

CHAPTER 1 INTRODUCTION

1.1 Background

Cambodia is one of the world's poorest developing countries. The agricultural sector has played a major role in contributing to the economic and social prosperity of Cambodia. Even though agricultural and economic development undertook a serious decline during a decade of civil war (1970-79) when there was much destruction of the resource base, the country has returned to more rapid growth after the failure of the Pol Pot regime at the end of 1979. The agricultural sector is looked upon to provide the main structure for the development of the war-torn economy.

In its initial efforts to revive agricultural production, a May 1980 agriculture conference introduced collectivization of the agricultural sector under socialistic central planning, including the formation of solidarity groups (*Krom Samaki*) as production units. They were small aggregates of twenty to fifty families, later reduced to fifteen families, living in the same locality, known to each other and able, to a certain extent, to profit collectively from their work. People working together in this way were able to offset somewhat the shortages of manpower, draft animals and farm implements when the country was recovering from war damage. According to some analysts from the former Soviet Union, the solidarity groups "organically united" three forms of property (Mortimer 1987):

- (a) the land, which remained state property;
- (b) the collectively-owned farm implements and the harvest; and
- (c) the individual peasant's privately-owned holding, each the private property of a peasant family.

In theory, each solidarity group received between ten and fifteen hectares of common land (first property), depending upon the region and land availability.

This land had to be cultivated collectively and the harvest (second property) had to be divided among member families according to the amount of work each family had contributed, as determined by a work point system. In addition to the land it held in common with other group members, family was also entitled to a private plot of between 1,500 and 2,000 square meters (third property) depending upon the availability of land. Individual shares of the group harvest and of the produce from private plots were the exclusive property of the producers, who were free to consume, store, barter or sell them. However, surplus outputs, especially the output of rice, had to be sold to the government in exchange for other goods and services (when they were available) (Mortimer 1987).

Thereafter, the government declared in the Fourth Party Congress (May 26 to May 29, 1981) that the nation's economic system had three main parts - the state economy, the collective economy and the family economy - and that each of these parts had its own significant role. The collective economy, the largest of the three elements, was assigned an important role in agricultural rehabilitation and development.

Although some official reports asserted that progress had been made following attempts at pushing collectivization forward in the countryside, in fact, there had been very little change (Frings 1993)¹. Frings (1993, p. 36) emphasises that:

"At present, the work of strengthening the organisation and management of the Production Solidarity Groups still encounters many difficulties and complications...Production Solidarity Groups".

By 1985, the centralized management of production had been relaxed, and the structure of production had begun to evolve toward a market orientation and an increasing role for the private sector. This was officially recognized by the Fifth

¹ A detailed discussion of the failure of collectivization can be obtained from Frings, V., 1993, 'The Failure of Agricultural Collectivization in the People's Republic of Kampuchea (1979-1989)', *Working Paper 80*, Centre of Southeast Asian Studies, Monash University, pp. 51-69.

Congress in October 1985 when a constitutional amendment legitimized the private sector as the fourth component of the economy.

In early 1986, the First Five-year Program of Socioeconomic Restoration and Development (1986-1990), or First Plan, began. The plan originated in February 1984 when the heads of the state planning commissions of Vietnam, Laos, and Cambodia met in Ho Chi Minh City and agreed to coordinate their 1986 to 1990 economic plans. The plan was intended to open a new phase of the Cambodian revolution; it gave highest priority to agricultural production, calling it “the first front line” and focused on the four sectors of food, rubber, fisheries and timber. It set production targets for each sector (Mortimer 1987).

1.2 Major Policy Changes in the late 1980s

By the beginning of 1989, the government had realized that central planning had not received the support of the majority of the population and was not economically productive. In 1989, the government opted for a private enterprise economy, opened the door to foreign assistance and gave active encouragement to private foreign investment. The majority of markets have now been liberalized, most prices have been freed and the scope of official subsidies has been significantly reduced, with only the fertiliser subsidy scheme remaining. The official exchange rate has been deregulated and now fluctuates with the parallel-market rate (World Bank 1992).

Important changes in the agricultural sector were introduced in 1989. The reforms, as summarized by the World Bank (1992), were undertaken on three broad fronts:

- (a) changes in land tenure policy and the farm-level structure of production;
- (b) improvements in pricing, taxation, and marketing policies; and

- (c) disengagement of the state role in production activities, reduction of subsidies and privatization of state enterprises.

1.2.1 Changes at the Farm Level

On the basis of favourable results from pilot initiatives undertaken in Takeo province since 1986, the National Assembly revised the Constitution in June 1989 to permit private ownership of land and chattels under three forms (World Bank 1992):

- (a) private land title - for the house/home lot where “market gardening, tree cropping and small-scale stock raising are carried on” - which is transferable.
- (b) possession rights to state-owned land (for a fee). These rights are inheritable; and
- (c) concession (usually for 10 to 15 years) for surplus land or land worked in excess of a farmer’s holding as long as it can be demonstrated that s/he has the means to cultivate it.

A new department, the Department of Land Reform and Titles, was established under the jurisdiction of the Ministry of Agriculture in November 1989 to provide support at the provincial level for the issuance of land titles (signed by the governor) and to the district authorities for the issuance of usufruct rights and concessions. In practice, concessions are issued mainly to large investors for the planting of agro-industrial raw materials such as rubber, pepper, soybean, and sugar cane.

1.2.2 Reforms in Pricing, Taxation and Marketing

The reforms in pricing, taxation and marketing, implemented for the most part after 1989, have been regarded by the World Bank (1992) as having

positive implications for the agricultural sector because they have provided incentives for farmers. As discussed by the World Bank (1992), the following are the most significant of these measures.

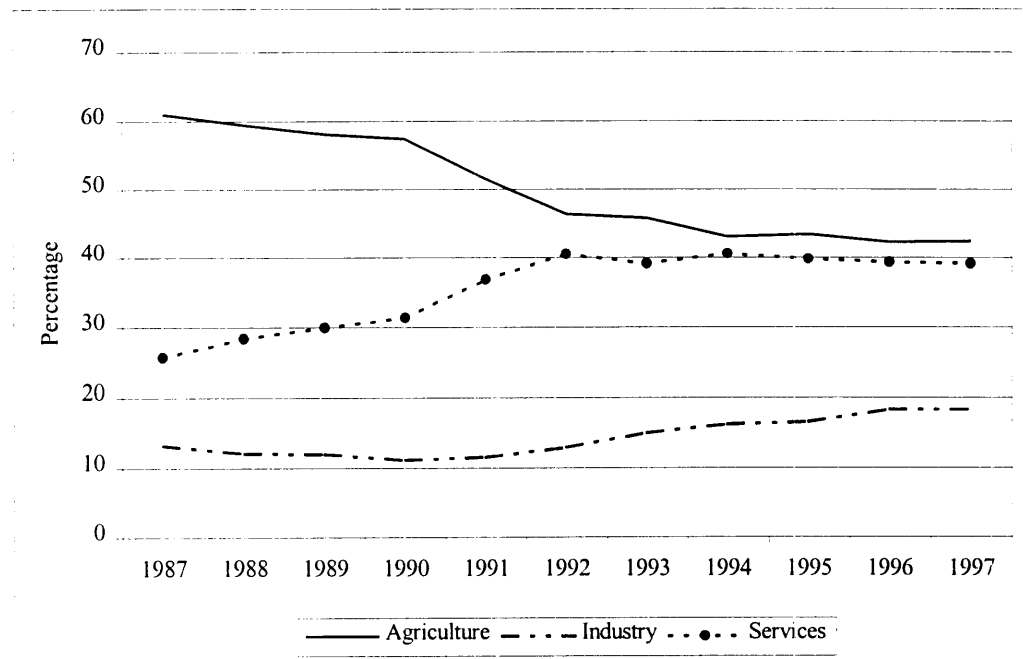
- (a) Price liberalization has been achieved. With the notable exception of fertilizers, most goods and services have shifted from a two-price system (state and market) to only one price (determined by the market). While the Ministry of Agriculture periodically publishes a price for rice (with the concurrence of the Council of Ministers), this price is used only as an indicator or a “fair” price (to monitor competitiveness); farmers and traders are free to agree on whatever price they want.
- (b) Import taxes on agricultural inputs were eliminated in 1990/92 and private imports have been encouraged.
- (c) Reduction, then in 1992 total elimination, of the land tax (patriotic contribution).
- (d) Reduction and virtual elimination of prevailing restrictions on the movement of goods and existing trade taxes between provinces.
- (e) With the virtual abandonment of the *Krom Samaki* system, farmers became free to sell their products to anyone they chose, after settlement of forced purchases at below market prices by the state.
- (f) Official procurement of food commodities (primarily rice, of about 400,000 tonnes per year) was substantially reduced as payments in kind to civil servants were reduced and, in 1992, eliminated. Until 1991, rice procurement had been determined by a committee comprising the three main ministries (Commerce, Planning and Transportation) and the National Bank. Since 1991, only the Ministry of Commerce has undertaken state rice procurement, partly to control the state’s rice reserves.

- (g) As a consequence of the above, state rice procurement at below market prices from farmers also ceased.
- (h) Liberalization of foreign trade has taken place, although permission is still needed for exports of rice, logs/sawn-wood, live stock, red corn, fish, soybean, and rubber; in the case of agricultural inputs, permission is needed only for importation of fertilizers and pesticides.

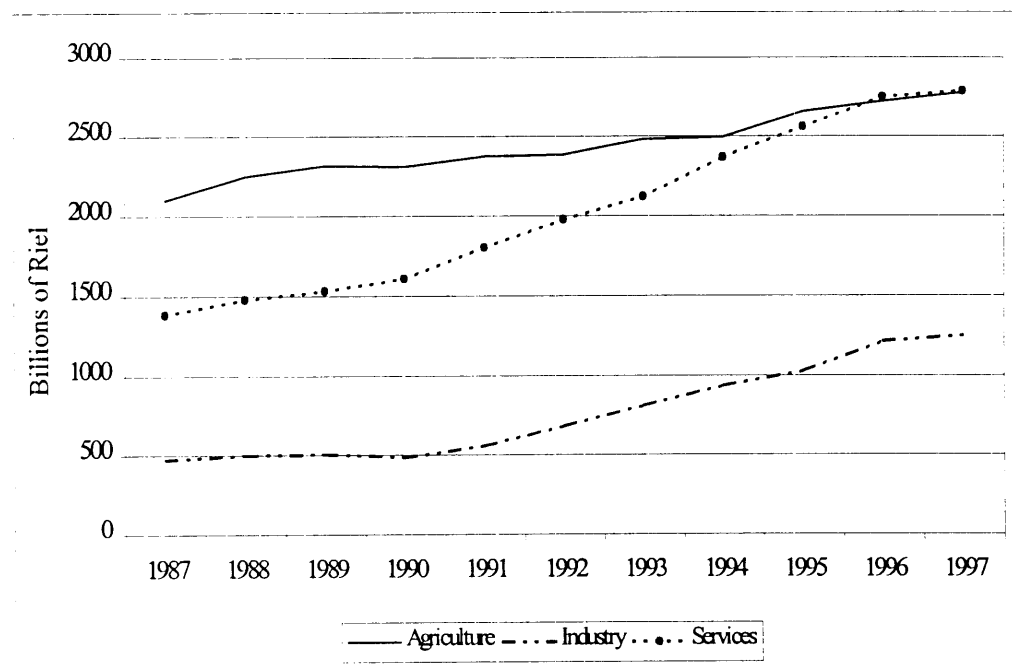
Since these major policy changes, the agricultural sector has grown remarkably. Although its contribution to Gross Domestic Product (GDP) has decreased from 61 per cent in 1987 to 42.5 per cent in 1997, the value of agricultural output has increased from 2.100 billion to 2.774 billion Riels (at constant 1993 purchase prices) during the same period (Figure 1.1 and Figure 1.2). The growth rate of agricultural sector was highly variable but nevertheless quite high in the 1990s (Appendix I-1). The growth rate of this sector reached as high as 6.4 per cent in 1995. The sector also provides almost all the country's export earnings and resources for domestic industries.

Rice, which is the staple food for Cambodians, is the single most important food crop in the agricultural sector. It contributed 13.7 per cent of the total GDP and occupied 87.5 per cent, just over 2 million hectares, of available cultivated area in 1997. It also provided about 75 per cent of the calorie intake, employed approximately 85 per cent of the rural population and provided the main source of income for the rural population (Department of Planning and Statistics 1996).

Although the average yield of paddy in Cambodia is low (1.31 tonnes per hectare, t/ha) compared with its East Asian neighbors (Figure 1.3), the total production of rice is quite high, reaching just under 3.5 million tonnes in 1996/97. This is higher than the pre-war production levels of approximately 2.5 million tonnes, of which surplus rice of about 252,000 tonnes per annum had been exported (Nesbitt 1997).

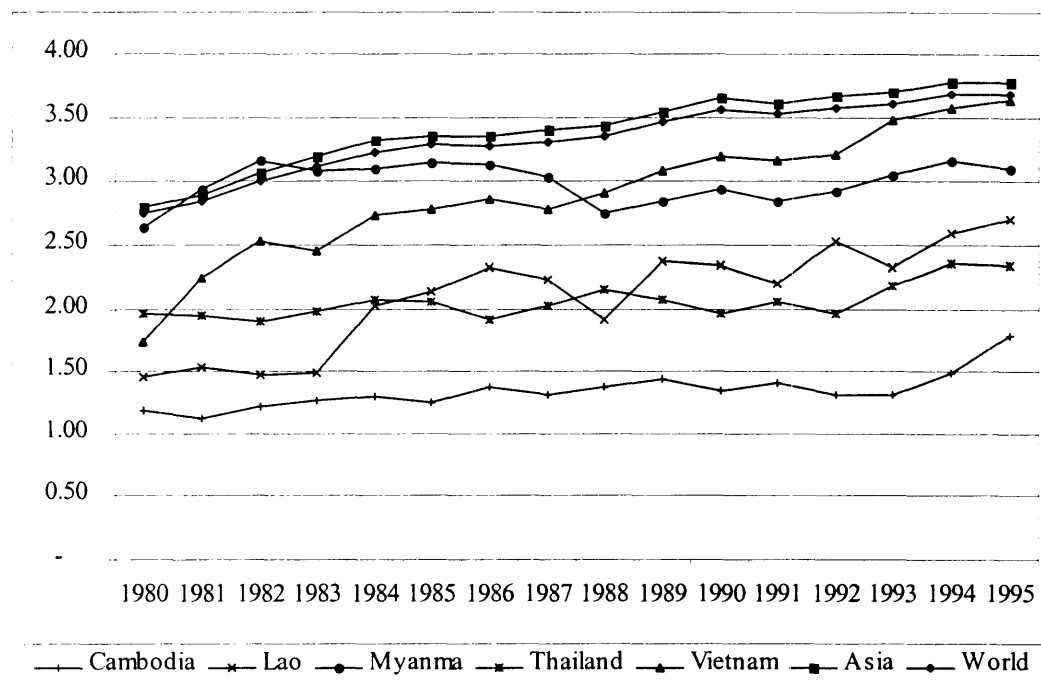
Figure 1.1 GDP Composition

Source: Ministry of Economy and Finance 1998.

Figure 1.2 GDP at Constant 1993 Purchase Prices

Source: Ministry of Economy and Finance 1998.

Figure 1.3 Rice Yield in Cambodia and Neighbouring Countries



Source: FAO, *Production Yearbook* and Department of Planning and Statistics.

1.3 Problem Identification

The structure of the rice sector in Cambodia can be regarded as being quite different in each of two sub-periods: the period from 1980-1989, characterised by government price regulation and a centrally planned production system and the period from 1989-1997 corresponding to a free market economy. During the first sub-period, rice production, as well as other agricultural production, was collectivised and two price systems were in place. Firstly, a ceiling price system was set up by the government and implemented by the Kampuchea Food Company of the Ministry of Commerce. The ceiling price, which was varied from year-to-year, normally lower than the (illegal) market price (Frings 1993). Farmers were forced to sell their products, particularly rice output, to government agencies in exchange for goods and farm inputs such as fertilizers and pesticides at a cheap price but only when inputs were available. Secondly, the private sector

was active in marketing and trading in a “black market” economy where market prices were offered for farm output. Although it was risky to exchange agricultural products at the black market price, trading between farmers and merchants did occur.

Perhaps in response to this price-controlled economy, there was only a slow increase in both cultivated area and output. This became a problem in the 1980s when unfavorable weather (droughts and floods) in major rice producing provinces which brought about severe food shortages almost every year.

The sub-period 1990-1997 was characterized by the freeing-up of the prices of all agricultural outputs. Price deregulation combined with the above-listed market and trading reforms have made marketing more competitive and, hence, have served to reduce marketing costs. Itinerant traders have appeared and have spread throughout the country; the import-export business is now much less monopolistic and a large-scale wholesale sector has developed.

Rice production has increased remarkably following these major reforms in the agricultural sector and the general economy. The area sown to rice expanded to just over 2 million hectares in 1997, while the attainable rice production area has reached the pre-war level of 2.5 million hectares. With favorable weather conditions in the last two years, the average yield has reached 1.67 t/ha for wet-season rice and 3 t/ha for dry-season rice. Although these yields are lower than those in other countries in the region, they are still higher than the pre-war levels when Cambodia exported rice. The increases in rice production, cultivated area and productivity in the 1990's seem to be a results of price deregulation and economic reforms introduced by the government in 1989. However, the price and non-price factors affecting the supply response of rice have not yet been empirically analysed.

This is despite a significant increase in demand for transparent analyses of rice production by government and non-governmental institutions. There also appear to be concerns within the government about the effects of government fertiliser subsidies. In recent debate about the impact of fertiliser subsidies, the Japanese and German governments, the Food and Agricultural Organisation (FAO), and the Asian Development Bank (ADB) (all of whom are major fertiliser suppliers) suggested that the Cambodian government review the fertiliser subsidy policy because of its adverse impacts on resource use efficiency. Such a review requires a knowledge of the relationship between fertiliser prices and rice output.

1.4 Objectives of the Study

The main objectives of this study are to:

- (i) identify the factors influencing the supply of rice in Cambodia during the period 1980-1997;
- (ii) estimate the short-run and long-run elasticities of the supply of rice in Cambodia; and
- (iii) demonstrate how these findings might be used to address some policy issues.

1.5 Significance of the Study

As yet there have been no significant studies of the supply of rice and the demand for rice in Cambodia. Most of the assessments of rice supply and demand have been done by the FAO, the World Food Programme (WFP), the World Bank and government institutions without the support of empirical analyses. Based on available data and assumptions of a 6.5 per cent production growth rate, a 3 per cent increase in cultivated area, and 2 t/ha average yield, the Ministry of Agriculture, Forestry and Fisheries estimates that the supply of rice production will reach 4.1 million tonnes by the year 2001 (Department of Planning and

Statistics 1996). Furthermore, the Ministry estimates that rice 1.81-2.92 million tonnes of rice production will be consumed domestically and the surplus of 700,000 tons of milled rice will be exported to earn foreign exchange².

The FAO and the WFP have attempted to evaluate annual rice supply and demand in Cambodia based on data obtained from government and non-governmental organisations in recent years. The FAO and WFP have released two annual reports on rice supply and demand covering 1996 and 1997, respectively. They concluded that in aggregate Cambodia produced rice surplus in the last two years but some area still faced the severe food shortage. Unfortunately these studies did not take into account the price variation that occurred as a result of deregulation during the 1980s and 1990s. In contrast, the current study will take market deregulation into account along with other factors, which might be important in determining rice production. Even though the outputs of agricultural area generally thought to respond to price movements, the aggregate supply of these products in developing countries may be unresponsive to incentives. This argument is supported by the studies of Bond (1983) and Valdes (1991) who claim that the supply response to price is inelastic and may be close to zero in some countries, especially Africa, due to the subsistence sector and high levels of risk aversion.

Finally, the knowledge obtained from this study should be useful for policy analysis. The empirical estimates of price elasticities of supply are important for forecasting the future supply of rice and assessing the effects of different policies on the supply of rice. For example, estimating the impacts of fertiliser prices on rice production would help in the decision of whether to free up fertiliser prices or to continue to subsidise them.

² This discussion is detailed in the Department of Planning and Statistics 1996, *Strategic Plan 1997-2001*, Ministry of Agriculture, Forestry and Fisheries, Royal Government of Cambodia, p. 2.

1.6 Hypotheses

To guide the study, the following hypotheses will be tested:

- input and output prices have no effect on areas allocated to wet-season and dry-season rice;
- the major policy reforms in 1989 have had no impact on the responsiveness of producers to output and input price changes; and
- rainfall has no major impact on the level of rice production in Cambodia.

1.7 Plan of Dissertation

The study is organized as follows; Chapter 2 briefly outlines the rice industry in Cambodia, including the history of rice production and marketing in Cambodia. Chapter 3 reviews some previous relevant studies concerning the framework of supply estimation and discusses the theoretical determinants of supply response of agricultural production. Chapter 4 outlines the econometric model specifications of supply response for rice production in Cambodia, and delineates the estimation procedures and the data. Results are presented in Chapters 5. Chapter 6 contains a discussion of how the results might contribute to policy analysis. Chapter 7 provides a summary and suggestions for further research.

CHAPTER 2 THE RICE INDUSTRY IN CAMBODIA

2.1 Introduction

Rice is the staple food for 10 million Cambodians and, considering food security, it is the most important field crop today. *Pisa bai* in Khmer, which means “eat rice”, is a common expression. Rice is eaten at breakfast, lunch and dinner and account for 75 per cent of calorie intake (World Bank 1992, p. 55). Furthermore, during the impressive economic development of the 1960s, it provided considerable foreign exchange for the economy.

As it has importance both for national food security and for economic development, the rice sector has been given the highest priority in development planning by all Cambodian governments and it is the central focus of government intervention. However, rice production in Cambodia has gone through stages of rapid development and unfavorable development. Cambodia was once on of the major rice exporters of the world and then it slumped into a period during which a vast percentage of the population had little to eat (Nesbitt 1997).

2.2 History of Rice Production in Cambodia

Helmerts (1997) indicates that Khmer farmers have been growing rain-fed rice for at least 2,000 years and possibly longer in the case of upland rice. Irrigated rice production technologies were introduced along trade routes from India about 1,500 years ago (Chandler 1993; Helmerts 1997). Cambodian farmers have integrated rice production into systems of land use including slash-and burn agriculture, livestock raising, fishing, and hunting and gathering.

Rice production technologies have been developed and improved gradually over a long period of time. Their most prosperous era was during the Angkorian Empire (9th to the 14th century), when the power of the empire's economy was

based on rice production. Some historians contend that Angkor gained its power through dramatic and widespread innovations in rice irrigation technology. The centerpiece of the irrigation system was the great system of reservoirs and canals around Angkor Wat that remains until today (Chandler 1993, Grunewald 1992; Helmers 1997).

The hydraulic works of the Angkor period were never repeated after the failure of the Angkorian Empire. During the pre-colonial period (15th to 18th century) when capital, territorial and population gains were forfeited, the agricultural sector slumped (Chandler 1993; Helmers 1997). In 1863, France established a protectorate and Cambodia became a component of the French Indochina Union, together with Laos and Vietnam, for the next 90 years. However, only in the period from the early 1900s until 1941 did the French systematically implement an agricultural development policy which aimed at the export of agricultural products, particularly rice and livestock. The French launched two strategies: large-scale rice plantations that used modern farming methods; and rice cultivation using traditional methods. The former strategy covered an area of more than 16,000 ha, while the latter covered 0.5 to 1.5 million ha during the colonial period.

Little was achieved in technical innovation in rice production under the second strategy (traditional cultivation) sub-sector and rice yields remained stagnant at around 1t/ha for 50 years (Tichit 1981). This low productivity was due to constraints such as the lack of investment, research, extension services, and credit facilities, as well as the poor education level of farmers (Tichit 1981; Helmers 1997)³.

Cambodian farmers, however, had proved responsive to rice market conditions in the colonial era since they earned good incomes from rice sales and, hence,

³ The details of the constraints on rice production during the French colonial period have been discussed in Helmers (1997).

increased production. The depression of the early 1930s led to a collapse, by as much as 60 per cent, of rice export prices and so farmers decrease the production of rice by reducing the cultivated area by one-third of the national total level. The price of rice, however, recovered somewhat later in the 1930s and the rice area increased rapidly in response to the price increase and reached 1.7 million ha by 1940. Consequently, Cambodia was the third largest rice-exporting country in the world and exported about 200,000 tonnes of milled rice by 1940 (Tichit 1981).

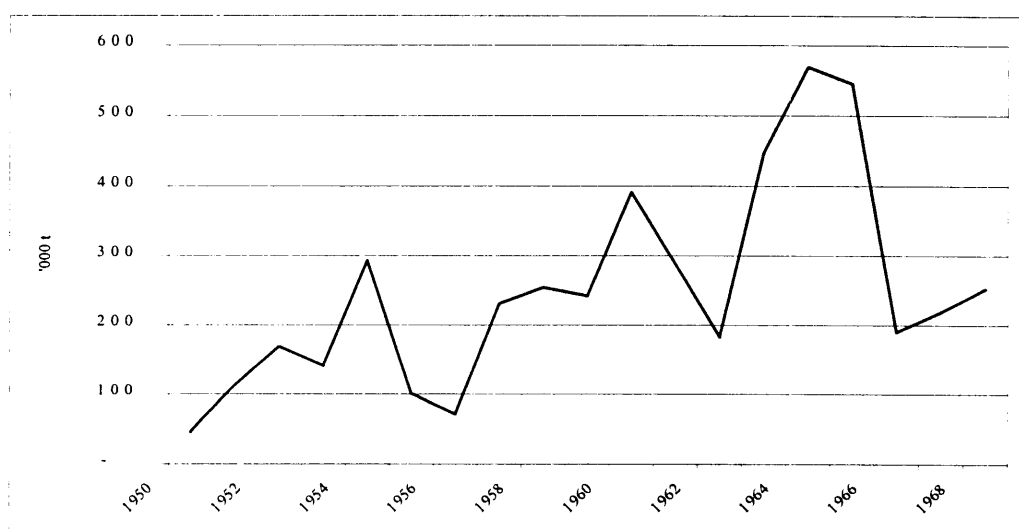
After gaining political independence from France in 1953, the government instituted ambitious development programs supported by western foreign aid. With support primarily from the United States Agency for International Development (USAID), irrigation schemes, canals and reservoirs were constructed in major rice producing provinces. A USAID Rice Production Program, which began in 1955, established six rice research stations and, by 1962, it was claimed that there was an improvement in the varieties bred from pure line selection of traditional varieties, which represented 20 per cent of the rice crop (Helmerts 1997). In addition, farmers benefited from the massive expansion of primary level education, rural credit, input subsidisation, and favourable export prices for rice.

By the end of 1960's rice production had increased remarkable. In 1968, the area of rice cultivation was 2.47 million ha which produced 3.25 million tonnes (Tichit 1981). With this quantity of output the government officially exported 252,000 tonnes of milled rice in 1968 (Appendix II-1). This led Cambodia to become one of the largest rice exporters (Helmerts 1997).

The agricultural sector was severely damaged by civil wars during the 1970s when much of the rural infrastructure and livestock were destroyed. By 1974 rice cultivated area declined by 77 per cent and production by 84 per cent compared with the 1970 levels (Helmerts 1997; Shawcross 1979). Rice production was the focus of agricultural development policy during the Khmer Rouge regime (1975-

1979). The policy aimed to improve rice production by increasing the cropping pattern to two or three times per year, substituting high-yielding varieties for traditional lower yielding varieties and expanding the area of rice production into cleared forest lands (Helmert 1997).

Figure 2.1 Cambodia Exports of Rice: 1950-1968



Source: Tichit, 1981.

Unfortunately, there was no reliable statistical information on rice area or production during this period, except FAO estimates of harvested areas and production (Appendix II-2). The FAO estimated that the annual harvested area of rice during the Pol Pot regime varied from 1-1.5 million ha and production from 1.5-1.8 million tonnes.

2.3 Rice Production during the Planned Economy (1980-1989)

After the failure of the Khmer Rouge regime in 1979, the country was devastated and under the threat of widespread famine. Millions of displaced and starving people were returning to their homes and there were concerns that the rice crop for the year would not be planted. Within the limits of foreign support (mainly

from the former communist block), war-torn infrastructure and scarce human resources, the government and farmers worked very hard to restore agricultural production, particularly rice production. Agriculture was organized on a collective basis and regarded as the best way to share scarce agricultural implements and draft animals (Frings 1993). *Krom Samaki* (Solidarity) groups were established under village and commune administration and agricultural land was collectivized and became state property. Within this form of production system, the government achieved partial progress in improving the technical agricultural capacity.

Rice production was gradually restored to meet basic needs, but production levels sufficient to ensure food security and to alleviate poverty remained evasive (Chandler 1993; Helmers 1997). To increase rice production and ensure national food security, the Vietnamese and former Eastern Block countries introduced improved (high-yielding) rice varieties, such as IR 36 and IR 42, and subsidized some farm inputs such as machinery, fertilizers and pesticides.

Despite this increase in rice production, Helmers (1997) claimed that by 1989 production had not yet reached a self-sufficiency level. The total cultivated area had increased from just under 1.5 million ha to just under 2 million ha from 1980 to 1989, respectively (Appendix II-3). Meanwhile, the production of rice increased from approximately 1.7 million tonnes to 2.5 million tonnes during the same period. Consequently, rice deficits had been observed during this period (Appendix II-4).

2.4 Rice Production in the 1990s

The failure of collectivization and the planned economic system had been obvious by 1989 and the government realised that these policies could not be adopted in view of the Cambodian conditions. Following a massive reduction in support from the former Eastern Bloc countries, the government had reformed the

entire economic system. The new policies were directed towards a free-market economy system. Not only the prices of goods and services but also the prices of agricultural commodities had been freed up. Agricultural land was no longer state property but the imports of all agricultural inputs were still subsidized by the government.

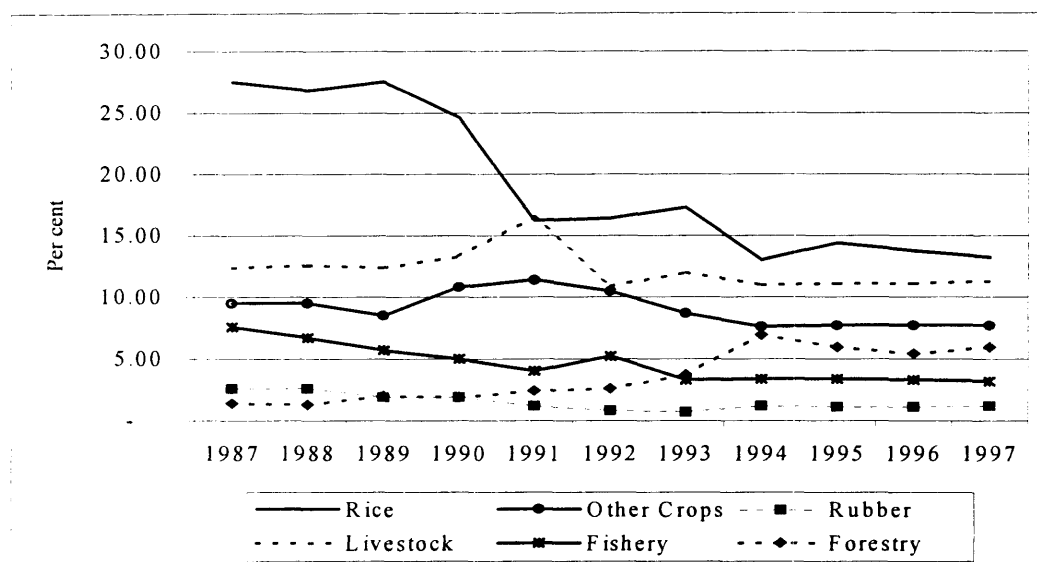
Since these major economic reforms, rice production in Cambodia has been conducted in a transition market economy. The agricultural sector still represents a priority area in national development policy. Strategies have been formulated to improve food security and self-sufficiency, stimulate economic growth, increase rural incomes, and develop agricultural export industries (Royal Government of Cambodia 1994; FAO 1994; Helmers 1997).

During the 1990s rice production has increased remarkably. Although its share of GDP decreased steadily, it is still the most important sector of the agricultural sector (Figure 2.2). The share of rice in GDP decreased from 27.5 per cent in 1987 to 13.2 in 1997 as the share of the agricultural sector decreased from 61 per cent to 42.5 per cent between 1987 and 1997 (Appendix II-5). The share of the industrial and service sectors increased during the same period from 13.3 per cent to 18.3 per cent, and from 25.7 to 39.2 per cent, respectively. However, the value of rice production in the economy rose from 967 billion Riels to 983 billion Riels at constant 1993 purchase prices. Likewise, the agricultural sector output increased from 2,100 billion Riels to 2,774 billion Riels (Appendix II-6).

The increase in the value of rice production is probably a result of increases in the cultivated areas and yields of rice. The acreage to rice increased from just under 1.5 million ha to just over 2 million ha between 1980 and 1997 (Appendix II-3 and Figure 2.3), while the yields increased from 1.19 t/ha to 1.77 t/ha during the same period (Figure 2.4). Furthermore, with the favorable weather conditions (rainfall) during the last few years (1995-1997), rice production not only reached the level of self-sufficiency but also provided a surplus of rice for export (FAO

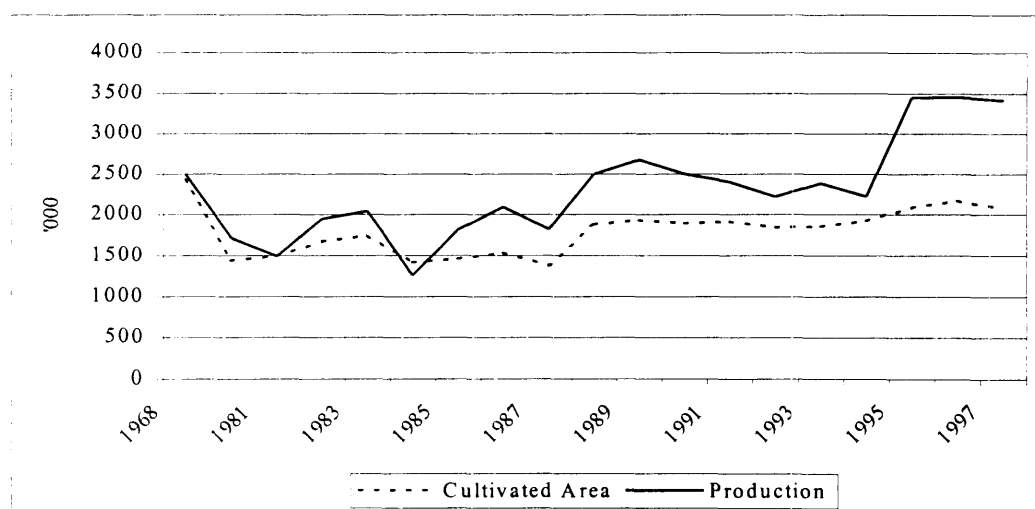
1997) (Appendix II-4 and Figure 2.5). It should be mentioned that since the civil war in the 1970s, Cambodia has experienced a severe shortage of rice supply and has had to import rice from neighbouring countries such as Vietnam and Thailand.

Figure 2.2 Percentage Share of Agricultural Sub-Sectors in the Economy



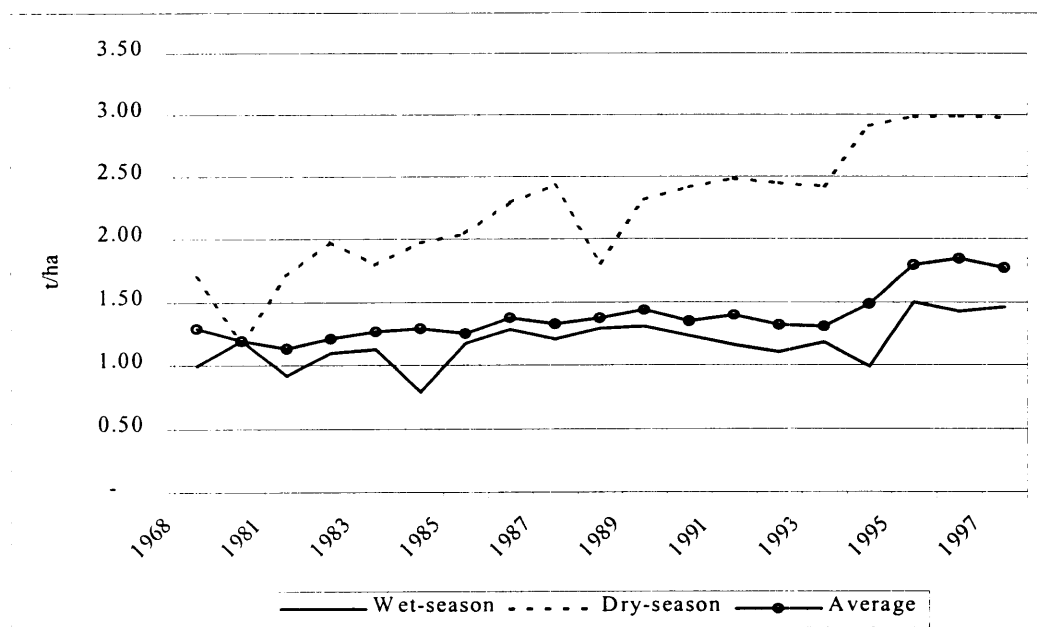
Source: Ministry of Economy and Finance, 1998.

Figure 2.3 Cultivated Area and Production of Rice



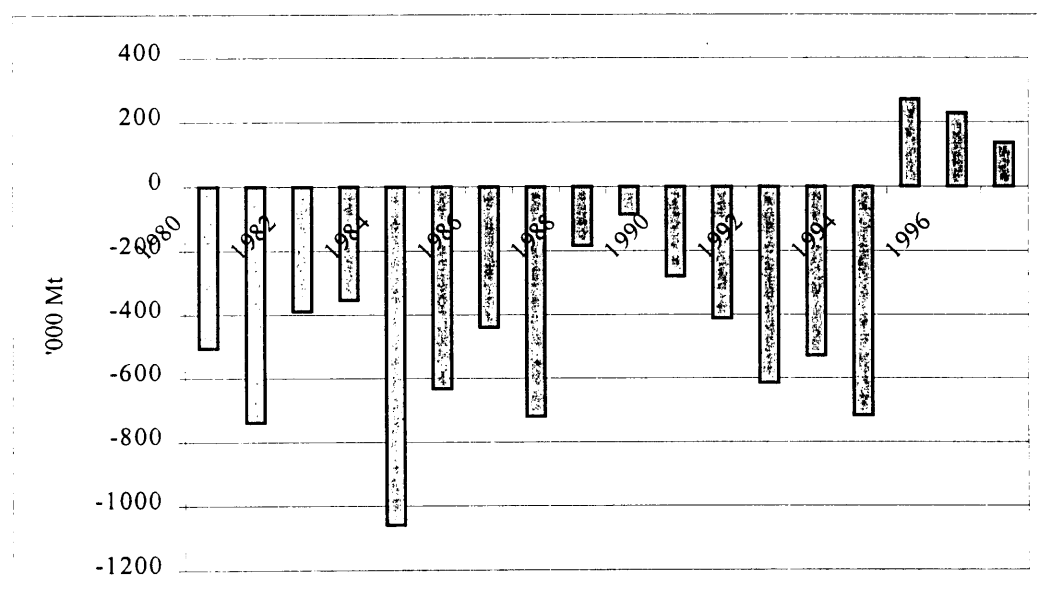
Source: Department of Planning and Statistics, Series.

Figure 2.4 Rice Yields



Source: Department of Planning and Statistics, Series.

Figure 2.5 Estimated Shortages and Surpluses of Rice (a)



Source: Department of Planning and Statistics, Series.

(a) negative and figures represent shortages and surpluses of rice, respectively.

Nesbitt (1997) claims that the increase in rice production in the 1990s is due to the following reasons:

- increases in cultivated area due partly to mine clearance;
- increases in the use of fertilizers and other farm inputs in production as a result of government subsidies;
- increases in adoption of high-yielding varieties;
- improved accessibility to the transport system;
- favorable weather;
- increased in availability of rural credit;
- increases in private investment in this sector; and
- increases in the price of rice in the free market as a result of major economic reforms.

2.5 Geography of Rice Cropping in Cambodia

Rice is mainly grown on flat land surrounding Tonle Sap Lake and toward the southeastern part of the country. Bruce (1992) and Helmers (1997) claim that the total area mapped for rice-based farming systems encompasses 3.2 million ha but this includes cropped areas, previously cropped fields, roads, villages and some non-arable land.

According to Mortimer (1987), Cambodia's cultivated rice land can be divided into three main areas. The first and most productive, which produces more than one tonne of rice per hectare, covers the area of the Tonle Sap Basin and the provinces of Battambang, Kampong Thom, Kampong Cham, Kandal, Prey Veng and Svay Rieng (Figure 2.6). The second area, which yields an average of 0.8 of a tonnes of rice per hectare, consists of Kampong Som, Kampot and Koh Kong provinces along the Gulf of Thailand and some less fertile areas of the central provinces. The third area with rice yields of less than 0.6 of a tonnes per hectare,

comprises the highlands and the mountainous provinces of Preah Vihear, Stung Treng, Ratanakiri and Mondulakiri.

These three zones have different rainfall patterns. The first zone receives 1250 mm to 1750 mm per annum, the second zone receives 2000 mm to 2500 mm and the third zone receives 2500 mm to 4000 mm per annum (Figure 2.7). Even though the last two zones receive higher rainfall levels, the productivity of rice in these zones is still low because of the infertile soils and poor cropping practices. It is noticeable that the productive area of the second zone is small compared with the total area sown to rice and farms regularly suffer salinity problems, especially in the coastal provinces of Kampot, Kampong Som and Koh Kong. Meanwhile the farmers in the third zone grow mainly upland rice that gives only low yields due to the use of local low-yielding varieties. The majority of upland rice varieties are local varieties.

2.6 Rice Crops and Ecosystem

Cambodia has two rice crops each year, a monsoon-season or wet-season crop (long cycle) and a dry-season crop. The major wet-season crop is grown in all provinces in Cambodia, while the dry-season crop is grown only in the central provinces of the country, where irrigation water is available during the dry season.

2.6.1 Wet-Season Rice

Wet-season rice is the main rice crop in Cambodia in terms of both area and production level. It is planted during the wet season in late May through July, when the first rains of the monsoon season begin to inundate and soften the land. The main harvest of this crop is usually gathered six months later, in December. The major ecosystems producing the wet-season rice crop are rain-fed lowland, deepwater and upland rice systems.

Rain-fed lowland rice is cultivated in all provinces of Cambodia but the largest concentrations are around the Tonle Sap Lake, the Tonle-Bassac Rive and the Mekong River. According to the dates of flowering or harvesting, rain-fed lowland rice varieties are broadly grouped into early-duration, medium-duration and late-duration varieties (Javier 1997). These three variety types grow well in the high fields with water levels of 0-15 cm, middle fields with water levels of 15-30 cm and low fields with water levels of 30-80 cm (Fujisaka 1988; Javier 1997). The early varieties flower as late as early November, the medium-duration varieties flower from mid to late November, and the late-duration varieties, from early to mid-December. This varietal classification system is widely adopted by the government in preparing statistical information on rice production in Cambodia.

Deepwater/floating rice is grown in low-lying areas and depressions that accumulate floodwater at a depth of 50 cm or more for at least one month during the growing period (Javier 1997). The floodwater comes from the Tonle Sap Lake, the Tonle-Bassac and the Mekong rivers. Their tributaries flood the low-lying areas and depressions, a portion of which is cultivated with deepwater rice.

Rain-fed upland rice areas are fields that depend entirely on rainfall. This rice is known as mountain rice (*srau phnom*) since it is produced on scattered rolling lands, some of which are mountainous forested areas (Javier 1997). This rice area is only a small proportion of the total rice land in Cambodia.

2.6.2 Dry-Season Rice

Dry-season rice is grown in small irrigated areas and flood-recession areas. Most of the dry-season rice varieties have a short vegetation period

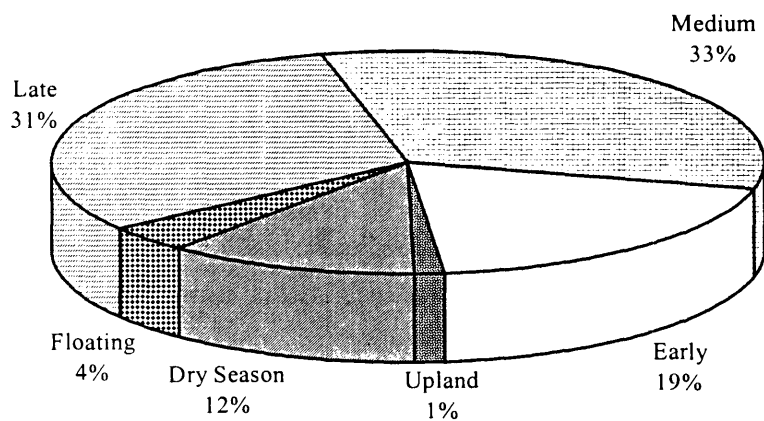
which is three to four months from planting to harvesting. It should be noted that only a very small area of the wet-season ricefield is planted a second time for dry-season rice. Dry-season rice is fully or partially irrigated during the dry season, from December to March, but it is the most productive rice environment (Figure 2.4). The high productivity of this rice is brought about by better water control, input use, higher solar radiation during crop growth and development, and the cultivation of fertilizer-responsive modern varieties (Javier 1997).

The proportion of cultivated areas of these rice crops varieties is diverse (Figure 2.8). The area of all varieties, except deepwater/floating rice, has increased dramatically over time (Figure 2.9). The area of early-duration rice increased from 225,000 ha in 1980 to 416,000 ha in 1996. A substantial area previously grown to medium-duration varieties was used for early-duration rice cultivation. Despite this, medium-duration rice tripled in area to 740,000 ha, representing more than 34 per cent of the total rice area in 1997. The medium-duration rice was cultivated in areas traditionally grown to late-duration rice. As a consequence, the reported area of late-duration rice for 1997 production may further decline if earlier maturing varieties adapted to various niches are found. Likewise, the deepwater/floating rice area has decreased remarkably. It covered an area of 400,000 ha in the late 1960s and reduced to about 100,000 ha in 1980. Thereafter, it remained stable in the 1980s and 1990s at around 100,000 ha. The reduction in the cultivated area of deepwater and late-duration varieties is claimed by Javier (1997) to be a result of farmers' full awareness of the risks in the production process. He explains that "farmers are fully aware that the shorter the time a crop remains in the field, the lesser the crop's exposure to risks associated with rain-fed lowland rice culture" (Javier 1997, p. 8).

The upland rice area is very small compared with other rice ecosystems, accounting for only 4 per cent of the total area in 1997. However, it has always

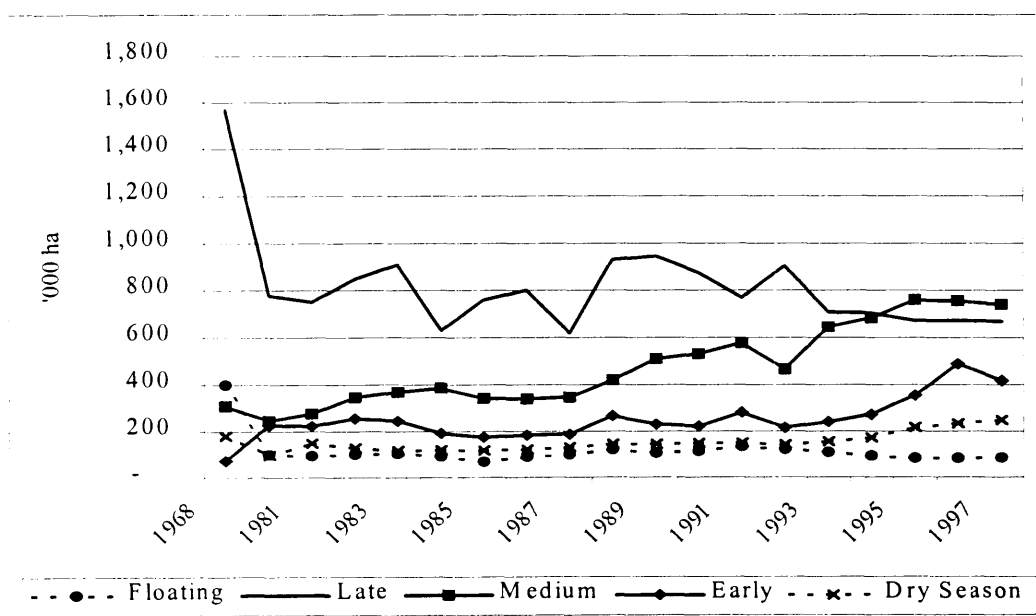
been part of Cambodia's cultural scene as the identity of its many ethnic groups are tied to upland rice growing.

Figure 2.8 Relative Areas of Rice Varieties: 1997



Source: Department of Planning and Statistics, 1998.

Figure 2.9 Production Area of Rice Varieties



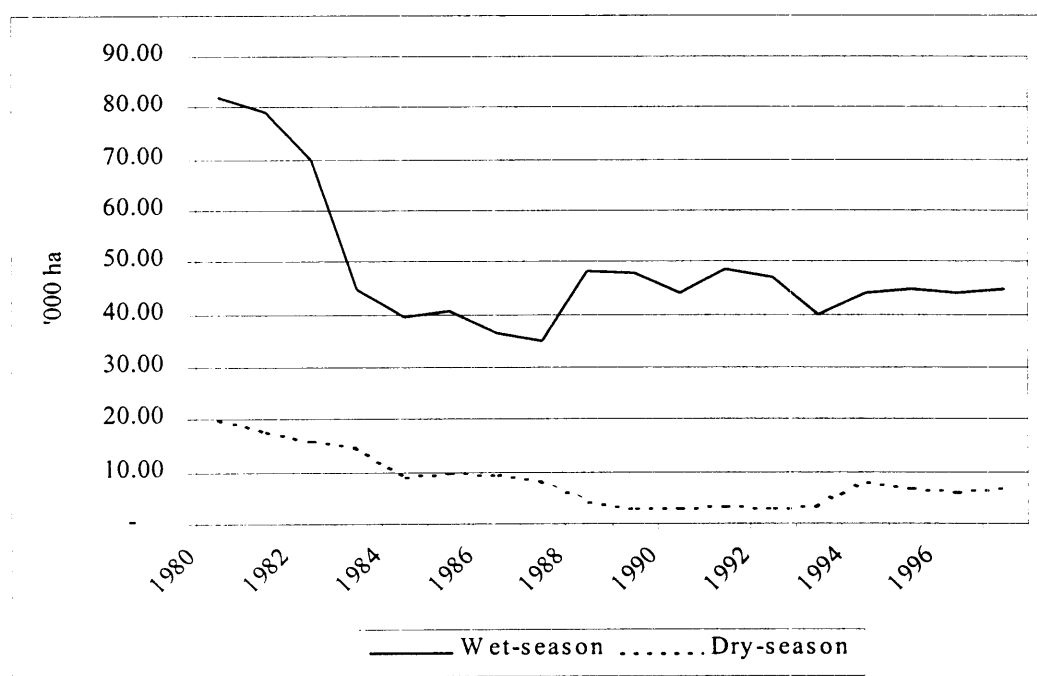
Source: Department of Planning and Statistics, Series.

Dry-season rice represents only 12 per cent of the total cultivated area but its productivity is the highest among rice varieties grown in Cambodia.

2.7 Maize Production

Maize is the second most important food crop in Cambodia in terms of its importance and production. It is grown during both the wet and dry seasons and covers a total area of about 50,000 ha, yielding 64,000 tonnes in 1997 (Appendix II-8). The areas planted to maize decreased from just over 100,000 ha to just over 50,000 ha over the period of 1980-1997. The wet-season maize area decreased nearly 50 per cent between 1980-1997, while the dry-season maize decreased nearly 60 per cent during the same period (Figure 2.10). However, the yields of both wet and dry-season maize increased notably from 1 t/ha to 1.3 t/ha.

Figure 2.10 Planted Area of Wet-Season and Dry-Season Maize



Source: Department of Planning and Statistics, Series.

2.8 Rice Marketing

The marketing of rice is a major economic activity in Cambodia. Since it is a staple food for Cambodians and widely grown in the majority of agricultural areas, the marketing of this product is important for food security in the entire country. However, comprehensive studies of the rice marketing system are lacking and much of the marketing and trade of rice are unrecorded. The marketing system during the 1980s and 1990s is characterised by two sub-periods: marketing during the planned economy period (1980-1989); and marketing during the market economy period (1990-1997).

2.8.1 Marketing during the Planned Economy Period

During this period, marketing activities were conducted by two distinct systems: the government and private trades on the black market. Upon coming to power in 1979, the government allowed the food marketing system to function very liberally, but most inter-district trade in rice and paddy was gradually taken over by parastatal government companies (Tickner 1996). Of these, KAMPRIMEX and KAMPAGREXPORT were the companies that dealt with the marketing of agricultural products in Cambodia. KAMPRIMEX was the food company responsible for the marketing of rice and paddy only, while the KAMPAGREXPORT dealt with the marketing of agricultural products other than rice and paddy (Tickner 1996).

Until 1981, KAMPRIMEX held the monopoly of the rice trade by establishing the Kampuchea Food Company which took all responsibility for buying, transporting, processing and distributing rice products. To ensure the collection of rice, the Kampuchea Food Company set up collection centres in all provinces. In addition, farmers were forced to sell

their product to the state at a low price (ceiling prices) but, in return, the farmers could buy some goods such as soap, books and clothes, at state prices.

While the government prices were not fixed, they were always lower than market prices. The prices of agricultural products had to be set every year by the Ministry of Agriculture, Forestry and Fisheries. The prices were set after calculation of production costs. These included input costs, labour costs and a 20 per cent margin for farmers' profits⁴. It is notable that the prices included in the calculation were based state prices that were lower than market prices. The calculated output prices were used to purchase rice output from farmers in all provinces in Cambodia.

Produced rice was then transported and stored in government warehouses. Thereafter, the rice was were transported to state rice mills and processed in the main rice producing provinces or in Phnom Penh, the capital city. Milled rice was redistributed to the main urban areas for government officials and shortage regions. Cameron and Twyford-Jones (1995) claim that about 300,000 tonnes of rice was purchased by the Kampuchea Food Company.

Although private trade was strictly controlled during the 1980s, when the transport of rice output out of a village required permission from local authorities, black market trade in rice still played an important role in the redistribution of outputs due to four main reasons (Mysliwiec 1987). Firstly, state prices were below prices offered on the free market because of a demand-supply gap. Secondly, there was a lack of government goods for exchange with farmers. Thirdly, the government goods, mostly from

⁴ Information obtained from an interview with Mr. Khem Chenda, former director of the Bureau of Price of the Department of Planning and Statistics, Ministry of Agriculture, Forestry and Fisheries.

former communist countries, could not compete with the diversity and quality of goods found in the free market. Finally, the transport system was inadequate and could not ensure timely delivery and collection of supplies.

2.8.2 Marketing during the Free Market Period

After the major economic reforms in 1989, the prices of all agricultural commodities, except the prices of fertilizers, were set free. Farmers no longer had an obligation to sell their products to the state; they could sell their products to whomever they wished.

According to Cameron and Twyford-Jones (1995), the marketing system for rice is highly fragmented and composed of a large number of small operators. Typically, the operators are single individuals or families who have low capital bases, operating in confined geographical areas. Cameron and Twyford-Jones (1995, p. 4) argue that the rice marketing system can be considered to be composed of six major segments: local rice collectors; mill operators; district traders; provincial traders; national traders; and retailers. These segments ensure the distribution of rice outputs in Cambodia, but the linkages between these segments and the market power of operators in different segments varies between provinces.

Although the marketing of rice is ensured by these six segments, the rice market in Cambodia is characterized by a high degree of fragmentation and inefficiency (Helmert 1997) which generates the situation of large surplus in some areas and shortages in others (Helmert 1997). FAO (1996, 1997) confirms that Cambodia produced surpluses of rice in 1996 and 1997, but that large segments of the population in many communes faced various degrees of food shortage due to the inefficiency of the

marketing of rice. FAO (1997) estimated that in 1996, despite Cambodia having a 139,000 tonnes⁵ surplus of rice, 291 communes in rice producing provinces were in deficit and 232 communes experienced chronic deficit (Appendix II-7).

2.9 Summary

Historically, rice is the most important crop for Cambodia. It had the first priority rating for economic development from all Cambodian governments. However, despite government encouragement, rice production has fluctuated over time.

After a decade of civil war and massive infrastructure destruction in the 1970s, rice production was restored but was faced with another decade (1980s) of economic isolation from foreign aid. The major economic reforms in 1989 with foreign assistance from the International Rice Research Institute (IRRI), World Bank, ADB, NGOs and other institutions, helped rice production to develop rapidly. Although the reclamation of rice acreage has not yet reached the level of the pre-war period, the production and yields of rice have increased to higher levels than those at the end of the 1960s.

Even though the major economic changes of 1989 brought about the market economy, the marketing of rice output is still considered inefficient resulting in a mismatch between the supply and demand for rice across the country and over time.

⁵ This figure is different from that estimated by the Ministry of Agriculture, Forestry and Fisheries since it used different calculation methods.

Figure 2.6 Major Rice Producing Areas in Cambodia

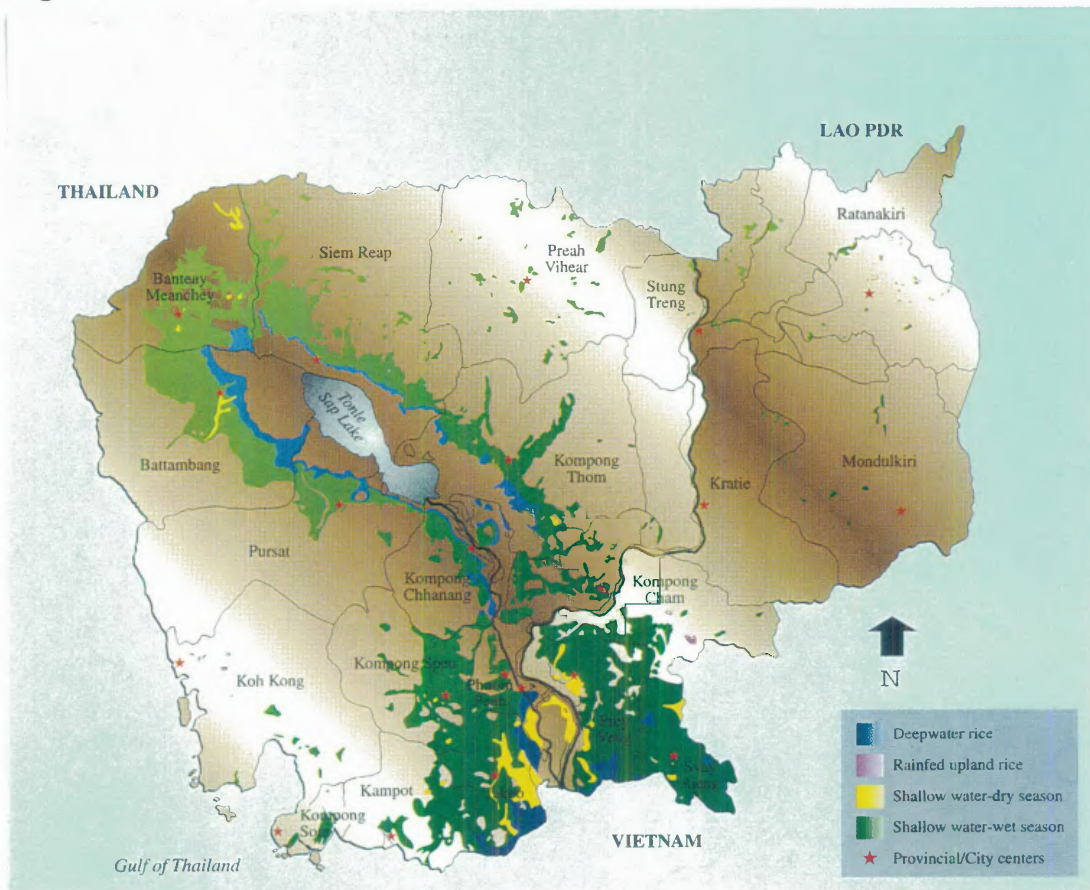


Figure 2.7 Rainfall Distribution in Cambodia



Source: Javier 1997, p. 55.