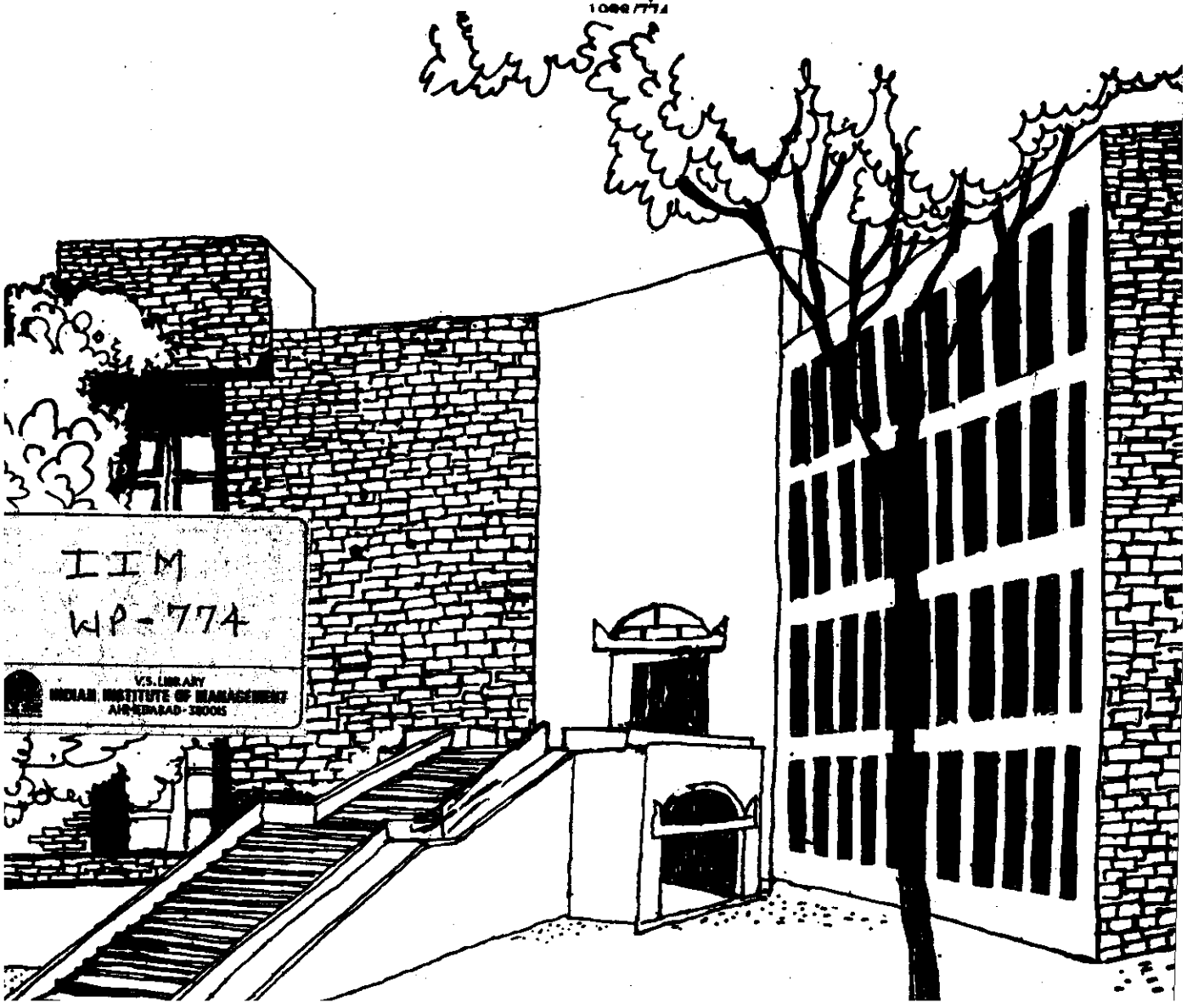
w. p. 774

विद्यातिनियोगाद्विकास:
IIM
AHMEDABAD

Working Paper

WP774
[redacted]
WP
1088/774



AQUACULTURE: MARKETING AND ECONOMICS IN INDIA

By

U.K. Srivastava

WP774
[redacted]
WP
1988/774

W P No. 774
December 1988

The main objective of the working paper series of the IIMA is to help faculty members to test out their research findings at the pre-publication stage.

INDIAN INSTITUTE OF MANAGEMENT
AHMEDABAD-380056
INDIA

PURCHASED
APPROVAL
GRANTS/EXCHANGE
PRICE
ACC. NO,
RAM SARABHAI LIBRARY
M AHMEDABAD.

AQUACULTURE: MARKETING AND ECONOMICS IN INDIA

*U.K. Srivastava**

I. BACKGROUND

The total fish production of the country during 1986-87 was about 2.9 million tonnes, of which 1.2 million tonnes was the contribution of the inland sector. Of the production from the inland sector, aquaculture presently contributes not more than 0.3 million tonnes. Inland fisheries, however, contributed about 57% of the domestic fresh fish supplies [8]. The demand-supply gap of fish in the domestic market estimated at one million tonnes in 1985 [3], is expected to widen considerably by the end of this century, even when the conservative demand estimate is put at 12.5 million tonnes [4,8]. This excess demand will manifest itself in a rapid rise in price of fish, which has already been the trend during the last 30 years. To meet this demand, the inland fish production (mainly through aquaculture) has to increase seven times in the next two decades [10].

Seafood has been one of the major foreign exchange earners for the country. Shrimp has dominated our seafood export industry from the beginning. The global market for shrimp has been on the upswing both in terms of volume and unit price. Shrimp production from the see in India is

*The author would like to express his gratitude to Mr. G. Ramachandran Nair of the Indian Institute of Management, Ahmedabad, for the research help in writing this paper

[Paper presented at the International Symposium on 'Aquaculture ResearchNeeds for the Year 2000' (Co-sponsored by the Far Eastern Regional Reseaarch Office (FEERO), Office of International Cooperation and Development (OICD), U.S. Department of Agriculture (USAD), and the Indian Council of Agricultural Research (ICAR)), to be held at the Maurya Sheraton Hotel, New Delhi on November 15 - 18

stagnant and it has even been declining in some pockets due to over exploitation. To meet the projected export level of Rs. 700 crores by 1990 and Rs. 1200 crores by the year 2000 A.D., development of brackishwater aquaculture is very crucial.

India possess a vast resource potential with favourable climate and environmental conditions for raising fish production through aquaculture. The potential of freshwater ponds and tanks which are more suitable water bodies for aquaculture is estimated to be about 7.53 lakh hectares [8.10]. The country also has about 420 irrigation reservoirs (upto 1000 ha. in area) which can be used for aquaculture. The total brackishwater area available in the country is about 14.06 lakh ha., of which 9 lakh ha. area [8] is estimated to be suitable for aquaculture (Table - 1).

While technology is a necessary condition for scientific aquaculture development, the economics and required profitability is the sufficiency condition for aquaculture development through diffusion and adoption of technology. This paper is designed to examine the present status of aquaculture in India, economics of both freshwater and brackishwater aquaculture, marketing of produce and research needs in the area of economics and marketing of aquaculture production.

II. PRESENT STATUS OF AQUACULTURE IN INDIA

FRESHWATER AQUACULTURE

Out of the avilable potential of 7.53 lakh ha, the exact area of tanks and ponds presently utilized for freshwater aquaculture is not available. However during 1986-87, in 20 of the 22 states, 197 FFDAs brought 1.85 lakh hectares of ponds under farming on scientific line. About 81% of this area is in 5 states - W.Bengal, Madhya Pradesh, Uttar Pradesh, Orissa, and Bihar. The annual average fish productivity which was less than 50 kg/ha. in 1973-74 rose to 1.56 tonnes in 1987-88 [6,7] as against 10 tonnes possible on the basis of technology available with research institutions in India. Under FFDA programme the maximum average annual yield is reported from Haryana (2520 kg./ha.) followed very closely by W.Bengal (2445 kg./ha.) and Punjab (2,250 kg./ha.). The total fish production from ponds and tanks is estimated to be about 3.0 lakh tonnes as against the theoretically expected production of 3.75 million tonnes on the basis of a contribution of 5 tonnes per ha.per year.

Some of the main constraints/problems faced in the freshwater aquaculture development in the country are: (1) Non-availability of quality fish seed of commercial species in adequate quanties at the right time, (2) Absence of uniform leasing policy in different states vesting the right for aquaculture on long term basis to interested fish farmers [13,15]; (3) Absence of cheap and acceptable supplementary feeds; (4) difficulties

in mobilizing of institutional finance\credit by small fish farmers, and (5) low price realisation to the producer due to the present market structure [7].

It will be elaborated and illustrated in the next section that the role of market factor in adoption of technology for semi-intensive and intensive culture is very crucial and it has not received required attention from the policy makers.

BRACKISHWATER AQUACULTURE

Out of total avilable potential of 0.9 million ha. brackishwater area, about 50.40 thousand ha. water area is presently used for culture by traditional and/or extensive method and it is mainly practiced in the bheries of W.Bengal, pokkali fields of Kerala, Gazanis in Karnataka and Khazans in Goa. Some of them were, and others even now, mainly agriculture lands used for growing a variety of paddy which is resistant to brackishwater. During mansoon, when the salinity is low, one crop of paddy is taken and after that the land is leased out to fish-farmers, who, in turn, raise the bunds, provide some make-shift sluices and allow the tide water to enter in along with prawn seed, fish seed and also other predators, and they are retained for a period of 5 to 6 months. They grow along with the natural conditions (in some cases selective stocking and spplementary feeding is also done) and later the surviving prawns and fish are harvested. The production

varies anywhere between 200 to 600 kgs of prawn per hectare per annum depending on the management. A concerted effort was made to develop production technology for semi-intensive and intensive culture under the ICAR scheme of All-India Co- ordinated Research Programme on Brackish-water Farming and the results achieved was not very impressive - a maximum production 515 kg. of penaid prawn in 4 month crops was achieved. Recently, private sector has come into brackishwater prawn farming practising a middle level technology between extensive and semi-intensive farming. A maximum production of 2.6 tonnes/ha./crop in the case of P.indicus and 1.4 tonnes/ha./crop in the case of P. monodon has been achieved in Andhra Pradesh [16]. The reported highest production with P.monodon is 6.2 tonnes/ha./crop at Sandesh Kali, Rampur in W. Bengal, under semi-intensive farming with high technical inputs and good management. These results shows that given the right inputs and management [1,2], it should be possible to achieve an average annual production of 5-10 tonnes/ha.

The total present production of these watebodies is estimated to be in the order of 17,000 tonnes of prawns [2] as against the theoretically expected production of 4.5 million tonnes, even when a conservative estimate of annual productvity of 5 tonnes is taken into account. If we take the productivity at 10 tonnes, the available water bodies can yield 9 million tonnes annually.

III. MARKETING CHANNELS, USEFLOWS, PHYSICAL FLOWS AND FARMER'S SHARE IN CONSUMER RUPEE

The marketing systems for fish and prawn are explained in terms of a) useflows; b) physical flows; c) channel flows; and d) farmer's share in consumer rupee [4].

FRESHWATER AQUACULTURE

Useflows : The production from freshwater aquaculture is largely consumed in fresh form. A negligible quantity is dried by traditional method and used fof non-edible purpose.

Physical Flows : Of the production from aquaculture, about 78 % of the production is consumed in rural areas and the remaining 22% is consumed in urban centres. The flow of rural local consumption observed was very high at about 72%. Only 2% of the production moved more than 100 Km from production centres and the remaining 26% moved upt 100 Km. Ice is used to preserve the freshness of fish. Very rarely the facilities of cold storage are used. Bamboo basket is widely used as packing material for transporting fish. It has been observed that 40 to 50 per cent of the fish brought into fresh fish market are in various stage of spoilage due to poor handling.

Channel Flows : There are 12 market intermediaries that have operate. Fish flows take place through various combinations of these intermediaries.

Market Intermediaries

Intermediaries	Notations
Preharvest contractor	PHC
Contractor-cum-Wholesaler- cum- Retailer	CO+W+R
Cooperative Society	CS
Commission Agent	CA O
utstation Commission Agent	OCA
Commission Agent-cum-Wholesaler	CA+W
Wholesaler	W
Wholesaler-cum-retailer	W+R
Worker-cum-Retailer	Wk+R
Worker-cum-Vendor	Wk+V
Retailer	R
Vendor	V

The following chart gives the pattern of flow of fish through different intermediaries.

Identification	Channels	Market share (%)
I	F-R-C	6.65
II	F-V-C	2.50
III	F-(Wk+R)-C	6.72
IV	F-(Wk+V)-C	1.00
V	F-W-R-C	10.90
VI	F-W-V-C	4.05
VII	F-CA-R-C	30.25
VIII	R-CA-V-C	2.75
IX	F-PHC-R-C	1.35
X	F-PHC-V-C	0.24
XI	F-(W+R)-C	1.46
XII	F-W-OCA	8.50
XIII	F-(W+CA)-OCA	4.53
XIV	F-(CO+W+R)-C	1.30
XV	F-CS-R-C	0.80
XVI	Others	17.00

Source: U.K. Srivastava et. al. , [8,10]

Note: F and C stand for fishermen and consumer respectively

It is observed that not all the channels were operative in all the districts and that some were more popular than others in the country as a whole. For

example channels V and VII are more popular than other channels.

The quantity of fish handled by each channel differed both at the national level as well as well at the state or district level. Channel-VII handled 30.25 % of the total production in an average district followed by channel-V (10.90%), channel-XII (8.50%) and so on , the last place being taken by channel-X whose contribution was a mere 0.24%. Thus, of the 12 market intermediaries, the retailer was the most prominent; the other significant intermediaries were the wholesaler, commission agent and vendor. The least important intermediaries happened to be pre-harvest contractor, wholesaler-cum-retailer, contractor-cum- wholesaler and cooperative society.

Sale through cooperatives\corporations was very limited. Even in this channel flow (included in Channel XVI), where fish farmer sold to cooperatives directly, private intermediaries were also involved like other cases. In such cases cooperatives became one more additional intermediary in the marketing channel flow.

Fish Farmer's Share in Consumer Rupee : The farmer's share of the consumer rupee varied between 66.1 per cnet to 79.3 per cent for one member channel in direct sale through retailers. The average share of farmer in more than one member channel was 61.3 per cent, with the lowest at 36.5 per cent and highest at 69.6 per cent. It was noticed that there is a positive

gap between the consumer prices and the one which the farmer receives. In the case of aquaculture in ponds and tanks, the farmer's share in consumer rupee is high but the consumer price of fish is very low. (for example, Rs. 10 to 12 as against Rs. 40 in Howrah market, Calcutta). In any case, the farmers average actual price realisation always remains less than Rs.8\-.

BRACKISHWATER

Useflows : Useflows varies across system and culture practices. It is estimated that, of the total production from brackishwater farms, 57% went for exports, 38 % went for domestic market as fresh form and the remaining 4% was dried for edible purpose.

Physical Flows

VIKRAM SARABHAI LIBRARY
INDIAN INSTITUTE OF MANAGEMENT
VASTRAPUR, AHMEDABAD-380056

Exportables : There were marked difference in physical flows across the state. Long distance flows were a feature in Karnataka. Almost 80 % of production from W. Bengal and 75 % of production from Kerala moved to processing units located at less than 100 Km.

Short distance flow within 50 km accounted for 31%, about 44% moved between 51 and 100 kms and the balance 25% moved beyond 100 kms.

Domestic Fresh Fish : The domestic fresh fish did not move long distances. About 12% was consumed by producer and their labourers and

37% was sold around the producing centres itself. Less than 2% moved beyond 100 km.

Channel Flows

Exportables : The exportables, mainly prawns, passed from nil to four hands. Fig-1 explains the channel flow of exportables.

In exportables, the maximum number of channel members is three. The farmers sold 17% directly to processing units, 42% through commission agents (sale-cum-actioners), 18% directly to wholesalers, and another 12% to peeling shed owners who worked as wholesalers. The commission agent (purchase) bought about 8% of the production on behalf of the wholesalers and peeling shed owners. The processor also bought 10 % through auction. There were, however marked variations from state to state.

Of the total production, about 42% of production was sold in auction, 17% directly to processor on fixed prices, and the remaining 41% to wholesalers and peeling shed owners through bilateral bargaining.

Peeling and beheading of prawns before processing increases its shelf life. The job of semi-processing (peeling and\or beheading) was undertaken at various levels. Data given below provides the estimate of the share of the job done by the different members in channel flow.

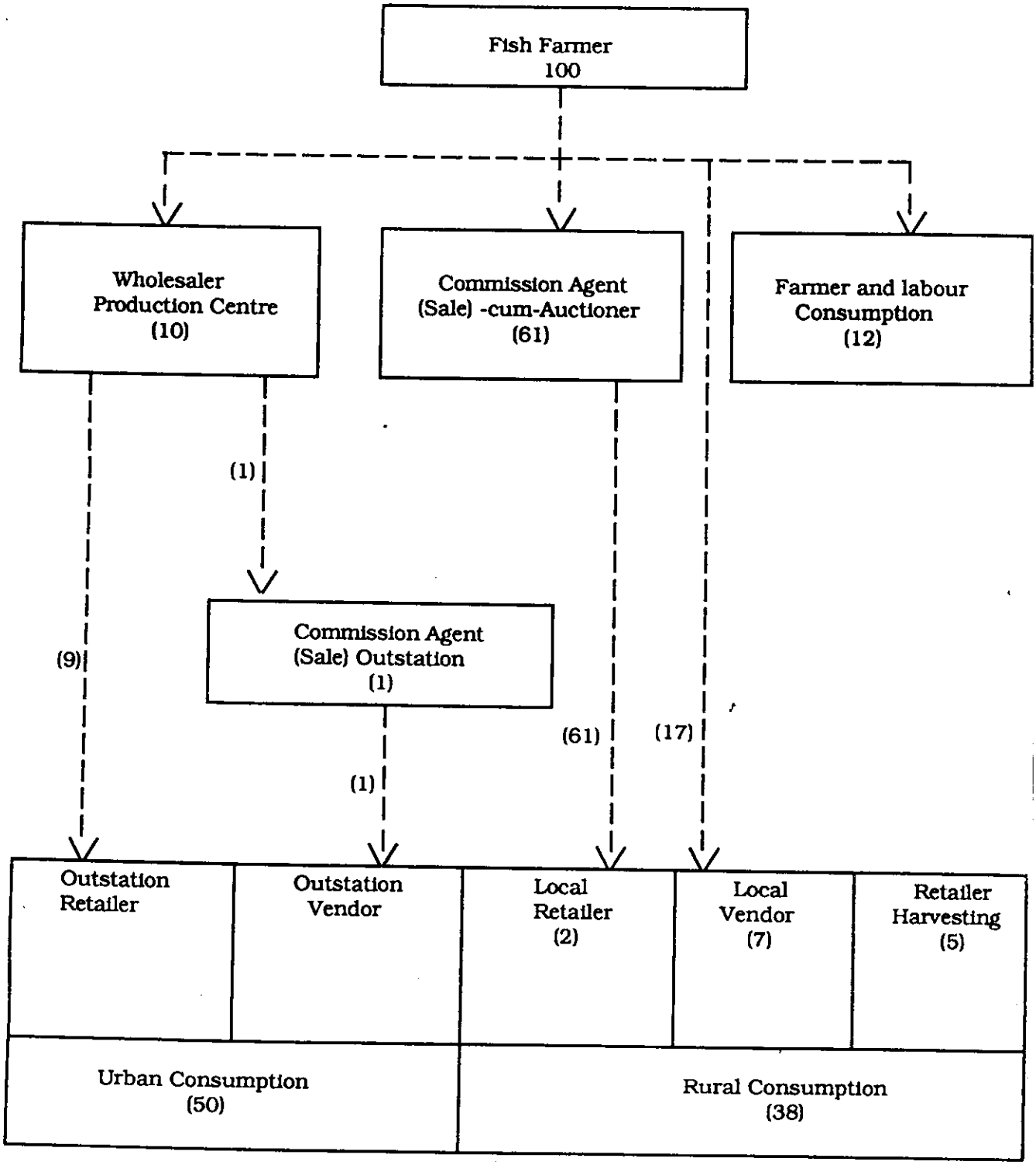


Figure 1 : Marketing Channels in Fresh Domestic Fish in India (1980-81)

Note 1. Figures are in M.T.

2. Figures in the parentheses represent percentage to total

Intermediaries	Share(%)
Farmers	25
Wholesalers	34
Peeling shed ownerss	20
Processor	17
Commission Agents	4

Source: U.K. Srivastava, **et. al.** , [8,10]

Note: * 3% of this is processed by the farmers who also perform the funcation of wholesalers

Fish for Deomestic Market : Domestic fresh fish passed through one to three hand before it reached the final consumers (Fig-2). Commission agent is the prominent intermediary in the domestic fresh fish channnel handling about 61% of the market share. The transaction took place mainly in W. Bengal which produced major part of the domestic supply. The direct sale by farmers to retailers and vendors was 17% and to the wholesalers it was 10 %.

IV. ECONOMICS OF AQUACULTURE

The economics of aquaculture depends on production levels, cost of inputs and price realization.

ECONOMICS OF FRESHWATER AQUACULTURE

The economics of one ha. model farm has been worked out based on the existing data and using different assumptions with respct to technology adoption and price realization

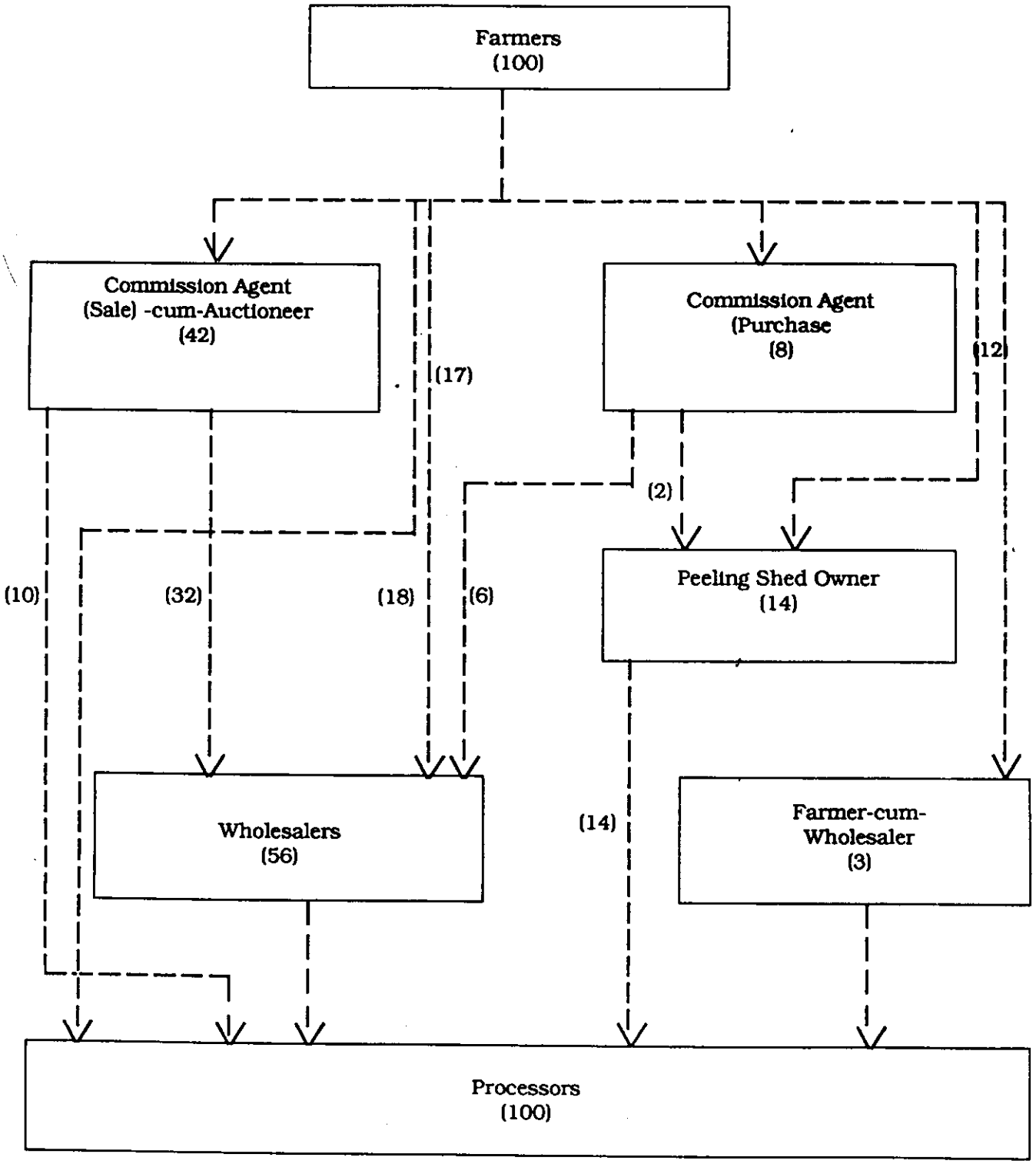


Figure 1 : Marketing Channels in Exportable Varieties in India (1980-81)

Note 1. Figures are in M.T.

2. Figures in the parentheses represent percentage to total

[5,8]. It was observed that the rate of supplementary feed applied in the fish farms at present is very low and the productvity can be doubled or even trebled applying more feed and fertilizer with better farm management. Also the average price realisation by the farmers is very low (Rs.9/-per kg. at best). The consumer price in major terminal market at Howarh (Calcutta) is more than Rs. 40/- per kg. Taking these factors into account economics of one ha. pond for three different conditions is stimulated (Table-2 and 2A) and analysed below:

1. Under present condition the yield per ha. is worked out at 2000 kg and the fish farmers realisation is Rs. 9/- per kg. The operating cost incurred by the farmers worked out to be Rs. 6275 and the farmer's net income is Rs. 11,725/-.

2. Assuming that when application of fertilizer and feed doubles with better management, the farm yield can double. With better size of fish harvested and through better marketing strategy it would be possible to double the price realisation to Rs. 18\- per kg. In this situation the farmer can have a net benefit of Rs. 60,530.

3. The assumptions made to stimulate the third condition is when the application of feed input is again doubled, the farm will produce fish to the tune of 5000 kg per ha. Assuming in a better market condition the fish can fetch a price of Rs.25\- per kg., the farmer will have a gross

income of Rs. 125000. After deducting the operating cost of Rs. 20580, the one hectare pond can generate a net earning of Rs. 104420.

ECONOMICS OF BRACKISHWATER AQUACULTURE

The capital investment for construction of prawn farm is very high and it is very difficult for a farmer to undertake pond construction on his own. There are also indivisibility in major capital cost items providing common facilities. So, it is proposed that the ponds are constructed in a cluster of 50 and 100 ha. This land is to be developed by a government agency called Brackishwater Fish Farmers' Development Agency (BFDA) and leased out to the fishfarmers. If we assume a lease amount of Rs. 9000 per ha., the BFDA will be able to service the loan and incur the maintainance and repair costs also. Also the BFDA will assist the farmers in supplying inputs, repairing of ponds, and marketing the farm produce, besides providing extension and technical guidance to lesseses. A model economics of BFDA from the operation of a cluster of 100 ha pond is given below [11,12].

Particulars	Rs.	
Capital Cost	Rs. 60 lakhs for 100 ha pond area —	
Gross Income		
Lease	9,00,000	
Commission from sale of seed and feed	6,00,000	
Total		9,60,000
Operating Cost		
Wages and Salaries	1,32,000	
Repaiar and maintenance	71,000	
Miscellanous	24,000	
Total		2,27,000
Net Benefit per Year	**7,33,000**	

Source: U.K. Srivastava, **et. al.** ,[12]

The capital cost for construction of a model cluster of 100 ha pond is estimated to be about Rs. 60 lakhs. The net income created by the BFDA is enough to pay the interest for the capital investment and recover the investment made.

Economics of Fish Farmers

The economics of one ha model farm given on lease to a fish farmer's family has been worked out from the fish farmer's point of view for pond under **P. indicus** and **P. monodon** separately and stimulated for three different conditions. Unlike freshwater aquaculture, technology is the major

constraint in brackishwater aquaculture and price realisation to the farmers is not at all a constraint because all the produce from brackishwater ponds are exportable. Table - 3 and 3A gives the economics of fish farmer from one ha pond stimulated under three different conditions as follows:-

1. In all three cases the selling price of prawn is constant Rs. 45/- for P. indicus and Rs. 50/- for **P. monodon**

2. In the first case the annual productivity of brackishwater pond is estimated to be 2000 Kg.\yr. (a very conservative figure). In the second case when the aplication of feed is doubled with better farm managemnt, the yield also doubles i.e. 4000 Kg. Again it is assumed that when the application of feed trebles with best farm management, the productivity goes to two and half times (i.e. 5000 Kg\year).

3. In the first case the farmer's annual net income is Rs.47960 for pond under **P. monodon** and Rs.31250 for ponds under **P.indicus.** In the second case the farmer's annual net income has considerably increases with a net earning of Rs. 1,15,432 for ponds under **P.monodon** and Rs. 83,700 for ponds under **P. indicus** . In the third case the increase of farmers annual net earnings is small, ie., Rs. 1,32,005 for pond under **P.monodon** and Rs. 90,250 for pond under **P. indicus.**

V. RESEARCH NEEDS IN THE AREA OF ECONOMICS AND MARKETING OF AQUACULTURE

Marketing is the most essential and important link in the success of the aquaculture, but is the most neglected activity today. Renumerative price for the producer and reasonable price for the consumer can be assured only by strengthening the fish marketing structure. Price realisation to the fish farmer in domestic fresh fish is very low (maximum of Rs. 9/-) mainly because most fish ponds are located far from the major consumer centres and the farmers were exploited by the traders. Fish farmers are under pressure to sell their produce at the pond site itself at whatever price they could realize because of lack of proper transport and other marketing infrastrcture. Very little effort has been done by the Fisheries Cooperatives and Corporations in this area. Even in case of cooperatives' intervention not much improvement has been made. For example, the Gujarat Fisheries Central Cooperative's experience in reservoir fish marketing could give a maximum of Rs.8\- per kg. to their primary members during 1986-87.

In order to strengthen the information base for generating policy alternatives in the area of economics and marketing of aquaculture produce, following aspects require research support:

i) The data base for plannning, implementation, monitoring and control of aquarculture development projects needs to be substantially

strengthened. In this context, a serious lack of following data may be mentioned:

a) There is no time series data on cost of fish and prawn farming, (both in case of freshwater and also in case of brackishwater), prices realized and net income earned by farmers at various diverse locations (typologies)in the country. In case of agriculture, the Ministry of Agriculture is now collecting the cost of production data from 9000 farmers across the country on time series basis. For aquaculture, data on production, cost and returns are only availavble on an ad hoc basis from some regions and these are also not always comparable.

b) Time series and cross section data on use flows, channel flows, price spread and marketing margins realized by the channel memebers. Once again these data are available only on an ad hoc basis.

ii) There is a need for research on the problems of financial institutions in funding, post-disbursement follow-up and recovery of loan for aquaculture development projects, both for freshwater as well as brackishwater

iii) Research support is needed for strengthening of cooperative structure and institutions involved in marketing of aquaculture produce. Particularly, there is need for research on the conditions for promoting vertical integration of cooperatives from primary production centres to transit and terminal markets.

iv) Research efforts are required to suggest means for regulation of market intermediaries and management of transit and terminal markets.

v) Rsearch efforts are needed to nderstand the problems of building retail fish marketing systems in metropolitan and urban centres.

vi) Problems in packaging and transport along with cost structure of alternatives need to be analysed.

vii) Evaluation of the experience of Fish Farmers' Development Agencies (FFDAs) and Brackishwater Fish Farmers' Development Agencies (BFDAs) in the different parts of the country in promoting aquaculture should be undertaken so that the programmes may be further strengthened.

TABLE 1

STATEWISE DISTRIBUTION OF ESTIMATED BRACKISHWATER AREA, AREA UNDER CULTURE AND AREA IDENTIFIED SUITABLE FOR DEVELOPMENT

(Area in thousand Ha.)

STATE	Estimated total brackishwater area	Area currently under culture	Area so far identified suitable for culture	Estimated potential area suitable for culture
WEST BENGAL	405	33	25	210
ORISSA	8	2.6	32	8
ANDHRA PRADESH	150	1.6	17	123
TAMIL NADU	80	0.1	15	72
KERALA	242	8.0	17	142
KARNATAKA	95	1.8	NA	85
MAHARASHTRA	80	1.8	14	70
GUJARAT	376	1.0	2	187
GOA & PONDICHERRY	20	0.5	NA	5
Total	1456	50.4	122	902

Source: U.K. Srivastava, et. al. [11 ,12]

TABLE 2

MODEL ECONOMICS ONE HA. FRESHWATER POND

(Figures in Rupees)

	Gross Benefitss	Operating Cost	Net Benefits
I	18000	6275	11725
II	72000	11470	60530
III	125000	20580	104420

TABLE 2A

BREAK-UP OF OPERATING COST

PARTICULARS	COST ESTIMATE I Rs.	II Rs.	III Rs.
Seed	1250	1250	1250
Organic Manures	250	500	1000
Feed	1600	3200	6400
Fertilizer	1125	2250	4500
lease charge	250	250	250
Interest on wkg. cpaital	240	360	480
Marketing cost	360	2160	5000
Labour charges	1200	1500	1700
Total	6275	11470	20580

Source: Data compiled from various research studies [5,8]

TABLE 3

MODEL ECONOMICS OF ONE HA. BRACKISHWATER POND FROM FARMER'S POINT OF VIEW

(Figures in Rupees)

	Pond under P.monodon			Pond under P. indicus		
	Gross Benefits	Operating Cost	Net Benefit	Gross Benefits	Operating Cost	Net Benefit
I	100000	52040	47960	90000	58750	31250
II	200000	84568	115432	180000	96300	83700
III	250000	117995	132005	225000	134750	90250

TABLE 3A

BREAK-UP OF OPERATING COST

(Figures in Rupees)

	POND UNDER P.MONODON			POND UNDER P. INDICUS		
PARTICULARS	I	II	III	I	II	III
Preparation of pond	1000	1000	1000	1000	1000	1000
cost of seed	4500	4500	4500	6000	6000	6000
cost of Fert. & Pest.	1200	2400	3600	1300	2600	3900
cost of feed	24375	48750	73125	29250	58500	87750
Energy cost	2700	4050	5400	2700	4050	5400
Harvesting & Marketing	900	1800	3600	900	1800	3600
Insurance	1640	3280	4920	1500	3000	4500
Repair and maintenance	600	600	600	600	600	600
Lease Charge	9000	9000	9000	9000	9000	9000
Interst on Working Capital	2125	3188	4250	2500	3750	5000
Labour Charges	4000	6000	8000	4000	6000	8000
Total	52040	84568	117995	58750	96300	134750

Source: Based on the revisions incorporated the data used in Brackishwater Aquaculture Development Project, IIMA. [11,12]

REFERENCES

1. Alagarswami, K., Status of and Strategy for Brackishwater Aquaculture Development in India, paper presented in the National Workshop on Inland Fisheries Development and Future Strategy, held at Lucknow on Sept. 22-24, 1988.

2. Bhakta, N.P., Status and Constraints of Brackishwater Farming in India, paper presented in the National Workshop on Inland Fisheries Development and Future Strategy, held at Lucknow on Sept. 22-24, 1988.

3. Gupta, V.K., et.al. , Marine Fish Marketing in Inida (Vol. 1- 6), Indian Institute of Management, Ahmedabad, 1984.

4. Kulkarni, G.R., and Srivastava, U.K. (Eds), A System Framework of Marine Foods Industry in India, Concept Publishin Co., New Delhi, 1985.

5. Narayanan, K.R., et. al. , Freshwater Fish Culture Development Project for Kheda District, Gujarat, Report submitted to Indian Institute of Management, Ahmedabad as a part of the course work on Designing Projects for Agriculture Development, Nov 17, 1985 - Jan. 18, 1986.

6. Sampath, V., and Haridas, C., Freshwater Aquaculture in India- Present Status and Prospects: An Overview, paper presented in the National Workshop on Inland Fisheries Development and Future Strategy, held at Lucknow on Sept. 22-24, 1988.

7. Sarma, B.C., Key Note Address delivered to the National Workshop on Inland Fisheries Development and Future Strategy, held at Lucknow on Sept. 22-24, 1988.

8. Srivastava, U.K., et. al. , Inland Fish Marketing in India (Vol. 1-8), Concept Publishing Co., New Delhi, 1984.

9. Srivastava, U.K., and Dharma Reddy, M. (Eds.), Fisheries Development in India, Concept Publishing Co., New Delhi, 1983.

10. Srivastava, U.K., and Vathsala, S. (Eds.), Strategy for Development of Inland Fisheries Resources in India, Concept publishing Co., New Delhi, 1984.

11. Srivastava, U.K., Dholakia, B.H., and Vathsala, S. (Eds.) Brackish water Aquaculture Development in India: Status and Task Ahead, Concept Publishing Co, New Delhi, 1987.

12. Srivastava, U.K., Dholakia, B.H., and Vathsala, S., Brackishwater Aquaculture Development Project (Part 1-3), (mimeographed), Indian Institute of Management, Ahmedabad, 1985-86.

13. Srivastava, U.K., Marine and Inland Fishery Sectors in India: Issues Arising out of Privatization of Common Property Resources for Accelerating Production, W.P. No.742, Indian Institute of Management, Ahmemdabad, 1988.

14. U.K. Srivastava, Marketing of Freshwater Fishes in India, Indian Journal of Agriculture Marketing, I(2), 1987.

15. Srivastava, U.K., Considerations in Evolving a Comprehensive Leasing Policy for Inland Waterbodies for Fish Production, W.P. No.694, Indian Institute of Management, Sept. 1987.

16. Venkatewan, V., and Anis, S., Success of Brackishwater Prawn Farming in Andhra Pradesh and its Applicability in Tamil Nadu, Proceedings of the Seminar on Shrimp Farming in Tamil Nadu, Madras, Aug. 31, 1988.

PURCHASED
APPROVAL
GRATIS/EXCHANGE
PRICE
ACC. NO,
VIKRAM SARABHAI LIBRARY
I M AHMEDABAD