

(農林)51-67

部内参考資料

タイ 国

第4次5カ年農業開発計画(案)

昭和51年12月

国際協力事業団

農林業計画調査部

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はじめに

本「タイ国第4次5ヵ年農業開発計画案概要」等の資料は、在タイ日本大使館の今藤書記官よりチャオピャ川下流西岸地区かんがい農業開発実施調査作業監理委員に提供あったものである。

今後の開発調査等の農林業開発への協力を進めるうえで有益な資料と考え、内部の執務参考資料として印刷製本した。

なお、原本は当部農林業技術課に保管している。

昭和51年12月

国際協力事業団
農林業計画調査部

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I タイ国第4次5カ年農業開発計画案

概 要

1. 要 約

本計画は、高い人口増加率、農業と他産業従事者との所得格差の増大及び地域格差、農業従事者の不完全就業状態、農業の低生産性及び農業技術導入の停滞、農用地開発の限界等農業をとりまく諸問題に対処し、

- ① 農家間及び農家、非農家間における所得の増大及び配分の改善
- ② 雇用機会の増大
- ③ 人口増加に応じた適正価格での食料供給
- ④ 国家の安全と統一の確保
- ⑤ 外貨の獲得
- ⑥ 農民の土地所有の保証

を目的とする。(添付の Thailand's Fourth Five-Year Agricultural Development Plan DO1981-Guidelines を参照)

2. 生産及び輸出目標等

本第2次ドラフトでは、目標年次(1981年)における人口その他の要素を数ケース想定し、Plan A, B₁, B₂, C, D, E, F の7案を比較検討している。ここでは、Plan A と B₂ を主としてとりあげ、その他は参考資料として別添参照されたい。(Table A)

(1) Plan A の場合

本ケースは、

- ① 1981年の人口増加率を2.1%とし、同年の人口を48,179千人と見込む。(年率2.3%増)
- ② 主要農産物(米、とうもろこし、キャッサバ、砂糖、ケナフ及びゴム)の6品目の輸出目標は、各案中最も高く設定し、米(精米)1.7百万トン(もみ換算2.6百万トン)、とうもろこし3百万トン、キャッサバ製品2.6百万トン、砂糖75万トン、ケナフ10万トン、ゴム45万トンとする。

- ③ 主要農産物の国内消費量は、計画期間中の所得増加率年2.2%として、1981年には米(もみ)13,436千トン、とうもろこし610千トン、キャッサバ根536千トン、砂糖486千トン、ケナフ214千トン、ゴム16千トンとする。
- ④ 以上をもとに主要農産物の生産目標は、米(もみ)16,036千トン、とうもろこし3.61百万トン、キャッサバ根7.10百万トン、砂糖1,236千トン、ケナフ314千トン、ゴム466千トンとする。
- ⑤ また、目標年次のかんがい面積は、現在の10,240千ライを19,805千ライ(雨期作)に、乾期作については1,964千ライを4,700千ライに増大させる。
- ⑥ RD品種(米)の導入面積を3,223千ライから12,420千ライに、施肥面積を14,944千ライから20,567千ライにそれぞれ増大させる。

(2) Plan B₂の場合

本ケースは

- ① 1981年の人口増加率を2.5%とし、同年次の人口を48,898千人と見込む。
- ② 輸出目標も中庸な数値とし、米(精米)1.4百万トン(もみ換算2.1百万トン)、とうもろこし2.5百万トン、キャッサバ製品2.17百万トン、砂糖55万トン、ケナフ8万トン、ゴム40万トンとする。
- ③ 国内消費は、所得年増加率2.2%として、米13,626千トン(もみ)、とうもろこし615千トン、キャッサバ根544千トン、砂糖493千トン、ケナフ217千トン、ゴム17千トンとする。
- ④ 以上により国内生産目標は、米(もみ)15.78百万トン、とうもろこし3,115千トン、キャッサバ根6,038千トン、砂糖1,043千トン、ケナフ287千トン、ゴム417千トンとする。
- ⑤ 目標年次のかんがい面積は、雨期作13,666千ライ、乾期作3,228千ライに増大させる。

⑥ RD品種の導入面積は、6407千ライに、施肥面積は19,300千ライにそれぞれ増大させる。

(3) Plan AおよびB₂で想定される農家所得

上記の生産目標のほか、別途試算された農畜産物の生産見通し、農家数推計等をもとに、農畜産物の価格を過去3カ年の平均（但し、米については、もみトン当たり2,500バーツ、砂糖きびトン当たり300バーツとする。）として、目標年次における農家所得を推計すると、農場当たり所得はPlan Aでは、14,643バーツ（東北地方では6,603バーツ、中央地方では24,407バーツ）となり、Plan B₂では、13,900バーツ（東北地方7,656バーツ、中央地方22,234バーツ）になるものとしている。

3. 計画策定の諸元と考え方

(1) 人口及び労働力

1970年センサス（最近時センサス）による地域別人口及び労働力は別表2のとおり。今回の農業開発計画の策定に当たっては、目標年次の人口増加率を2.1%、2.5%、及び2.8%と3ケースを想定した。（推定値 Table 11）

(2) 農用地

1973年のタイの土地利用姿は、国土面積321百万ライで、うち農用地106,406千ライ（34%）、森林134,561千ライ（42%）、その他77,282千ライ（24%）となっている（Table 3）。計画策定に当たっては、水源保護等の観点から現状の森林面積の保存は必要であるとし、農用地の外延的拡大による農業生産の増大は期待していない。また、上記の農用地面積に含まれていないいわゆる焼畑農業についても、これを制限する方向で考える。したがって今後の生産増大は土地生産性の向上に期待することが大きい。農用地を主として水利条件から4分類すると、タイプI（洪水地帯：浮稲適地）2,927千ライ（3%）、タイプII（かんがい地帯）

19,365千ライ(19%), タイプⅢ(雨水利用地帯)49,271千ライ(49%), タイプⅣ(畑作専一地帯)28,873千ライ(29%)計100,436千ライ(1973/4作期)となっている(Table 4)。しかるに同作期の作物作付状況は稲52,270千ライ(タイプⅠ,Ⅱ及びⅢ計71,563千ライに作付可能), 畑作物29,621千ライ, 計81,891千ライであり, 農用地利用率は81.5%にとどまっており, さらに利用率を上げることが可能である。

(3) 農業資源(物的及び人的)

土地以外の物的及び人的資源の現状は, 極めて貧弱で, 新しい生産技術の導入の遅れを示している。例えば1974年の農家1戸当たり牛保有頭数約2頭, 1ライ当たり土地価格約2,000バーツ, 物的投入額1ライ当たり1.4バーツであり(Table 5), 農家の教育水準をみても無教育3.6%, 小学校(4年制)1.9%, 中学校(4-12年)4.2%, その他3.2%と約6割が小学校以下となっている(1963年)(Table 5)。この改善を図ることが生産性の向上, 新技術の導入に必要である。

(4) 農業生産

1973/4年産の主要農産物の生産量及びライ当り収量は, 米(うるち)9,009千トン(ライ当り収量284Kg), もち米4,744千トン(256Kg), とうもろこし2,343千トン(343Kg), 砂糖きび12,640千トン(7,800Kg), ケナフ615千トン(185Kg), キャッサバ6,416千トン(2,400Kg), ゴム368千トン(65Kg)となっている。また, 家畜飼養頭羽数は, 水牛5,942千頭, 牛4,729千頭, 豚4,270千頭, 家禽72,378千頭となっている。これらの単位収量や繁殖牛, 豚の子牛, 子豚生産率は国際的にみて, きわめて低い水準にある。(Table 8 参照)

(5) 農産物の輸出入

農産物の輸出は, タイの外貨獲得手段として大きな比重を占めている。主要品目の輸出入の状況はTable 8のとおりである。

(6) 農家所得等

1970年センサスによれば、同年の農家戸当り可処分所得は3,530バーツで、うち農外所得が2,044バーツと過半を占めている。また、労働力人口のうち非就業又は不完全就業の割合が4割強となっている(Table 9)。地域的には、特に東北地方が貧しく、農家所得の向上とともに農業以外を含め就業機会の増大を図る必要がある。さらに農家所得をバンコクの都市所得と比較すると約10分の1にすぎない。

(7) 土地所有と農地改革

1974年における地域別の農場規模の散布度及び所有形態は Table 12 のとおりである。これによると、全国平均農場規模は約31ライで、30ライ未満農家戸数が全農家の62%、30~50ライ農家が21%、50ライ以上が17%となっている。また、農地の所有形態についてみると全国で約7割の農家及び農地が自作であり、自小作が2割弱、小作は統計的には数%にすぎないが、その殆んどが中央地域に存する。

(8) かんがい

農業の生産性向上のための大きな要素であるかんがいについての現状(1974年)及び将来計画(1981年目標)は、Table 18のとおりである。すなわち、現状のかんがい面積は、雨期作10,241千ライ、乾期作1,964千ライであるが、現在建設中及び計画中の工事が完成すれば目標年次には、それぞれ19,805千ライ、4,777千ライに増大する。

(9) 畜産

畜産については、目標年次の国内消費及び輸出向の需要に見合った生産を目標とするが、人口増加率2.1%の場合には、目標年次の総需要を牛793千頭(うち輸出向20千頭)、水牛271千頭(5千頭)、豚6,208千頭(8千頭)、鶏及びあひる165,610千羽(3,500千羽)、卵6,512トン(3,000トン)と、人口増加率2.5%の場合には、牛809千頭(25千頭)、水牛280千頭(10千頭)、豚6,311千頭(15千頭)、鶏及び

あひる 171,910 千羽 (7,500 千羽), 卵 7,561 トン (4,000 トン) と見込んでいる。(Table 19)

4. 各案の比較 (特に Plan A と B₂)

最初に述べたように本ドラフトでは 7 案が提示され、それぞれ比較検討されているが (Table 20), ここでは特に Plan A と B₂ を中心に比較する。

A 案の概略は前述のとおりであるが、その特徴は、①人口増加率を低くおさえとあること (第 4 次 5 カ年計画全体の案と同じ)。②農産物の輸出を高く見込んでいること。③RD 品種の導入、施肥面積及びかんがい面積の拡大を大巾に見込んでいること。示されるように国内生産を最大化する反面需要は低目にして輸出を拡大しようとするものである。また、この案による雇用及び所得面に関しては、④タイ全体としては非就業又は不完全就業の農業労働人口の割合は現状 (1974 年 62%) より改善される (目標年次 58%) もの、東北タイではむしろ悪化するとみている (68% → 72%)。⑤所得についても同様タイでは現状よりも低下する (Table 22, Figure 8, Figure 10, Table 30, 39, 46, 47, 48)。これに対し、B₂ 案の特色としては (同案は B₁ 案の変形で前提条件はほぼ同様である。), ①人口増加率は、現状からゆるやかに低下する傾向をたどる。②輸出についても大巾な増加は見込まない。③RD 品種、施肥、かんがいについても大巾な拡大を見込まないという需要、供給とも中庸な計画である。また、雇用、所得面に関しては、④この案では特に東北タイの雇用及び所得の改善を政策的にとりあげ、⑤産出の配分を東北タイにウェイトを置くよう調整し、⑥同地域の非又は不完全就業人口割合を改善 (現状 68% → 67%) するとともに、⑦所得についても現状を上回るようにする。このように Plan B₂ は、現状をもとに中庸な計画であることと特に東北タイの安定に視点を置いた計画といえる。(Table 47, 48, 32, 41, 46, 49)

その他 Plan C は、人口増加率を高く見込んだ場合のもの、D は A と同様の

人口増加率で輸出を低くしたもので、Bはかんがい面積を現状で固定した場合、PはR.D品種及び施肥面積を現状固定したものであるが説明は略する。

以上の各案のうち本ドラフトにおいては、Plan B₂を最も妥当なものと評価している。

II Thailand's Fourth Five - Year

Agricultural Development Plan

AD 1981 - Guidelines

Prepared by

Division of Agricultural Economics

Ministry of Agriculture and Cooperatives

Royal Thai Government

on behalf of

The National Economic and Social

Development Board, Office of the Prime Minister,

Royal Thai Government

Second Draft

August 30, 1976

Summary

In general, agricultural development planning is required when existing conditions do not meet the needs of the people and programs and measures the change those conditions are required. Thailand's current agricultural conditions do not meet the needs of Thai farmers. Important factors preventing the needs of farmers from being met can be reviewed as follows:

1. High population growth: The present rate of population growth is 2.7 - 2.8 percent per annum. If this rate of growth continues total population will reach 49,534,000 by 1981. If it reaches that level there will be large increases in food demand and in the number of people seeking employment.

2. Very low average income of farmers: The income disparity among farmers themselves and between farmers and the nonfarm population are high. Farm household income averaged approximately 3,530 Baht in 1970 while during the same year income of Bangkok households averaged 32,200 baht. Study of regional farm income indicates that Northeastern farmers have been able to increase their incomes only at a very slow rate. Average farm household income was only 2,015 Baht in the Northeast in 1970. Central region farmers had average household incomes of 5,928 Baht during the same year.

3. High Unemployment among agricultural workers: This situation will become more and more serious if the population growth rate remains at a high level. At present, 62 percent of the economically active farm population the kingdom are unemployed or underemployed. The situation is particularly serious in the Northeastern and Northern regions, where 89

percent and 82 percent of the dry season and 15 percent and 41 percent of the rainy season labor respectively were employed in 1973.

4. Low agricultural productivity and very slow rates of technological adoption by farmers: There has been little increase in crop yield per rai during the recent past. Some crops have declined in yield per rai. Rice yields per rai in 1961 were approximately 256 kilograms. In 1975 they were 265 kilograms. Maize yield per rai in 1961 was 321 kilograms and increased to 375 kilograms in 1975 because of the favorable climatic conditions. Casava yield per rai in 1961 was approximately 2,779 kilograms but decreased to 2,080 kilograms in 1974. Therefore, it can be concluded that the increase in crop production in the past was derived mainly from expansion of cultivated land and planted area. Moreover, only 24 percent of the area planted to rice, an essential crop is currently fertilized.

5. Limited agricultural land: To use more forest land for agriculture will be difficult in the future because the present forest area is less than the desired goal. Therefore, it is necessary to maintain forest reserves to protect Thailand's water resources. At present, there are approximately 100.44 million rai of agricultural land and approximately 134.56 million rai of forest land. The rest are land areas occupied by homes, rivers, canals, swamps, roads and industry.

6. Reluctance of farmers to adopt new technology: Because farmers have low income and the distribution of their income is still very unequal between regions the farmers

themselves lack enthusiasm to improve their crop productivity.

Given such conditions that are unattractive to the farmers, it is necessary to ameliorate those conditions to the benefit of the farmers. But, how and to what extent improvements can be made depends on studies, and analyses of alternative agricultural development plans. These alternatives will depend in turn on determinants of product demand and the supply of production factors.

The Plan for agricultural development desired by the farmers should have the following main objectives:

- (1) To increase income and improve the income distribution among Thailand's farmers themselves and between farmers and the non-farm population.
- (2) To increase employment opportunities for Thailand's population.
- (3) To produce sufficient food to meet the needs of the population at fair prices.
- (4) To build national security and unity.
- (5) To earn more foreign currency.
- (6) To see that the farmer's own land.

The strategy for agricultural development planning to reach such objectives and result in a productive outcome for the farmers must be implemented through consideration of various agricultural development plans in order that each plan can have various determinants which show the effects realized from changes in the determinants. Those determinants can be divided into two groups. The first group will effect agricultural product demand and includes population, income, exports and commodity prices. The second-group of factors

will affect production levels and includes farm land, irrigation water use, technology adoption, commodities prices, cost of production factors and climatic conditions. Changes in any factor or group of factors will effect agricultural product demands and/or supplies.

Table A Alternative Plan Targets for AD 1981

Type of Statistic	AD 1981 Targets						
	Plan A	Plan B1	Plan B2	Plan C	Plan D	Plan E	Plan F
1. Population Growth Rate (Percent)	2.1	2.5	2.5	2.8	2.1	2.1	2.1
2. Exports (Million tons)							
Rice (Paddy)	2.60	2.16	2.16	2.60	1.53	2.62	1.85
Maize	3.00	2.49	2.50	3.00	2.00	3.00	3.00
Cassava (Roots)	6.57	5.48	5.48	6.57	4.43	6.57	6.57
Sugar	0.75	0.55	0.55	0.75	0.35	0.75	0.75
Kenaf	0.10	0.08	0.08	0.10	0.05	0.10	0.10
Rubber	0.45	0.40	0.40	0.45	0.35	0.45	0.45
3. Production (Million tons)							
Rice (Paddy)	16.04	15.78	15.79	16.42	14.97	16.05	15.29
Maize	3.61	3.11	3.12	3.61	2.61	3.61	3.61
Cassava (Roots)	7.10	6.03	6.02	7.21	4.95	7.10	7.10
Sugarcane	16.30	13.73	13.72	16.48	10.97	16.30	16.30
Kenaf	0.32	0.30	0.30	0.33	0.27	0.32	0.32
Rubber	0.47	0.41	0.41	0.47	0.37	0.47	0.47
4. Irrigated land (AD 1975 Area 12,205 Million Rai)	24,505	16,893	16,893	24,705	24,705	12,205	12,205
Wet Season (AD 1975 Area 10,241 Million Rai)	19,805	13,665	13,665	19,805	19,805	10,241	10,241
Dry Season (AD 1975 Area 1,964 Million Rai)	4,700	3,228	3,228	4,900	4,900	1,964	1,964
5. Area Seeded to RD varieties (AD 1975 Area 3,223 Million Rai)	12,420	6,407	6,407	12,420	12,420	6,446	3,223
6. Area Rertilized (AD 1975 Area 14,974 Million Rai)	20,567	19,300	19,300	20,567	20,567	18,785	14,974
7. Fertilizer Use (Kgs. per Rai):							
On Native Varieties.	25	25	25	25	25	25	Trend
On RD Varieties.	80	60	60	80	80	80	Levels

Note: (1) 1 Rai \doteq 0.16 ha

Table B Comparative Area Planted, Production, Domestic Consumption and Exports of Major Crops in 1975 and 1981 by Alternative Plans.

Unit: Million Tons

Economic Crop	1975	1981								
		Plan A	Plan B1	Plan B2	Plan C	Plan D	Plan E	Plan F		
1. Rice (Paddy)										
Area Planted (1,000 rai)	53,243	55,681	49,275	54,483	56,226	53,505	51,182	52,662		
Production	14,092	16.04	15.78	15.79	16.42	14.97	16.05	15.29		
Domestic Consumption	12,678	13.44	13.62	13.63	13.82	13.44	13.43	13.44		
Export	1,414	2.60	2.16	2.16	2.60	1.53	2.62	1.85		
A. Non Glutinous Paddy										
<u>Rice</u>										
Area Planted (1,000 rai)	32,425	33,698	27,397	32,605	34,225	31,721	30,423	29,530		
Production	8,867	10.24	9.91	9.92	10.48	9.23	10.24	9.42		
Domestic Consumption	-	7.78	7.89	7.90	8.02	7.78	7.74	7.78		
Export	-	2.46	2.02	2.02	2.46	1.45	2.46	1.64		
B. Glutinous Paddy Rice										
Area Planted (1,000 rai)	20,818	21,983	21,876	21,878	22,001	21,784	20,759	23,132		
Production	5,224	5.80	5.87	5.87	5.94	5.74	5.81	5.87		
Domestic Consumption	-	5.66	5.73	5.73	5.79	5.86	5.65	5.66		
Export	-	.14	.14	.14	.15	.08	.16	.21		
2. Maize										
Area Planted (1,000 rai)	8,010	11,427	10,251	11,258	11,381	8,411	11,377	11,250		
Production	3.00	3.61	3.11	3.12	3.61	2.61	3.61	3.61		
Domestic Consumption	.853	.61	.62	.62	.61	.61	.61	.61		
Export	2.147	3.00	2.49	2.50	3.00	2.00	3.00	3.00		

		Table B Continue							Unit: Million Tons		
Economic Crop	1975	1981							Plan B	Plan F	
		Plan A	Plan B1	Plan B2	Plan C	Plan D	Plan E	Plan F			
<u>1. Cassava</u>											
Area planted (1,000 rai)	3,078	3,607	2,998	3,398	3,651	2,482	3,785	3,813			
Production	7,052	7.10	6.03	6.02	7.21	4.95	7.10	7.10			
Domestic Consumption	0.266	0.53	.55	.54	.55	.52	.53	.53			
Export	6.786	6.57	5.48	5.48	6.56	4.43	6.57	6.57			
<u>2. Sugar Cane</u>											
Area planted (1,000 rai)	2,347	1,951	1,657	1,657	1,974	1,340	1,953	1,953			
Production	19,099	16.30	13.73	13.72	16.48	10.97	16.30	16.30			
Domestic Consumption	11,100	6.30	6.40	6.40	6.39	6.48	6.30	6.30			
Export	7,959	10.00	7.33	7.33	10.00	4.67	10.00	10.00			
<u>3. Para Rubber</u>											
Area planted (1,000 rai)	5,745	8,039	7,001	7,144	8,045	6,428	8,043	8,013			
Production	.414	.47	.41	.41	.41	.37	.47	.47			
Domestic Consumption	.079	.02	.01	.01	.02	.02	.02	.02			
Export	.335	.45	.40	.40	.45	.35	.45	.45			
<u>4. Kenaf & Jute</u>											
Area planted (1,000 rai)	2,038	2,162	2,012	2,124	2,203	1,817	2,162	2,161			
Production	.308	.32	.30	.30	.33	.27	.32	.32			
Domestic Consumption	.151	.22	.22	.22	.23	.22	.22	.22			
Export	.157	.10	.08	.08	.10	.05	.10	.10			

Table C Showing 1973 and 1981 Comparative Employment and Income under Alternative Plans

	1973	1981						
		Plan A	Plan B1	Plan B2	Plan C	Plan D	Plan E	Plan F
Number of farms	3,539,282	4,742,637	4,742,637	4,742,637	4,742,637	4,742,637	4,742,637	4,742,637
A. Agricultural Employment								
Total labor force	11,676	14,052	14,052	14,052	14,052	14,052	14,052	14,052
Employment	4,417	5,956	5,732	5,963	5,995	5,449	5,938	5,945
Percentage of Unemployment	62	58	59	58	57	62	58	58
B. Agricultural Income								
Total Value of Crops (Mil.)	48,031	74,158	69,885	69,978	75,384	64,168	78,552	71,292
Total Value of Crops per Farm by Average (Baht)	13,571	15,636	14,735	14,755	15,895	13,530	15,467	15,032
Crop Production Expenditures per Farm by Average (Baht)	3,256	3,736	3,496	3,598	3,828	3,091	3,936	3,749
Net Income from Crops per Farm by Average (Baht)	10,315	11,200	11,239	11,157	12,067	10,439	11,531	11,283
Net Income from Forestry, Fisheries, Fruits, Vegetables and Livestock (Baht)	2,743	2,743	2,743	2,743	2,743	2,743	2,743	2,743
Net Income per Farm (Baht)	13,058	14,643	13,982	13,900	14,810	13,182	14,274	14,026

Note: (1) 1 Baht = ¥15, \$1 = 20 Baht

Table 2. Characteristic Features of Thailand's Population and Labor Force by Region in 1970.

Unit: Persons

Region	Total Population	Agricultural Population (1)	Economically Active Population (15-64 years of age)	
			Total (2)	Employed only in Agriculture (3)
North ^a	7,813,000	5,599,613	3,402,233	1,925,664
Northeast ^b	11,700,000	9,407,088	5,268,192	3,145,111
Central Plain	10,612,000	4,044,385	4,251,424	2,300,020
South	4,272,000	2,676,210	1,753,951	997,325
Thailand	34,397,000	21,729,296	14,630,800	8,368,120

- Source: (1) Population and Housing Census National Statistical Office, Office of the Prime Minister, 1973 table 1 and table 2.
 (2) Population and Housing Census, National Statistical Office, Office of the Prime Minister, Royal Thai Government, Bangkok, Thailand, 1973, table 19.
 (3) Estimated by using proportion from 1973 General survey, Division of Agricultural Economics, Ministry of Agriculture and Cooperatives.
 (a) North - includes changwat Loei
 (b) Northeast - excludes changwat Loei

Table 11. AD 1970 and Projected AD 1981 Population Statistics Under Alternative Population Growth Assumption by Region

Unit: 1000 persons
Population Growth Rate Low - 2.1 percent per annum

	North	Northeast	Central Plain	South	Thailand
Population AD 1970 1/	7,813	11,700	10,612	4,272	34,397
Project Population AD 1981 2/	10,946	16,386	14,863	5,984	48,179
Projected Increase	3,133	4,686	4,251	1,712	13,782
Economically Active Population AD 1970	3,402	5,268	4,251	1,759	14,680
Project Economically Active Population AD 1981	4,019	7,730	8,087	2,554	22,390
Projected Increase	617	2,462	3,836	795	7,710

Population Growth Rate Medium-2.5 percent per annum

	North	Northeast	Central Plain	South	Thailand
Population AD 1970 1/	7,813	11,700	10,612	4,272	34,397
Projected Population AD 1981 2/	11,110	16,630	15,085	6,073	48,898
Projected Increase	3,297	4,930	4,473	1,801	14,501
Economically Active Population ^a AD 1970	3,402	5,268	4,251	1,759	14,680
Projected Economically Active Population AD 1981	4,019	7,730	8,087	2,854	22,390
Projected Increase	617	2,462	3,836	795	7,710

Table 11. Continue

Population Growth Rate High - 2.8 percent per annum

	North	Northeast	Central Plain	South	Thailand
Population AD 1970 1/	7,813	11,700	10,612	4,272	34,397
Projected Population AD 1981 2/	11,254	16,847	15,281	6,152	49,534
Project Increase	3,441	5,147	4,669	1,880	15,137
Economically Active Population AD 1970	3,402	5,268	4,251	1,759	14,680
Projected Economically Active Population AD 1981	4,019	7,730	8,087	2,534	22,390
Project Increase	617	2,462	3,836	795	7,710

Source:- 1/ 1970 Population Housing Census (Table I), National Statistics Office Office of The Prime Minister 1973, Bangkok, Thailand

2/ Projected from 1970 Population & Housing Census (Table 4, 16, 19), National Statistic Office, Census of The Prime Minister, 1973, Bangkok, Thailand. The projections were made by the Institute of Population Studies, Chulalongkorn University, Bangkok Thailand.

a) Since available population projections vary only with respect to assumed fertility and hence new births the economically active population is the same for all projections 5 years into the future. Given such projection procedures projected economically active populations will vary from one a not only after 15 years.

Land for Agriculture:

Thailand covers a total land area of 321 million rai. That total land area includes land areas of many classes. The classes and area of each are indicated in Table 3.

Table 3. Thailand's Land Area by Class of Land and Region in AD 1973

Region	Land Area by Class (Rai)		
	Farm Holdings <u>1/</u>	Forese <u>2/</u>	Others
North	24,735,568	63,168,750	25,944,435
Northeast	47,802,248	31,865,625	19,888,377
Central Plain	25,087,356	24,378,750	14,270,769
South	11,481,231	15,208,125	17,178,766
Thailand	100,406,406	134,561,259	77,282,347

Source:- 1/ The Center for Agricultural Statistics, Division of Agricultural Economics; Ministry of Agriculture and Cooperatives, Royal Thai Government.

2/ Royal Ministry Department, Royal Thai Government Bangkok Thailand, AD 1974.

Agricultural production in Thailand takes place on that land area classified as agricultural. It is true that some agricultural production takes place on non-agricultural lands. However, this production, based on slash and burn techniques is detrimental to preservation of water sheds and maintenance of annual forest product supplies. Therefore, the intent of the government is to restrict such practices. Thus agricultural planning will proceed on the basis of those lands classified as agricultural and limited additional areas identified as suitable for agricultural use.

The agricultural land area of Thailand consists of four types of land. Land Type I is that land which is continuously flooded and hence suited only to production of floating rice. Land Type II is that land area where controlled irrigation practices can be employed. Land Type III is that land area which permits only rainfed paddy production. Land Type IV is that land area in Thailand which can produce only upland crops.

The four types of land described above form the land base for current and future agricultural production in Thailand. The quantities of each type of land in Thailand and each region of Thailand are shown in Table 4.

Table 4. Thailand's Agricultural Land Area by Class and Region in AD 1973 - 1974.

Region	Land Area by Type : Unit - Rai				
	Type I	Type II	Type III	Type IV	Total
North	2,591,000	8,821,000	8,670,000	7,145,000	22,227,000
North-east	-	2,333,000	33,623,000	7,690,000	43,646,000
Central Plain	336,000	11,670,000	3,963,000	6,274,000	22,240,000
South	-	1,544,000	3,015,000	7,764,000	12,323,000
Thailand	2,927,000	19,365,000	49,271,000	28,872,000	100,436,000

- 1) Total agricultural land in Table 4 differs from that indicated in Table 3 because land in farms used for roadways and farmsteads is included in Table 3.

Agricultural resource development in Thailand is based on the land area shown in Table 4. The effectiveness with which that land base is used by the Thai people depends to a large degree on the development of secondary inputs and the quantity of capital inputs available for use in agricultural

production. These factors of production include production skills reflected in education levels achieved by farmers, breeding stock on farms and capital investment. A summary description of these factors is the topic of the following section.

Agricultural Resource Development:

The information contained in Table 5 illustrates the resource development situation on Thai farms. Thai farmers have had limited opportunity to attend school. The resulting low level of education among farmers causes reluctance to try new techniques and hence restricts adoption of new technology. The limited number of breeding stock on farms and low level of capital investment are indicative of the traditional nature of production techniques. These conditions have very positive implication. The potential to markedly increase Thailand's agricultural output through provision of agricultural training programs and programs to stimulate adaption of new technologies is indeed great.

Table 5 Indicators of Thailand's Average Agricultural Resource Development by Region - AD 1974

Region	Average Number of Livestock per farm		Indicators of Average Farm Capital Investment per rai	
	Cattle (Number)	Buffaloes (Number)	Value of Land (Baht per rai)	AD 1974 Purchased Inputs Excluding Hired Labor (Baht per rai)
North	.96	1.21	1,331	9
Northeast	.91	1.89	1,731	14
Central Plain	.78	.94	2,993	24
South	1.38	.43	2,760	11
Thailand	.96	1.33	1,962	14

Table 5. Contd.

Level of Education of Farm Family Heads² AD 1963

	No Education		Grade 1-4		Grade 4-12		Other ³	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
North	308,732	39.7	157,673	20.3	290,035	37.3	21,202	2.7
Northeast	392,998	32.2	210,158	17.2	591,938	48.5	25,692	2.1
Central Plain	255,135	35.5	139,398	19.3	299,898	41.5	28,540	3.9
South	206,815	41.9	87,481	17.7	172,522	35.0	26,188	5.3
Thailand	1,163,680	36.2	594,710	18.5	1,354,393	42.1	101,622	3.2

Current Education Level of Farm Family Children Who have Education Beyond Prathom 71,4

	NE	North			Central			South			Kingdom
		Number	Percent	Number	Percent	Number	Percent	Number	Percent		
MS 1	13,333	7,025	6,197	3,296	29,851						
MS 2	55,180	24,901	26,211	32,536	138,828						
MS 3	75,563	40,712	34,654	33,000	183,920						
MS 4	10,766	6,074	6,675	10,015	33,530						
MS 5	6,707	4,006	7,049	8,452	26,214						
MS 6	5,252	2,191	7,768	4,484	19,695						
VOCATIONAL UNIVERSITY	18,346	7,222	15,786	17,588	58,942						
Total	13,035	3,911	13,757	10,996	41,699						
	198,182	96,042	118,088	120,367	537,679						

Source: 1) Division of Agricultural Economics, Ministry of Agriculture and Cooperatives, Royal Thai Government, Bangkok, Thailand.

2) National Statistical Office, Census of Agriculture AD 1963 Royal Thai Government, Bangkok, Thailand, 1965.

3) Includes persons who attended special or foreign schools for whom it was not possible to determine the equivalent of grades completed in the standard system.

4) This data summarizes the educational status of the children of farm family heads farming in AD 1973 for those children who have completed education beyond pathom seven.

Agricultural Production:

The types of agricultural commodities produced in Thailand and the levels of production indicate the use and productivity of Thailand's agricultural resources. In DC 1973-74 Thai farmers used labour, land and capital resources to produce the per rai and total production levels shown in Tables 6 and 7.

Table 6. Agricultural Production for Major Crops in Thailand AD 1973-74 by region Total Production - 1,000 tons

Commodity	Region				
	North	Northeast	Central Plain	South	Thailand
Rice (NG) /1	2,306	1,512	4,445	747	9,009
Rice (G)	1,674	3,018	10	41	4,744
Corn (BE) /2	1,270	344	729	-	2,343
Sugarcane /3	1,007	453	11,180	-	12,640
Kenaf /1	27	570	18	-	615
Cassava	491	1,225	4,463	237	6,416
Rubber	-	-	18	350	368

Average Production per Rai-Kilograms

Commodity	Region				
	North	Northeast	Central Plain	South	Thailand
Rice (NG) /1	299	119	329	258	284
Rice (G)	434	208	177	374	256
Corn /2	345	345	337	-	343
Sugarcane /3	7,000	5,000	8,100	-	7,800
Kenaf /4	225	184	167	-	185
Cassava	2,755	2,317	2,410	2,056	2,400
Rubber	-	-	38	67	65

- Source: 1) AD 1974 Division of Agricultural Economics, Ministry of Agriculture and Cooperatives, Royal Thai Government, Bangkok, Thailand.
 2) Board of Trade and Department of Extension, Royal Thai Government, Bangkok, Thailand.
 3) Sugar Institute, Ministry of Industry, Royal Thai Government, Bangkok, Thailand.

Table 7. Agricultural Productivity^a of Major Livestock Types in Thailand AD 1973/74 by Region

Live stok Types	Region				
	North	Northeast	Central	South	Thailand

Production Unit: number of animals or birds

Buffa- loes	1,293,846	3,608,379	809,355	230,102	5,941,683
Cattle	1,078,865	1,983,523	832,990	834,104	4,729,491
Hogs	1,035,048	1,352,344	1,324,883	557,581	4,269,856
Poultry	16,578,630	28,739,178	19,131,640	7,928,654	72,378,102

Marketing Unit: 1000 head

Buffa- loes	122	545	72	38	779
Cattle	149	372	75	141	738
Hogs	812	1,336	1,931	380	4,460
Poultry	4,382	8,992	15,281	2,847	31,504

Average Number of Births per Mature Female per annum

Buffa- loes	.226	.23	.22	.29	.23
Cattle	.32	.29	.37	.22	.29
Hogs	6.81	5.39	7.62	6.51	6.96

Source: Division of Agricultural Economics, Office of the Under Secretary of State, Ministry of Agriculture and Cooperatives, Royal Thai Government, Bangkok, Thailand

- a) Productivity refers to the efficiency of a producing unit or the commodity output realized from a given input level.

Table 8 Thailand's Agricultural Import-Export Situation for Selected Commodities AD 1970 and AD 1973

Units - 1,000 tons and 1,000,000 Baht

Commodity or Commodity Group	Quantity (Q) Value (V)	AD 1970		AD 1973	
		Export	Import	Export	Import
Rice (Non Glutinous)	Q	977.0	*	822	
	V	2,347		4,594.3	
Rice (Glutinous)	Q	102.4		27.0	
	V	180.2		126.2	
Maize	Q	1,520.0	.08	1,456.0	1.0
	V	1,856.9	.54	2,861.2	1.0
Sugar	Q	168.0		276.0	
	V	139.5		1,155.6	
Rubber	Q	278	n.a.	391.0	n.a.
	V	2,249.7	207.0	4,572.6	142.4
Cassava Products	Q	1,327.0		1,836.0	
	V	1,227.2		2,536.6	
Buffalo, Bullocks and Cows	Q	35.0	.2	46.0	2.4
	V	72.8	3.4	138.6	.7
Swine	Q	16.0	.3	11.0	.6
	V	10.3	.4	8.3	2.4
Dairy Products	Q		46.0		40.0
	V		397.3		511.2
All Agricultural Products		16,977.7	3,834.50	22,150.8	5,519.7
Agricultural Trade Balance Exports-Imports		7,693.3		16,631.1	

Source: See Appendix Table 1

* Indicates Zero;

** Rubber Products; n.a. - not applicable;

As indicated in Table 8 agricultural population in Thailand has met most domestic requirements and made a significant contribution to foreign exchange earnings and Thailand's balance of payments. For example, net foreign exchange earnings resulting from agricultural trade totalled 28.4 million baht in AD 1974.

Providing food for Thai citizens at reasonable prices and contributing to Thailand's balance of trade are important contributions. However, the industry's provision of income and employment for 80 percent of Thailand's people is very important, too. Cash income and income in kind received from agriculture and family income generated by the agricultural sector are shown in Table 9. They indicate how much agriculture contributes to the income objectives of Thailand's people and the extent to which income objectives are being met through agriculture. Figure 4 and Table 10 show the degree of success being realized in achievement of employment objectives in Thailand through agriculture.

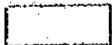
Table 9 Regional Average Farm Family Income by Source and Total Family Income Generated in Non Agricultural Sectors by Agriculture in AD 1970

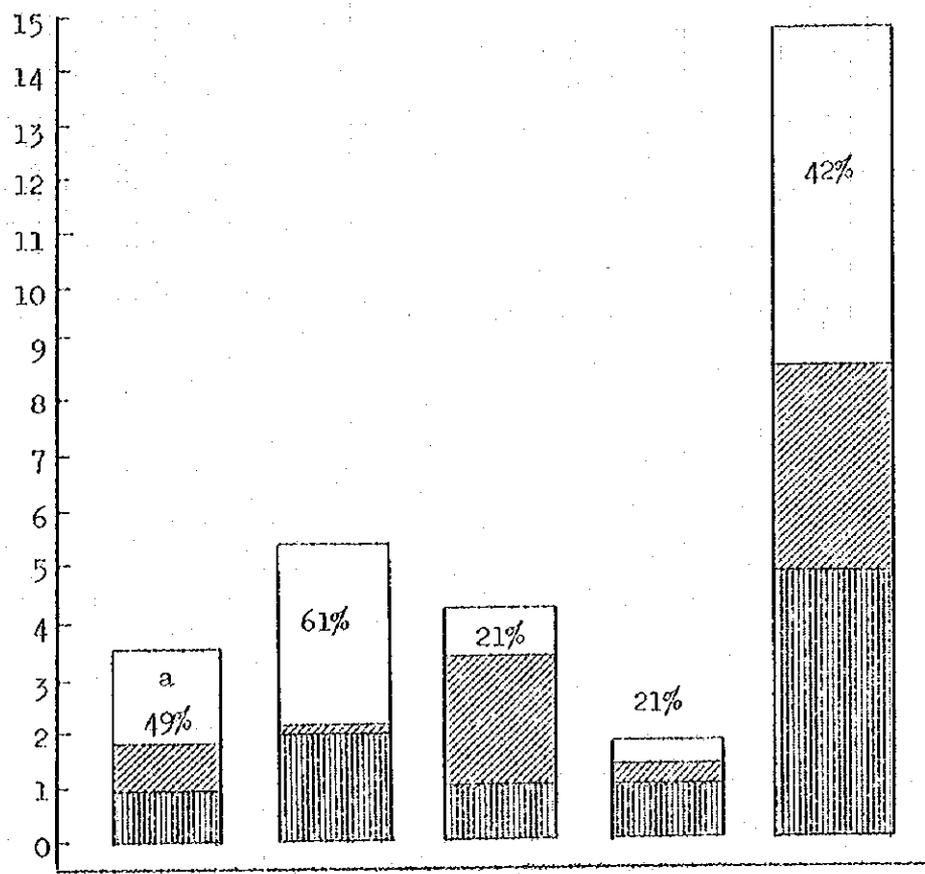
Region	Farm Income (Baht)			Total Family Income Generated in Non-Agricultural Sectors by Agriculture DC 1973
	Income from Farm Sources Less Operating Expenses	Income from Off-farm Work	Farm Family Disposable Income	
North	2,187	1,002	3,789	
Northeast	952	1,064	2,015	
Central Plain	1,343	4,585	5,928	
South	1,784	2,170	3,954	
Thailand	1,486	2,044	3,530	44,325 Million Baht

Source: Division of Agricultural Economics, Ministry of Agriculture and Cooperatives, Royal Thai Government Farm Income and Expenditures in Thailand - AD 1970 Bangkok, Thailand.

a) Includes value of rice grown and consumed by the family.

Million
Persons
Age. 15-64
Years

 - Agricultural Employment
 - Non-Agricultural Employment
 - Unemployed and/or Underemployed



Region North Northeast Central Plain South Thailand

Figure 4. Employment Situation in Thailand by Region for Agriculture and the Non-Agricultural Sector AD 1970^b

a) Percent unemployed and/or underemployed

b) Agricultural Use Levels are for the Year AD 1973 as estimated by Division of Agricultural Economics, Ministry of Agriculture and Cooperatives.

Source: See Table 10.

Table 10 Labor Force and Employment in Thailand for Agriculture and Non-Agricultural Sectors by Region AD 1970

Unit: 1000 Persons

Region	Total population 11 years of age and over	Labor Force 11-65 ⁺ (1)	Economically Active Population (1)			Economically Active Population Employed only in Agriculture 15-64 (3)	Economically Active Population by Occupation (1)	
			15-64		Agriculture 15-64		Non-Agriculture 15-64	
			11-14	65 & over				
North (3)	5,166	3,863	395	3,402	64	1,926	2,891	511
Northeast (4)	7,327	6,101	734	5,268	99	3,145	4,788	460
Central Plain	7,193	4,737	379	4,251	107	2,300	2,312	1,940
South	2,776	1,951	132	1,759	60	997	1,428	351
Thailand	22,462	16,650	1,640	14,681	332	8,368	11,419	3,262

- Sources: (1) Table 19, 1970 Population and Housing Census, National Statistical Office, Office of the Prime Minister, Thailand
 (2) Table 16, 1970 Population and Housing Census, National Statistical Office, Office of the Prime Minister, Thailand
 (3) Estimated by using proportion from 1973 General Survey, Division of Agricultural Economics, Ministry of Agriculture and Co-operatives, Bangkok, Thailand.
 (4) North - including chagwat Loei.
 (5) Northeast - excluding chagwat Loei
 (6) Unknown category distributed by using age group proportions
 (7) Unemployment = Labor force - Employment.

Table 10 Contd:

	Employment (2,6)			Unemployment and Underemployment (7)		
	11-14	15-64	65+	11-14	15-64	65+
North ⁽³⁾	144	1,732	34	251	1,670	32
Northeast ⁽⁴⁾	183	2,043	80	551	3,225	69
Central Plain	243	3,344	74	136	908	33
South	81	1,389	44	50	370	16
Thailand	651	8,508	182	988	6,173	150

8) The AD 1970 census was taken April 1. Since April is a month of the dry season all farmers except the small number who can secure off farm work and those with dry season irrigation water are waiting for the farm season to begin. The farmers who are waiting for the planting season are therefore underemployed rather than unemployed. In other words, they have a job but it does not provide them with work to do in every month of the year.

Table 12: The Distribution of Farm Size and Land Area by Tenure Class and Region in Thailand AD 1974

Region	ALL FARMS					Total
	Number of Farms by Size Class in Rai					
	0-10	11-20	21-30	31-40	41-50	more than 50
NE	170,837	359,162	344,656	234,765	142,039	250,798
North	252,682	202,578	106,367	74,806	60,886	157,275
Central	111,851	128,470	131,368	87,211	72,225	161,829
South	113,110	160,868	90,310	46,989	28,833	40,880
Kingdom	648,480	851,078	672,701	443,771	303,983	610,782
Average farm size (Rai)	6.03	14.77	24.00	34.55	44.65	77.65
Total Land Area	3,910,334	12,570,422	16,548,445	15,332,288	13,572,841	47,427,222
						109,348,721
Region	OWNED FARMS					Total
	Number of Farms					
	0-10	11-20	21-30	31-40	41-50	50
NE	109,393	256,965	260,802	191,512	115,260	270,800
North	159,130	112,273	59,163	44,941	37,629	93,292
Central	15,478	67,811	60,929	36,530	32,655	80,198
South	13,001	111,951	66,295	36,614	24,417	36,178
Kingdom	417,002	549,001	447,189	309,597	209,962	417,469
Average farm size (Rai)	5.89	14.80	24.60	34.61	44.66	77.52
Total Land Area	2,456,142	8,125,215	11,000,849	10,715,152	9,376,903	32,362,197
						74,036,450

PARTY OWNED AND PARTLY RENTED FARMS

Region	Number of Farms					Total
	0-10	11-20	21-30	31-40	41-50	
NE	10,513	26,695	23,853	14,077	12,975	104,217
North	39,645	38,905	17,637	13,777	13,373	160,837
Central	9,744	24,196	36,327	28,014	21,467	171,627
South	22,902	31,729	13,583	5,728	1,800	77,936
Kingdom	82,804	121,525	91,400	61,596	49,615	514,617
Average farm size (Rai)	8.08	14.80	24.60	34.66	44.69	34.12
Total Land Area	669,056	1,796,570	2,248,440	2,134,917	2,217,294	17,558,732

RENTED FARMS

Region	Number of Farms					Total
	0-10	11-20	21-30	31-40	41-50	
NE	679	300	663	157	0	2,181
North	1,088	1,631	3,326	1,252	217	7,999
Central	11,014	12,254	12,549	6,679	6,535	59,355
South	56	79	0	0	156	291
Kingdom	12,836	14,264	16,538	8,089	6,908	69,826
Average farm size (Rai)	5.36	15.81	26.17	36.07	47.31	31.14
Total Land Area	68,801	225,514	432,799	291,770	326,617	2,174,382

a) The information on land tenure presented does not cover all farmers. Information on those who, for example, are given free use of public land or farm institutional land are not included.

Source: Division of Agricultural Economics, Office of the Under Secretary, Ministry of Agriculture and Cooperatives. Royal Thai Government, Bangkok, Thailand.

Table 18. Actual AD 1975 Irrigable Area Planted to Paddy and Potentially Irrigable Paddy Area by Season Given Completion of Dams and Reservoirs under Construction and Scheduled for Completion by AD 1981.

Region and Zone	Wet Season		Dry Season	
	Irrigated (rai)	Irrigable (rai)	Irrigated (rai)	Irrigable (rai)
Zone 1	317,324	518,965	7,048	111,154*
Zone 2	27,644	182,070	-	46,486*
Zone 3	471,645	1,067,720	5,608	370,625*
Zone 4	64,406	153,334	-	21,777*
Zone 5	303,448	415,248	20,634	147,426*
Northeast Region	1,184,467	2,337,337	33,290	706,468
Zone 6	300,748	1,099,242	5,026	96,856*
Zone 8	283,480	1,173,812	7,000	296,132*
Zone 9	294,220	570,650	72,501	162,943*
Zone 10	475,077	1,191,000	191,351	471,133*
North Region	1,353,525	4,034,704	275,878	1,027,064
Zone 7	383,445**	676,638	23,392**	38,907*
Zone 11	5,345,427**	6,858,923	1,316,399**	2,309,071*
Zone 12	621,953**	1,266,816	149,735**	245,813*
Zone 13	539,500**	1,905,213	94,445**	147,409*
Zone 14	153,125**	798,578	32,180**	170,304*
Zone 15	137,602**	183,760	6,259	4,156*
Zone 16	17,200	36,500	1,330	3,456*
Central Plains	7,198,252	11,726,428	1,623,740	2,919,116
Zone 17	393,006	958,800	31,167	116,021*
Zone 18	65,398	219,100	82	7,849*
Zone 19	46,670	529,000	-	-*
South Region	505,074	1,706,900	31,249	123,870
Thailand	10,241,318	19,805,369	1,964,157	4,776,518

Source: Irrigation Department, Ministry of Agriculture and Cooperatives, Royal Thai Government, Bangkok, Thailand.

Note:* Estimated using the following procedure to allocate dry season irrigable area for projects without dry season data. In those cases Dry Season Irrigable Area for Projects without Dry Season Data=(Dry Season Irrigable Area for Project with Data Available/Wet Season Irrigable Area for Project with no Dry Season Data). Such estimates were required for 38 percent of the total area or 1.8 million rai.

** The distribution of project areas was estimated using the following procedure to allocate project area where projects involved are in more than one zone and changwat:

Project Area in Changwat=(Total Irrigated Area in Projects /Total Planted Area in Project Changwats) (Planted Area in Changwat). - 36 -

Table 19. Estimated AD 1981 Domestic, Export^{a/} and Total Livestock Product Demands for Thailand by Region.

Assumed Population Growth Rate: Low; Exports Low^b

Region and Commodity	Unit	Domestic Demand
North	-- Cattle	1,000 Head 223
	Buffalo	" 23
	Swine	" 978
	Chicken & Ducks	1,000 Birds 26,440
	Egg (Hens & Ducks)	Ton 417
Northeast	-- Cattle	1,000 Head 78
	Buffalo	" 7.3
	Swine	" 592
	Chicken & Ducks	1,000 Birds 60,190
	Eggs	Ton 920
Central Plain	-- Cattle	1,000 Head 382
	Buffalo	" 216
	Swine	" 3,595
	Chicken & Ducks	1,000 Birds 50,820
	Eggs	Ton 1,736
South	-- Cattle	1,000 Head 90
	Buffalo	" 12.7
	Swine	" 1,035
	Chicken & Ducks	" 24,660
	Eggs	Ton 439

a) Export demands were estimated only at the Kingdom level and assumed to be distributed among regions according to efficiency and/or government policy criteria.

b) Conditions assumed in Plan Alternative D to be discussed later.

Table 19 (Continued)

Region and Commodity	Unit	Domestic Demand	Export Demand	Total Demand
Thailand - Cattle	1,000 Head	773	20	793
Buffalo	"	266	5	271
Swine	"	6,200	8	6,208
Chicken & Ducks	1,000 Birds	162,110	3,500	165,610
Eggs	Ton	3,512	3,000	6,512

Table 19. (Continued) Estimated AD 1981 Domestic, Export and Total Livestock Product Demands for Thailand by Region.

Assumed Population Growth Rate : Medium; Exports: Medium^c

Region and Commodity		Unit	Domestic Demand
North	- Cattle	1,000 Head	226
	Buffalo	"	23.4
	Swine	"	994
	Chicken & Ducks	1,000 Birds	26,820
	Eggs	Ton	23
Northeast	- Cattle	1,000 Head	80
	Buffalo	"	7.4
	Swine	"	602
	Chicken & Ducks	1,000 Birds	61,040
	Eggs	Ton	933
Central Plain	- Cattle	1,000 Head	387
	Buffalo	"	219.2
	Swine	"	3,650
	Chicken & Ducks	1,000 Birds	51,540
	Eggs	Ton	1,760
South	- Cattle	1,000 Head	91
	Buffalo	"	20
	Swine	"	1,050
	Chicken & Ducks	1,000 Birds	25,010
	Eggs	Ton	445

c) Conditions assumed in Plan Alternatives B1 and B2 to be discussed later

Table 19. (Continued)

Region and Commodity	Unit	Domestic Demand	Export Demand	Total Demand
Thailand - Cattle	1,000 Heads	784	25	809
Buffalo	"	270	10	280
Swine	"	6,296	15	6,311
Chicken & Ducks	1,000 Birds	164,410	7,500	171,910
Eggs	Ton	3,561	4,000	7,561

Table 20. Principal and Illustrative Plan Alternatives Analyzed

Manning Factors	Principal Plan Alternatives	Illustrative Plan Alternatives
Demand Factors:	Plan A Plan B1 Plan B2 Plan C Plan D Plan E Plan F	
Population:		
Growth Rate (Percent)	2.1 2.5	2.1 2.1 2.1 2.1 2.1
Income:		
	Regional and Land Type	
Growth Rate (Percent) ^a	2.2 2.2 Minimum Income Levels Specified	2.2 2.2 2.2 2.2 2.2
Exports	High Medium Medium High High	High High High High High
Commodity Prices	AD 1973-AD 1975 Average Level or Government Specified Price See Appendix Table 4	
Apply Factor Minimum Use Levels		
Land Available: (1,000 rai)		
Total	111,547 111,547 111,547 111,547 111,547 111,547 111,547	
Type I	2,927 2,927 2,927 2,927 2,927 2,927 2,927	
Type II	19,805 13,649 13,649 19,805 19,805 10,241 10,241	
Type III ^b	48,637 54,794 54,794 32,327 32,327 36,242 36,242	
Type IV	40,073 40,073 40,073 40,073 40,073 40,073 40,073	
Type V	104 104 104 104 104 104 104	
Irrigated Land: (1,000 rai)		
Total	24,582 16,992 16,992 24,582 24,582 12,205 12,205	
Wet Season	19,805 13,665 13,665 19,805 19,805 10,241 10,241	
Dry Season	4,900 3,228 3,228 4,900 4,900 1,964 1,964	
Technology Adoption: (Percent or 1,000 rai)		
RD variety use:		
Percent of Land		
Type II in Wet Season	62.7 49.9 49.9 62.7 62.7 62.9 62.9	
Total Land Type II	12,420 6,407 6,407 12,420 12,420 6,446 6,446	
Percent of Land		
Type III Area Bound	27.2 21.5 21.5 27.2 27.2 22.3 22.3	
Total Land Type III	8,788 7,659 7,659 8,790 8,790 8,533 8,533	
Fertilizer Use: (Kgs. per rai)		
On Native Varieties	25 25 25 25 25 25 25	
On RD Varieties	80 60 60 80 80 80 80	
EA Fertilizer (1,000 rai)		
	20,567 19,300 19,300 20,567 20,567 18,785 18,785	
		14,974

a) This growth rate is based on past trends and assumes their continuation.
 b) The Portions of Type III Land which can be seeded to paddy under average weather conditions are the Land Type III constraints shown in Table 46.
 c) The maximum dry season rice area was assumed to be 60 percent of irrigable land.

Table 22. AD 1981 Supply Factor Levels Assumed in Analysis of Plan Alternative A

Supply Factor	Assumed AD 1981 Levels				
	Thailand	North	Northeast	Central Plain	South
Economically					
Active Agricultural Population (Labor Supply)	16,912,005	3,415,409	7,025,657	4,396,980	2,073,959
Land Available Rai					
Total	111,547,017	24,187,711	47,839,518	24,479,082	15,040,706
Type I	2,927,000	2,591,800	-	336,000	-
Type II	19,805,369	4,034,000	2,337,337	11,726,428	1,381,500
Type III	48,637,500	8,670,000	33,623,000	3,963,000	2,301,500
Type IV	40,072,728	8,892,007	11,879,181	8,453,654	10,847,886
Type V	104,420	-	-	-	104,420
Irrigated Land-Rai					
Total	24,581,887	5,061,768	3,043,805	14,645,544	1,830,770
Wet Season	19,805,369	4,034,704	2,337,337	11,726,428	1,706,900
Dry Season	4,776,518	1,027,064	706,468	2,919,116	123,870
Technology Adoption					
RD Variety Use:					
Percent of Land Type II in Wet Season	62.7	78.4	22.8	68.3	41.6
Total Land Type II Area-Rai	12,420,000	3,163,000	533,000	8,015,000	710,000
Percent of Land Type III Bounds ^a	25.3	32.6	19.4	54.7	37.6
Total Land Type III Area-Rai	8,788,000	1,767,000	4,019,000	2,277,000	726,000
Fertilizer use Levels (Kgs. per Rai)					
On Native Varieties	25	25	25	25	25
On RD Varieties	80	80	80	80	80
Rice Area Fertilized (Rai)	20,567,000	1,834,000	9,004,000	8,121,000	1,528,000
Commodity Prices	See Table 20				

a) The portions of Type III Land which can be seeded to paddy under average weather conditions are the Land Type III constraints shown in Table 46.

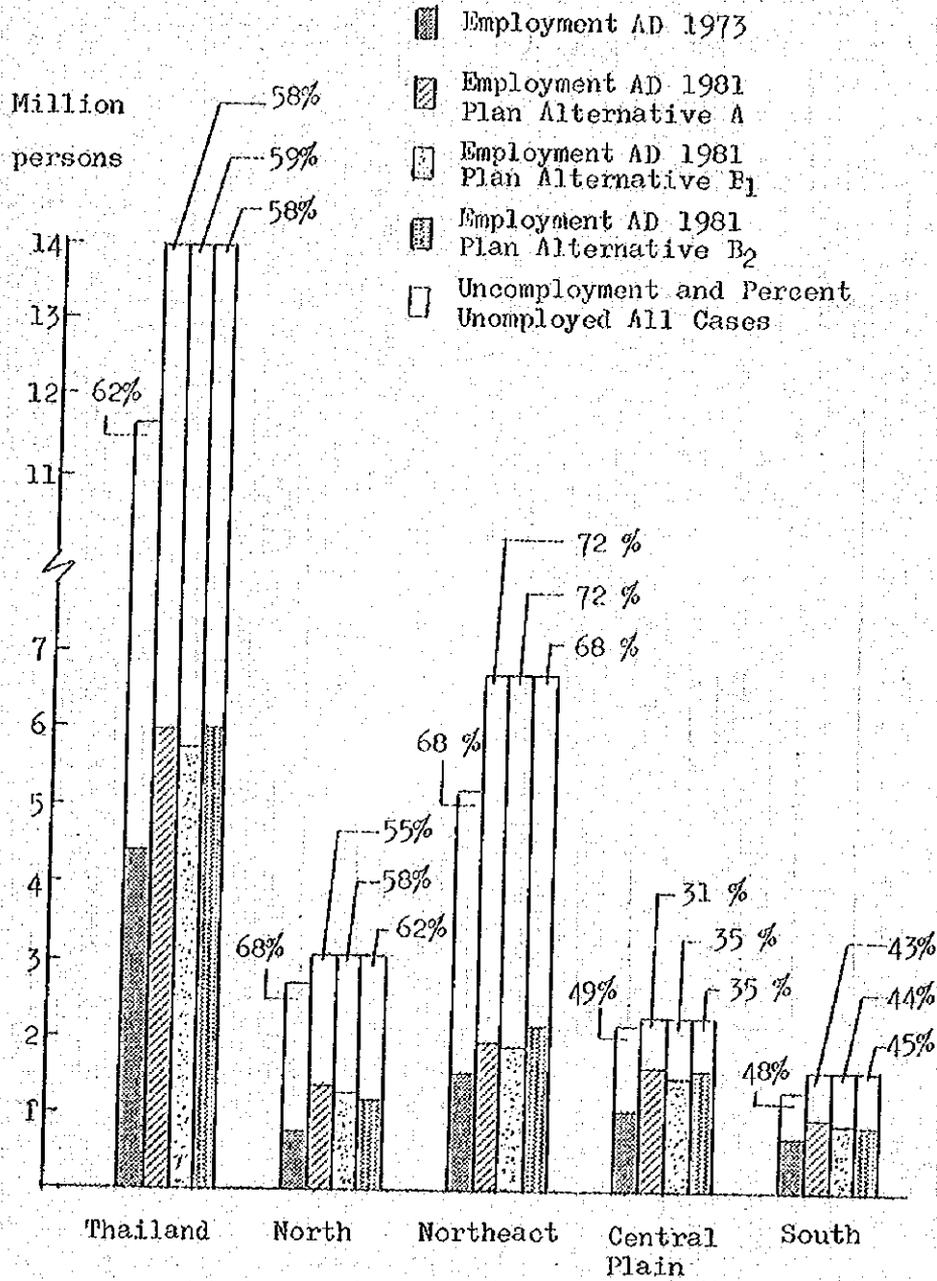


Figure 8 Economically Active Population and Employment Situation in Agriculture in AD 1973 and in AD 1981 under Plan Alternative A, B1 and B2

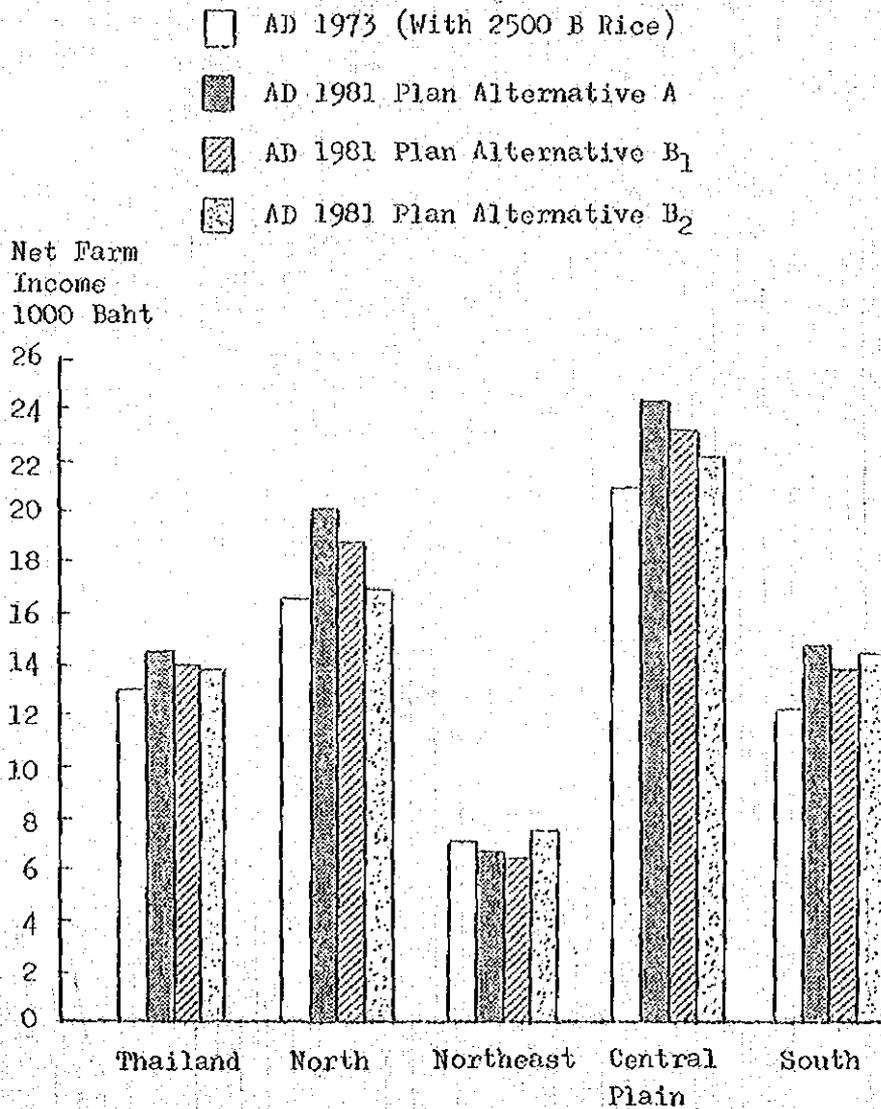


Figure 10 Net Farm Income^a is Thailand in AD 1973 and in AD 1981 as Estimated Under Plan Alternative A, B₁ and B₂

a) The value of rice grown and consumed by the farm family is included.

Table 30 Thailand's Employment and Income Situation by Region Under Plan Alternative A Conditions AD 1981

Descriptive Statistics	Region				
	North	Northeast	Central Plain	South	Thailand
Number of Farms:	927,919	2,026,381	1,144,132	644,205	4,742,637
<u>Agricultural Employment Situation (1,000)</u>					
<u>Annual Labor Force:</u>					
Employment	3,132	6,814	24,075	1,698	14,052
Percent Unemployed	55	72	31	43	58
<u>Month of Peak Labor Use:</u>					
Employment	Dec.	July	August	Dec.	Dec.
Employment	3,132	5,033	2,044	1,511	9,872
Percent Unemployed	None	26	15	11	30
<u>Wet Season:</u>					
Employment	1,811	2,691	1,922	1,020	
Percent Unemployed	42	61	20	40	
<u>Dry Season:</u>					
Employment	819	822	1,281	907	
Percent Unemployed	74	88	47	47	
<u>Agricultural Production and Income (Baht)</u>					
Total Value of Crop Production (Million Baht)	20,695	15,164	28,812	9,487	74,158
Average Gross Crop Production per Farm	22,303	7,483	25,182	14,727	15,636
Average Crop Operating Expenses per Farm	5,105	1,986	6,576	2,230	3,736
Average Net ^a Crop Income per Farm	7,198	5,497	18,606	12,497	11,900
Net Income from Forestry, Fishing, Fruits, Vegetables and Livestock	2,903	1,106	5,801	2,231	2,743
Net Farm Income	20,101	6,603	24,407	14,728	14,643

a) Assumes zero cost for owned land and labor resources and includes rice grown for home consumption

Table 39. AD 1981 Levels of Major Crop Production, Consumption and Exports by Region for Plan Alternative A

Commodity and Type of Statistic	Region (Unit-Million tons)				
	North	Northeast	Central Plain	South	Thailand
Rice (Non-Glutinous)					
Production	2.27	1.64	5.14	1.19	10.24
Consumption	1.26	1.36	3.73	1.43	7.78
Exports	1.01	.28	1.41	-.24	2.46
Rice (Glutinous)					
Production	2.19	3.06	.52	.03	5.80
Consumption	1.99	3.58	.06	.03	5.66
Exports	.20	-.52	.46	0	.14
Maize					
Production	2.17	.04	1.40	0	3.61
Consumption	.17	.04	.40	0	.61
Exports	2.0	0	1.0	0	3.00
Kenaf & Jute					
Production	.04	.28	0	0	.32
Consumption	0	.18	.04	0	.22
Exports	.04	.10	-.04	0	.10
Cassava					
Production	.04	.42	4.99	1.65	7.10
Consumption	.04	.07	.40	.02	.53
Export	0	.35	4.59	1.63	6.57
Sugar Cane					
Production	.60	.64	15.06	0	16.30
Consumption	.60	.64	5.06	0	6.30
Exports	0	0	10.00	0	10.00
Rubber					
Production	-0	-0	.05	.42	.47
Consumption	0	-0	.02	0	.02
Exports	0	-0	.03	.42	.45

Table 46 AD 1981 Land Area Available and Land Area Used by Region Land Type and Plan Alternative

Region	Land Availability Use & % Used	Plan Alternative A.					
		Land Type 1	Land Type 2	Land Type 2 Dry Season	Land Type 3	Land Type 4	Land Type 4 Dry Season
				1,000 Rai			
North	Available Land	2,591	4,034	1,027	5,420	8,892	
	Land Used	2,591	4,034	730	5,420	7,548	
	% Used	100	100	71	100	85	
North-east	Available Land	0	2,337	706	20,719	11,878	
	Land Used	0	2,337	455	19,848	4,120	
	% Used	0	100	64	96	35	
Central Plain	Available Land	336	11,726	2,919	4,165	8,453	
	Land Used	336	11,430	1,766	3,537	7,386	
	% Used	100	97	61	85	87	
South	Available Land	0	1,706	124	1,932	10,847	
	Land Used	0	1,706	99	1,931	10,651	
	% Used	0	100	80	100	98	
Thailand	Available Land	2,927	19,805	4,900	32,327	40,071	
	Land Used	2,927	19,509	3,052	30,739	29,706	
	% Used	100	99	62	95	74	

Table 47 AD 1981 RD Variety Maximum Area Allowed and RD Variety Actual Area Use for Each Plan Alternative by Region and Land

Region (1,000 Rai of Land Type)

Plan Alternatives		North		Northeast		Central Plain		South		Thailand	
		Land 2	Land 3	Land 2	Land 3	Land 2	Land 3	Land 2	Land 3	Land 2	Land 3
A	Maximum Area Allowed	3,163	1,767	533	4,019	8,015	2,287	710	726	12,420	8,798
	Actual Area	0	0	153	891	1,224	216	710	726	2,087	1,833
	% Used	0	0	29	22	15	9	100	100	17	21
B1	Maximum Area Allowed	1,637	1,537	276	3,076	4,127	2,380	367	660	6,407	7,659
	Actual Area	0	1,537	106	1,327	1,307	370	367	660	1,760	3,394
	% Used	0	100	38	43	32	16	100	100	28	51
B2	Maximum Area Allowed	1,637	1,537	276	3,076	4,127	2,306	367	660	6,407	7,659
	Actual Area	0	1,537	106	1,327	1,807	611	367	660	1,760	4,145
	% Used	0	100	38	43	32	26	100	100	28	54
C	Maximum Area Allowed	3,163	1,767	533	4,019	8,015	1,281	710	726	2,421	7,793
	Actual Area	0	0	153	617	1,220	216	710	726	2,083	1,559
	% Used	0	0	29	15	15	17	100	100	117	20
D	Maximum Area Allowed	3,168	1,767	533	4,019	8,015	1,281	710	726	12,421	7,793
	Actual Area	0	0	153	891	1,138	216	710	726	2,001	1,833
	% Used	0	0	20	22	14	17	100	100	16	24
E	Maximum Area Allowed	1,061	2,368	270	4,158	4,905	3,357	210	1,066	6,446	10,941
	Actual Area	0	1,937	270	3,994	971	1,538	210	1,066	1,451	8,535
	% Used	0	82	100	96	20	46	100	100	23	78
F	Maximum Area Allowed	531	1,180	135	2,079	2,452	1,678	105	533	3,223	5,470
	Actual Area	531	1,180	135	2,079	2,452	1,678	105	533	3,223	5,470
	% Used	100	100	100	100	100	100	100	100	100	100

Table 48 Rice Area Fertilized and Fertilized Rice Area
Bound by Region for Each Plan Alternative AD 1981

Plan Alternative		Region (1000 rai)				
		North	North-east	Central Plain	South	Thailand
A	Maximum Area Allowed	1,834	9,084	8,121	1,528	20,567
	Actual Area	1,097	9,084	6,363	1,354	17,898
	% Used	60	100	78	89	87
B ₁	Maximum Area Allowed	1,760	8,958	7,100	1,482	19,300
	Actual Area	1,165	8,436	6,760	1,347	17,708
	% Used	66	94	95	91	92
B ₂	Maximum Area Allowed	1,760	8,958	7,100	1,482	19,300
	Actual Area	1,165	8,436	6,564	1,347	17,512
	% Used	66	94	92	91	91
C	Maximum Area Allowed	1,834	9,084	8,121	1,528	20,567
	Actual Area	1,097	9,084	6,361	1,394	17,936
	% Used	60	100	78	91	87
D	Maximum Area Allowed	1,834	9,084	8,121	1,528	20,567
	Actual Area	1,097	9,084	5,934	1,337	17,452
	% Used	60	100	27	13	15
E	Maximum Area Allowed	1,667	8,912	6,803	1,403	18,785
	Actual Area	1,343	8,912	6,803	1,403	18,461
	% Used	80	100	100	100	98
F	Maximum Area Allowed	1,010	6,718	6,126	1,100	14,974
	Actual Area	1,020	6,718	6,126	1,110	14,974
	% Used	100	100	100	100	100

Table 32 Employment and Income Situation by Region Under
B2 Conditions AD 1981

Descriptive Statistics	Region				
	North	Northeast	Central Plain	South	Thailand
Number of Farms	927,919	2,026,381	1,144,132	644,205	4,742,637
<u>Agricultural Employment Situation (1000's)</u>					
Annual Labor Force:					
Employment	3,132	6,814	2,408	1,698	14,052
Percent Unemployed	1,191	2,270	1,563	937	5,963
	62	67	35	45	58
Month of Peak Labor Use:					
Employment	Dec.	July	August	Dec.	Dec.
Percent Unemployed	1,865	5,289	1,970	1,448	10,171
	40	22	18	15	28
Wet Season:					
Employment	1,610	3,159	1,821	978	
Percent Unemployed	49	54	24	42	
Dry Season:					
Employment	591	1,008	1,193	879	
Percent Unemployed	81	85	50	48	
<u>Agricultural Produc- tion and Income (Baht)</u>					
Total Value of Crop Production (Million Baht)	16,416	18,890	25,599	9,073	69,978
Average Gross Crop Production per Farm	17,692	9,322	22,374	14,083	14,755
Average Crop Operating Expenses per Farm	3,770	2,772	5,941	1,781	3,598
Average Net ^a Crop Income per Farm	13,922	6,550	16,433	12,302	11,157
Net Income from Forestry, Fishing Fruits, Vegetables and Livestock	2,903	1,106	5,801	2,231	2,743
Net Farm Income	16,825	7,656	22,234	14,533	13,900

a) Assumes zero cost for owned labor and land resources and includes value of rice grown for home consumption

Table 41. AD 1981 Levels of Major Crop Production, Consumption and Exports by Region for Plan Alternative B₂.

Commodity and Type of Statistic	Region (Unit-Million Tons)				
	North	Northeast	Central Plain	South	Thailand
Rice (Non-Glutinous):					
Production	2.15	1.72	4.97	1.08	9.92
Consumption	1.28	1.38	3.79	1.45	7.90
Exports	.87	.34	1.18	-.37	2.02
Rice (Glutinous):					
Production	2.31	3.05	.49	.02	5.87
Consumption	2.02	3.63	.06	.02	5.73
Exports	.29	-.58	.43	0	0.14
Maize:					
Production	1.32	.56	1.24	0	3.12
Consumption	.17	.04	.41	0	.62
Exports	1.15	.52	.83	0	2.50
Kenaf & Jute:					
Production	0	.30	0	0	.30
Consumption	0	.18	.04	0	.22
Exports	0	.12	-.04	0	.08
Cassava:					
Production	.04	1.64	4.20	.14	6.02
Consumption	.04	.07	.41	.02	.54
Exports	0	1.57	3.79	.12	5.48
Sugar Cane:					
Production	.61	.65	12.47	0	13.72
Consumption	.61	.65	5.14	0	6.39
Exports	0	0	7.33	0	7.33
Rubber:					
Production	0	0	0	.41	.41
Consumption	0	0	.01	0	.01
Exports	0	0	-.01	.41	.40

Table 46 Plan Alternative B2

Region	Land Availability Use & % Used	Land Type 1	Land Type 2 Wet Season	Land Type 2 Dry Season	Land Type 3	Land Type 4	1,000 Rai	
							-----	-----
North	Available Land	2,591	2,783	613	6,286	8,891		
	Land Used	2,591	2,783	363	6,286	4,255		
	% Used	100	100	59	100	48		
North- east	Available Land	0	1,612	336	21,139	11,879		
	Land Used	0	1,612	273	21,139	6,818		
	% Used	0	100	81	100	57		
Central Plain	Available Land	366	8,091	2,205	5,803	8,453		
	Land Used	366	8,091	1,797	5,495	6,134		
	% Used	100	100	81	95	73		
South	Available Land	0	1,177	73	2,351	10,840		
	Land Used	0	1,177	58	2,351	10,306		
	% Used	0	100	79	100	95		
Thailand	Available Land	2,927	13,665	3,228	35,579	40,072		
	Land Used	2,927	13,665	2,493	35,263	27,515		
	% Used	100	100	77	99	69		

Table 49 Thailand's AD 1981 Employment and Income Situation by Region Under Plan Alternative B2 Conditions the Guidelines Plan

Descriptive Statistics	North	Northeast	Central Plain	South	Thailand
Number of Farms	927,919	2,026,381	1,144,132	644,205	4,742,637
<u>Agricultural Employment Situation (1000's)</u>					
Annual Labor					
Force	3,132	6,814	2,408	1,698	14,052
Employment	1,191	2,270	1,563	937	5,963
Percent Unemployed	62	67	35	45	58
Month of Peak					
Labor Use:	Dec.	July	Aug.	Dec.	Dec.
Employment	1,865	5,289	1,970	1,448	10,171
Percent Unemployed	40	22	18	15	28
Wet Season:					
Employment	1,610	3,159	1,821	973	
Percent Unemployed	49	54	24	42	
Dry Season:					
Employment	591	1,008	1,193	879	
Percent Unemployed	81	85	50	48	
Agricultural Production and Income (Baht)					
Total Production					
Million Baht)	16,416	18,890	25,599	9,073	69,978
Average Gross Crop Production per					
Farm	17,692	9,322	22,374	14,083	14,755
Average Crop Operating Expenses per Farm					
	3,770	2,772	5,941	1,781	3,598
Average Net ^a Crop Income per Farm					
	13,922	6,550	16,433	12,302	11,157
Net Income from Forestry, Fishing, Fruits, Vegetables and Livestock					
	2,903	1,106	5,801	2,231	2,743
Net Farm Income	16,825	7,656	22,234	14,533	13,900

a) Assumes zero cost for owned labor and land resources and includes value of rice grown for home consumption.

Table 50. AD 1981 Levels of Major Crop Production, Consumption and Exports by Region for Plan Alternative B₂ the Guideline Plan

Commodity and Type of Statistics	Region (Unit-Million tons)				
	North	Northeast	Central Plain	South	Thailand
Rice (Non-Glutinous):					
Production	2.15	1.72	4.97	1.08	9.92
Consumption	1.28	1.38	3.79	1.45	7.90
Exports	.87	.34	1.18	-.37	2.02
Rice (Glutinous)					
Production	2.31	3.05	.49	.02	5.87
Consumption	2.02	3.63	.06	.02	5.73
Exports	.29	-.58	.43	0	0.14
Maize					
Production	1.32	.56	1.24	-	3.12
Consumption	.17	.04	.41	-	.62
Exports	1.15	.52	.83	-	2.50
Kenaf & Jute					
Production	0	.30	-	-	.30
Consumption	0	.18	.04	-	.22
Exports	0	.12	-.04	-	.08
Cassava					
Production	.04	1.64	4.20	.14	6.02
Consumption	.04	.07	.41	.02	.54
Exports	0	1.57	3.79	.12	5.48
Sugarcane					
Production	.61	.15	12.47	-	13.23
Consumption	.61	.65	5.14	-	6.39
Exports	0	0	7.33	-	7.33
Rubber					
Production	-	-	0	.41	.41
Consumption	-	-	.01	0	.01
Exports	-	-	-.01	.41	.40

Table 51. AD 1981 Guidelines Plan Demand Factor Levels and Resource use Patterns
Kingdom and Regional AD 1981 Levels and Use Patterns

	Thailand	North	Northeast	Central Plain	South
Demand Factor Levels:					
Population Growth per Annum %	2.5	2.5	2.5	2.5	2.5
Income Growth - %	2.2	2.2	2.2	2.2	2.2
Minimum Income per Family (Baht)	13,900	16,825	7,656	22,234	14,533
Exports	High				
Resource Use Levels:					
Labor Employment (1000 Full time Jobs)	5,963	1,191	2,270	1,563	937
Land: (1000 rai)					
Type 1	2,927	2,591	-	336	-
Type 2	13,665	2,783	1,612	8,021	1,177
Type 3	35,263	6,200	21,139	5,485	2,351
Type 4	27,515	4,255	6,818	6,134	10,306
Type 5	-	-	-	-	104
Irrigated Land: (1000 rai)					
Wet Season	13,665	3	1,612	8,091	1,177
Dry Season	2,493	363	273	1,797	58
RD Variety Use: (1000 rai)					
Land Type II	1,780	-	106	1,307	367
Land Type III	4,145	1,537	1,327	621	660
Rice Area Fertilized (1000 rai)	17,512	1,165	8,436	6,564	1,347

Table 52 Land Consolidation Plan

Item	Start 1st yr.						Total
	1976	1977	1978	1979	1980	1981	
Aerial Photo	300,000	360,000	480,000	480,000	600,000	600,000	2,820,000
Topographic Survey	300,000	360,000	480,000	480,000	600,000	600,000	2,820,000
Cadastral Survey	300,000	360,000	440,000	440,000	550,000	550,000	2,610,000
Design	90,000	200,000	300,000	400,000	400,000	500,000	1,890,000
Construction	48,500	90,000	200,000	300,000	400,000	400,000	1,438,000

Table 53 Land Consolidation Project (1977 - 1981)

Project	Irrigation Area	Land Consolidation Area Completed till 1975	During Construction 1976	Area (RAI)				
				1977	1978	1979	1980	1981
Phitsamulok (IBRD)	900,000	-	3,000	9,000	25,000	75,000	125,000	125,000
Nongwai Pioneer Project (N.E.)	300,000	600	3,000	7,000	15,000	15,000	20,000	15,000
Nan Oon (N.E.) (VSAID)	225,000	-	1,000	5,000	15,000	20,000	20,000	
Greater Chao Phya Project	5,700,000	43,000	29,000	41,000	98,000	118,000	130,000	150,000
Mae Wang (North)	77,000	-	-	1,000	5,000	12,000	20,000	30,000
Mae Klong (Project)	2,500,000	-	1,000	20,000	20,000	30,000	42,000	45,000
Phethaburi	336,000	-	-	1,000	12,000	20,000	30,000	35,000
Multiple Purpose Cooperative Project at Chainat Province	45,000	8,000	3,500	6,000	10,000	10,000	13,000	-
Total		51,600	40,500	90,000	200,000	300,000	400,000	400,000

