

Cost and earning analysis of ice plant of fishery industry of ratnagiri

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Abstract

This paper attempts to explore the cost and earning analysis of ice plant of fishery industry of Ratnagiri. Cost and earning analysis of any business gives an idea about the economic feasibility. Considering vast differences in the production capacities of ice plants, costs and earning analysis was performed separately for the two categories of ice plants, first with less than 50 tonne and second with more than 50 tonne capacity. The net profit earned by less than 50 tonne capacity ice plant was much more less than that of more than 50 tonne capacity. All the economic indicators estimated clearly showed that the more than 50 tonne capacity ice plants were more profitable than that of less than 50 tonne capacity ice plants.

Introduction

Fish is highly perishable food commodity; its spoilage begins as soon as the fish is dead after catching. Various biochemical and microbiological changes (Gopakumar, 2002) take place in fish after death, due to which it become inedible. Biochemical and microbiological process can be reduced by lowering the temperature of fish. Ice is an effective and ideal cooling medium commonly used for lowering the temperature, which absorbs heat from fish and prevents spoilage. Fish is to be marketed at lower temperature in cold chain from the time of harvest till it is consumed. India being a developing country, cold chains are not well established and ice is commonly used as a cheapest source for preservation of fish while marketing.

Fishing voyages at present are of several days duration and the use of ice on-board fishing vessels is a common practice to keep the fish in good condition till it is landed. Similarly, use of ice has

become a common practice in the marketing of fish to get better price. Usage of quantity of ice for preservation of fish depends on quantity and quality of fish to be marketed. Requirement of ice for on-board fish preservation varies according to type of fishing operation. Quantity of ice required in the fishing industry varies season-wise as quantity and kind of fish landed varies from season to season. Ice plants were established in Ratnagiri since the inception of mechanized fishing. Mechanized fishing during those periods was shrimp targeted, as the shrimp was the major commodity of export during that period.

Marine fishing industry in Maharashtra has witnessed rapid development due to intensive mechanization program, which have led to the rise in seafood production. Maharashtra has five maritime districts namely Mumbai, Thane, Raigad, Ratnagiri and Sindhudurg. Ratnagiri district is one of the major fish contributors having 167 km of coastline. Mirkarwada is one of the important minor fishing harbors situated in Ratnagiri city, the head

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quarters of Ratnagiri district. In addition to Mirkarwada fishing harbor, there are 18 fish landing centers in Ratnagiri block. There are 344 trawlers, 161 purse-seiners and 570 gill-netters (Anon, 2008) operated along the coast of Ratnagiri block. Marine fish landed in Ratnagiri block is either processed for export or sold in fresh condition in local markets through various marketing personnel. There are total 18 numbers of ice plants situated in Ratnagiri city and one ice plant situated in Jaigad village. These ice plants are fulfilling the present requirement of ice of the fishing industry of the Ratnagiri block. As per the vast requirement of ice in fishery industry, it is necessary to carry out economic feasibility of various production capacity of ice plant. Earlier, Indian Institute of Management, Ahmedabad studied state-wise economics of various capacity of ice plant (Gupta *et al.*, 1984). However, the economic feasibility of various production capacities of ice plants of fishery industry of Ratnagiri is unknown. Considering the importance of ice plants in fishery industry of Ratnagiri, the present study was undertaken to understand the cost and earning analysis of various production capacity of ice plants in Ratnagiri block.

Materials and Methods

The study was carried out in the year 2007-08 in Ratnagiri block. The study was employed along the 67 km stretch of Ratnagiri block extended from 17°18'50.89" N and 73°11'15.90" E to 16°45'37.70" N and 73°18'20.00" E (Fig.1). There were the vast differences in the production capacities of ice plants, costs and earning analysis was performed separately for the two categories of ice plants, first with less than 50 tonne and second with more than 50 tonne capacity, which were operating in Ratnagiri block. The averages of different economic factors of these ice plants were estimated separately. Interview schedules were constructed for collection of required information about different economic factors of ice plant were formulated (McGoodwin, 2001).

Data related all economic parameters of ice plants were collected from all the 19 ice plants functioning in Ratnagiri block. Expenditure on land, construction of building, electrification, machinery, fabrication of block ice cans, plumbing and furniture were included in capital cost, whereas the expenses on electricity, machinery maintenance, salary, office expenses and water charges were the major components of variable cost. Capital costs and variable costs for less than and more than 50 tonne capacity ice plants were calculated separately for each component by averaging cost incurred by sampled units (Dewey,

1975). The fixed cost per annum was calculated by adding the interest on capital cost and variable cost, depreciation on capital cost and insurance (Dewey, 1975). Monthly revenue was raised by multiplying the total monthly ice production with the average sale price for the respective month. Total revenue was estimated by summing the revenue of each month. The annual net profit for both categories of ice plant was obtained separately by subtracting the total expenditure from the revenue in a year.

Capital turnover ratio, rate of return to capital, gross ratio, variable cost ratio, fixed cost ratio (Salim and Biradar, 2001) and pay back period (Bensam, 1999) were some of the key economic indicators estimated separately for both the categories of ice plants on the basis of costs and earning analysis of ice plants operating in Ratnagiri block.

Results and Discussion

The ice plants operating in Ratnagiri block were mostly established during the period from 1972 to 2008. Considering the vast differences in the production capacities of ice plants, costs and earning analysis was performed separately for the two categories of ice plants, first with less than 50 tonne and second with more than 50 tonne capacity (Table 1 and 2). The total capital cost of less than and more than 50 tonne capacity ice plant was Rs. 34,02,841/- and Rs. 59,01,456/- respectively. The major share of capital investment was construction cost, followed by machinery cost, block ice cans etc (Fig. 1 and 3). The variable cost was Rs. 17,70,075/- and Rs. 31,40,500/- for less than and more than 50 tonne capacity ice plant respectively whereas, the project cost of respective plants were Rs. 51,72,916/- and Rs. 90,41,956/-. The major expenditure among the variable costs was on electricity charges, salaries and water charges etc (Fig. 2 and 4). Similar observation about the variable costs was also reported by Gupta *et al.* (1984) for 18 tonne capacity ice plants in Maharashtra. The annual revenue of less than and more than 50 tonne capacity ice plants was Rs. 34,52,400/- and Rs. 86,31,000/- respectively whereas, the net profit calculated for respective ice plants were Rs. 7,15,091/- and Rs. 38,04,519/-. Gupta *et al.* (1984) have also reported the costs and earning analysis of 18 tonne capacity ice plant. The most of the costs, revenue and net profits reported by them were much more less than the values estimated for the respective factors during the present study. These differences are observed due to the escalation of prices, as both the studies are carried out in different periods.

Capital turn over ratio was estimated at 1.01 and 1.46 for less than and more than 50 tonne capacity ice plant respectively (Table 3). It has indicated that a rupee earned per rupee invested was more in second

category ice plant than first category ice plant. The gross ratio, variable cost ratio and fixed cost ratios were estimated at 0.79, 0.51 and 0.28 respectively for less than 50 tonne capacity ice plant and for more

Table 1: Costs and earning analysis for ice plant of less than 50 tonne capacity in Ratnagiri Block

A. Capital cost		
Particulars	Quantity	Amount
1. Land cost	10 are @ Rs. 18,000/- per are	Rs. 1,80,000.00
2. Construction Cost	a. Construction cost 223 sq. m. building @ Rs. 3,768/- per sq. m	Rs. 8,40,264.00
	b. Brine tank, 40 sq. m. @ Rs. 3,768/- per sq. m.	Rs. 1,50,720.00
	c. Overhead tank (25,000 lit)	Rs. 1,50,000.00
	d. Water storage tank (40,000 lit)	Rs. 1,50,000.00
3. Machinery cost	a. Compressor (KC3) 2 numbers @ Rs. 2,50,000/- each	Rs. 5,00,000.00
	b. Condenser	Rs. 1,50,000.00
	c. Receiver	Rs. 27,000.00
	d. Electric host (crane) with 1 hp pump	Rs. 50,000.00
	e. Ice crusher 2 numbers @ Rs. 25,000/- each	Rs. 50,000.00
	f. Agitator	Rs. 10,000.00
	g. Compressor motor 2 numbers @ Rs. 1,00,000 each	Rs. 2,00,000.00
	h. Valves	Rs. 15,000.00
	i. Oil separator	Rs. 5,000.00
4. Plumbing		Rs. 70,000.00
5. Block ice cans	360 numbers @ Rs. 1,500/- per one can	Rs. 5,40,000.00
6. Furniture cost	a. Table and chairs	Rs. 10,000.00
	b. Cupboard 2 numbers @ Rs. 6,000/-	Rs. 12,000.00
7. Electrification		Rs. 2,92,857.00
Total Capital cost		Rs 34,02,841.00
B. Variable cost		
1. Salary	a. Labors (4 numbers): @ Rs. 3,500/- per labour for 12 months	Rs. 1,68,000.00
	b. Operators (3 numbers): @ Rs. 4,000/- per operator for 12 months	Rs. 1,44,000.00
	c. Watchman (2 numbers): @ Rs. 2,000/- per watchman for 12 months	Rs. 48,000.00
2. Electricity charges	for 24,500 units/month @ Rs. 5/- per unit (9 month)	Rs. 11,02,500.00
3. Water charges	9,450 tonne water @ Rs. 13.5/- per tonne	Rs. 1,27,575.00
4. Maintenance charges of machinery		Rs. 1,00,000.00
5. Maintenance charges of building		Rs. 50,000.00
6. Office expenses		Rs. 30,000.00
Total variable cost		Rs. 17,70,075.00
C. Total Project cost (A+B)		Rs. 51,72,916.00
D. Total loan amount at 80 per cent of the total project cost		Rs. 41,38,333.00
E. Fixed cost	a. Interest on total loan amount @ 15%	Rs. 6,20,750.00
	b. Depreciation on Capital cost @ 10%	Rs. 3,40,284.00
	c. Insurance on total assets (for one year)	Rs. 6,200.00
Total Fixed cost		Rs. 9,67,234.00
F. Total cost (B+E)		Rs. 27,37,309.00
G. Revenue		Rs. 34,52,400.00
H. Profit/Loss (G-F)		Rs. 7,15,091.00
I. Profit		Rs. 7,15,091.00

Table 2: Costs and earning analysis for ice plant of more than 50 tonne capacity in Ratnagiri Block**A. Capital cost**

Particulars	Quantity	Amount
1. Land cost	20 are @ Rs. 18,000/- per are	Rs. 3,60,000.00
2. Construction Cost	a. Construction cost 372 sq. m. building @ Rs. 3,768/- per sq. m	Rs. 14,01,696.00
	b. Brine tank, 70 sq. m. @ Rs. 3,768/- per sq. m.	Rs. 2,63,760.00
	c. Overhead tank (60,000 lit)	Rs. 2,50,000.00
	d. Water storage tank (1 lakh lit)	Rs. 3,00,000.00
3. Machinery cost	a. Compressor (KC3) 1 number @ Rs. 2,50,000/-	Rs. 2,50,000.00
	(KC4) 1 number @ Rs. 5,00,000/-	Rs. 5,00,000.00
	b. Condenser	Rs. 2,50,000.00
	c. Receiver	Rs. 54,000.00
	d. Electric host (crane) with 1 hp pump	Rs. 1,00,000.00
	e. Ice crusher 2 numbers @ Rs. 25,000/- each	Rs. 75,000.00
	f. Agitator	Rs. 10,000.00
	g. Compressor motor 2 numbers @ Rs. 1,00,000 each	Rs. 3,00,000.00
	h. Valves	Rs. 25,000.00
	i. Oil separator	Rs. 7,500.00
4. Plumbing		Rs. 1,57,500.00
5. Block ice cans	500 numbers @ Rs. 2,500/- per one can	Rs. 12,50,000.00
6. Furniture cost	a. Table and chairs	Rs. 10,000.00
	b. Cupboard 2 numbers @ Rs. 6,000/-	Rs. 12,000.00
7. Electrification		Rs. 3,25,000.00
Total Capital cost		Rs. 59,01,456.00
B. Variable cost		
1. Salary	a. Labors (7 numbers): @ Rs. 3,500/- per labour for 12 months	Rs. 2,94,000.00
	b. Operators (4 numbers): @ Rs. 4,000/- per operator for 12 months	Rs. 1,92,000.00
	c. Watchman (3 numbers): @ Rs. 2,000/- per watchman for 12 months	Rs. 72,000.00
2. Electricity charges	for 42,500 units/month @ Rs. 5/- per unit (9 month)	Rs. 19,12,500.00
3. Water charges	20,000 tonne water @ Rs. 13.5/- per tonne	Rs. 2,70,000.00
4. Maintenance charges of machinery		Rs. 2,00,000.00
5. Maintenance charges of building		Rs. 1,50,000.00
6. Office expenses		Rs. 50,000.00
Total variable cost		Rs. 31,40,500.00
C. Total Project cost (A+B)		Rs. 90,41,956.00
D. Total loan amount at 80 per cent of the total project cost		Rs. 72,33,565.00
E. Fixed cost	a. Interest on total loan amount @ 15%	Rs. 10,85,035.00
	b. Depreciation on Capital cost @ 10%	Rs. 5,90,146.00
	c. Insurance on total assets (for one year)	Rs. 10,800.00
Total Fixed cost		Rs. 16,85,981.00
F. Total cost (B+E)		Rs. 48,26,481.00
G. Revenue		Rs. 86,31,000.00
H. Profit/Loss (G-F)		Rs. 38,04,519.00
I. Profit		Rs. 38,04,519.00

Table 3: Economic indicators for less than and more than 50 tonne capacity ice plants

Particulars		<50 tonne	>50 tonne
Aggregate measure			
1	Total cost (Rs.)	Rs. 27,37,309.00	Rs. 48,26,481.00
2	Total capital cost (Rs.)	Rs. 34,02,841.00	Rs. 59,01,456.00
3	Total variable cost (Rs.)	Rs. 17,70,075.00	Rs. 31,40,500.00
4	Fixed cost (Rs.)	Rs. 9,67,234.00	Rs. 16,85,981.00
5	Income over variable cost (Rs.)	Rs. 16,82,325.00	Rs. 54,90,500.00
6	Annual ice production (tonne)	4,932	12,330
7	Annual revenue (Rs.)	Rs. 34,52,400.00	Rs. 86,31,000.00
8	Total number of production days	274	274
9	Net annual profit (Rs.)	Rs. 7,15,091.00	Rs. 38,04,519.00
10	Cost of electrification (Rs.)	Rs. 2,92,857.00	Rs. 3,25,000.00
11	Construction cost (Rs.)	Rs. 12,90,984.00	Rs. 22,15,456.00
12	Machinery cost (Rs.)	Rs. 10,77,000.00	Rs. 17,29,000.00
Efficiency ratio			
1	Capital turnover ratio	1.01	1.46
2	Rate of return to loan amount (%)	32.28	67.6
3	Gross ratio	0.79	0.55
4	Variable cost ratio	0.51	0.36
5	Fixed cost ratio	0.28	0.2
6	Payback period (yrs)	3.22	1.34
Economic efficiency measures			
Per production day			
1	Production per day (tonne)	18	45
2	Revenue (Rs.)	Rs. 12,600.00	Rs. 31,500.00
3	Variable cost (Rs.)	Rs. 6,460.13	Rs. 11,461.68
4	Income over variable cost (Rs.)	Rs. 6,139.87	Rs. 20,038.32
5	Net profit (Rs.)	Rs. 2,609.82	Rs. 13,885.11

Fig. 1: Proportion of constituent components of capital cost for ice plant of less than 50 tonne capacity

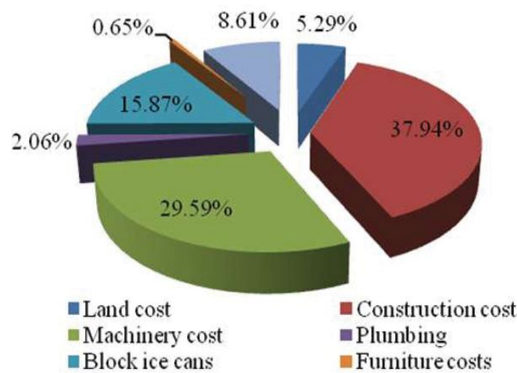


Fig. 3: Proportion of constituent components of capital cost for ice plant of more than 50 tonne capacity

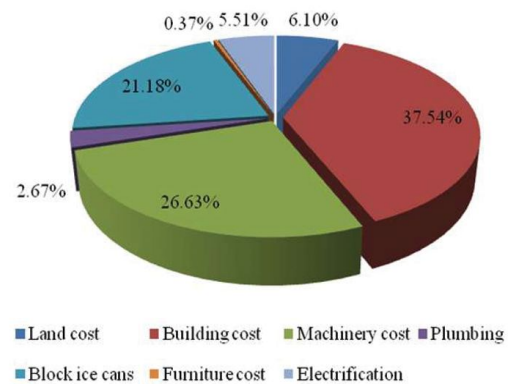


Fig. 2: Proportion of constituent components of variable cost for ice plant of less than 50 tonne capacity

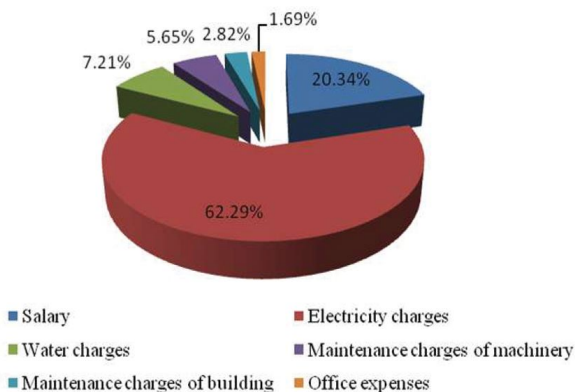
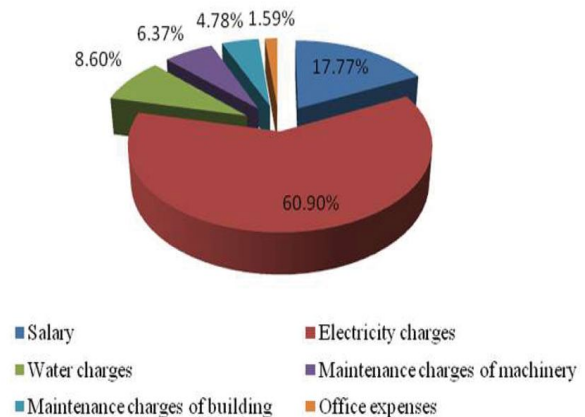


Fig. 4: Proportion of constituent components of variable cost for ice plant of more than 50 tonne capacity



than 50 tonne capacity ice plant, these were 0.55, 0.36 and 0.20 respectively. The value of gross ratio of both ice plants are below one, which signifies that the ice plants of both categories are profitable in the first year itself, as 79 and 55 per cent amount from the revenue is spent towards the total cost for less than and more than 50 tonne ice production capacity ice plants respectively. The revenue spent towards the variable cost for less than and more than 50 tonne capacity ice plant was 51 and 36 per cent respectively and only 28 and 20 per cent of revenue was spent towards fixed cost for the same capacity ice plant respectively. The pay back period was 3.22 and 1.34 years for less than and more than 50 tonne capacity ice plant respectively, which indicated that more than 50 tonne capacity ice plant required one and half year to recover the initial investment whereas, less than 50 tonne capacity ice plant required more than three and half years. The per day net profit recorded for less than and more than 50 tonne capacity ice plants were Rs. 2,609.82/- and Rs. 13,885.11/- respectively. There is no report available to compare the result of the present study therefore; the result of the present study cannot be compared with others.

Conclusion

It could be concluded from the present study that instead of low production capacity ice plants, owner should have to prefer to establish ice plant with more production capacity for good economic feasibility.

In the present study, it exposed that the less than 50 tonne capacity ice plant earned lesser net profit as compare to more than 50 tonne capacity ice plant. It is clear from all the economic indicators that more than 50 tonne capacity ice plants were more profitable as compared to less than 50 tonne capacity ice plants.

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