15,875	109	26
1986	1142	796	5,689	16,003	140	20
1987	921	623	5,589	15,103	111	24
1988	1266	865	5,726	17,000	151	20
1989	1040	727	5,896	18,996	123	26
1990	1092	815	6,028	19,225	135	24
1991	1174	884	6,301	19,427	140	22
1992	1306	968	6,423	21,500	151	22
1993	1371	1131	6,559	22,836	172	20
1994	1772	1205	6,598	23,528	182	20

Source: Agricultural Statistics, General Statistics Office, Hanoi

kg per ha in 1986-92. Average 1996 use in the MRD was 165 kg urea, 91 kg NPK, and 112 kg other fertilizer per ha for the main spring crop. It was reported that farmers in the RRD also apply 8 to 10 mt of farmyard manure per ha in rice production (Khiem et al. 1996). Most farmers in the MRD do not use manure. Fertilizer productivity in rice production shows a steadily declining trend. The average amount of paddy produced per kilogram of fertilizer declined from 50 kg in the period 1976-81 to 20 kg by 1994-95 (Table 2.6).

During the historical period of collective agricultural production, application of green manure was common on collective lands. With the switch to the contract system of production in 1981, requiring farm households to sell a contracted part of the harvest to the state at a fixed price, green manure production declined rapidly.[1] With increasing opportunity costs of labor, the use of farm family labor for the production of green manure will become increasingly expensive. Less labor demanding options for maintaining soil fertility will be needed to maintain the level of output.

For irrigated rice production, one should not expect much further productivity growth to be achieved by increasing the amount of fertilizer use. The partial factor productivity with respect to fertilizer use has been on a rapidly declining trend, similar to other intensively cultivated areas across Asia. Productivity could be enhanced to some degree by increasing the efficiency of fertilizer use. Improved placement, incorporation of fertilizers, and better timing of fertilizer application can have significant yield effects per kilogram of fertilizer applied.

2.5 Input Use and Management

Labor and mechanical power input: Unlike its Southeast Asian neighbors, growth in the use of mechanical power in Vietnam has been constrained by centralized control of machines and restrictive import policies. Up until 1989, the government followed a policy of 'technical duality' with respect to mechanical power. For operations with a perceived labor displacement effect such as land preparation, mechanical power was discouraged and improved animal tools were encouraged. For other operations such as pumping, milling, and threshing, mechanical equipment was encouraged. The wage rate has continued to be extremely low in Vietnam with the average household income about US $12.00 per month (Bolay et al., 1997).

Machinery imports took precedence over local manufactured equipment and machinery pools were encouraged over individual contract hire operations. The net result was a sparse spread of small farm equipment. In 1977, the north

[1] With the switch to the contract system of production, green manure production declined rapidly for several reasons. First the opportunity cost of land used for green manure production increased substantially since it could now be used for high-value crop production, which generated income directly for the farm household. Second, green manure production required high amounts of labor (especially for incorporation). Third, since the land was not owned by the cultivator, the incentives for investing in long-term soil fertility were small. China experienced a similar decline in green manure production when it switched from collective agricultural production to the "household responsibility system" (Stone, 1990).

only used 10,160 tractors, which provided mechanized land preparation for 16% of the area; in the south, 27,520 tractors provided mechanized land preparation for 30 to 40% of the area. Thus, the use of labor and mechanical power is much different in the MRD compared with the RRD and other northern areas of Vietnam.

As a result of this government policy, labor and mechanical power utilization in Vietnam other than the MRD is substantially different from the neighboring Southeast Asian rice bowls. The spread of mechanical power technology has not been as extensive as in the neighboring countries, especially for land preparation and threshing. Many rice growing operations now being performed by machines in other countries continue to be done by human and animal power in northern Vietnam.

Farm households, relying almost exclusively on farm labor, have devised several labor-saving practices for land preparation, crop establishment, harvest, and post-harvest activities. A factor productivity analysis by Khiem and Pingali found that rice labor utilization in person-days per ha per crop had declined from about 85 in 1989 to 71 in 1992. Use of hired labor per ha also declined from 25 to 20 person-days per ha per crop. One can anticipate significant labor productivity effects to result from the spread of mechanical power for land preparation, harvesting, and threshing.

Since 1988, individual ownership of machinery has been allowed and machinery pools have been disbanded. Contract plowing and threshing operations are now common in the MRD and could potentially emerge in the RRD. For the MRD, it is estimated that approximately 50% of the farmers use tractors and power tillers for land preparation and harrowing; of these, 95% rent contract plowing services. In the case of threshing, approximately 90% use axial flow threshers, all of them through rental arrangements. Average crop land per farm is estimated at 1.6 ha in the MRD (IFPRI, 1996) with an average of 2 parcels per farm.

In the RRD, given the small and widely dispersed parcels that farmers cultivate, animals have been the predominant source of power. Average crop land per farm is estimated at 0.23 ha in the RRD with an average of 8 parcels per farm (IFPRI, 1996). Almost all farmers use animal-drawn plows and harrows. Mechanical threshing, using pedal threshers, has become popular since 1989. The pedal threshers are generally obtained through rental services.

Further policy reforms are required to support the private manufacture of small farm equipment as well as credit for equipment purchases. Without these reforms, it is unlikely that further machinery use will be widespread in Vietnam.

The RRD continues to have one of the most labor-intensive cultivation systems in Asia. Labor input is around 250 man-days per ha per crop. The very labor-intensive rice production system of west Java has an average labor input per crop of 106 man-days per ha. The total labor used in the Philippines is 69 man-days per ha, and in Thailand, 42 man-days per ha. Labor input in the MRD is comparable to these countries with about 54 man-days per ha per crop. Family labor accounts for around 61% of the total labor input in the MRD and 94% in the RRD, as compared to 50% for Thailand, 30% for the Philippines, and 13% for Indonesia. With prospective increases in wages and the rising opportunity cost of family labor, sustaining rice productivity growth in the RRD will require less labor-demanding crop management technologies.

Crop establishment: Despite trends towards increased mechanization of rice production in Asia, one of the main labor bottlenecks continues to be crop establishment through transplanting rice seedlings. Indonesia also has this problem where labor requirements for transplanting are approximately one third of the total labor used for crop production. Costs to the farmer are not only monetary but also organizational, in terms of ensuring adequate and timely labor for transplanting. In countries such as Thailand, where the rapid growth in off-farm employment has increased the opportunity cost of labor and therefore agricultural wages, there has been a rapid shift from transplanting to direct seeding within the last decade. The direct seeding operation requires minimal amounts of hired labor. The average crop establishment labor requirement in Thailand is only 4 man-days per ha as compared to 29 man-days per ha for Indonesia, and in Central Luzon, 14 man-days per ha. In Vietnam both extremes exist; in the north, transplanted rice requires around 55 man-days per ha, while in the south, farmers practicing direct seeding only use two to three man-days per ha per crop.

The majority of the MRD farmers use direct seeding rather than transplanting. Given the restrictions on hiring labor that existed prior to 1989, Vietnamese farmers had to depend primarily on family labor resources for the very labor-intensive transplanting operation. Consequently, there has been a switch from transplanting to direct seeding. In the MRD, direct seeding involves broadcast seeding with minimal amounts of herbicide use, where water levels in the paddy are manipulated to control weed growth. Weed control also includes 2-4-D application and hand weeding 30 days after broadcast seeding.

Direct seeding has not been adopted in the RRD because of the short growing season. As mentioned earlier, for the spring rice crop, 45-60 day-old seedlings are transplanted. If the spring crop was direct seeded, two of the four months available for a high-value winter crop would be lost. To switch from transplanting to direct seeding of the wet season crop, an additional month would be required in the field, but this period would conflict with the harvest of the spring crop. Intensive cultivation of three crops (two rice and one upland crop) is possible only with transplanting of both rice crops. Direct seeding even one of the crops would reduce the cropping intensity to two crops per year. Given the very high opportunity cost of land in RRD, transplanting will likely continue to be the norm despite the higher labor requirements. The transplanting operation in the MRD also only requires about half the labor amount used in the north, main-

ly because 30-day old seedlings are used.

Crop care: The most labor-intensive crop care operation in rice production is weeding. In farming systems where high levels of herbicides are used, manual weeding requirements are minimal; hence crop care labor requirements are low. Thailand uses a relatively low crop care labor input of 7 man-days per ha compared to Indonesia and northern Vietnam, which use 32 and 46 man-days per ha, respectively (Table 2.7). Labor used for weeding in the MRD is much lower than in northern Vietnam at around 13 man-days per ha per crop, which is comparable to the Philippines.

Table 2.7 Labor, fertilizer, and pesticide use for rice production in selected countries, dry season.

	Philippines (N. Ecija)	Thailand	Indonesia	Vietnam	
Input Item				Northern	Southern
Year	1989	1989	1989	1991	1991
Sample size	132	146	71	184	97
Farmer's yield (mt/ha)	4.83	3.82	6.33	4.33	5.28
Labor (man-days/ha)	68	42	106	246	96
Land preparation	12	5	7	33	17
Crop establishment	14	4	29	54	12
Crop care	12	7	32	69	35
Harvest	30	26	38	90	32
Fertilizer (kg/ha)					
Nitrogen	99	80	95	93	90
Phosphorous	23	41	76	23	40
Pesticides ($/ha)	29	19	20	7	18

Source: Khiem et al. (1996)

The amount of labor required for weeding depends on the amount of herbicides used. Herbicide use is still very low in Vietnam. In both the MRD and the RRD, manual weeding is done almost exclusively by family labor. The opportunity cost of family labor is expected to rise as a result of non-rice employment opportunities and the increasing trend towards diversification out of rice. A relatively small increase in herbicide use could have significant productivity effects.

2.6 Harvest and Post-Harvest Operations

As in other Asian countries, the labor peak at harvesting will cause labor to become increasingly expensive as alternative employment opportunities become available. Small-scale mechanization of harvest operations could have significant productivity effects. Threshing labor requirements have dropped in both northern and southern Vietnam due to the increasing use of mechanical threshers, i.e., axial flow type in the south and pedal threshers in the north. In the 1991 dry season, manual harvesting in the RRD required approximately 33 man-days per ha and approximately 15 man-days in the MRD. While harvesting labor in the north is predominantly family, over 70% of this labor tends to be hired in the south. Field threshing in the south reduces yield loss as well as labor use (Table 2.8).

The intensity of land use varies in the MRD. The cultivated land/labor ratio ranges from lowest in Ben Tre Province (0.14 ha of cultivated land per laborer) and Tien Giang Province (0.46 ha) to highest in Long An (Plain of Reed) and Kien Giang (Long Xuyen Quadrangle). The migrating laborers are the landless or smallholders in all provinces of the MRD but the majority come from densely populated areas of Ben Tre and Tien Giang Provinces. In the Plain of Reed and Long Xuyen Quadrangle, migrating laborers contribute up to 80-90% of harvesting labor. The divergence of harvest times within the MRD provides all-year-round employment for migrating workers. However, the labor shortage during peak harvest time raises the wage rate and the cost of harvesting especially in August every year. The normal harvesters' share of output is 20 kg paddy rice per cong (1300m^2) but can increase up to 30 or 40 kg/1300m^2. There is a regular seasonal movement pattern of hired laborers between provinces in the MRD that is determined by the rice harvest calendar.

Table 2.8. Post-harvest losses in two sequences of harvesting operations, Mekong River Delta, 1995

Operation	Sequence A	Sequence B
	----------kg./ha----------	
Cutting loss	131.1	233.3
Shattering	107.0	187.1
Missed cut	24.1	46.3
Handling loss	25.9	50.0
Bundling		50.0
Gathering	25.9	
Threshing loss	129.9	169.7
Blower	84.3	116.9
Separation	33.4	37.8
Transport loss	12.2	15.0
Total loss	286.9	456.7
Percentage of yield loss	7.16%	11.4%

Source: Khiem et al., 1996.

Note: Sequence A: draining water off the field -cutting -gathering -stacking -threshing on the field -cleaning -transport (paddy) to house. Sequence B: cutting -gathering -bundling -transport (reaped stalk bundles) to house -stacking -threshing near the house -cleaning. Estimates were done based on 24 farmers' fields in each group. All growing IRRI variety (MTL85).

2.7 Production Cost

Studies on rice production costs in different agro-ecological environments and crop production seasons of Vietnam in 1995/96 showed the average cost per ha planted ranging from US$ 384 to US$ 638 or from US$ 85 to US$ 130 per mt of rough rice (Table 2.9). The RRD has relatively high cost compared with the MRD because of the small, labor-intensive farms. Comparative studies on production cost of modern and traditional varieties in the MRD by IRRI and Can Tho University in 1991/92 yielded similar results (Table 2.10).

Estimated production cost of modern varieties was about two times higher than that of traditional varieties. In general, there is abundant labor and few employment opportunities except during harvest periods in rural areas, thus the imputed cost for family labor tends to be high if it is valued at the wage rate of hired labor. On the other hand, the irrigation fee paid

Table 2.9 Comparison of Mekong River Delta and Red River Delta rice production costs and returns by season, 1995-96

Region/crop	Yield (mt/ha)	Price ($/mt)	Income ($/ha)	Cost ($/ha)	Net return ($/ha)
MRD:					
winter-spring	6.02	$131	$789	$394	$395
summer-fall[1]	4.80	154	748	408	340
rainy season[2]	4.01	173	693	384	309
RRD:					
winter-spring	5.15	$180	$926	$638	$288
summer-fall[1]	–	–	–	–	–
rainy season[2]	4.36	$190	$828	$569	$259

Source: Data derived from International Food Policy Research Institute 1996. Rice Market Monitoring and Policy Options Study, Washington, D.C.

[1] The summer-fall crop is not planted in the RRD because of the shorter growing period.

[2] The rainy season crop is commonly referred to as the 10th month or Lua Mua crop in Vietnam.

Table 2.10 Costs and returns in rice farming in the Mekong River Delta, 1991-92

			Irrigated rice	
Item	Unit	Deep-water rice	Autumn harvest	Spring harvest
Yield	mt/ha	2.4	4.9	5.9
Labor	man-day/ha	48	84	98
Fertilizer NPK	kg/ha	27	195	219
Paid-out costs				
Total	US$/ha	103.4	240.5	249.1
Current inputs	US$/ha	27.6	124.2	145.6
Capital rental charge	US$/ha	23.9	57.1	48.4
Wage bill	US$/ha	34.2	40.8	37.1
Land tax	US$/ha	17.7	18.1	18.1
Imputed costs				
Total	US$/ha	85.1	123.2	134.2
Family labor	US$/ha	22.8	53.1	61.4
Family capital	US$/ha	0.9	7.0	7.4
Interest charge	US$/ha	61.4	63.1	65.4
Total cost	US$/ha	188.5	363.7	383.3
Gross returns	US$/ha	242.5	406.0	488.9
Evaluation of benefits	US$/ha	214.9	281.8	343.3
Value added	US$/ha	139.1	165.5	239.8
Family income	US$/ha	139.1	165.5	239.8
Operating surplus	US$/ha	54.0	42.3	105.6
Unit cost of production	US$/mt	79	74	65
Labor productivity	US$/day	2.3	1.6	1.7

Source: Khiem et al., 1996.

by farmers is heavily subsidized. Farmers usually have to pay for the operating cost of the irrigation project but not for the cost of the capital investment. Production cost for the MRD is the most important of all regions for evaluating the international competitiveness of Vietnam as most of the exported rice is produced in the MRD. The cost of production per ha in the MRD ranged from US $384 to US $408 in 1995-96 (Table 2.9). The estimated cost per mt of paddy was US $50.58 for the winter-spring crop, US $85 for the summer-fall crop, and US $95.76 for the rainy season "Lua Mua" crop. Average farm paddy prices per mt for these three crops were reported to be US $131, US $154, and US $173, respectively, in 1995/96 (IFPRI, 1996). Net return per ha in the MRD ranged from a low of US $309 for the rainy season crop to US $395 for the winter-spring crop in 1995/96. Paddy prices had declined to a range of only US $71 to US $92 per mt in 2000 (FAS, June 2000). The estimated paddy production cost in 2000 was US $85-US $92 per mt for the MRD (US Department of Agriculture, FAS, June 2000).

3. UTILIZATION AND MARKETS

3.1 Domestic Marketing

In the period before 1987, food was considered a political good and the food industry was monopolized by the state. The private market was suppressed and the rice marketing system was tightly controlled. Paddy procurement was carried out using three alternative forms. Under the first form, each cooperative or rice production group had to turn over to the government a certain quantity of paddy. The second form was used to collect payment for the irrigation fee, land preparation, seed, fertilizer or barter for manufactured commodities. Under the third form of trade, farmers could sell paddy to the state based on an agreed price, which was below the market price. Only about 2-3% of total paddy was traded on the free market.

Prior to 1988, the Ministry of Food (MOF) was in charge of all paddy distribution from the village up to the national level. At the village level, agricultural cooperatives were responsible for distributing food to their members, and for buying paddy under the supervision of the MOF to fulfill their food obligations to the state. Reform policy initiated in 1988 liberalized the domestic rice market. Small private traders and dealers came into the rice market to compete with the state marketing system. Public food companies, which formerly monopolized retail rice distribution, now concentrate on processing rice and perform inter-provincial trading and export. They now depend primarily on private traders for sourcing their rice supply. Wholesale rice markets have been established at several supply points such as Cantho and Cai Be in the MRD. Both the domestic and export market prices for rice have been updated daily at wholesale rice markets since 1988. After decades of importing rice as well as experiencing severe food shortages in 1987-88, Vietnam exported 1.4 million mt of rice in 1989. Over 1989-96, rice production grew 4.8 % per year and rice exports grew 11% per year. Vietnam became the third largest rice exporter in 1996 when exports reached 3 million mt. World rice trade increased from 10-12 million mt in the mid 1980s to over 20 million mt by 1995, providing an outlet for the increased exports from Vietnam.

National rice exports have continued upward since 1995, reaching 4.5 million mt for the marketing year 1998-99: however, export demand dropped sharply in June 2000. For the first 10 months of calendar 1999, the exported grades were 5% or less broken (0.62 million mt); 10% broken (0.56 million mt); 15% broken (0.91 million mt); 25% broken (1.37 million mt); and 100% broken (0.20 million mt). Major rice importers during this period were: Africa (0.90 million mt); Cuba (0.20 million mt); Indonesia (1.12 million mt); Iraq (0.37 million mt); and the Philippines (0.50 million mt). Export prices per mt for VN long-grain white rice FOB Ho Chi Minh City (HCMC) were US $200 for 5% broken, US $195 for 10% broken, and US $178 for 25% broken as of February 2000. February 2000 domestic prices were US $121-129 per mt for farm paddy (16% moisture) and US $179-186 per mt for average white rice. By June 2000, the local white rice price had dropped to US $106-128 per mt and paddy prices dropped to US$ 71-92 per mt which is at or below production cost. Rice export prices ranged from US $136 to $165 per mt in June 2000.

There continue to be major infrastructure problems in rice transport and port facilities that increase the marketing cost. The HCMC port, which handles about 70% of the rice exports, has a congested channel access to the South China Sea and relatively high port costs, causing the shipment cost of exports to be almost twice as much as from ports in Thailand. The Cantho port is better located on the Mekong River but can only accommodate small vessels. The excessive shipping cost from Vietnam restricts the FOB port price for rice compared to other rice exporters with better port facilities.

3.2 Mekong River Delta Rice Market

Since 1989, a quality rice export premium has induced an increase in both private and state investment in milling facilities in the MRD. Improved milling technologies from Japan, France, and Italy were introduced. The MRD milling sector now includes over 5,000 small mills scattered in all villages to serve the local markets, 175 medium rice mills with an average capacity of over 2 mt per hour equipped with grading and polishing facilities, and 7 large mills with a capacity of over 4 mt per hour. In addition, there is a jumbo-size Satake mill with over 6,000 mt capacity per day at HCMC and one with 240 mt per day capacity located at Soc Trang.

Marketing costs and margins for a typical farmer-private trader/assembler-public food company-export channel in the MRD are shown in Table 3.1. On the average, 96.5% of Vietnam rice farmers sold their paddy to traders (IFPRI Survey, 1995-96). MRD farmers received about $98 per mt for their paddy in 1995 (Table 3.1). Marketing cost from the farm

Table 3.1 Rice marketing cost for farmer-private trader/assembler-public food company-export channel in Mekong River Delta, 1995.

Channel/cost item	Long An	Dongthap	Cantho	Minhai	MRD
1. Smaller trader/assembler			US$ per metric ton		
Farm gate price (paddy)	$103.76	$94.68	$97.71	$94.95	$97.80
Transport cost (10 km)	2.05	2.05	2.05	2.05	2.05
Tax	0.46	0.46	0.46	0.46	0.46
Profit	3.92	6.23	6.60	6.05	5.49
Subtotal to food company	110.18	103.39	106.79	103.49	105.78
2. Public food company					
Trader price (paddy)	110.18	103.39	106.79	103.49	105.78
Transport cost (50 km)	0.92	1.47	1.47	1.47	1.47
Loss	1.83	2.20	2.11	2.20	2.02
Subtotal per mt paddy	112.93	107.06	110.37	107.16	109.27
X 1.58 mt paddy[1]	178.43	169.15	174.38	169.31	172.65
Milling polishing and grading	4.59	4.13	4.59	4.59	4.52
Depreciation	2.75	2.29	4.87	1.38	2.33
Storage fee and loss	0.46	0.49	0.42	0.41	0.42
By products (bran/broken)	(14.68)	(13.76)	(14.22)	(13.76)	(13.85)
Subtotal ex food company	171.55	162.30	170.04	161.97	166.0
3. Export processing					
Bank interest (3 mo.)	4.59	4.59	5.05	4.13	4.59
Transport/loading	2.29	3.76	3.21	6.42	3.97
Packaging bags	7.34	7.34	7.34	7.34	7.34
Export tax (1%)	1.99	1.99	1.99	1.99	1.99
Port operation cost	4.13	4.59	4.63	4.59	4.30
Total cost (milled rice)	191.89	184.57	192.22	186.40	188.26
Export price	199.36	199.36	199.36	199.36	199.36
Profit	7.47	14.79	7.14	12.96	11.10

Source: Market survey by Khiem, et al. (1996).

[1] Estimated for 63% milling yield in 1995. FAS estimated the milling yield at 66% for 1997-99 (FAS, April 1999); however, farm paddy is typically sold at 16% moisture and should be stored at 13% moisture to maintain high quality.

gate to the pubic food company added $11 per mt of paddy. The milling yield of 63% required 1.58 mt of paddy per mt of white rice. Milling cost per mt of white rice was $7.27 per mt including short-term storage. Bran and broken rice by-products returned a value of $13.85 per mt of white rice, thus there was a margin of $21.20 per mt of white rice milled by the food company. Additional cost to market the white rice for export was about $22 per mt, increasing the total cost to $188.26 per mt FOB the HCMC port. The export price in 1995 was $199.36 per mt, which was almost the same as for 5%-10% broken white rice in 1999.

Unit operating costs per mt of rice marketing agents in the MRD were estimated at $11.67 for wholesalers, $6.29 for medium size millers, $7.29 for large millers and polishers, and $44.99 for state-owned enterprises (SOEs)(IFPRI Survey, 1995-96). Rice sales of SOEs in the MRD are mainly for export. Marketing agents in the MRD receive a 29% share of the rice retail price as their margin; farmers get a 71% share.

3.3 Central and Red River Delta Rice Markets

The Central Region, the RRD, and other areas north of the MRD are traditionally rice-deficit regions. Less than a third of the national rice output is produced outside of the MRD and RRD. In the 1998-2000 period, about 54% was produced in the MRD and 17% in the RRD. Unit operating costs per mt of marketing agents in the RRD were estimated at $7.85 for wholesalers, $3.26 for medium size millers, $8.24 for large millers and polishers, and $55.26 for SOEs. The marketing system is less developed in the RRD compared with the MRD, and volumes handled by various marketing agents are much smaller. Marketing agents in the RRD earned only a 17% margin share of the retail price and farmers got an 83% share (IFPRI Survey, 1995-96).

The participation of private marketing agents in these two regions is mainly in local markets. Private agents supply about 80% of the local consumption demand, handling small quantities of 3-5 mt per agent per year. About 150 rice mills serve the Hanoi market. Farmers directly market 36% to consumers in the Central Region, 26% in the RRD, and less than 4% in the MRD. A wider range of different marketing channels is used in the RRD than in the MRD including: (1) farmer-consumer, (2) farmer miller-consumer, (3) farmer-food company-consumer, (4) farmer-private trader-food company-consumer, and (5) farmer-private trader-retailer-consumer. Estimated MRD farm sale outlets in 1996 were 10% to state assembly, 80% to private wholesale assemblers, 8% to retail assemblers and 2% to millers (Kheim et al. 1996.) The net marketing margin varied from 5% to 10% in 1996. Processing costs of state-owned enterprises ranged from $43 to $55 per mt, about 4 to 5 times higher than for private millers.

3.4 Domestic Demand

Domestic utilization accounted for 15.1 million mt of milled rice in 1998 compared with 3.5 million mt exported (FAO, 1998). Direct food use of rice was 12.8 mt in 1998. Rice has traditionally been a staple Vietnamese food, accounting for about 75% of total caloric intake (Daly, 1973). Per capita food use in 1998 of other carbohydrates was 38 kg of starchy roots, and 12 kg of corn and wheat (FAO, 1998). The target rice intake for Vietnam was set at 147 kg per person per year in 1995. Rice availability in 1995 was 176 kg per capita for the RRD, 438 kg for the MRD, and 187 kg for Vietnam overall, leaving a surplus of about 3 million mt (IFPRI, 1996). Reported rice consumption per household in 1992-93 (the most recent consumption survey) ranged from 750 kg to 950 kg in rural areas and 500 to 700 kg in the cities (Table 3.2). The average household rice consumption calculated from the 1992-93 Vietnam Living Standards Survey conducted by the General Statistics Office was 806 kg in rural areas, 617 kg in urban areas, and 768 kg overall in Vietnam. The richest 20% of rural households only consumed 705 kg compared to 526 kg in the richest 20% of urban households. The reduced consumption in more affluent households suggests that per capita rice consumption could fall as income rises in Vietnam. Although the average household size was not reported in the 1992-93 survey, it was determined in the IFPRI survey (1995-96) that average household size of rice farmers was five in the RRD and 5.8 in the MRD. Thus, the average rice consumption was 140-161 kg per capita in the rural areas that constitute 80% of the population.

Table 3.2 Vietnam rice consumption and purchase per household by income group, 1993.

Region	Quantity consumed (kg)	Quantity purchased (kg)	Per capita income US $[1]	Purchase % of income
Vietnam	768	316	128	10.8
Rural	806	256	107	9.8
poorest 20%	780	181	48	11.4
2nd poorest 20%	824	269	74	12.1
3rd poorest 20%	854	281	99	9.9
4th poorest 20%	837	276	135	7.6
richest 20%	705	296	237	5.8
Urban	617	557	211	15.2
poorest 20%	727	585	57	32.7
2nd poorest 20%	746	638	85	26.4
3rd poorest 20%	712	648	113	21.0
4th poorest 20%	648	580	155	15.0
richest 20%	526	492	323	8.7

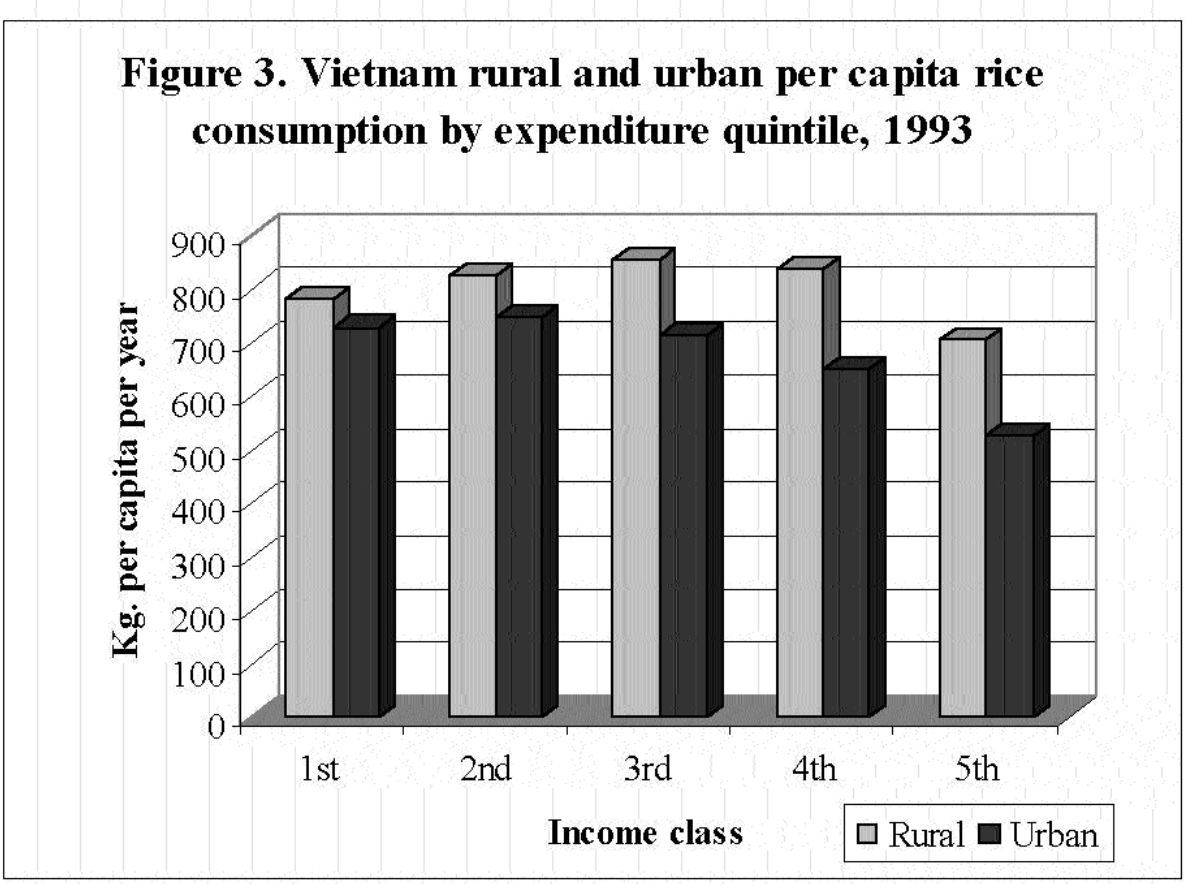
Source: Vietnam Living Standards Survey, General Statistics Office. 1992-93

[1] 10,000 VND per US $1.00 in 1993

Vietnam set an ambitious target in 1999 of doubling the per capita availability of domestic animal protein by 2010 (FAS, December 1999). As of 1998, the per capita availability of animal protein was only 13.7 grams, among the lowest in Asia (FAO, 1998). Over the past several years, Vietnam's urban economy has begun a steady transition from the traditional open-air wet market to modern supermarkets and shopping centers. This trend alone has greatly increased the importation of Western food products. As of 1999, Hanoi had over 25 mini-marts and supermarkets, and HCMC had in excess of 30. Trade in imported consumer-ready food products is expanding with about $1.0 billion imported in 1998 (FAS, 1999). The newly imposed 5-day work week coupled with increased urban income has increased demand for ready to eat food, snack foods and luxury food items. Increased urbanization is expected to reduce per capita urban rice consumption as urban households have more diversified diets. As indicated in the 1993 survey, the urban rice consumption per capita is significantly less than the rural consumption in Vietnam (Figure 3). However, about 80% of Vietnam's current population still resides in rural areas with low per capita income. The rural population may continue to increase per capita rice consumption with increased income as illustrated in Figure 3.

The urban population in Vietnam is projected by IFPRI to grow from about 20% in 1995 to 33-35% of the total by 2020 (Goletti, et al., 1997). Bolay et al., (1997) predicted that the Vietnam urban population will account for 27.1% in 2000 and 46.7% in 2020. A national population control plan has been drafted to reduce total population growth below 1.9% in 2001 and gradually reducing it below 1.5% in 2025 (Xuan, 1997). The government proposes a penalty system for violation of the population control plan.

Long-term rice demand projections were developed by Goletti, et al., 1997 (Table 3.3). Three demand scenarios were



assumed. The high-demand scenario assumed 4% urban population growth from 1995-2020, the medium 3.7% growth, and the low with the urban population level staying at 20% of the total population. Income growth per year was assumed to be 4% for the high, and 6% for the medium and low projections. Total population change was derived from UN population projections, which included high, medium, and low variants for the three respective demand projections. Per capita rice demand is projected to fall in future years with all projections as households become more wealthy and adopt more diversified diets. Total demand in 2020 is estimated at 17 million mt with the high projection, 14.7 million mt with the medium, and 13.4 million mt with the low (Table 3.3).

Although the projection for Vietnam by Goletti et al. (1997) that per capita rice consumption will eventually fall and have negative income elasticity may be true eventually, there is still speculation in 2000 whether or not the average per capita rice consumption in Vietnam is declining. Only Japan and South Korea with a high degree of urbanization and high income, and more recently Malaysia and Thailand, have experienced a decline in per capita use. The income threshold experienced at which consumers start substituting higher-quality and more varied foods for rice has not yet been reached in other Asian countries including India, Indonesia, Bangladesh, and the Philippines. Average per capita rice demand in Vietnam has continued rising since 1995 subsequent to the projection by Goletti et al. (1998) to reach over 211 kg in 2000 (PS&D, 2000). Vietnam rice consumption has also been replacing other cereal consumption (Hossain, 1996).

The domestic rice demand projection for 1998 to 2010 developed by the Arkansas Global Rice Model (AGRM) assumes a slight increase in per capita total use based on the recent growth rate of total per capita domestic use (Wailes et al., 2000). Per capita total domestic use is projected to increase from 212.5 kg in 1999 to 215.4 kg in 2010. This total domestic use includes seed use and waste as well as the consumption or food use. The difference in this domestic use estimate compared with the estimate by Goletti et al. (Table 3.3) is the probable seed use and waste after milling. It is possible that the domestic demand projections by Goletti et al. (1997) may not have included the seed and waste components of demand, which could result in an overestimate of the surplus available for export.[2]

[2] The analysis by Goletti et al. (1997) assumed a milling conversion factor of 0.65 and a net yield of 56% from paddy to milled equivalent. This loss of paddy can easily occur through harvest and transport operations (see Table 2.8). They estimated exports as the residual of production and consumption after deducting this milling conversion and loss factor.

Table 3.3 Vietnam rice demand projections, 1995–2020

Year	Low demand[1]			Medium demand[2]			High demand[3]		
	Per capita (kg/year)	Population (millions)	Total demand (million mt)	Per capita (kg/year)	Population (millions)	Total demand (million mt)	Per capita (kg/year)	Population (millions)	Total demand (million mt)
1995	157	73.8	11.6	157	73.8	11.6	157	73.8	11.6
2000	156	80.0	12.5	157	80.5	12.6	158	81.0	12.8
2005	153	85.2	13.0	153	86.8	13.3	157	88.5	13.9
2010	148	88.7	13.1	149	92.3	13.7	156	95.8	14.9
2015	142	92.6	13.2	144	98.0	14.1	154	103.6	15.9
2020	138	96.5	13.4	141	104.2	14.7	152	111.9	17.0

Source: Goletti et al., 1997

[1] 6% income growth, 4% urban population growth, low variant UN population projection

[2] 6% income growth, 3.7% urban population growth, medium variant UN population projection

[3] 4% income growth, 0% urban population growth, high variant UN population projection

3.5 Export Markets

While the domestic input-output markets have largely been liberalized, most of the import/export sector is still monopolized by the state. Export and import licences, especially for primary commodities, have been granted to only SOEs. A few private-sector firms were permitted to export rice in 1999 for the first time but with only tiny direct allocations and quotas from the provincial government. At the start of the liberalization process in early 1989, 42 parastatals (government-owned enterprises) were granted permits to export rice. Some of them did not have experience in dealing with the international buyers and locating sources of domestic supply. This arrangement has lead to high risk in meeting terms of contracts, thus contributing to a lower price for Vietnam export rice compared with similar quality rice from Thailand. Late in 1993, the government decided to further limit the number of rice export organizations by granting export licenses to only 21 state companies. In 1994, this number was reduced to 14 plus a few temporary ones (Table 3.4). Selection was based on the volume of paddy surplus in each province. Provinces with more than 20 thousand mt of paddy surplus were allowed to establish one export enterprise. Two export enterprises were granted for each province if the volume was higher than 60 thousand mt.

The Prime Minister's Office normally approves the rice export target each year based on a recommendation by the Ministry of Agriculture and Rural Development (MARD) and the Ministry of Trade (MOT). MARD is responsible for maintaining the country's food supplies and for recommending where and when to export. The MOT supervises all import/export activities and sets the minimum rice export price that is adjusted based on world price fluctuations. Export quotas, amounting to 70% of the export target, are distributed to the licensed exporters at the start of the year. The remaining 30% is reserved for later distributions based on an assessment of possible shortfalls in domestic supplies. Companies pay an export tax ranging from 1 to 4% of gross value depending on product value, 2% in the case of rice, plus contributions to the state budget. The rice export target set for 2000 was 4.2 million mt (FAS, December 1999).

The MOT and the Association of Rice Exporters jointly set a floor price for exported rice in each quality class in reference to the world market price. For instance, in January 1996, the floor price for 25% broken rice was set at US $297-300 per mt.

Although export licences have been limited only to parastatals, private traders and millers indirectly participate in the business by supplying rice. There are also trilateral arrangements in which private traders deliver contracted rice to specified locations or ports. In recent years, up to 70-80% of exported rice has come from private companies or traders. When a state company gets an order, it purchases the required amount of rice from private companies. There is no open bidding process. Presumably each state company works with a group of private companies, although the exact arrangements are not clear. In Cai Be, Tien Giang province and Cantho City in the Mekong Delta, wholesale markets were established and the spot market price was set daily. These markets have become the standard for setting the farmgate and retail price for rice. In recent years, several parastatals and private millers have invested in upgrading milling and processing facilities in order to capture the premium associated with higher quality rice. The proportion of 5% broken, as opposed to 35-40% broken, in total rice exports increased from less than 1% to 26% in 1993 (Table 3.5). However, lower quality rice was exported in 1999.

Table 3.6 summarizes principal buyers of Vietnam rice in the period 1989-92 and 1999. Most of the importers that buy Vietnam rice re-sell to third parties. The four largest buyers of Vietnam rice in the period 1990-95 were France, Singapore, Hong Kong, and Malaysia. About 35% of the total rice exports in 1992 had final destination in Africa; 31% went to Asian countries (Malaysia, Sri Lanka and India accounted for 62%); 10.5% went to the Middle East; 9.2% went to North America; 5.9% went to South America; and 5.8% went to Russia.

In recent years, attracted by the high food price in China and despite tight control by the government, illegal rice exports have increased through the northern border by small traders. Many of the same ethnic groups live on both sides of

Table 3.4 List of parastatals granted licenses to export rice in Vietnam, 1996

Name of the companies	
1. Food Company of Long An Province	10. Import/Export Company of Kien Giang
2. Food Company of Tien Giang Province	11. One parastatal of Dong Thap Province
3. Food Company of Vinh Long Province	12. One parastatal of An Giang Province
4. Food Company of Can Tho Province	13. Food Company of Ho Chi Minh City
5. Food Company of Soc Trang Province	14. Petechim (Petroleum & Chem. Imp./Exp Company)
6. Food Company of An Giang Province	15. Southern General Food Company (VINAFOOD II)
7. Food Company of Minh Hai Province	16. Northern General Food Company (VINAFOOD I)
8. Import/Export Company of Tra Vinh	17. Import/Export of Thai Binh Province
9. Agric. Inputs Import/Export Company of Dong Thap	

Source: Khiem, et al. 1996.

Table 3.5 Distribution of rice exports by percent broken, Vietnam, 1989-93 and 1999

Export class by percent broken	1989	1990	1991	1992	1993	1999
			Percent			
5	0.3	3.3	6.0	18.5	25.7	19.9
10	1.5	13.0	30.0	20.8	25.6	17.5
15	3.0	5.9	3.0	13.0	13.3	25.0
20	2.3	2.0	8.0	1.2	8.2	-
25	4.9	20.2	26.4	15.4	14.7	37.6
35	82.8	46.5	19.0	23.0	9.2	0.3
45	5.2	5.0	2.0	1.0	-	-

Source: Ministry of Trade, Hanoi, 1989-1993, and FAS, March 2000.

Table 3.6 Principal export destinations of Vietnam rice, 1989-92 and 1999.

Country	1989	1990	1991	1992	1999
			Thousand metric tons		
France	324.6	161.6	250.8	496.6	171.0
Hong Kong	99.2	7.9	158.2	313.6	34.0
India	61.1	44.9	5.0	77.1	--
Cuba	14.1	10.7	14.4	68.9	195.0
Indonesia	131.2		59.3	22.6	1,379.0
Iran	--	94.6	--	--	111.0
Italy[1]	--	--	--	14.7	--
Iraq	--	--	--	46.0	453.0
Libya	--	--	--	50.5	
Russia	--	146.8	57.0	12.1	11.0
Malaysia	--	--	41.5	221.1	142.0
Japan	--	--	60.5	65.2	15.0
Philippines	--	334.2	--	--	502.0
Singapore	--	0.2	172.9	352.1	84.0
Netherlands[1]	--	--	--	18.9	--
South Korea	--	--	--	76.7	10.0
Others	790.0	824.0	213.3	116.0	1,448.0
Total	1,420.2	1,624.9	1.032.9	1,951.1	4,555.0

Source: Statistics of Vietnam's Economy, 1993, and FAS, March 2000

[1] Included with France to represent European Union imports in 1999.

the border. These illegal exports to China were estimated to reach about 0.5 million mt in 1994 (Khiem et al, 1996). Some illegal rice imports also enter Vietnam from Cambodia (FAS, June 2000). In 1999, the major importers were Indonesia (1.4 million mt); the Philippines (0.5 million mt); Iraq (0.5 million mt); West Africa (0.5 million mt); and Cuba (0.2 million mt).

Export prices in October 1999 fell to near the lowest level in six years (Table 3.7) due to a major reduction in import demand by Indonesia, the major importer of Vietnam rice in 1999. However, there was some later strengthening in the export price by December 1999.

Table 3.7 Average export price of Vietnam rice, 1989-95 and 1999.

Rice export class by percent broken	1989	1990	1991	1992	1993	1994	1995	1999
				US$ per metric ton				
Average export price	226	188	229	208	204	214	238	196
5 percent broken	270	250	253	241	206	235	289	203
15 percent broken	–	–	--	212	184	225	277	196
35 percent broken	–	–	--	191	167	200	265	180

Source: Vietnamese Association of Food Imports and Exports 1996, and FAS, October 1999.

For 2000, the government of Vietnam had approved a rice export quota of 4.3 million mt excluding any surplus from the north and central provinces. The new quota was to be allocated with 2.9million mt to direct rice exporters in the MRD and HCMC, 1.2 million mt to state food corporations and foreign-invested enterprises having licences in rice processing for export, and 0.2 million mt for non-direct exporters, i.e., companies who sign export contracts (FAS, March 2000).

4. POLICY REFORMS AND RICE PRODUCTIVITY

From 1976 to 1985 following the Vietnam War, the collective system was in effect and the main development for agriculture was irrigation investment to shift the rice sector to a more modern rice production system.

The economic renewal ("Doi Moi") program, initiated in the late 1980s, yielded unprecedented levels of GDP growth, averaging 8% per year between 1990 and 1997. This GDP growth contributed to a significant reduction in the share of the population living in acute poverty. Some major reforms undertaken from 1989 to 1996 include:

- decollectivization of agriculture and new land law promising security of land tenure
- price reforms, including removal of virtually all administered prices, movement toward interest rate liberalization and exchange rate unification
- liberalization of foreign trade and investment
- progress towards establishment of a legal framework for the encouragement of private-sector led growth
- initial opening of the financial sector to domestic and foreign private banks

Two distinct sets of policy reforms contributed to the recent rice export boom in Vietnam. The first set of reforms initiated in 1981 involved switching from a collectivized agricultural production system to a household-oriented contract system of production. The second set of policy reforms initiated in 1988 liberalized the agricultural sector and restored producer incentives. A detailed account of the policy reforms and their impact is found in Pingali and Xuan (1992).

4.1 Contract System of Production

Faced with large food deficits and declining productivity, Vietnam switched from collectivized agricultural production to a household-oriented contract system of production in 1981. Collectivized production was well entrenched in northern Vietnam, where all production was carried out by production teams using communally-owned equipment. Payment for producers' paddy was based on the work-point system that involved an assessment of the producers' work effort. In southern Vietnam, attempts at collective efforts were made only for obtaining inputs and marketing output. Overall, collectivization attempts failed to fulfill the government policy objective of rapid food productivity growth. In fact, the growth in aggregate rice output was at its lowest level during the 1976-81 time period. The failure of collectivization in Vietnam can be attributed to ineffective policies that disregarded producer incentives and disrupted market mechanisms for the flow of inputs and outputs.

The contract system of production that replaced collectivization in 1981 was designed to improve producer incentives and thereby increase productivity. In this system, individual households were required to enter into a contract with the collective to produce a certain level of output on the land assigned to them for production. The contracted output had to be sold to the state at a fixed price. All output in excess of the contracted amount could be kept for home consumption or sold to private traders.

The introduction of the contract system of production allowing farmers to be compensated for production above the contracted quota had a significant impact on food output growth between the years 1981 to 1987, when output started to level off. Aggregate paddy output grew annually at the rate of 3.14% during 1982-87 as compared to 0.46% for the 1976-81 time period (Table 4.1). Most of the output growth was attributed to an increase in yield rather than an expansion in area cultivated. In the southern provinces, aggregate paddy

Table 4.1 Milled rice supply, export, and consumption, 1980 and 1987-95.

	1980	1987	1988	1989	1990	1991	1992	1993	1994	1995
Total supply (1000 mt) [1]	6,534	8,473	9,537	10,657	10,785	11,008	12,112	1,281	13,176	13,958
Import (+) or export (-) (1000 mt)	168	202	108	-1,317	-1,428	-1,010	-1,950	-1,722	-1,983	-2,052
Reserved stock variation (1000 mt)	--	159	-293	320	153	-163	138	na[2]	na[2]	na[2]
Available for consumption (1000 mt)	6,702	8,834	9,352	9,660	9,510	9,835	10,300	1,108	11,193	11,906
Population (mil. persons)	53.7	62.4	62.7	64.7	66.2	6.76	69.3	71.0	72.5	73.9
Per capita availability (kg)	125	141	147	149	144	145	149	156	154	161

Source: Ministry of Agriculture and Rural Development, Food Security Project.
[1] Total rice output minus 15% accounted for post-harvest losses and seed.
[2] Not available.

output grew by over 2.5 million mt from 1980 to 1987. For the same period, the corresponding increase in the northern provinces was around 2 million mt. Pingali and Xuan (1992) provide an econometric estimate of the productivity impact in Vietnam of switching from collectivized agricultural production to the contract system. The switch to the contract system was estimated to have resulted in a productivity jump of 12% and 16%, respectively, for the northern and southern provinces. By 1989, Vietnam was producing 90% of its food requirements as compared to 73% in 1980 (UNDP, 1989).

The success of the contract system could not be sustained over the long term due to the following reasons: 1) land use and crop choice decisions were administered by the State Planning Commission in the traditional "top-down approach," without consideration of farmer preferences and local market conditions; 2) the government often failed to procure all the grain it had contracted to procure at harvest time due to financial difficulties; 3) as a consequence of (2), seasonal surpluses at the farm gate often led to a crash in the private rice price in several regions, which while benefitting the urban poor had obvious severe disincentive effects on the farmers; 4) the persistence of providing only centralized input supplies resulted in inadequate and untimely provision of inputs to the farmers; and 5) the lack of land tenure security resulted in inadequate farm-level investments for maintaining long-term land productivity.

4.2 Rice Market Liberalization

Some shortcomings of the above contract system were corrected through a series of reforms introduced in 1989 (see Pingali and Xuan, 1992 for a detailed account). The most important reforms were: 1) assigning farmers long-term, inheritable leases on their land; 2) replacement of the contract system with a fixed land tax system, which meant that farmers were no longer required to sell a large part of their output to the state at a low price; 3) increased privatization of the output market; 4) decentralization of input supplies; and 5) removal of the food grain subsidy for government employees and the army.

These policy reforms resulted in a sharp increase in rice exports. In early 1989, when the food grain subsidy was removed, the rice price in government stores was equated to the private market price without considering quality differences. The quality of rice sold in government stores was much poorer than the privately sold rice since farmers traditionally supplied their quota obligations with lower quality rice. Since there was no longer a price advantage at the government stores, the former recipients of food grain subsidies quickly shifted to purchasing the higher quality rice from the private market, thus causing a major buildup of government rice stocks. The excess government stocks were sold on the international market by mid-1989. Between June to December 1989, approximately 1.2 million mt of rice were exported out of Vietnam compared to only 100 thousand mt total rice exports for the entire year of 1988 (IRRI, 1991).

The free-market price (Hanoi market price) increased rapidly in 1989 due to both the sudden shift in demand as a result of removing the subsidy and the subsequent large-scale disposal of publically held rice on the export market by the government. The domestic rice price in early 1989 was US $125 lower per mt than the world market price because of the competition from government-subsidized rice. The domestic price equaled the world price by mid-1990. Since the purchase of food grains from farmers was also privatized in 1989, the farmgate price rose rapidly in response to the exports-induced shift in demand. In the south, the farmgate price for the wet-season harvest rose from US $58 per mt of paddy in 1989 to US $75 per mt in 1990. The farm price then leveled off at US $85 per mt in 1991 and 1992. Rice sales by southern households responded to the increased price, rising from 2.7 mt per year per household in 1989 to 6 mt per year in 1990, and 7.5 mt per year in 1992, with an increase in average land area per household from 1.0 ha in 1989 to 1.20 ha in 1992. Total rice sales per household in the south rose from 40% of total production in 1989 to 66% in 1992. Rice sales were much less in the north but went up from 95 kg per household in 1989 to 162 kg per household in 1992, with a fixed average land area of 0.25 ha per household.

The additional rice sales from 1989 to 1992 came mostly from an increase in production; however, in the first and second year of market liberalization (1989-90), rice exports may have come at the expense of some domestic consumption, especially in traditionally food-deficit areas such as northern and central Vietnam. This can be inferred from the substantially higher prices in northern Vietnam relative to the price in Ho Chi Minh City in the early years. This situation changed after 1991 as regional price differences, after accounting for transport costs, were not significantly different (Barker, 1994). A comprehensive assessment by Khiem (1994) has shown that the growth in rice production has come from both area expansion and yield growth induced by the liberalization policies. Details of Khiem's study are summarized below.

4.3 Productivity Impact of Market Liberalization

Using time series and cross-section data covering the seven regions of Vietnam over 17 years from 1976-92, Khiem (1994) estimated the impact of policy reforms in 1981 and 1989 on rice area expansion, yield and fertilizer demand. The effects of market reforms and of crop-specific policies on farmers' land use and input allocation decisions were estimated by a system of supply response equations using methodology by Mundlak (1988).

Irrigated rice area increased significantly with market reforms. The movement from the collective system to contract farming (1981-88) led to a 10.4% increase in irrigated rice area. Liberalization of the rice market in 1989 lead to a further 33% increase in irrigated rice area. The irrigated area expansion occurred mainly in the MRD, through a substitution out of maize to irrigated dry-season rice cultivation and through the conversion of rain-fed deep-water production areas to double crop irrigated rice cultivation. Rice area expansion did not occur in the RRD or in central Vietnam.

Policy reforms and the restoration of producer incentives resulted in significant yield increases in both the RRD and the MRD. Under the 1981-88 contract system, farmers obtained 30% higher yields than under the collective system. Further liberalization of the rice market in 1989 led to additional yield gains of 54%. Yield gains occurred mainly in the irrigated environments where modern rice varieties became widely used.

Yield growth occurred chiefly because of rapid increase in chemical fertilizer use with market liberalization. Relative to the collectivization period prior to 1981, fertilizer use per ha increased by 44% in the north and 211% in the south with the movement to the contract system. A further increase in fertilizer use took place with additional market liberalization initiated in 1989. Average fertilizer use per ha was 40 kg in 1976-81, 120 kg in 1987-88, and 140 kg in 1992.

Land reallocation and the promulgation of new land law constitute the most important components of agricultural policy reform affecting rice production. When the contract system replaced the collective system, and farm lands were allocated to households, farmers still had the obligation to turn over to the state a contracted level of output at a fixed price. Although this shift from a fixed wage to a fixed rent system of production increased efficiency in management decisions and work efforts, the lack of tenure security, low output price, and inadequate input supplies constrained further growth in productivity. More tenure security was provided in 1988 when new long-term cultivation rights lasting from 15 to 25 years that are transferable within the family were granted to households. Despite this improvement in land tenure, the continued prohibition of private-land transfer and the limitation of the tenure period discouraged market transactions in land and reduced incentives for private investments for land conservation and improvement. To overcome these problems, regulations on land tenure were revised in the Land Law approved by the National Assembly in July 1993. The Land Law allows the holders of land-use titles to have five rights: "exchange, transfer, inheritance, lease and mortgage," conditional to the payments of taxes for such transfers. The 1993 Land Law represents a major advancement for Vietnam in the reform of land property institutions for promoting market-oriented economic development. The Land Law provides nearly the same security in household land-use rights as private property rights in developed market economies even though state ownership is maintained (Hayami, 1994). To insure the titling of land-use rights to individual households, land-use certificates were issued based on cadastral surveys.

5. OUTLOOK AND CONCLUSIONS

Although Vietnam has had spectacular growth in rice exports starting from 1989, government policy has restricted development of the rice marketing system to the disadvantage of the private sector. An important restriction is the government rice export quota policy that allocates the quota only to state-owned enterprises (SOEs). Thus the private sector was prohibited from engaging in rice exporting. The export quota also represents an implicit tax on domestic producers. A few private-sector firms were permitted to have direct export licences in 1999 for the first time. In 2000, 90% of the rice export quotas will be allocated to provinces and cities (FAS, October 1999). These export quotas may be re-allocated to various rice exporters including the private sector. There also has been restricted domestic trade from the south to the north due to inter-provincial trade regulations and taxes. These market restrictions reduce the efficiency of the marketing system and the distribution system.

Despite these problems in rice marketing control by the government, Vietnam has made progress in recent years in moving from a planned economic model to a more effective market-based economy. Except for rice, most prices are now fully decontrolled, and the currency has been fully devalued and floated at world market prices. The scope for private sector activity has been expanded through de-collectivization of the agricultural sector and the introduction of laws giving legal recognition to private business. Nearly three-quarters of current export earnings are generated by two commodities:

rice and crude oil. Output has risen, led by construction and industry. However, the industrial sector remains burdened by non-competitive SOEs that the government is unwilling or unable to privatize. These inefficiencies, in turn, contribute to the low income of rice farmers by increasing the marketing cost and reducing the export value of rice and also do not help to correct the problem of high unemployment in Vietnam.

5.1 Arkansas Global Rice Model Baseline Projection for 2001-2010

Rice price and income elasticities used in the Arkansas Global Rice Model (AGRM) for Vietnam are derived from logarithmic equations based on the previous ten-year period. For 1999, the estimated retail price elasticity of demand was -0.018 and the income elasticity 0.17 for the average rice consumer. The urban and rural population are combined in one demand function. Estimated elasticity of area harvested with respect to farm price also derived from logarithmic equations was 0.11 for the MRD and 0.043 for the rest of Vietnam in 1999. The AGRM baseline projection assumes no major shocks will occur from 2001 to 2010 regarding the weather or international developments that would impact rice trade. The AGRM for Vietnam is linked with a multi-country econometric model that projects equilibrium world prices and trade of rice in the international market (Wailes et al., 2000). The AGRM baseline projection shown in Table 5.1 is that the Vietnam harvested area will increase from 7.7 million ha in 2001 to 7.9 million ha in 2010, about 0.3% per year. Average yield in milled equivalent increases from 2.73 mt per ha in 2001 to 3.11 mt in 2010, about 0.14% per year. Total milled production increases from 21.1 to 24.6 million mt, and total per capita use including seed and waste increases marginally from 212.5 to 215.4 kg. Population is projected to increase from 77.4 million in 2001 to 86.4 million in 2010 based on Wharton Econometrics Forecasting Associates (WEFA) and Project LINK estimates (Wailes et al., 2000). Total domestic use including waste and seed use increases from 16.9 to 19.1 million mt. Net exports are projected to increase from 4.2 million mt in 2001 to 5.5 million mt in 2010.

5.2 Alternative Arkansas Global Rice Model Projections for 2001-2010

Since there is some uncertainty as to whether or not Vietnam can maintain its impressive growth rate in rice production and also some speculation about the future domestic demand, a sensitivity analysis was added to the AGRM baseline projection to determine the impact on net exports. The sensitivity analysis included both positive and negative adjustments to the annual growth rate for rice yield and similar adjustments to the annual increase in GDP that would change the per capita consumption. The projection of domestic demand by the AGRM included an income elasticity of 0.17 for per capita rice consumption. The alternative scenarios for annual growth in rice yield included the baseline growth rate of 1.38% compared with a higher rate of 1.6% and a lower rate of 1.2%. The effect on net exports with the baseline domestic use projection shown in Table 5.2 was an increase in net exports from 5.0 million mt in 2010 to 6.2 million mt with the higher yield growth scenario and a decrease to 5.2 million mt in 2010 with the lower yield growth scenario.

GDP was adjusted up 1% or down 1% from the baseline each year. Net rice exports in 2010 with the baseline yield growth are projected to be 5.8 million mt with the lower GDP compared with 5.2 million mt using the higher GDP (Table 5.2). The combination of higher yield growth and lower GDP scenario resulted in an export projection of 6.5 million mt in 2010 compared with only 4.6 million mt using the low-yield growth and higher GDP scenario.

5.3 International Food Policy Research Institute Alternative Projections for 2000-2010

IFPRI's Vietnam rice economy projections (Goletti et al., 1997) are based on three alternative supply scenarios and three demand scenarios (Table 5.3). The IFPRI projections use population projection data that are derived from the United Nations (UN). The alternative UN projections for Vietnam's population are (1) low variant (80.0 million in 2000 rising to 88.7 million in 2010); (2) medium variant (80.5 million in 2000 rising to 92.3 million in 2010); and (3) high

Table 5.1 AGRM baseline projection of Vietnam rice supply and utilization, 2001-2010 (milled equivalent).

Variable	Units	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Harvested area	(1000 ha)	7,728	7,774	7,800	7,820	7,827	7,854	7,872	7,892	7,911	7,933
Milled yield	(mt/ha)	2.73	2.77	2.81	2.85	2.90	2.94	2.98	3.02	3.07	3.11
Production	(million mt)	21.1	21.5	21.9	22.3	22.7	23.1	23.5	23.9	24.3	24.6
Per capita use	(kg)	212.5	212.7	213.0	213.3	213.6	214.9	214.3	214.6	215.0	215.4
Population	(million)	77.4	78.4	79.4	80.4	81.4	82.4	83.4	84.4	85.4	86.4
Total domestic use	(million mt)	16.9	17.1	17.4	17.6	17.9	18.1	18.4	18.6	18.9	19.1
Net exports	(million)	4.2	4.4	4.6	4.7	4.8	5.0	5.1	5.2	5.4	5.5

Source: Wailes et al. (2000)

Table 5.2. AGRM alternative projections of Vietnam rice supply and utilization, 2001-2010 (milled equivalent).

Scenario/variable	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1. Baseline scenario:					Million metric tons					
Production	21.1	21.5	21.9	22.3	22.7	23.1	23.5	23.9	24.3	24.6
Total domestic use	16.9	17.1	17.4	17.6	17.9	18.1	18.4	18.6	18.9	19.1
Net exports	4.2	4.4	4.6	4.7	4.8	5.0	5.1	5.2	5.4	5.5
2. Higher yield growth scenario:[1]										
Production	21.2	21.7	22.1	22.5	22.9	23.4	23.9	24.3	24.8	25.3
Total domestic use	16.9	17.1	17.4	17.6	17.9	18.1	18.4	18.6	18.9	19.1
Net exports	4.3	4.5	4.7	4.9	5.1	5.3	5.5	5.7	5.9	6.2
3. Lower yield growth scenario:[2]										
Production	21.0	21.4	21.8	22.1	22.5	22.8	23.2	23.5	23.8	24.1
Total domestic use	16.9	17.1	17.4	17.6	17.9	18.1	18.4	18.6	18.9	19.1
Net exports	4.1	4.3	4.4	4.5	4.6	4.7	4.8	4.9	4.9	5.0
4. Lower GDP growth scenario:[3]										
Production	21.1	21.5	21.9	22.3	22.7	23.1	23.5	23.9	24.3	24.6
Total domestic use	16.8	17.1	17.3	17.5	17.7	17.9	18.1	18.4	18.6	18.8
Net exports	4.2	4.5	4.7	4.8	5.0	5.2	5.3	5.5	5.7	5.8
5. Higher GDP growth scenario:[4]										
Production	21.1	21.5	21.9	22.3	22.7	23.1	23.5	23.9	24.3	24.6
Total domestic use	17.0	17.2	17.5	17.8	18.0	18.3	18.6	18.9	19.2	19.5
Net exports	4.1	4.3	4.4	4.6	4.6	4.8	4.9	5.0	5.1	5.2
6. Higher yield/higher GDP scenario[5]										
Production	21.2	21.7	22.1	22.5	22.9	23.4	23.9	24.3	24.8	25.3
Total domestic use	17.0	17.2	17.5	17.8	18.0	18.3	18.6	18.9	19.2	19.5
Net exports	4.2	4.5	4.6	4.8	4.9	5.1	5.3	5.4	5.6	5.8
7. Lower yield/lower GDP scenario[6]										
Production	21.0	21.4	21.8	22.1	22.5	22.8	23.2	23.5	23.8	24.1
Total domestic use	16.8	17.1	17.3	17.5	17.7	17.9	18.1	18.4	18.6	18.8
Net Exports	4.2	4.3	4.5	4.6	4.8	4.9	5.1	5.1	5.2	5.3
8. Higher yield/lower GDP scenario[7]										
Production	21.2	21.7	22.1	22.5	22.9	23.4	23.9	24.3	24.8	25.3
Total domestic use	16.8	17.1	17.3	17.5	17.7	17.9	18.1	18.4	18.6	18.8
Net exports	4.3	4.6	4.8	5.0	5.2	5.5	5.7	6.0	6.2	6.5
9. Lower yield/lower GDP scenario[8]										
Production	21.0	21.4	21.8	22.1	22.5	22.8	23.2	23.4	23.8	24.1
Total domestic use	16.8	17.1	17.3	17.5	17.7	17.9	18.1	18.4	18.6	18.8
Net exports	4.1	4.3	4.5	4.6	4.8	4.9	5.0	5.1	5.2	5.3

[1] Yield growth of 1.6% versus baseline of 1.38%
[2] Yield growth of 1.2% versus baseline of 1.38%
[3] GDP of 1.0% less than baseline
[4] GDP of 1.0% more than baseline
[5] Yield growth 1.6% and GDP of 1% more than baseline
[6] Yield growth 1.2% and GDP of 1% more than baseline
[7] Yield growth 1.6% and GDP of 1% less than baseline
[8] Yield growth 1.2% and GDP of 1% less than baseline

variant (81.0 million in 2000 rising to 95.8 million in 2010). All three UN population projections for Vietnam exceed the one used in the AGRM projection, which would tend to increase total domestic rice consumption and decrease rice exports. However, as shown in Table 3.3 earlier, the IFPRI study used extremely low per capita rice-use coefficients compared to those used in the AGRM projections. The IFPRI per capita use coefficients were based on patterns of rice consumption per household in the 1992-93 Vietnam Living Standards Survey, which excluded seed use and at least part of the waste. The only loss assumed in the IFPRI study was the 56% net yield of paddy to milled equivalent, which likely would only cover the harvesting and transport losses before milling. On the demand side, the IFPRI per capita use coefficients distinguish between urban and rural consumers and account for a changing mix of the urban and rural population, which causes the price elasticity and income elasticity to change over time with the changing ratio of urban and rural population (see Table 3.3). The AGRM does not explicitly account for possible changes in this population mix as only one per capita consumption estimate is used in the analysis. The three IFPRI supply scenarios vary on the rice area growth

Table 5.3 IFPRI projections of Vietnam rice supply and utilization, varying supply and demand conditions, 2000-2010 (milled equivalent)

Year/variable	Low supply[1] Varying demand			Medium supply[2] Varying demand			High supply[3] Varying demand		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
2000:									
Sown area (1,000 ha)	6,766	6,766	6,766	7,111	7,111	7,111	7,111	7,111	7,111
Milled yield (mt/ha)[4]	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20
Production (million mt)[4]	15.0	15.0	15.0	16.3	16.3	16.3	16.3	16.3	16.3
Domestic (million mt)	12.5	12.6	12.8	12.5	12.6	12.8	12.5	12.6	12.8
Net exports (million mt)	2.4	2.4	2.2	3.8	3.7	3.6	3.8	3.7	3.6
2005:									
Sown area (1000 ha)	6,766	6,766	6,766	7,111	7,111	7,111	7.474	7,474	7,474
Milled yield (mt/ha)4	2.33	2.33	2.33	2.42	2.42	2.42	2.52	2.52	2.52
Production (million mt)4	15.9	15.9	15.9	17.4	17.4	17.4	19.0	19.0	19.0
Domestic use (million mt)	13.0	13.3	13.9	13.0	13.3	13.9	13.0	13.3	13.9
Net exports (million mt)	2.9	2.6	2.0	4.3	4.0	3.4	6.0	5.7	5.1
2010:									
Sown area (1000 ha)	6,766	6,766	6,766	7,111	7,111	7,111	7.474	7,474	7,474
Milled yield (mt/ha)4	2.47	2.47	2.47	2.57	2.57	2.57	2.67	2.67	2.67
Production (million mt)4	16.8	16.8	16.8	18.4	18.4	18.4	20.1	20.1	20.1
Domestic use (million mt)5	13.1	13.7	14.9	13.1	13.7	14.9	13.1	13.7	14.9
Net exports (million mt)	3.8	3.1	2.0	5.3	4.7	3.5	7.0	6.4	5.2

Source: Goletti, et al. (1997).

[1] No area growth, 1.2% yield growth

[2] 1% area growth from 1995-2000, then no area growth, yield growth 2% from 1995-2000, then 1.2%

[3] 1% area growth from 1995 to 2005, then no area growth, yield growth of 2% from 1995 to 2005, then 1.2% growth

[4] Production based on 66% milling rate and 14.5% waste of milled rice, ie. net 56% of paddy; calculated in Table 3.3.

and yield growth. The low-supply scenario assumes no area growth and 1.2% annual yield growth Other medium- and high-supply scenarios assume both area growth and yield growth (Table 3.3). The IFPRI high-supply scenario for 2000-2010 compares the closest on area with the AGRM baseline projection (Table 5.1) except that IFPRI uses planted area and the AGRM is based on harvested area of rice. The milled yield per ha with the IFPRI high-supply scenario also comes closest to the AGRM yield estimate but is still less. Production from 2001-2010 is projected to be less with the IFPRI high-supply scenario than in the AGRM projection (Table 5.3). The AGRM model for Vietnam is linked with a multi-country econometric model that projects equilibrium world prices and trade of rice in the international market (Wailes et al. 2000). It may be noted that the IFPRI supply analysis was based on the 1995-96 IFPRI survey when both the rice area and yield were much less than currently. The IFPRI model also is not linked to any international rice model as is the AGRM to allow for price response to the international rice market.

Rice exports in the IFPRI report are forecast to range from 2.2-3.8 million mt with alternative scenarios in 2000 to a change of 2.0-7.0 million mt in 2010 (Table 5.2). The IFPRI high-supply scenario with a range of 5.2-7.0 million mt of rice exports compares the closest of all supply scenarios with the AGRM export projections of 4.6 to 6.5 million mt in 2010 with alternative assumptions regarding the rate of yield growth and GDP changes.

Other Vietnam rice export projections have been developed by Food and Policy Research Institute at Iowa State University and USDA. FAPRI projected that Vietnam's net exports would increase from 4.00 million mt in 1999/2000 to 5.53 million mt in 2009/2010 (FAPRI 1999 Baseline Summary, November 1999). USDA projected 4.1 million mt in 1999/2000 increasing to 5.3 million mt in 2010 (USDA-ERS, February 2000).

Vietnam is currently facing an economic slow down since 1998 due to the East Asian crisis and other internal problems. The internal problems include the lack of balance in economy growth, leading to widening rural-urban gaps and a capital-intensive pattern of growth that is not generating sufficient jobs. These internal problems could increase disparities between rural-urban areas and between different regions and place severe strains on Vietnam's natural environment with major degradation occurring. The continued low rice production cost in Vietnam has been sustained by low agricultural wages because of the poor job opportunities. A major improvement in Vietnam's employment situation could shift the competitive advantage of Vietnam as a rice exporter.

Farmers have had a successful market for rice since 1989 but incurred an extremely low price problem in 2000 when the market price was near or below the production cost. A persistence of this problem could cause a major shift out of rice to other crops that are less risky to produce than rice because of the flooding and drought conditions.

5.4 Conclusions

Economic reforms in Vietnam have contributed to a spectacular rise in rice production and exports. After rice self-sufficiency was attained in 1989, Vietnam shifted rapidly from importing rice to become the second largest world rice exporter, second only to Thailand. The production shift was due to both an expansion of area and improvement in yield. Production increased 5% yearly from 1988 to 1995 with area expansion contributing about 2.4% and yield 2.8% of the annual growth rate. Production has increased another 20% from 1995 to 1999 to 30 million mt (paddy equivalent) with area increasing by 13% and yield 7%. The continued expansion is mainly due to the conversion of single to double or triple rice cropping in the MRD. Improved drainage and irrigation also contributed to the area increase. Modern short-season variety adoption and higher fertilizer use have increased rice yield and also supported the increase in cropping intensity.

Rice production cost in Vietnam has continued to be low by international standards due largely to the low rural labor cost and the subsidized cost of irrigation. Estimated production cost of paddy ranges from $51 to $96 per mt in the MRD, the dominant exporting region of Vietnam. Estimated supply cost of milled rice at the HCMC port was about $188 per mt in 1995 including a 1% government export tax (Khiem et al.., 1996). The export price at the HCMC port in 1995 was $199.36 per mt, almost the same as for 5%-10% broken white rice exported in 1999 (FAS, 2000).

Although Vietnam has developed a strong export program in rice, government policy has restricted development of the rice marketing system to the disadvantage of the private sector. An important restriction is the government rice export quota policy that sets a rice export quota, which is allocated only to state-owned enterprises (SOEs). The quota represents an implicit tax on domestic producers. The prohibition on private-sector rice exporting eliminates benefits of competition, adding to marketing costs and restricting the export price of Vietnam rice. Vietnam also tends to have a lower export price compared with similar quality rice from Thailand because of the high transport cost in shipping from the HCMC port.

Despite these problems in rice marketing control by the government, the country has made progress in recent years in moving from a planned economic model to a more effective market-based economy. Except for rice, most commodity prices are now fully decontrolled, and currency has been fully devalued and floated at world market prices. There is also some policy improvement for rice as a few private-sector firms were permitted to have direct export licences in 1999 for the first time. A more liberal policy for rice will help to further increase rice production and exports.

Although the growth rate of increased rice production has been slowing in the past 5 years there is still strong potential for further growth. A key question regarding exports is: "What will be the change in domestic rice consumption with increased prosperity in Vietnam?" The current population in 2000 is estimated at about 76 million with 80% living in rural areas. Current average per capita rice demand is about 211 kg (PS&D, 2000). Other studies of Vietnam have assumed a major increase in the population living in urban areas, which would reduce per capita rice demand and free up additional rice for export (Goletti et al, 1997). However, there is still speculation whether per capita rice use is declining in Vietnam although the 1992-93 Vietnam Living Standards Survey suggested that urban consumption was less than rural consumption and richer households consumed less rice per capita.

The Arkansas Global Rice Model (AGRM) baseline estimate for Vietnam projects that net exports will increase from 4.2 million mt in 2001 to 5.5 million mt in 2010 (Wailes et al. 2000). This baseline projection assumes no major shocks will occur from 2001 to 2010 regarding the weather, policy, or international developments that would impact rice trade. Population is projected to increase from 77.4 million in 2001 to 86.4 million in 2010 based on WEFA and Project LINK estimates (Wailes et al., 2000). Total per capita milled rice use including seed and waste is projected to increase from 212.5 to 215.4 kg. Total projected milled rice use is 19.1 million mt in 2010 and projected milled production is 24.4 million mt, leaving a residual for export of 5.5 million mt.

Due to the uncertainty about future growth in rice production and also rice consumption in Vietnam, a sensitivity analysis of both yield growth and GDP changes was conducted with the AGRM. Projections of net rice exports in 2010 ranged from 4.6 to 6.5 million mt with the two alternative yield growth scenarios and the two alternative GDP scenarios. The general conclusion is that Vietnam will continue to be a major world rice exporter for at least the next decade.

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