

CHAPTER 7 SUMMARY, LIMITATIONS & FURTHER RESEARCH

7.1 Summary

As the single most important food crop in Cambodia, rice is the central focus of Cambodian agricultural policy. The government has intervened in the rice sector in the quest for domestic self-sufficiency in food and a surplus for export. The major policies which have been implemented in Cambodia since 1980, are: the ceiling price and collectivisation of the agricultural production system during the planned economy (1980-1989); price deregulation post-1989; and current the current fertiliser subsidy.

To assist analyses of these policies, this study was aimed at identifying the determinants influencing the supply of rice. Wet-season and dry-season rice were estimated separately because of the differences in production systems and crop biology.

The results of the analysis indicate that there are production lags due to the difficulties and costs of rapid adjustment. The statistical results also provide evidence showing that the price variables have no significant effect on the area and yield of rice, except for the area of dry-season rice. The rainfall variable is one of the most important factors affecting the area allocated to wet-season rice production. A simple time trend representing technological improvement in rice production was also an important explanator of rice yields.

Some implications follow from the empirical results. Firstly, the insignificance of price variables suggests that price factors do not have a significant impact on rice production, except for the dry-season rice cultivated area. Hence, government policies attempting to increase rice production by regulating the prices of output and inputs seem to be inappropriate for Cambodian conditions. Current

government intervention in the way of a fertiliser subsidy leads only to misallocation of scarce resources. Secondly, rainfall distribution is one of the most important factors influencing rice production. It influences the farmers' decisions regarding area allocation to wet-season rice production. Finally, technological improvement in rice production in Cambodia is in increasing both wet-season and dry-season rice yields.

The results suggest that attempts to increase rice output through improving the price received by farmers and/or lowering the prices of fertilisers would be ineffective. Rather government policy should focus on technological improvement and agricultural infrastructure.

7.2 Limitations

The most important limitations of the study are the following:

- although the data used in this study were obtained from official institutions, they may be somewhat unreliable and may contain inaccuracies due to the data collection procedures used by the Ministry of Agriculture, Forestry and Fisheries;
- monthly rainfall distribution during the wet-season could not be obtained in time to be used in this study;
- comprehensive data on either areas covered by high-yielding rice varieties or input usage could not be obtained and used to represent the technological improvement in rice production in Cambodia;

7.3 Suggestions for Further Research

Opportunities for further research include the following:

- Include trend in quadratic form.

- Monthly rainfall should be included in both the area and yield equations to capture the real effects of rainfall on area allocated to wet-season rice and the productivity of wet-season rice.
- Since the number of cross-sections is slightly greater than the number of time series, the error component models could be used. This may probably provide better results for the yield equations.
- The home demand for rice could be an interesting subject of future study which will allow policy-makers to gain a better understanding of how marketed surplus responds to price changes.
- Impose inequality constraints on the adjustment coefficient γ using non-linear least squares or Bayesian methodology.

APPENDICES

Appendix I-1 Annual Growth Rate of the Major Sectors in the Economy at 1993 Prurchase Prices

Sector	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Agriculture	7.20	2.90	-0.20	2.90	0.30	4.10	0.50	6.40	2.40	2.10
- Paddy	1.60	6.90	-6.40	-4.00	-7.50	7.30	-11.90	18.80	0.20	0.00
- Other crops	19.60	-1.20	2.70	3.80	-8.10	-14.80	-11.90	12.00	6.20	4.30
- Rubber	21.40	5.90	5.60	0.00	10.50	-5.90	15.60	8.10	5.00	2.40
- Livestock	2.30	0.00	8.10	9.70	20.70	4.10	-2.70	6.30	7.50	5.00
- Fishery	14.80	-4.90	3.40	2.30	5.50	4.40	4.40	2.50	-0.90	-2.00
- Forestry	6.90	18.70	7.20	52.00	15.80	72.60	91.00	-24.40	-6.60	1.10
Industry	5.40	1.60	-4.10	14.30	22.30	19.40	15.30	10.00	18.20	3.00
Services	6.60	3.60	5.10	12.20	9.60	7.30	11.60	8.00	7.30	1.50

Source: Ministry of Economy and Finance, 1998.

Appendix II-1 Cambodia Rice Production and Exports: 1950 to 1968

Year	Planted Area (^{'000} ha)	Production (^{'000} tonnes)	Exports of Rice (^{'000} tonnes)	Export of Milled Rice (^{'000} tonnes)
1950	1,657	1,576	132	46
1951	1,682	1,651	65	113
1952	1,697	1,277	45	169
1953	1,629	1,627	-	141
1954	1,693	1,733	-	293
1955	1,743	1,488	-	101
1956	1,837	1,789	-	71
1957	1,937	1,986	-	231
1958	2,030	2,123	-	254
1959	2,098	2,083	-	242
1960	2,150	2,335	-	391
1961	2,257	2,383	-	288
1962	2,286	2,039	-	183
1963	2,332	2,622	-	447
1964	2,376	2,760	-	569
1965	2,344	2,500	-	546
1966	2,414	2,376	-	190
1967	2,513	2,457	-	219
1968	2,473	3,251	-	252

Source: Tichit, 1981.

Appendix II-2 Cambodia Rice Production: 1970-78

Yaer	Harvested Area (ha)	Yield (kg/ha)	Proudction (tonnes)
1970	2,399,000.00	1,590.00	3,814,410.00
1971	1,880,000.00	1,453.00	2,731,640.00
1972	1,548,000.00	1,245.00	1,927,260.00
1973	737,000.00	1,425.00	1,050,225.00
1974	681,000.00	932.00	634,692.00
1975	1,050,000.00	1,454.00	1,500,000.00
1976	1,400,000.00	1,429.00	1,800,000.00
1977	1,500,000.00	1,286.00	1,800,000.00
1978	1,400,000.00	1,071.00	1,500,000.00

Source: FAO, *Production*, Series.

Appendix II-3 Rice Production in Cambodia

Unit: '000

Year	Planted Area			Harvested Area			Production			Yield		
	Total	Wet	Dry	Total	Wet	Dry	Total	Wet	Dry	Average	Wet	Dry
1968	2,427	2,303	124	1,944	1,826	118	2,503	2,293	210	1.29	1.26	1.78
1980	1,441	1,346	95	1,440	1,345	95	1,717	1,605	112	1.19	1.19	1.18
1981	1,493	1,343	150	1,317	1,171	146	1,490	1,234	256	1.13	1.05	1.75
1982	1,674	1,546	128	1,615	1,488	127	1,949	1,696	253	1.21	1.14	1.99
1983	1,740	1,624	116	1,611	1,506	105	2,039	1,831	208	1.27	1.22	1.98
1984	1,418	1,299	119	978	868	110	1,260	1,025	235	1.29	1.18	2.14
1985	1,462	1,345	117	1,450	1,333	117	1,812	1,573	239	1.25	1.18	2.04
1986	1,535	1,413	122	1,520	1,402	118	2,093	1,813	280	1.38	1.29	2.37
1987	1,378	1,249	129	1,370	1,243	127	1,815	1,502	313	1.32	1.21	2.46
1988	1,879	1,735	144	1,825	1,695	130	2,500	2,240	260	1.37	1.32	2.00
1989	1,932	1,787	145	1,861	1,721	140	2,672	2,336	336	1.44	1.36	2.40
1990	1,890	1,740	150	1,855	1,710	145	2,500	2,138	362	1.35	1.25	2.50
1991	1,910	1,761	149	1,719	1,572	147	2,400	2,030	370	1.40	1.29	2.52
1992	1,844	1,701	143	1,685	1,545	140	2,221	1,871	350	1.32	1.21	2.50
1993	1,856	1,701	155	1,824	1,674	150	2,383	2,008	375	1.31	1.20	2.50
1994	1,924	1,754	170	1,495	1,330	165	2,223	1,728	495	1.49	1.30	3.00
1995	2,086	1,870	216	1,924	1,709	215	3,447	2,802	645	1.79	1.64	3.00
1996	2,171	1,937	234	1,879	1,649	230	3,458	2,759	699	1.84	1.67	3.04
1997	2,076	1,827	249	1,929	1,685	244	3,415	2,673	742	1.77	1.59	3.04

Source: Department of Planning and Statistics, Series.

Appendix II-4 CambodiaN Food Balance: 1980-1997

Year	Population (a)	Food Needs (b) (‘000 tonnes)	Rice Production (‘000 tonnes)	Seeds (c) (‘000 tonnes)	Animal Feed(d) (‘000 tonnes)	Post Harvest Lose (e) (‘000 tonnes)	Available food (‘000 tonnes)	Balance (‘000 tonnes)
1980	7,251,881	1,965	1,717	137	34	86	1,459	-505.81
1981	7,399,879	2,005	1,490	119	30	75	1,267	-738.87
1982	7,550,897	2,046	1,949	156	39	97	1,657	-389.64
1983	7,704,997	2,088	2,039	163	41	102	1,733	-354.90
1984	7,862,241	2,131	1,260	101	25	63	1,071	-1,059.67
1985	8,022,695	2,174	1,812	145	36	91	1,540	-633.95
1986	8,186,424	2,219	2,093	167	42	105	1,779	-439.47
1987	8,353,494	2,264	1,815	145	36	91	1,543	-721.05
1988	8,523,973	2,310	2,500	200	50	125	2,125	-185.00
1989	8,697,932	2,357	2,672	214	53	134	2,271	-85.94
1990	8,875,441	2,405	2,500	200	50	125	2,125	-280.24
1991	9,056,572	2,454	2,400	192	48	120	2,040	-414.33
1992	9,241,400	2,504	2,221	178	44	111	1,888	-616.57
1993	9,430,000	2,556	2,383	191	48	119	2,026	-529.98
1994	9,618,600	2,607	2,223	178	44	111	1,890	-717.09
1995	9,810,972	2,659	3,447	276	69	172	2,930	271.18
1996	10,007,191	2,712	3,458	277	69	173	2,939	227.35
1997	10,207,335	2,766	3,415	273	68	171	2,903	136.56

Notes: (a) 2.5 % growth rate assumed from 1993.

(b) It is estimated by the Ministry of Agriculture that each person's rice needs/yr equal 271 kg rice.

(c) It is estimated by the Ministry of Agriculture that 8% of rice production is kept as seed for the following season production.

(d) It is estimated by the Ministry of Agriculture that 2% of rice production is kept for animal feed.

(e) It is estimated by the Ministry of Agriculture that post harvest losses amount to 5% of Production.

Source: Department of Planning and Statistics, Series.

Appendix II-5 Percentage Share of Agricultural Sub-Sectors in the Economy

Year	Rice	Other Crops	Rubber	Livestock	Fishery	Forestry	Agriculture
1987	27.50	9.50	2.60	12.40	7.60	1.40	61
1988	26.80	9.50	2.60	12.60	6.70	1.30	59.5
1989	27.50	8.50	1.90	12.40	5.70	2.00	58.1
1990	24.60	10.80	1.90	13.30	5.00	1.90	57.4
1991	16.20	11.40	1.20	16.50	4.00	2.40	51.5
1992	16.40	10.50	0.80	10.90	5.20	2.60	46.4
1993	17.30	8.70	0.70	12.00	3.30	3.70	45.8
1994	13.00	7.60	1.20	11.00	3.40	6.90	43.1
1995	14.40	7.70	1.10	11.10	3.40	5.90	43.5
1996	13.70	7.70	1.10	11.10	3.30	5.40	42.3
1997	13.20	7.70	1.20	11.30	3.20	5.90	42.5

Note: Agriculture is defined to include fishery and forestry

Source: Ministry of Economy and Finance, 1998.

Appendix II-6 GDP at Constant 1993 Purchase Prices

Unit: Billion Riels

Yaer	Rice	Other Crops	Rubber	Livestock	Fishery	Forestry	Agriculture
1987	967.00	481.00	34.00	426.00	143.00	49.00	2,100.00
1988	983.00	575.00	41.00	436.00	164.00	52.00	2,251.00
1989	1,050.00	568.00	43.00	436.00	156.00	62.00	2,316.00
1990	983.00	583.00	46.00	471.00	161.00	67.00	2,310.00
1991	944.00	605.00	46.00	517.00	165.00	102.00	2,377.00
1992	873.00	556.00	41.00	624.00	174.00	118.00	2,385.00
1993	937.00	473.00	39.00	649.00	181.00	203.00	2,482.00
1994	826.00	417.00	45.00	632.00	189.00	388.00	2,495.00
1995	981.00	467.00	48.00	671.00	194.00	293.00	2,654.00
1996	983.00	496.00	51.00	721.00	182.00	274.00	2,716.00
1997	983.00	517.00	52.00	758.00	188.00	277.00	2,774.00

Note: Agriculture is defined to include fishery and forestry

Source: Ministry of Economy and Finance, 1998.

Appendix II-7 Number of Communes with a Rice Deficit in 1996

Provinces	No. of Communes	Communes in Deficit	Communes in Chronic Deficits (a)
Phnom Penh	76	4	2
Kandal	147	19	17
Kampong Cham	193	52	43
Svay Rieng	80	17	17
Prey Veng	116	11	8
Takeo	99	13	10
Kampong Thom	81	24	12
Siem Reap	108	21	16
Battambang	128	20	7
Pursat	44	13	8
Kampong Chhnang	69	5	5
Kampot	95	37	34
Kampong Speu	86	40	40
Kratie	46	15	13
Other Provinces	0	0	0
Total	1368	291	232

Note: A. Communes in deficit in 1996 are those in which more than 50 per cent of the households are rice producers; the average area of rice planted per rice producer is greater than 0.5 ha; and the paddy deficit per head is greater than 41 kg.

B. Communes in chronic deficit are those which should still be in deficit if there had been no crop loss.

(a) a subset of communes in deficit in 1996.

Source: FAO, 1996.

Appendix II-8 Cambodia Maize Production: 1980-1997

Year	Area ('000 ha)			Harvested Area ('000 ha)	Production, ('000 tonnes)	Average Yield (t/ha)
	Total	Wet	Dry			
1980	102.00	82.00	20.00	101.00	101.00	1.00
1981	97.00	79.00	18.00	85.00	85.00	1.00
1982	86.00	70.00	16.00	61.00	50.63	0.83
1983	60.00	45.00	15.00	49.00	42.63	0.87
1984	48.60	39.60	9.00	43.00	47.73	1.11
1985	50.70	40.70	10.00	46.00	41.86	0.91
1986	46.10	36.60	9.50	43.00	50.74	1.18
1987	43.20	35.00	8.20	40.00	38.00	0.95
1988	52.30	48.20	4.10	50.00	41.00	0.82
1989	51.00	48.00	3.00	49.00	53.90	1.10
1990	47.00	44.00	3.00	45.00	51.75	1.15
1991	52.00	48.60	3.40	50.00	60.00	1.20
1992	50.00	47.00	3.00	48.00	60.00	1.25
1993	43.30	40.00	3.30	43.00	45.58	1.06
1994	52.00	44.00	8.00	37.00	45.14	1.22
1995	52.00	45.00	7.00	45.00	54.90	1.22
1996	50.00	44.00	6.00	47.00	64.39	1.37
1997	52.00	45.00	7.00	49.00	63.70	1.30

Source: Department of Planning and Statistics, Series.

REFERENCES

- Almon, S. (1965), 'The distributed lag between capital appropriations and expenditures', *Econometrica* 33 (1), 178-196.
- Anderson, K. (1974), 'Distributed lags and barley acreage response analysis', *Australian Journal of Agricultural Economics* 18 (2), 119-132.
- Asia Business Network (1998), *Country Profile: Cambodia – Economy*, Internet: http://www.abisnet.com/cambodia_1.htm.
- Askari, H. and Cummings, T.J. (1976), *Agricultural Supply Response: A Survey of the Econometric Evidence*, Praeger Publishers, USA.
- Askari, H. and Cummings, T.J. (1977), 'Estimating agricultural supply response with the Nerlove model: a survey', *International Economic Review* 18 (2), 257-292.
- Balassa, B.A. (1960), 'Collectivization in Hungarian agriculture', *Journal of Farm Economics* 42 (1), 35-51.
- Bardhan, K. (1970), 'Price and output response of marketed surplus of food-grains: A cross-sectional study of some North Indian villages', *American Journal of Agricultural Economics* 52 (1), 51-61.
- Behrman, J. (1966), 'Price elasticity of the marketed surplus of a subsistence crop', *Journal of Farm Economics* 48 (4), 875-893.
- Behrman, R.J. (1968), *Supply Response in Underdeveloped Agriculture: A Case Study of Four Major Annual Crops in Thailand, 1937-1963*, North-Holland Publishing Com., Amsterdam.
- Bhargava, P.N. and Rustogi, V.S. (1972), 'Study of marketable surplus of paddy in Burdwan district', *Indian Journal of Agricultural Economics* 27 (3), 63-68.
- Binswanger, P.H. (1980), 'Attitudes toward risk: experimental measurement in rural India', *American Journal of Agricultural Economics* 62 (3), 395-407.
- Bista, R.N. (1984), *Estimating supply response functions with pooled time-series and cross-sectional observations: an econometric study using Nepalese agricultural data*, MEd dissertation, University of New England, Armidale, NSW.

- Blaustein, S. (1989), 'Cambodia's future - I: looking to the private sector', *The Nation*, Feb. 20, Vol. 248 (7), pp. 226-228.
- Bond, E.M. (1983), 'Agricultural responses to prices in Sub-Saharan African countries', *IMF Staff Papers* 30, 703-726.
- Bruce, R.C. (1992), 'Hectarage of different rice ecosystems in Cambodia', *Report* 6 p.
- Cagan, P. (1954), 'The monetary dynamics of hyper-inflations', in *Studies in the Quantity Theory of Money*, M. Friedman (ed.), University of Chicago Press, Chicago.
- Calasewaka (1991), Supply response of pepper in Indonesia, MEd dissertation, University of New England, Armidale, NSW.
- Cameron, B. and Twyford-Jones, P. (1995), *Marketing of Rice in Cambodia*, Ministry of Agriculture, Forestry and Fisheries, Royal Government of Cambodia.
- Chan, S., Kato, T. and Long, V.P. (1997), 'Cambodia in the regional economy: A cross-country study', *International Workshop on Cambodia: Challenges and Options of Regional Economic Integration*, Cambodia Development Resource Institute, Phnom Penh, Kingdom of Cambodia.
- Chandler, P.D. (1993), *A History of Cambodia*, 2nd edn, Boulder, Colorado: Westview Press.
- Chembezi, D.M. and Womack, A.W. (1992), 'Regional acreage response for US corn and wheat: the effects of government programs', *Southern Journal of Agricultural Economics* 24 (1), 187-198.
- Cochrane, W.W. (1955), 'Supply analysis: conceptualizing the supply relation in agriculture', *Journal of Farm Economics* 37 (5), 1161-1176.
- Coelli, T.J. (1992), 'Forecasting wheat production using shire level data' (draft), Econometrics Department, University of New England, Australia.
- Coleman, D. (1983), 'A review of the arts of supply response analysis', *Review of Marketing and Agricultural Economic* 51 (3), 201-230.
- Cowling, K. and Gardner, T.W. (1962), 'Analytical models for estimating supply relations in the agricultural sector: a survey and critique', *Journal of Agricultural Economics* 15 (3), 439-450.
- Dantwala, M.L. (1963), 'International planning to combat the scourge of hunger through

- out the world', *Annals of Collective Economy* 34, 71-96.
- Department of Major Construction (1993), *Country Report*, Ministry of Public Works and Transport, Kingdom of Cambodia.
- Department of Planning and Statistics (1993-1994), *Bulletin of Statistics and Agricultural Studies*, No. 1-8, Ministry of Agriculture Forestry and Fisheries, Phnom Penh, Kingdom of Cambodia.
- Department of Planning and Statistics (1995a), *Agricultural Statistics, 1995*, Ministry of Agriculture, Forestry and Fisheries, Phnom Penh, Kingdom of Cambodia.
- Department of Planning and Statistics (1995b), *Bulletin of Agricultural Prices*, Ministry of Agriculture, Forestry and Fisheries, Phnom Penh, Kingdom of Cambodia.
- Department of Planning and Statistics (1996a), *Strategic Plan 1997-2001*, Ministry of Agriculture, Forestry and Fisheries, Phnom Penh, Kingdom of Cambodia.
- Department of Planning and Statistics (1996b), *The Basic Concepts of the 5 Year Rehabilitation and Development Plan 1996-2000*, Ministry of Agriculture, Forestry and Fisheries, Phnom Penh, Kingdom of Cambodia.
- Department of Planning and Statistics (1998), *Agricultural Statistics, 1996-97*, Ministry of Agriculture, Forestry and Fisheries, Phnom Penh, Kingdom of Cambodia.
- Dillon, L.J. and Anderson, R.J. (1990), *The Analysis of Response in Crop and Livestock Production*, 3rd Edition, Pergamon Press, Great Britain.
- Duloy, J.H. and Watson, A.H. (1964), 'Supply relationships in the Australian wheat industry', *Australian Journal of Agricultural Economics* 8 (1), 28-45.
- EDSD (1998), *Cambodia*, Asian Development Bank, Internet: <http://www.internotes.asiandevbank.org/notes/cam1/CAMNACT.htm>.
- Ellis, F. (1993), 'Private trade and public role in staple food marketing: the case of rice in Indonesia', *Food Policy* 18 (4), 428-438.
- Ellis, F. (1996), *Agricultural Policies in Developing Countries*, Cambridge University Press, Great Britain.
- Ezekiel, M. (1937-38), 'The Cobweb theorem', *The Quarterly Journal of Economics* 52 (1), 255-280.
- Falcon, W.P. (1963), 'Real effect of foreign surplus disposal in underdeveloped

- economies: further comment', *The Quarterly Journal of Economics* 77 (2), 323-326.
- FAO (1994), *Cambodia: Agricultural Development Options Review (Phase 1)*, Vol. 1. Sector review, Rome: FAO.
- FAO (1996), *Special Report: FAO/WFP Crop and Food Supply Assessment Mission to Cambodia*, Internet: <http://www.fao.org/waicent/faoinfo/economic/giews/english/alertes/cambodia.htm>.
- FAO (1997), *Special Report: FAO/WFP Crop and Food Supply Assessment Mission to Cambodia*, Internet: <http://www.fao.org/waicent/faoinfo/economic/giews/english/alertes/srcmb297.htm>.
- Fisher, B.S. (1975), 'Supply response in the wheat-belt of south-eastern Australia: the impact of delivery quotas on wheat plantings', *Australian Journal of Agricultural Economics* 19 (2), 81-93.
- Fisher, B.S. (1978), 'An analysis of storage policies for the Australian wheat industry', Research Report No. 7, Department of Agricultural Economics, University of Sydney.
- Fisher, B.S. and Munro, G.R. (1983), 'Supply response in the Australian extensive livestock and cropping industries: a study of intentions and expectations', *Australian Journal of Agricultural Economics* 27 (1), 1-11.
- Francisco, E.M. and Guise, J.W.B. (1988), 'A note on establishing yield-rainfall relationships', *Agricultural and Forest Meteorology* 42, 75-81.
- Francisco, M.E. (1980), 'Regional rainfall, crop yields and farm incomes in New South Wales: a simulation approach', APMAA Report No. 9, Department of Agricultural Economics and Business Management and Department of Economic Statistics, University of New England, Armidale, NSW.
- Franzel, S., Colburn, F., and Degu, G. (1989), 'Grain marketing regulations: impact on peasant production in Ethiopia', *Food Policy* 14 (4), 347-358.
- Frings, V. (1993), 'The failure of agricultural collectivization in the People's Republic of Kampuchea (1979-1989)', Working Papers, Center of Southeast Asian Studies, Monash University, Australia.

- Fujisaka, S. (1988), *Rice Agroecosystems, Farmer Management, and Social Organization in Kampuchea: a Preliminary Assessment and Research Recommendations*, IRRI Res. Pap. Ser. 136, p. 16.
- Ghatak, S. and Ingersent, K. (1984), *Agriculture and Economic Development*, The Johns Hopkins University Press, USA.
- Ghosh, N. and Neogi, C. (1995), 'Supply response of foodgrains and policy actions: a model with rational expectation hypothesis', *Indian Journal of Agricultural Economics* 50 (2), 135-152.
- Goodwin, M.R. (1947), 'Dynamical coupling with especial reference to markets having production lags', *Econometrica* 15 (3), 181-204.
- Griffiths, E.W. and Anderson, R.J. (1978), 'Specification of agricultural supply functions-empirical evidence on wheat in Southern N.S.W.', *Australian Journal of Agricultural Economics* 22 (2), 115-128.
- Griffiths, W., Thomson, G. and Coelli, T. (1995), 'Predicting output from seemingly unrelated area and yield equations', Paper contributed to the Australian Agricultural Economics Society 39th Annual Conference, University of Western of Australia, Perth.
- Grunewald, F. (1992), *Essai d'analyse Historique de l'Evolution de l'Agriculture Cambodgienne*, Phnom Penh, Group de recherche et d'echanges technologiques.
- Guanawardana, P.J. and Oczkowski, E.A. (1992), 'Government policies and agricultural supply response: paddy in Sri Lanka', *Journal of Agricultural Economics* 43 (1), 231-242.
- Guise, J.W.B. (1969), 'Factors associated with variation in the aggregate average yield of New Zealand wheat (1918-1967)', *American Journal of Agricultural Economics* 51 (3), 866-881.
- Heady, E.O. (1961), 'Uses and concepts in supply analysis', *Agricultural Supply Functions: Estimating Techniques and Interpretations*, Ch. 1 in E.O. Heady, C.B. Baker, H.D. Diesstin, E. Kehrberg and S. Staniforth (ed.), Iowa State University Press, Ames.
- Helmert, K. (1997), 'Rice in the Cambodian economy: past and present', Ch. 1 in H.J.

- Nesbitt (ed.), 1997.
- Henneberry, S.R. and Tweenten, L.G. (1991), 'A review of international agricultural supply response', *Journal of international Food and Agribusiness Marketing* 2 (3/4), 49-95.
- Islam, A.M. (1982), Supply response in Bangladesh jute, MEd dissertation, University of New England, Armidale, NSW.
- Jaforullah, M. (1985), Supply response of sugarcane in the mill zones of Bangladesh: an economic study, MEd dissertation, University of New England, Armidale, NSW.
- Javier, E.L. (1997), 'Rice ecosystems and varieties', Ch. 5 in H.J. Nesbitt (ed.), 1997.
- Johnson, G.L. (1960), 'The state of agricultural supply analysis', *Journal of Farm Economics* 42 (2), 435-452.
- Judge, G.G., Griffiths, E.W., Hill, C.R., Lutkepohl, H. and Lee, C.T. (1985), *The Theory and Practice of Econometrics*, 2nd Edition, John Wiley & Sons, Canada.
- Just, R.E. (1974), 'An investigation of the importance of risk in farmers' decisions', *American Journal of Agricultural Economics* 56 (1), 14-25.
- Just, R.E. (1993), 'Discovering production and supply relationships: present status and future opportunities', *Review of Marketing and Agricultural Economics* 61 (1), 11-40.
- Kato, T. (1997), 'Regional integration for sustainable development in Cambodia', *International Workshop on Cambodia: Challenges and Options of Regional Economic Integration*, Cambodia Development Resource Institute, Phnom Penh, Cambodia.
- Kaylen, M.S. and Koroma, S.S. (1991), 'Trend, weather variables, and the distribution of US corn yields', *Review of Agricultural Economics* 13 (1), 249-258.
- Killich, T. (1989), 'Economic Development and the Adaptive Economy', ODI Working Paper 31, Regent's College, London.
- Killick, T. (1981), *Policy Economics: A textbook of applied economics on developing countries*, Heinemann Educational Books, USA.
- Kmenta, J. (1986), *Elements of Econometrics*, 2nd Edition, Macmillan, New York.
- Koutsoyiannis, A. (1973), *Theory of Econometrics: An Introductory Exposition of*

- Econometric Methods*, The Macmillan Press Ltd, Great Britain.
- Koyck, L.M. (1954), *Distributed Lags and Investment Analysis*, North Holland, Amsterdam.
- Krishnan, T.N. (1965), 'The marketed surplus of food-grains: is it inversely related to price?' *Economic Weekly*, Vol. 17 (Annual number, February 1965).
- Krishna, R. (1967), 'Agricultural price policy and economic development', in Herman, M. Southworth and Bruce F. Johaston (ed.), *Agricultural Development and Economic Growth*, Cornell University Press, Ithaca, pp. 497-547.
- Lahiri, A.K. and Roy, P. (1985), 'Rainfall and supply-response', *Journal of Development Economics* 18 (2-3), 315-334.
- Lim, D. (1975), *Supply Responses of Primary Producers*, Penerbit Universiti Malaya, Kuala Lumpur.
- Maji, C.C., Jha, D. and Venkataramanan, L.S. (1971), 'Dynamic supply and demand models for better estimations and projections: an econometric study for major food-grains in the Punjab region', *Indian Journal of Agricultural Economics* 26 (1), 21-34.
- Mandal, G.C. and Ghosh, M.G. (1968), 'A study of marketed surplus of paddy at the farm level in four East Indian villages', *Indian Journal of Agricultural Economics* 23 (3), 21-29.
- Mangahas, M.Recto, A.E. and Ruttan, V.W. (1966), 'Price and market relationships for rice and corn in the Philippines', *Journal of Farm Economics* 48 (2), 685-703.
- Marienga, J.A. (1995), The supply response analysis of maize production in Kenya, MEd dissertation, University of New England, Armidale, NSW.
- Mathew, M. (1991), A supply response analysis of cocoa production in Sabah (Malaysia), MEd dissertation, University of New England, Armidale, NSW.
- Mathur, P.N. and Ezekiel, H. (1961), 'Marketable surplus of food and price fluctuations in a developing economy', *Kyklos* 14.
- Mehta, K.V. (1991), The estimation of supply response in the wheat sheep zone of Australia: a profit function approach, MEd dissertation, University of New England, Armidale, NSW.

- Mellor, J.W. and Stevens, R.P. (1956), 'The average and marginal products of farm labour in underdeveloped economies', *The Journal of Farm Economics* 38 (3), 780-791.
- Misra, B. and Sinha, S.P. (1961), 'A study of marketable surplus of food-grains in a village in Bihar', *Indian Journal of Agricultural Economics* 16.
- Mortimer, R.L. (1987), *Cambodia: A Country Study*, R.R. Ross (ed.), Internet: http://www.abisnet.com/cambodia_1.htm.
- Muth, F.J. (1961), 'Rational expectations and the theory of price movements', *Econometrica* 29 (3), 315-335.
- Mysliwiec, E. (1987), *Punishing the Poor: the International Isolation of Kampuchea*, Oxford, OXFAM.
- Nerlove, M. (1958), *The Dynamics of Supply: Estimation of Farmers' Response to Price*, The Johns Hopkins Press, USA.
- Nerlove, M. and Bachman, K.L. (1960), 'The analysis of changes in agricultural supply: problems and approaches', *Journal of Farm Economics* 17 (3), 531-552.
- Nesbitt, H.J. (1997), *Rice Production in Cambodia*, Cambodia-IRRI-Australia Project, IRRI.
- Nesbitt, H.J. and Chan, P. (1997), 'Rice-based farming systems', Ch. 4 in H.J. Nesbitt (ed.), 1997.
- Nesbitt, H.J. (1997), 'Topography, climate, and rice production', Ch. 2 in H.J. Nesbitt (ed.), 1997.
- Nette, A. (1996), 'Cambodia tries again: kingdom braces for another agrarian revolution', *Cambodia Times, On The Net*, 19-25 August, Internet: <http://www.Cambodiatimes.com/aug19,'96/15.html>.
- Olson, R.O. (1960), 'The impact and implications of foreign surplus disposal on underdeveloped economies', *Journal of Farm Economics* 42 (1), 1042-1045.
- Organization for Economic Co-operation and Development (OECD) (1975), 'Review of Agricultural Policies: General Survey', *Agricultural Policy Reports*, OECD, Paris, France.
- Organization for Economic Co-operation and Development (OECD) (1990), 'Reforming

- Agricultural Policies: Quantitative Restrictions on Production', *Direct Income Support*, OECD, Paris, France.
- Pal, S., Bahl, D.K. and Mruthyunjaya (1993), 'Government interventions in foodgrain markets: the case of India', *Food Policy* 18 (5), 414-427.
- Park, W.I. and Garcia, P. (1994), 'Aggregate versus disaggregate analysis: corn and soybean acreage response in Illinois', *Review of Agricultural Economics* 16 (1), 17-26.
- Peterson, W. and Hayami, Y. (1977), 'Technical change in agriculture' in agriculture in Martin, L.R. (ed.) (1977), *A Survey of Agricultural Economic Literature*, University of Minnesota Press for AAEA, Minneapolis 1, 496-540.
- Pindyck, S.R. and Rubinfeld, L.D. (1998), *Econometric Models and Economic Forecasts*, 4th edition, Irwin McGraw-Hill, USA.
- Powell, A.A. and Gruen, F.H. (1966), 'Problems in aggregate agricultural supply analysis: II-preliminary results for cereals and wool', *Review of Marketing and Agricultural Economics* 34 (4), 186-201.
- Ramanathan, R. (1989), *Introductory econometrics with Applications*, Harcourt Brace Jovanovich, Orlando, Florida.
- Rao, P.V.G.K. (1965), 'Marketed surplus and agricultural production-A case study of a village in U.P.', *Agricultural Situation in India* 20.
- Rayns, W.L. (1989), *Pooled Time Series Analysis*, SAGE Publications, USA.
- Royal Government of Cambodia (1994), *National Programme to Rehabilitate and Develop Cambodia*, Phnom Penh, RGOC.
- Rozemuller, H.B. (1998), 'From pig rearing to stock marketing: rice milling, a broad spectrum of entrepreneurial activities', Occasional Paper No. 1, JSRC Printing House, Phnom Penh, Kingdom of Cambodia.
- Ruttan, V.W. (1957), 'Agricultural and nonagricultural growth in output per unit of input', *Journal of Farm Economics* 39 (5), 1566-1575.
- Salassi, M.E. (1995), 'The responsiveness of US rice acreage to price and production costs', *Journal of Agriculture and Applied Economics* 27 (2), 386-399.
- Samuelson, P.A., Nordhaus, W.D., Richardson, S., Scott, G., and Wallace, R. (1992),

- Economics*, Vol. 1, 3rd Australian Edn., McGraw-Hill Book Company, Sydney.
- Sanderson, B.A., Quilkey, J.J. and Freebairn, W.J. (1980), 'Supply response of Australian wheat growers', *Australian Journal of Agricultural Economics* 24 (1), 129-140.
- Schultz, T.W. (1960), 'The value of US farm surpluses to underdeveloped countries', *The Journal of Farm Economics* 42 (5), 1019-1030.
- Schultz, T.W. (1978), *Distortions of Agricultural Incentives*, Indiana University Press, USA.
- Senauer, B. (1985), 'A protectionist foodgrain price policy: the case of rice in Panama', *Food Policy* 10 (4), 352-364.
- Sharma, K.L. and Gupta, M.P. (1970), 'Study of farm factors determining marketed surplus of Bajra in Jaipur district', *Indian Journal of Agricultural Economics* 25 (2), 64-68.
- Sharma, V.P. and Joshi, P.K. (1995), 'Performance of rice production and factors affecting acreage under rice in coastal regions of India', *Indian Journal of Agricultural Economics* 50 (4), 153-165.
- Shastri, C.P. (1961), 'The problems of marketable surplus in agriculture in Bihar', *Indian Journal of Agricultural Economics* 16.
- Shaw, L.H. (1964), 'The effect of weather on agricultural output', *Journal of Farm Economics* 46 (1), 218-230.
- Shawcross, W. (1979), *Sideshow: Kissinger, Nixon, and the destruction of Cambodia*, New York: Simon and Schuster.
- Shepherd, A. (1989), 'Approaches to the privatization of fertilizer marketing in Africa', *Food Policy* 14 (2), 143-154.
- Temu, E.P., (1984), *Marketing, Board Pricing, and Storage Policy with Particular Reference to Maize in Tanzania*, 1st edn, Vantage Press, USA.
- Tichit, L. (1981), *L' Agriculture au Cambodge*, Paris, Agence de Coopération Culturelle et Technique.
- Tickner, V. (1996), 'Food security in Cambodia: a preliminary assessment', Draft Report prepared for the United Nations Research Institute for Social Development, CDRI, Cambodia.

- Timer, C.P. and Falcon, W.P. (1975), 'The political economy of rice production and trade in Asia', in *Agriculture in Development Theory*, L. Reynolds (ed.), Economic Growth Centre, Yale University Press, New Haven.
- Tomek, W.G. and Robinson, K.L. (1977), 'Agricultural price analysis and outlook', in *A Survey of Agricultural Economic Literature*, ed. L.R. Martin, Vol. 1, University of Minnesota Press for AAEA, Minneapolis, 329-409.
- Tomek, W.G. and Robinson, K.L. (1981), *Agricultural Product Prices*, 2nd edn, Cornell University Press, USA.
- Traill, B. (1978), 'Risk variables in econometric supply response models', *Journal of Agricultural Economics* 29 (1), 53-62.
- Tuinenburg, K. (1988), 'Market restructuring and pricing policies', *Food Policy* 13 (1), 27-36.
- Valdes, A. (1991), 'The role of agricultural exports in developing countries', Ch. 3 in C.P. Timmer (ed.), Cornell University Press, Ithaca.
- Vincent, P.D., Powell, A.A. and Dixon, B.P. (1982), 'Changes in supply of agricultural products', in *Agriculture in the Australian Economy*, D.B. William (ed.) 1982, Sydney University Press, 210-224.
- Visser, H. (1974), *The Quantity of Money*, Martin Robertson & Company, Ltd, London.
- Waugh, F.W. (1964), 'Cobweb Models', *Journal of Farm Economics* 46 (3), 732-750.
- White, F.C. and Shideed, K.H. (1991), 'Structural change in supply response analysis of corn acreage', *Review of Agricultural Economics* 13 (2), 237-248.
- White, P.F., Oberthur, T. and Pheav, S. (1997), 'Soils and rice', Ch. 3 in H.J. Nesbitt (ed.), 1997.
- World Bank (1992), *Cambodia: Agenda for Rehabilitation and Reconstruction*, The World Bank, East Asia and Pacific Region Country Department I.
- Yap, L.C. (1994), 'China: rice market reforms', *Food Policy* 19 (4), 367-380.
- Zellner, A. (1962), 'An efficient method of estimating Seemingly Unrelated Regressions and tests for aggregation bias', *American Statistical Association Journal* 54, 348-368.