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Economics of cold storage industry in eastern district of Uttar Pradesh

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Abstract

Cold storage units were categorized into small, medium and large categories on the basis of their capacities. It was observed that 77.44 per cent of total capacity was used exclusively for potato and rest was used potato seeds and other perishable commodities. Net returns were nearly at par for medium and large units i.e. Rs. 498.73 thousand and Rs. 428.83 thousand respectively and higher as compared to small units, which were Rs. 390.18 thousand. Break even quantity (BEQ) as percentage of actual quantity was 44.51 per cent for small, 52.47 per cent for medium and 65.61 per cent for large units. Payback period was about 10 years and ranged from 7 (small units) to 14 (large units). The capital-output ratio was found to be the highest for small units as compared to medium and large units i.e. 1.48, 1.37 and 1.22 respectively. The most prominent problems faced by the industry were the increase in electricity charges and non availability of finance throughout the year. So that the investment in the cold storages fetched proportionately less benefit. However, their profitability can be enhance through the government intervention by decreasing electricity charges, providing finance throughout the year, low interest rate on borrowed capital and adequate supply of electricity.

Key word-Input-output relationship, economic evaluation, size of holding, net return

Introduction

India's geographical complexity and agro climate diversity poses enormous challenges in preserving and delivering agriculture produce from farm to the ultimate consumer with minimum spoilage. The provision of cold storage makes these commodities safe for trade to handle and gives the consumer wider range of diet throughout the year and better value for their money. A marked effect of cold storage on marketing of fruit and vegetable, for example, lies not only in hold in these products beyond their natural season, but also on widening the area of production. This is important from the producer's point of view, but what is perhaps of even great importance is effect of refrigeration in reducing waste and making the system of distribution generally more efficient. The cold storage helps to store various agricultural produce to avoid glut in markets, for regulation of supply and thus benefiting both farmers and consumers. The cold storage movement has played an important role in developed countries to minimize the hazard of gluts and non-remunerative returns. The first cold storage in India was established early in 1982 at Kolkata (Joshi, 1982). But noticeable progress in expansion of cold storage industry was not made until 1947. Even in Punjab prior to 1949 there were no cold storage facilities (Acharya and Agrawal, 1999). The lack of cold storages facilities is leading to heavy losses because of violent fluctuation in the prices of fruits and vegetables (Phandis, 2003). The production of agriculture produce is localized, depending upon climate and soil, but it consumed all over. Moreover, the produce is seasonal while demand continues throughout the year. Thus, storage brings about time utility and helps the marketing

of produce throughout the year. The problem which attracts the attention of researchers is the cost at which the cold storage industry creates time utility. Therefore, this study has been undertaken to work out the economics of cold storage industry and to examine the constraints in the growth of cold storage industry in eastern district of Uttar Pradesh.

Methodology

The present study was conducted in Ghazipur district of eastern Uttar Pradesh. This district has 184024 M.T. production and 242.01q/ ha productivity of potato during the study period. This district has the second largest producer of potato after Farrukhabad district. The total 33 cold storage were running in district Ghazipur during study period. About 60 per cent of the total potato production was stored in this cold storage.The cold storage were categorised into small, medium and large categories according to the capacity by using cumulative cube root frequency method. Thus small units were categorised having a capacity of 1500-2400, medium 2500-3200 and large above 3200 M.T. Seven storage units from each categories were selected purposively. On the whole, a sample of 21 units was selected.

Table -1 Category, capacity, total No. of cold storage, and selected cold storage for study

Categories	Capacity in M.T.	Total No. Of cold storages	Cold storages selected for the study
Small Medium Large	1500-2400 2500-3200 Above 3200	7 14 12	7 7 7
Total	-	33	21

The data were collected on the investment pattern of the cold storage units during 2006-2007. Information pertaining to constraints being faced by cold storage was also obtained. Cost structure was divided into two categories fixed cost and variable cost. Fixed cost included depreciation of machinery and equipments, rental value of land, permanent labour and interest on fixed capital. Variable cost included the cost of casual labour, raw material, minor repair, oil and electricity, miscellaneous charges and interest on working capital.

Statistical Analysis

To examine the economic viability of cold storages, net returns, break even quantity (BEQ), break even quantity as percentage of total quantity stored, and pay-back period were calculated (Singh and Rangi, 1997).

(a) Net returns= Gross Return- Total costs

(b) Break even quantity (BEQ)= $$\frac{\text{Total Fixed Cost}}{\text{(Avereage Storage Charges} - \text{Average Variable Cost)}}$$

(c) Break even quantity as percentage of total quantity stored

(d) Payback Period= $$\frac{\text{Initial fixed investment}}{\text{Annual net returns}}$$

To work out the input- output relationship of the cold storages, the capital-output ratio, share of fixed and variable cost in the capital- output ratio, benefit- cost ratio at variable and total cost were calculated.

Results and Discussion

The two components of costs i.e. fixed costs and variable costs (table -2) were separately worked out in order to calculate the different economic efficiency measures. The variable costs constituted the major share of total cost. Total cost was Rs. 810.11 thousand for small units, Rs. 1343.99 thousand for medium and Rs. 1920.24 thousand for large size units. Variable costs as percentage of total cost were 61.37 per cent, 59.62 percent, 57.40 percent in case of small, medium and large units respectively. In the case of variable costs, the major components of cost were electricity and oil. Costs of raw material, electricity, oil and casual labour as percentage to the total cost were 1.04, 30.27 and 16.80 respectively for small units and 2.70, 30.84 and 14.4 per cent for medium units and 2.17, 31.97 and 10.7 per cent for large units.

Fixed costs accounted for a smaller share of total costs as compared to the variable costs. Fixed costs as percentage to the total costs were 38.63, 40.38 and 42.60 in case of small, medium and large units respectively. Depreciation on machinery and cost of permanent labour constituted the major share of fixed cost. Cost of permanent labour was 8.81, 10.35 and 11.5 per cent of total cost in case of small, medium and large units respectively. Cost of permanent labour was more than casual labour in case of large units but in case of small and medium units, cost of casual labour was higher than permanent labour. The cost on permanent labour was Rs. 71.37 thousand, Rs. 139.17 thousand and Rs. 221.61 thousand for small, medium and large units respectively, where as the cost on casual labour was Rs. 136.11 thousand for small, Rs. 193.64 for medium and Rs. 206.93 thousand for large units.

The fixed and variable costs incurred and net revenue earned by different sized units was considered for economic analysis. To test the worthiness of the investment on the cold storages two indicators i.e. break even quantity and payback period were studied.

It can be seen from table -3 that BEQ was higher in case of large units, i.e. 2119.40 thousand kg followed by 1289.38 thousand kg for medium and 668,98 thousand kg for small units, it means that units can survive even if they store these quantities of products. It was observed that payback period about 10 years for the investments in this industry. However, it was 6.92 years for small, 8.64 years for medium and 14.37 years for large unit to cover their investment with increase in size of cold storage units might be responsible for increase in the payback period of the units as these grew in size.

Table -2 Investments and costs of cold storage units, Ghazipur district of U.P. (2006-07)

Particulars		Large Units		Medium Units		Small Units		Overall	
S.N.	**Investment /Cost**	**Rs. (000)**	**Per cent**	**Rs. (000)**	**Per cent**	**Rs. (000)**	**Per cent**	**Rs. (000)**	**Per cent**
i)	Land	1521.12	24.68	869.23	32.20	869.23	32.20	1201.23	28.36
ii)	Machinery	3254.37	52.80	1037.51	38.44	1037.51	38.44	2085.43	45.62
iii)	Building	1387.53	22.52	792.48	29.36	792.48	29.36	1102.24	26.02
	Total	**6163.02**	**100.00**	**4304.49**	**100.00**	**2699.22**	**100.00**	**4348.91**	**100.00**
A.	**Fixed Costs**								
i)	Depreciation on machinery	325.44	16.95	196.44	14.62	103.75	12.81	208.54	14.79
ii)	Rental value of building	81.52	4.25	69.23	5.15	48.17	5.94	66.31	5.11
iii)	Rental value of land	101.87	5.30	79.71	5.93	56.13	6.93	79.24	6.05
iv)	Permanent labour	221.62	11.54	139.17	10.35	71.37	8.81	144.05	10.23
v)	Interest on fixed cost	87.65	4.56	58.15	4.33	33.53	4.14	59.77	4.34
	Sub-total (A)	**818.09**	**42.60**	**542.70**	**40.38**	**312.95**	**38.63**	**557.91**	**40.54**
B.	**Variable costs**								
i)	Casual labour	206.93	10.78	193.64	14.41	136.11	16.80	178.89	13.99
ii)	Raw material	41.72	2.17	36.23	2.70	8.46	1.04	28.80	1.97
iii)	Minor repairs	85.19	4.44	42.86	3.19	36.43	4.50	54.82	4.04
iv)	Electricity, oil	613.88	31.97	414.56	30.84	245.25	30.27	424.56	31.03
v)	Miscellaneous costs	36.34	1.89	28.15	2.09	17.64	2.18	27.28	2.05
vi)	Interest on working expenses	118.09	6.15	85.85	6.39	53.27	6.58	85.74	6.37
	Sub-total (B)	**1102.14**	**57.40**	**801.29**	**59.62**	**497.16**	**61.37**	**800.19**	**59.46**
	Grand total A+B	**1920.24**	**100.00**	**1343.99**	**100.00**	**810.11**	**100.00**	**1358.11**	**100.00**

Table 3. Economic evaluation of different size category of cold storage

Particular	**Small**	**Medium**	**Large**	**Overall**
Total quantity stored (000 kg)	1503.00	2474.29	3230.15	2402.48
Rental price (Rs./ kg)	0.7986	0.7447	0.7272	0.7481
Fixed cost (000 Rs)	312.95	542.70	818.09	557.91
Variable cost (Rs./ kg)	0.3308	0.3238	0.3412	0.3331
Net returns over variable cost (Rs./ kg)	0.4678	0.4209	0.3860	0.4150
Break-even quantity (BEQ) (000 kg)	668.98	1289.38	2119.40	1344.36
BEQ as % of actual quantity stored	44.51	52.47	65.61	55.96
Storage above BEQ (000 kg)	834.02	1184.91	1110.75	1058.12
Payback period (year)	6.92	8.64	14.37	9.99

Table 4. Input - Output relationship on different size of cold storage

Particulars	Cold storage size category			
	Small	Medium	Large	Overall
Capital-output ratio	1.48	1.37	1.22	1.32
Benefit-cost ratio (at variable cost)	1.41	1.30	1.13	1.25
Benefit-cost ratio (at total cost)	0.48	0.37	0.22	0.32
	(32.43)	(27.01)	(18.03)	(24.24)
Share of fixed cost in capital-output ratio	0.57	0.55	0.52	0.54
	(38.51)	(40.38)	(42.62)	(40.91)
Share of variable cost in capital-output ratio	0.91	0.82	0.70	0.78
	(61.49)	(59.62)	(57.38)	(59.09)

Note: figures in parenthesis denote percentage

Input-output relationship

It is clear from the table-4 that by investing a rupee on fixed and variable resources, an amount equal to rupees 1.32 was earned from an average cold storage in district as indicated by capital-output ratio. This showed that there was a net earning of rupee 0.32 which come to be 24.24 per cent of total earning and remaining 75.56 percent was the total cost on average of cold storage. The capital- output ratio was worked out to be 1.48, 1.37 and 1.22 on small, medium and large sized cold storage respectively. This showed an inverse relationship between investment and earning per unit of capital. It was interesting to observe that share of fixed cost in capital-output ratio was increasing with size of cold storage which worked out as 38.51 per cent for small, 40.38 per cent on medium and 42.62 per cent on large sized cold storage. On the other hand, the share of variable cost was found to be inversely related with the size of cold storages. All this proved that fixed cost per unit of investment (capital) was higher on large sized cold storages as compared to the smaller ones while variable cost showed the other way trend. Hence, it may be concluded that the cold storages fetched proportionately less benefit as compared to the heavy investment (Gill, 2003). Therefore, investment decision in cold storages has to be taken very carefully.

Constraints in the growth of industry

Cold storage is the most important infrastructural need for perishable and semi perishable commodities, which require immediate attention. The government's role in this regard should be positive, constructive and facilitative to induce private sector participation. However, there are some operational problems which responsible for the slow growth of the industry. The main problem/ constraints faced by selected storage units in studied area are given in table-5. The most prominent problem was the increase in electricity charges (Anand, 2002). It was followed by non availability of finance throughout the year, irregular electric supply, lower rental charges of storage, high repair charges of machinery and expenses on account of increase in oil prices (compressor oil), heavy maintenance cost for old machinery and prices of diesel and refrigerant, surplus capacity and unhealthy competition, fluctuation in voltage, and high interest rate on borrowed capital.

It is suggested that there should be the fixation of minimum support price of potatoes because main commodity stored in majority of cold storage's is potato. Sometimes, the glut of potatoes in market harms the industry because farmers and traders do not pick stored potato in case of prices fall, causing huge losses to owners. The industry demands that the government should also fix the storage rent of potatoes. Due to the

excess storage capacity in the area, there is variation in storage rents for different products. Subsidy on the heavy investment of the building and machinery for the construction of cold storage should be available at proper time (Sharma, 2002).

Table -5. Important problems in the growth of cold storage industry

S.N.	Problems	Frequency	Percentage to Total
1.	Increase in electricity rates	10	47.6
2.	Non availability of finance throughout the year	9	42.9
3.	Lower rental charges	8	38.0
4.	High repair rates	7	33.33
5.	High expenses	6	28.6
6.	Surplus capacity and unhealthy competition	5	23.8
7.	Fluctuation in voltage	5	23.8
8	High interest rate	5	23.8

Regular electric supply is essential for the cold storage business. U.P. electric board should pay attention towards the regular electric supply to the storage units especially located in rural areas. Moreover, the cold storage owners should be given loan on easy terms and condition to meet the day to day financial requirement.

Conclusion

Net returns per cold store were nearly at par for medium and large units and higher as compared to small units. Break even quantity as percentage of actual quantity was the lowest for small units. Also pay back period was lowest for small units. The capital-output ratio was found highest on small units as compared to medium and large units. This showed an inverse relationship between investment and earning per unit of capital. Fixed investment per unit of capital investment was higher on large sized cold storage as compared to smaller ones, while variable investment showed the other way trend. The most prominent problem faced by the industry was the increase in electricity rates and non availability of finance throughout the year. It was concluded that the heavy investment in cold storages fetched proportionately less benefit. However, their profitability can be enhanced through the government intervention.

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