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THE ECONOMICS OF MILKFISH AQUACULTURE IN ILOILO, PHILIPPINES

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THE ECONOMICS OF MILKFISH AQUACULTURE IN ILOILO, PHILIPPINES

By

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UPM

To my darlings:

RC, who loves chocolate, ice cream and balloons

and

Christmas Boy, whose first smile I did not see,

just to defend this manuscript

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Faculty : Economics and Management

The milkfish (Chanos chanos) industry plays a vital role in the Philippine economy. The industry, however, is facing the problem of low productivity.

This study evaluates the efficiency of resource use in milkfish aquaculture. The translog production and translog profit functions were estimated using cross-sectional data obtained through a survey of 67 milkfish farmers surveyed in Iloilo, Philippines. In both functions, the explanatory variables were inorganic fertilizer, seed, labour, pesticides, age of pond and respondent's experience. Farm size was entered as dummy variable for small, medium and large farms.

The performance of each farm category was evaluated using economic indicators such as rate of return on investment, rate of return on operating cost, ratio of net profit to gross revenues and ratio of net profit to variable costs. The results showed that the small farms had performed better than the other farm groups.

The regression results revealed that the milkfish farmers were profit-maximizers. The translog profit function was found to be better than the translog production function in explaining the farmers' production process at 5% level of significance. In addition, the variable inputs were found to be highly price inelastic; cross elasticities of inorganic fertilizer, seed and labour with pesticide were low while complementarity of inorganic fertilizers with seed and labour were high.

The study concludes that the present productivity level of milkfish aquaculture can only be increased through technological advancement since milkfish farmers are already price efficient. However, the technological innovation that should be propagated must suit the farmers' scale of fishpond operation. For instance, a less capital intensive culture technique, such as the use of cheaper supplementary feeds from indigenous materials should be investigated.

bahawa ladang kecil mempunyai prestasi yang baik berbanding dengan ladang-ladang lain.

Keputusan regresi menunjukkan bahawa penternak "milkfish" adalah pemaksimum keuntungan. Fungsi keuntungan translog didapati lebih baik dari fungsi pengeluaran translog di dalam menerangkan proses pengeluaran penternak pada tahap 5% signifikan. Disamping itu, input berubah didapati sangat anjal dari segi harga. Keanjalan silang baja bukan organan, biji benih dan buruh dengan racun perosak adalah rendah, manakala daya penggenap baja bukan organan dengan biji benih dan buruh adalah tinggi.

Kajian ini merumuskan bahawa tahap daya pengeluaran masakini akuakultur "milkfish" hanya boleh ditingkatkan melalui perkembangan teknologikal kerana penternak telahpun cekap dari segi harga. Tetapi, inovasi teknologi yang harus dikembangkan mestilah sesuai dengan skel operasi penternakan. Sebagai contoh, teknik kultur yang tidak intensif modal, seperti penggunaan makanan tambahan yang murah dari bahan-bahan yang wujud di tempat berkenaan, harus diselidiki.

CHAPTER I

INTRODUCTION

Overview of the Philippine Fishing Industry

Fish Production

The Philippines is one of the world's top consumers and producers of fish and other fishery products. For Filipinos, fish is the major and cheapest source of protein which accounts for more than one half of the Filipinos' protein intake.

In terms of production, the country accounted for 2.15% of the world's total nominal catch in 1987. This represents about one sixth of the contribution of Japan, the world's leading producer as well as consumer of fish (FAO, 1987).

The Philippine fishing industry consists of production activities (fish capture and fish culture) as well as processing and marketing of fish and fishery products. The contribution of the industry to the Gross National Product (GNP) amounted to about 5.0% in 1987, almost one-fifth of the agriculture's share.

Fish production in the Philippines comes from three sectors: commercial fisheries, aquaculture and municipal fisheries.

Total fish production grew at an average annual rate of 4% for the period 1980-1989. In 1989, total volume of fish produce reached almost 2,367 mt, 47% of which came from municipal fisheries, 26% from commercial fisheries, while aquaculture accounted for 27% (Table 1).

Table 1
Fish Production in the Philippines by Sector, 1980-89 (in '000 metric tons)

Year	Total	Commercial		Aquaculture		Municipal	
	mt	mt	% of total	mt	% of total	mt	% of total
1980	1,672.254	488.478	29.21	289.166	17.29	894.600	53.50
1981	1,772.897	494.768	27.91	339.501	19.15	938.600	52.94
1982	1,896.983	526.273	27.74	392.348	20.68	978.300	51.58
1983	2,110.230	519.316	24.61	445.073	21.09	1,145.800	54.30
1984	2,080.439	513.335	24.67	477.887	22.97	1,089.217	52.36
1985	2,052.111	511.987	24.95	494.742	24.11	1,045.382	50.94
1986	2,089.484	546.230	26.14	470.893	22.54	1,072.361	48.68
1987	2,213.040	591.192	26.71	560.970	25.35	1,060.879	47.94
1988	2,269.744	599.995	26.43	599.550	26.41	1,070.195	47.16
1989	2,366.588	624.655	26.39	637.307	26.93	1,104.626	46.68
Annual Growth (%)	4.00		2.8		39.42		2.55

Source: Bureau of Fisheries and Aquatic Resources, 1980-89.

While capture fisheries (municipal and commercial) remains the primary source of fish, the growing contribution of aquaculture to total fish production can hardly be ignored. In the past decade, the percentage share of aquaculture to total production has increased from 17% to 27%, while contributions of municipal and commercial fisheries declined from 53.50% to 46.68% and from 29.21% to 26.39%, respectively.

In terms of average annual growth, the aquaculture sector grew at 9.42%, the highest rate registered among the three sectors

Aquaculture Production

Aquaculture can further be categorized into three subsectors, namely: (1) mariculture, which includes oyster, mussel and seaweed culture; (2) freshwater culture, such as fishpens and fish cages, and; (3) fishpond culture, which is either brackishwater or freshwater pond culture.

In 1985-1989, aquaculture production increased by 28.82%, with mariculture achieving the highest growth rate of 38.48% (Table 2). The relatively high increase in mariculture production could be attributed to increasing popularity of seaweed culture. In the case of fishpond culture, production also attained a relatively high increase of 34.23%. Production from freshwater pond culture escalated tremendously by about 115% in the same period. However, brackishwater production remained dominant, accounting for 88% of total fish production, or 253,580 mt in 1989.

Table 2
Volume and Growth of Aquaculture Production
in the Philippines, 1985-89 (in metric tons)

Subsector	1985		1989		Growth (%)
	Volume	%	Volume	%	1985-1989
Total	494,742	100.00	637,307	100.00	28.82
Mariculture	220,894	44.65	305,885	48.00	38.48
Freshwater	59,420	12.01	43,604	6.84	(26.62)
Fishponds	214,428	43.34	287,818	45.16	34.23
brackishwater	198,546	92.59	253,580	88.10	27.72
freshwater	15,882	7.41	34,238	11.90	115.58

Source: Bureau of Fisheries and Aquatic Resources, 1985-89.

For fishpen and fish cage culture (freshwater), production declined by 26.62%. This could be attributed to the reported decrease in fishpen area from about 29,000 ha in 1985 to 24,000 ha after a year. This is despite the fact that annual average yield from fishpen culture is five times greater than the average yield from fishpond culture. The unpredictability of the weather, which carries with it greater risk and uncertainty in production, may be one of the reasons why fishpen operation declined.

Contribution of Aquaculture to the Economy

Admittedly, the aquaculture sector has been significantly contributing to fish production. As the country's population continues

to rise, demand for fish is likely to increase, necessitating further increase in production. The role of aquaculture becomes more pressing as the contribution of capture fisheries (commercial and municipal) to fish production has been declining in the past decade. Due to the declining share of capture fisheries which may be attributed to the biological limits of the fishery resource and the continuous increase in fishing effort, the bulk of the future increases in fish production is expected to come from the aquaculture sector.

Production from culture fisheries is also an important source of foreign exchange earnings. In 1988, exports of fish and other fish products amounted to 128,902 mt worth P9.6 billion (US$420.5 million), mostly traded to Japan, USA, Canada, Hongkong and West Germany. Exports of shrimps and prawns accounted for 55.21% of total export earnings or P5.3 billion (US$232.97 million), while that of milkfish was valued at P75.86 million (US$3.33 million) (Philippines,BFAR,1989).

The aquaculture sector also provides employment to over 220,000 people. Among them are fishpond managers and caretakers, hired labourers, fry gatherers, concessionaires, dealers and middlemen who, directly or indirectly, depend on aquaculture for their livelihood.

Overview of Milkfish Farming in the Philippines

Milkfish Aquaculture

In the Philippines, milkfish is the most important pond cultured species in terms of land area and volume of production.

In 1988, the total hectarage of brackishwater ponds in operation was 210,680 ha with a total production of 240,206 mt. About 73% of the volume produced were milkfish, while prawn accounted for 17.3% (Philippines,BFAR,1989). Although there is no official estimate as to the area devoted to milkfish, most brackishwater fishponds were used for milkfish culture, with an estimated yield of 800 kg/ha/yr. Locally known as "bangos", milkfish is one of the best suited species for brackishwater pond culture .

Brackishwater pond culture of milkfish can either be intensive or extensive. Intensive culture refers to a culture system which uses recent techniques, such as scientific pond design, fertilization, feeding, stock manipulation and pest control (Shang, 1976). Extensive culture on the other hand, is a traditional method, relying heavily on natural food bases such as "lablab" (micro-benthic algae), "lumut" (filamentous green algae) and plankton.

Milkfish Production

The average annual growth of milkfish production during the period 1978-88 was 4.46% (Table 3). However, production has shown a declining trend since 1983 at an average rate of 4.67%.

Table 3
Volume and Growth of Milkfish Production
in the Philippines, 1978-88 (in '000 mt)

Year	Volume ('000 mt)	Growth (%)
1978	127.02	-
1979	138.91	9.36
1980	171.94	23.78
1981	236.33	37.45
1982	252.16	6.70
1983	245.26	(2.74)
1984	241.32	(1.61)
1985	195.66	(18.92)
1986	184.91	(5.49)
1987	199.25	7.76
1988	175.94	(11.70)
Average		4.46

Source: Bureau of Fisheries and Aquatic Resources, 1978-88.

The decline in milkfish production may be attributed to rise in demand for prawns in the international market. Milkfish farmers were caught in a dilemma, of whether to polyculture prawns with milkfish or to entirely shift to prawn culture. Due to the export potential of prawns, the area devoted to prawns has been reported to increase, which implies that some milkfish farmers were already shifting to prawn culture.

Statement of the Problem

Several studies conducted on milkfish aquaculture (Librero, 1977; Shang, 1976; Chong and Lizarondo, 1982; Chong et al. 1982; Chong et al. 1984) indicate that milkfish farms were mostly underutilized. Intensification of culture system, or adoption of improved techniques, was largely constrained by biotechnical, economic and institutional factors.

A majority of milkfish farms, even those intensively operated or using supplementary inputs, were producing far below the national average yield of about 800 kg/ha/yr. Even the national average yield is low, considering a yield of over 2,000 kg/ha achieved in experimental stations of the Aquaculture Department of the Southeast Asian Fisheries Development Center (SEAFDEC-AQD). In fact, a yield of 2,000 kg/ha or more is not entirely experimental but has already been obtained by some farmers, especially those located in the provinces of Bulacan, Iloilo and Pangasinan.

The productivity of the Philippine milkfish culture is much lower compared with that of Taiwan, where milkfish farms recently yield over 3,000 kg/ha due to greater use of inputs and good management.

Clearly, a yield gap of over 1,000 kg/ha exists, and the possibility of increasing the current yield by two-fold is not remote. Essentially, the problem is how to attain further increases in milkfish productivity which, could raise profits or minimize costs per unit output to producers.