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ECONOMICS OF INTEGRATED FISH-CHICKEN FARMING SYSTEM (LONGYAM) IN TASIKMALAYA DISTRICT, INDONESIA

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ECONOMICS OF INTEGRATED FISH-CHICKEN FARMING SYSTEM (LONGYAM) IN TASIKMALAYA DISTRICT, INDONESIA

By

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Dedicated with love to:

my late father, Soemardi Darmoatmodjo,
my late mother, Titi Moeljati,
my grandmother,
my sisters,
my brothers

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Chairman : Prof. Dr. Mohd. Ariff Hussein
Faculty : Economics and Management

The study is an attempt to analyse the economic aspects of Integrated Fish-Chicken Farming System (longyam) in the District of Tasikmalaya, Indonesia. Linear Programming was employed as an analytical tool to determine the optimal enterprise-mix and allocation of resource use for three farm categories: small, medium and large. The Functional Mathematical Programming System (FMPS) was used to obtain the solution required. Primary data was collected from a farm survey and secondary data obtained from relevant agencies were used as supplementary information.

The study found that large farmers earned the highest net profit for all the five fish species i.e. mas, nilem, tawes, tambakan and nila as compared to small and medium farmers.

Small farmers obtained the highest net profit in broilers and layers production. On the other hand, medium farmers led in raising cockerels. It was also shown that the total costs in culturing fish as well as raising chicken per one ha farm declined as farm size increased.

The optimal solutions generated a higher total net revenue for the three farm categories over the existing practice. Large farmers have a greater potential for earning a higher income than small and medium farmers.

The inclusion of chicken enterprise in the solution increased the employment of labour on small, medium and large farms in all the months of the planning period. The largest increase in labour utilisation was in small farms followed by large and medium farms.

Government intervention through the injection of subsidised credit to cooperative or farmers' association can go a long way in increasing farmers' income. In addition, the role and involvement of extension workers can be intensified for better enterprise management and adoption of new technology in longyam.

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

KEPENTINGAN EKONOMI SISTEM PERLADANGAN IKAN-AYAM (LONGYAM) BERSEPADU DI DAERAH TASIKMALAYA, INDONESIA

Oleh

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Pengerusi : Prof. Dr. Mohd. Ariff Hussein
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Kajian ini adalah satu percubaan untuk menganalisis aspek ekonomi longyam (Sistem Perladangan Ikan-Ayam Bersepadu) di Daerah Tasikmalaya, Indonesia. Pemprograman linear telah digunakan sebagai alat untuk menentukan gabungan bidangusaha-bidangusaha dan pengagihan sumber yang optimum bagi tiga kategori kolam: kecil, sederhana dan besar. Pakej komputer FMPS (Functional Mathematical Programming System) digunakan untuk mendapatkan penyelesaian yang diperlukan. Data primer yang diperlukan didapati daripada bancian ladang. Untuk melengkapkan maklumat, data sekundar diperolehi dari agensi-agensi yang berkaitan.

Kajian ini mendapati petani yang mengusahakan kolam dalam kategori besar memperolehi pendapatan bersih yang tertinggi bagi kesemua lima jenis ikan, iaitu mas, nilem, tawes, tambakan

dan nila berbanding dengan pengusaha kolam bersaiz kecil dan sederhana. Petani dalam kategori kecil memperolehi keuntungan bersih yang tinggi dalam penternakan ayam daging dan ayam telur, sementara pengusaha kolam bersaiz sederhana memperolehi pulangan yang tinggi bagi ternakan ayam pejantan. Kajian juga menunjukkan jumlah kos ternakan ikan sehektar sebagaimana dalam ternakan ayam menurun dengan peningkatan saiz kolam.

Penyelesaian optimum menghasilkan jumlah pulangan bersih yang lebih tinggi bagi ketiga-tiga kategori kolam dibandingkan dengan amalan masakini. Potensi untuk memperolehi pendapatan yang tinggi adalah besar bagi petani yang mengusahakan kolam bersaiz besar.

Pemilihan ternakan ayam di dalam penyelesaian optimum, meningkatkan guna tenaga buruh bagi kesemua kategori kolam dan tempoh masa perancangan. Peningkatan penggunaan buruh yang tinggi berlaku bagi kebun bersaiz kecil, diikuti oleh kolam bersaiz besar dan sederhana.

Campur tangan pemerintah melalui subsidi kredit kepada koperasi atau pertubuhan peladang dijangka boleh meningkatkan pendapatan petani. Selanjutnya peningkatan aktiviti-aktiviti pengembangan, juga oleh pemerintah dijangka boleh membantu petani menggunakan teknologi baru di dalam pengusahaan longyam.

CHAPTER I

INTRODUCTION

Background

Indonesia is the largest archipelago in the world. It comprises of five major islands and more than 13,000 smaller ones. The five main islands are Sumatera, Java - Madura, Kalimantan, Sulawesi and Irian Jaya. Altogether about 6,000 islands are inhabited.

The archipelago is on a crossroad between two oceans, the Pacific and the Indian oceans, and bridges two continents, Asia and Australia. This unique position has a great influence on the evolution of the cultural, social, political and economic life of the people in the country.

The area of the Republic of Indonesia is estimated at 5,193,250 sq km which embraces a land territory of 2,027,087 sq km and a sea territory of 3,166,163 sq km (Department of Information, Indonesia, 1989). As the islands of Indonesia lie along the equator, her climate and weather are characterised by the two tropical seasons, namely the dry and the rainy seasons. The dry season is between April and October and the rainy season is between November and March, with the heaviest rainfall during December and January.

Based on the latest 1980 census, the number of people living in Indonesia was estimated at 147,490,298 and its annual growth rate was 2.32 per cent. As the fifth most populated country in the world, Indonesia faces an uneven population distribution problem. About 60.7 per cent of people live in Java - Madura (Central Bureau of Statistics, Indonesia, 1986) and as shown in Table 1, Java - Madura are the most densely populated islands. Land on the two islands are the most fertile in the country. Besides, Jakarta, the capital city is also located on the island of Java.

Table 1

Population Density of Indonesia per sq km
1930 - 1980

Island	1930	1961	1971	1980
Java - Madura	315	476	576	690
Sumatera	17	33	44	59
Kalimantan	4	8	10	12
Sulawesi	22	38	45	55
Irian Jaya and other islands	8	12	15	19
INDONESIA	32	51	62	77

Source : Central Bureau of Statistics, Indonesia, 1986

In 1985, the working population defined as those ten years and older was 62.5 million. The distribution of the working population by employment, as seen in Table 2, reflects the fact that Indonesia is an agricultural based country. In 1986, this

sector contributed 26 per cent of Indonesia's Gross Domestic Product (GDP), with the fishery sector contributing 6.8 per cent of the GDP.

Table 2

Distribution of the Working Population by Employment, 1985 (percentage of the working population)

Sectors	Per cent
Agriculture, forestry, fishery	54.6
Mining and quarrying	0.6
Manufacturing industry	9.2
Electricity, gas and water	0.1
Construction	3.3
Wholesale and retail trade and restaurant	14.9
Transportation, storage and communication	3.1
Finance, insurance, real estate and business services	0.4
Public services	13.3
Others	0.1

Source : Central Bureau of Statistics, Indonesia, 1986

General Features of Fisheries in Indonesia

Fish is the primary source of animal protein in Indonesia as it is relatively cheaper than other animal proteins. An average Indonesian should consume some 55 grams of protein per day to meet the minimal nutritional requirements. Of this total, 15 grams should come from animal protein, i.e. 10 grams from fish and 5 grams from livestock. Ten grams of fish protein equals 60 grams of fish flesh a day or 82 grams of whole fish per day. Hence, per capita consumption requirement should be

29.5 kg of whole fish per year (Sidarto and Atmowasono, 1976). In 1986, the fish consumption rate, however, was only 14.67 kg per capita (Central Bureau of Statistics, Various Issues, Indonesia). Thus, the consumption rate was only about one-half (50 per cent) of the minimal nutritional rate requirement.

The low consumption rate of fish in Indonesia is due to: (1) non-availability of fish in the market, (2) unacceptability of certain fish species or certain form of fish product, (3) consumers' attitude and preference towards fish, (4) high price of fish relative to vegetables and rice, and (5) low income of consumers (FAO, 1982).

Since the population of Indonesia is growing at 2.32 per cent per annum, the need for fish is also increasing. So far, marine fisheries as a source of fish supply has been mostly exploited . Consequently, production is not able to increase significantly to meet the growing demand for fish. This shortfall has led to the introduction of aquaculture as an additional source of fish supply for meeting the protein requirement of the people.

The Indonesian Government's 1988 Guidelines of State Policy (Garis-Garis Besar Haluan Negara, 1988) (Department of Information, Indonesia, 1989) states that the priority for economic development is on the agricultural sector, which includes fishery, and to continue efforts toward establishing self-sufficiency in food production. Productive capacity is to

be enlarged to meet domestic and industrial demand, to increase export potential and farm's income as well as employment opportunities. With regards to the increasing demand for fish, the Government attempts to increase production of fish through the improvement of aquacultural techniques.

Aquaculture in Indonesia includes those practised in freshwater pond, brackish water, cage and the paddy-field. Generally, fish are cultured either in monoculture or polyculture, using different levels of management intensity such as extensive, semi-intensive or intensive management systems. An extensive management system normally uses the pond's natural environment for producing fish feed. It has a lower stocking rate, hence the returns generated are also low. A semi-intensive management system requires the application of fertilizers to produce natural food such as planktons. In this management system, although supplementary feed is given, a significant amount of the fish diet is supplied by natural food. An intensive system is characterised by the use of a nutritionally completed pelleted feed and fertilizer. In this system, natural food produced in the pond only provides a minor contribution to fish nutrition (Edwards et al., 1988). Generally, through this system, higher yields will be generated due to a higher stocking rate.

In 1985, the production of fish through aquaculture in Indonesia contributed about 12.7 per cent (304.57 thousand metric tons) of the total fishery production for the whole country (Table 3). From this amount, approximately 156.37 thousand metric tons came from brackish water pond, 84.24 thousand metric tons from freshwater ponds, 0.75 thousand metric tons from cage culture and 63.22 thousand metric tons originated from paddy-fields. From Table 3, it can be seen that the production of fish culture has continuously increased over the last ten years. The breakdown of fish culture production is summarised in Table 4.

Among the 27 provinces in Indonesia, the West Java province is the largest producer of fish through fish culture in the country (Table 5). The West Java province is endowed with land that is suitable for aquaculture. Aquaculture in Indonesia itself is believed to have originated in West Java. In 1985, there were 105,797 ha of land in West Java that were utilised for fish culture and the production was about 109.41 thousand metric tons consisting of 31.19 thousand metric tons from 49,980 ha of brackish water ponds, 53.34 thousand metric tons from 18,181 ha of freshwater ponds, 0.55 thousand metric tons from 1.0 ha of cages and 24.33 thousand metric tons of fish were produced from 41,635 ha of paddy-fields. In terms of monetary value, the production from freshwater ponds contributed 46.3 per cent of the total value of aquaculture,