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EFFICIENCY AND LABOUR ABSORPTION IN IRRIGATED RICE FARMS IN NUEVA ECIJA: PHILIPPINES

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EFFICIENCY AND LABOUR ABSORPTION IN IRRIGATED RICE FARMS IN NUEVA ECIJA: PHILIPPINES

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LIST OF ABBREVIATIONS

ADB	-	Asian Development Bank
ADC	-	Asian Development Council
BAEcon	-	Bureau of Agricultural Economics
CFIA	-	Cristamakita Farmers Irrigators' Association
DAR	-	Department of Agrarian Reform
FSDC	-	Farm Systems Development Corporation
IA	-	Irrigators' Association
IBRD	-	International Bank for Reconstruction and Development
IDA	-	Institutional Development Programme
IFAD	-	International Fund for Agricultural Development
IRRI	-	International Rice Research Institute
NEDA	-	National Economic and Development Authority
NIA	-	National Irrigation Administration
NSO	-	National Statistics Office
OECF	-	Overseas Economic Cooperation Fund of Japan
OPEC	-	Organization of Petroleum Exporting Countries
PIA	-	Penaranda Irrigators' Association
RPEP	-	Rice Production Enhancement Programme
SFS	-	Small Farmers System.
USA	-	United States America
USAID	-	United States Agency for International Development

Abstract of the thesis presented to the Senate of Universiti Pertanian Malaysia in partial fulfilment of the requirements for the degree of Master of Science

EFFICIENCY AND LABOUR ABSORPTION IN IRRIGATED RICE FARMS IN NUEVA ECIJA: PHILIPPINES

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The focus of the study is on the determination of economic efficiency and labour absorption capacity of rice farms operating under the two types of small-scale irrigation systems (gravity type and pump type) in Nueva Ecija, Philippines.

Rice farms from both types of irrigation systems were assessed using the normalized restricted profit function. Data from two hundred and sixty two rice farmers, 140 from Cristamakita Farmer Irrigators' Association (CFIA) comprising the gravity irrigated farms and 122 from Penaranda Irrigators' Association (PIA) comprising the pump irrigated rice farms, was analysed using the SAS Syslin computer package.

Profitability analysis shows that among the variable inputs considered, only labour, fertilizer and seeds possess the correct a priori signs and only fertilizer is significant to farm profit. Land has positive coefficient as expected but the coefficient is not significant. Land tenure status of the farmers affects farm profit in favour of owner-operators. Owner-operators have greater income per farm and per hectare compared to other farmer-groups considered, regardless of farm proximity to the irrigation canal.

Empirical findings show no difference in relative economic efficiency between the farmer-groups considered. Both farmer-groups operate on the same level of economic efficiency.

Both farmer-groups failed to maximize profit in the short run. Both groups of farmers were not successful in equating the marginal value products of the variable resources to their respective prices.

The elasticity of demand for labour with respect to its price is inelastic (-0.29). This implies that under existing farm conditions, rice farming is unlikely to absorb excess farm labour without decreasing wage rate. Labour however, is responsive to output price changes. Fertilizer was found out to be responsive to its own price (-1.43) and also responsive to output price.

Response of paddy supply to changes in the price of the variable inputs supports a priori expectations, but all the coefficients are not significant. Moreover, paddy supply is more sensitive to seed price compared to the price of labour, fertilizer, pesticides and animal-machine.

Human labour and animal-machine were found to be complementary inputs. The rest of the inputs considered were also found to be complementary with each other like labour with fertilizer, labour with seeds and labour with pesticides. This shows that decrease in the prices of fertilizer, pesticides and seeds will encourage increase in their usage hence, will also increase labour demand

Demand for variable inputs was not responsive to land, but responsive to irrigation fee.

The results of the study indicate room for increasing food supply through improvement of farmers' allocative efficiency.

Abstrak tesis yang dikemukakan kepada Senat Universiti Pertanian Malaysia sebagai memenuhi sebahagian daripada syarat yang diperlukan untuk mendapatkan Ijazah Master Sains

KECEKAPAN DAN PENYERAPAN TENAGA BURUH DI LADANG-LADANG PADI YANG MENDAPAT PENGAIRAN DI NUEVA ECIJA: FILIPINA

oleh

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Fokus kajian ini ialah terhadap kecekapan ekonomi dan keupayaan penyerapan buruh dalam penanaman di bawah dua jenis sistem pengairan (graviti dan pam) di Nueva Ecija, Filipina.

Penanaman padi daripada kedua-dua jenis sistem pengairan telah dianalisis dengan menggunakan "normalized restricted profit function". Data dari seramai 262 petani telah dikumpul, di mana 140 darinya terdiri dari Cristamakita Farmer Irrigators' Association (CFIA) yang menggunakan sistem pengairan graviti dan 122 lagi daripada Peñaranda Irrigators' Association (PIA) yang menggunakan sistem pengairan jenis pam.

Data telah dianalisis dengan menggunakan pakej komputer SAS Syslin.

Analisis keberuntungan menunjukkan bahawa di antara input-input berubah yang diambilkira hanya buruh, baja dan benih memberikan jawapan yang positif tetapi baja sahaja yang signifikan kepada keuntungan ladang. Tanah mempunyai koefisyen yang positif seperti yang dijangka, tetapi koefisyen ini tidak signifikan. Status pemilikan tanah oleh petani boleh memberi kesan ke atas keuntungan ladang.

Daripada keputusan yang diperolehi, tidak terdapat perbezaan di dalam kecekapan ekonomi relatif di antara kedua kumpulan petani di atas. Kedua-dua kumpulan petani beroperasi di tahap penggunaan teknikal dan/atau kecekapan alokatif yang sama.

Kedua-dua kumpulan petani ini juga gagal untuk memaksimumkan untung dalam jangkapendek. Mereka juga gagal untuk menyamakan nilai keluaran marginal sumber-sumber berubah dengan harga masing-masing.

Keanjalan permintaan buruh yang tertakluk kepada harga adalah tidak anjal (-0.29). Ini menunjukkan, di bawah keadaan ladang yang biasa, penanaman padi sukar menyerap lebihan buruh ladang tanpa mengurangkan kadar upah. Bagaimanapun, penyerapan buruh dipengaruhi oleh perubahan dalam harga output. Manakala

baja dipengaruhi oleh harganya sendiri (-1.43) serta harga outputnya.

Tindakbalas bekalan padi ke atas perubahan dalam harga input-input berubah sudah dijangka,tetapi semua koefisyen tersebut tidak signifikan. Tambahan pula, bekalan padi lebih sensitif kepada harga benih jika dibandingkan dengan harga buruh, baja, racun serangga dan haiwan yang digunakan di ladang.

Tenaga buruh dan haiwan tersebut dianggap sebagai input pengenap. Lain-lain input yang diambilkira juga dianggap sebagai penggenap seperti buruh dengan baja, buruh dengan benih, dan buruh dengan racun serangga.

Permintaan untuk input-input berubah tidak dipengaruhi oleh tanah, tetapi ia dipengaruhi oleh bayaran untuk pengairan.

Keputusan dari kajian ini menunjukkan bahawa bekalan makanan boleh dipertingkatkan melalui tambahan alokasi petani.

CHAPTER I

INTRODUCTION

Background Information

Rice is one of the most important commodities both economically and politically in Asia. From 1973 to 1975, 91 percent of the world total rice production was millions of farmers in Asia and more than one billion people lived basically on rice.

In the Philippines, rice is considered critically important as a wage crop and comprises about 70 percent of the total food consumption of Filipinos on the national basis. It is the most important grain and it is consumed by almost 80 percent of the population. However, Philippines is among the countries with the lowest production of rice per hectare (1.7 tons) (Barker and Hayami, 1976). Typhoons, floods and droughts are prevalent and destroy the field crop.

In 1972 and 1973, floods and drought caused a severe drop in domestic rice production. The shortage in rice production forced the country to import rice from some Asian rice-exporting countries like Thailand and Burma and even from the USA, to meet the domestic demand.

The major development goal of the Philippine government is to be self-sufficient in rice. This was part of the two-pronged strategy adopted in 1972, after a serious shortage in rice, to achieve self-sufficiency in food production within a decade through a nationwide production support programme known as "Masagana 99" [1] and an accelerated irrigation programme. These programmes were backed up by supervised production loans to farmers. Funds were disbursed through banks such as Philippine National Bank, Land Bank of the Philippines and Cooperative and Rural Bank.

In 1977, owing to significant progress in both of the programmes mentioned, the country was able to achieve self-sufficiency in rice for the first time. This increase in output continued in the 1980's. From 1978 to 1981 the Philippines was able to export 0.05, 0.13, 0.23 and 0.11 million tons of milled rice respectively to the world market[2]. However, in 1982, owing to frequent typhoons and floods domestic rice production dropped and the country had to import

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[1] Bountiful yield of 99 cavans of paddy per hectare equivalent to 4950 kilograms (4.95 tons)

[2] Commodity Review Outlook, FAO Economic and Social Development Studies, 1987-1988

rice again until 1985. Imports of milled rice into the Philippines in 1985 rose sharply to 500,000 tons following shortfalls in the previous years. In 1986, because of favourable weather condition agricultural crops production increased by 8.7 percent than that of 1985. Paddy production reached an estimated 9.1 million metric tons representing a 10.9 percent increase over the 1985 production of 8.2 million metric tons (Table 1). In 1987, the country did not import rice as domestic supplies was sufficient to meet demand.

Besides being a major source of nutrition, rice farming is also an important source of employment in the rural areas. The landless farmers, particularly women, derive their income from working in the rice farms as hired labourers. The income thus derived constitutes a high proportion of the family's cash income (Unnevehr and Stanford, 1983). Although growth in the industrial sector provides some job opportunities outside agriculture, landless households who do not have the resources to invest in education, remain dependent on opportunities in rice sector (Castillo et al. 1983).

With the increasing number of Filipinos, 58.9 million as of 1988 and an estimated addition of 1.49 million expected in 1989, the government is faced with the problems of unemployment and inadequate food supply. Food production, particularly rice, must be increased to meet an ever increasing demand.

Table 1

Production of Agricultural Crops of the Philippines: 1985 and 1986 (1000 mt)

Food Crops	Crop Year 1985	1986	Percent change
Paddy	8,200.1	9.097.1	10.9
Corn	3,438.8	3,922.0	14.1
Root Crops	2,453.2	2,668.5	8.8
Fruits & Veg.	6,646.4	6,874.1	3.4
Other Food Crops	353.2	359.7	1.8
Total	21,092.0	22,921.4	8.7

Source: National Economic and Development Authority, Philippine Statistical Yearbook, 1986

Improvements in physical and institutional infrastructure such as irrigation, research and extension are the key factors in achieving self-sufficiency in rice in South and Southeast Asia (Barker and Hayami, 1976). In the Philippines, these measures were given priority by the government since the 1970's as essential for agricultural development. It is hoped that by the year 2000, a target area of 2.98 million hectares representing 86 percent of the total cultivable land, will be irrigated.

Irrigation Development in the Philippines

Development of irrigation in rice production has been the focus of attention in most countries in Asia. Absence of good and effective irrigation will severely limit the attainment of the desired level of food output, particularly rice. In the Philippines, efforts at accelerating irrigation development were given a boost by the creation of Farms Systems Development Corporation (FSDC) in 1975. This organization was created to promote the development of small-scale irrigation and farm based associations. The government believes that the goal of attaining the highest possible agricultural efficiency, within the limits of water resources and engineering design as well as achieving an equitable distribution of irrigation water, depends to a large extent on the farmers working cooperatively for mutual benefit. The strategy now adopted in all National Irrigation Administration (NIA) national projects is the organization of Irrigators' Groups to promote the equitable allocation and efficient distribution of water and to resolve any conflicts that may arise. It is further hoped by the NIA that the project beneficiaries will become more actively involved in the operation and management of the irrigation schemes themselves through the hierarchy of farm organizations.

Since 1975, FSDC has been supported by an aid loan of US$6.5 million. Another US$10 million loan was subsequently added, called the Small Farmers Systems (SFS) for funding institutional infrastructures such as irrigation systems, farm tools and machinery, storage and transportation facilities and water management devices. The FSDC is concerned not only with irrigation development but also with the complementary farm technology and institutional development for an integrated farm systems development.

More than 3 million hectares of the total land area in the Philippines are suitable for irrigation development. The government aims to place all these area under irrigation within the next 22 years. The total service area under all types of irrigation systems, as of 1986, is 1.47 million hectares. The small scale system comprises about 58 percent of the total area (Table 2).

NIA Development Projects During the Year 1987

During the year 1987, the NIA vigorously pursued the implementation of eighteen (18) irrigation projects with a total potential irrigable area of 380,062 hectares located in various parts of the country with foreign loan aid. Five of the projects were financially assisted by the International Bank for Reconstruction and Development (IBRD), ten by the Asian Development Bank (ADB), and three by Overseas Economic

Table 2

Status of Irrigation Development in the Philippines as of December, 1986

Item		Hectares
Potential irrigable area		3,142,264
Actual hectarage developed		1,468,503
National	611,690	
Small-Scale Systems:		
Gravity	704,685	
Pump	152,128	

Source: NIA Year End Report to The President, December 31,1986

Cooperation Fund (OECF) of Japan. The estimated cost of these projects was P11,172.25 (US$514.85) million including the foreign loans totalling to P13,238.302 (US$610.06) million.

The major features of these projects include the following: construction of diversion dams and headwork structures; rehabilitation, upgrading and/or construction of water distribution canals and appurtenant structures;

Note: One US dollar is equivalent to P21.70

improvement, construction and/or upgrading of service and access roads; on-farm development and conservation; and construction of project facilities for both the construction, operation and maintenance stages.

In terms of area, those irrigation projects were able to generate a total of 22,051 hectares of new areas. A total of 2,144 hectares were planted with various tree species within the Magat and Pantabangan watershed areas, bringing the total area reforested to 24,078 hectares at the end of 1987.

Locally Funded National Irrigation Projects

In 1987, two locally-funded small-scale projects with an estimated total cost of P42.93 million and covering an aggregate service area of 5,882 hectares were implemented (Table 3). Due to insufficient funds however, implementation of some locally-funded National Projects were temporarily suspended.

These two national projects were able to rehabilitate a total of 200 hectares and bring in the total generated new area to 3,630 hectares.

Status of Small-Scale Irrigation Projects, 1987

In 1987, the Communal Irrigation Program (Small-Scale) implemented a total of 729 projects, out of which 369 projects

Table 3

Status of Locally-Funded National Irrigation Projects, 1987

Name & Location of Project	Irrigable area (ha)	Updated Estimated cost (Pmill)	Implementation Schedule: Date Started	Implementation Schedule: Completion date	Financial Status: Allotment get (Pmill)	Financial Status: Expenditure to date (Pmill)	Financial Status: Year-end project status as of Dec.1987 (%)	Generated / Rehabilitated Area: Jan.-Dec. 1987 (ha)	Generated / Rehabilitated Area: As of Dec. 1987 (ha)	Remarks
I.Region I										
a. Agno Clear Water Devt. Project, Pangasinan	4,282	12.87	1981	1987	14.80	10.96	100.00	(200)	(4,282)	Completed
b. Lower Agno River Irri. Project, Pangasinan	8,000	56.50	1974	1987	40.38	39.99	86.60	-	-	Suspended due to fund constraint
c. Ambayoan-Dipalo Ext. Project, Pangasinan	1,140	7.30	1978	1987	6.02	6.02	84.63	-	(915)	Suspended due to fund constraint