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An economic analysis of cold storage units in Raipur district of Chhattisgarh

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Abstract

The present investigation An economic analysis of cold storage units in Raipur district of Chhattisgarh was conducted in Department of Agricultural Economics, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh during the year 2022-23. In this research to analyzed the cost benefit of cold storage in Raipur. There was a total of 346 cold storages in the state, 93 of which were in Raipur alone. 10 out of these 93 cold storages were chosen based on their capacity of 5000 MT and received government funding for the current study. Using a timetable designed specifically for it, chosen cold storages provided primary data on cost-benefit analysis. Techniques like Benefit-Cost Ratio, Net Present Value, Internal Rate of Return, and Profit Ratio were used to analyses the productivity of investments. The measures adopted showed that all the cold storages under study were economically viable and profitable. Positive Net Present Values even before the project's life is over and more than unity Benefit Cost Ratios are both excellent signs of a viable enterprise. All the cold storages show the positive and good rate of Internal Rate of Return with an average of 47.2%. Profit rate was also more than 100 which is good for the any business. Additionally, the break-even period was calculated to be between 2 and 5 years, which is a relatively short time frame and a significant incentive for financial investment in the company. Since each of the 10 cold storages used for the research had previously achieved break even, there is no risk involved in operating these facilities.

Keywords: Benefit-cost ratio, net present value, profit rate, internal rate of return, break-even period

Introduction

India is the world's second top producer of both fruits and vegetable with total production of 342 MT out of this fruit contribute 107 MT and vegetable production is 204 MT. In spite of this, post-harvest losses, which make up roughly 18 percent to 20 percent of overall production, result in a relatively low per capita availability of fruits and vegetables. Out of total post-harvest losses only 2 percent produced are processed for further value-added product. Additionally, by the time products were delivered to buyers, their quality had already declined. This is mostly due to the perishable nature of produce, which necessitates a cold chain structure to preserve the quality and increase their shelf life if consumption is not fulfilled right away after harvest. Farmers are forced to sell their produce right away after harvest due to a lack of cold storage and cold chain facilities, which leads to a glut scenario and low-price realization. Chhattisgarh is the 14th largest producer of fruits with a contribution of around 2.5% of the total fruit production in India.

Chhattisgarh is one of the leading producers of fruits in India. The state is known for its high-quality mangoes, guavas, litchis, and bananas. Additionally, Chhattisgarh is also a major producer of jackfruit, oranges, and papayas. The favorable climate and fertile soil in the state make it an ideal location for fruit cultivation. Mango, Guava, Lime, Litchi, Cashew-nut, Cheku, and other major fruit crops are grown in the state of Chhattisgarh. Minor fruit crops like Sitafal, Bael, Ber, and Anola are also grown both as

cultivated and wild crops. The state's total fruit crop area is 2,54,756 Ha, and in 2020-21, 34,58,811 MT of fruit were produced there. Agroclimatically, the entire state can successfully cultivate mango, while the northern hilly region of Surguja and Jashpur district is ideal for the production of litchi. The Bastar & Raigarh district's plateau is a good place to grow cashew nuts.

In the state, most vegetable crops, including solanaceous plants, cucurbits, beans, cabbage, cauliflower, etc., are cultivated successfully. In the 2020-2021 growing season, there were 4,89,849 Ha of vegetable crops in the state, yielding 68,68,801 MT.

Potatoes are also an important agricultural product in Chhattisgarh, India. The state is among the top potato-producing states in the country, with a significant portion of the harvest used for both domestic consumption and exports. The favorable climate and soil conditions in Chhattisgarh, combined with efficient farming practices, contribute to the high potato production in the state.

In Chhattisgarh total number of cold storages is 346 and in the study area i.e., Raipur cover highest number cold storage 93.

Materials and Methods

1) Benefit Cost Ratio (BCR)

One method for determining if a project will be financially viable is to look at the benefit- cost ratio. This analysis is the most credible and practical criterion for project assessment. The discounted stream of gross benefits is divided by the

discounted stream of expenses to arrive at the benefit cost ratio. To put it another way, benefit cost ratio is the ratio of the project's present value of gross benefit stream to its present value of cost stream. The benefit cost ratio is given by

$$BCR = \frac{\sum_{t=0}^n \frac{B_t}{(1+r)^t}}{\sum_{t=0}^n \frac{C_t}{(1+r)^t}}$$

Net Present worth (NPW) or Net Present Value

The time value of money is the foundation of the NPW idea. The difference between the total project expenses and the gross benefits in each year of the project's life is used to calculate the net present worth, which is the present value of the net yearly balance of the cash flow stream. The difference is determined using an interest rate that accounts for the opportunity cost of capital. Project eligibility depends on whether the present value is positive. The NPW is given by

$$NPW = \sum_{i=1}^n \frac{B_n - C_n}{(1+i)^n}$$

Internal Rate of Return (IRR)

Internal rate of return is one of the key methods for determining a project's yield, or how profitable the project will be. The implicit rate of return (IRR) criteria refers to the project's percentage rate of return. It is also referred to as capital's marginal efficiency. It is known as the discount rate at which future earnings match the present value of capital expenditures. i.e., the rate of return at which the project's net present value is equal to zero. IRR on the other is equal to the discount rate at which NPW is zero, i.e., the anticipated value of the rate of interest that fulfils the following equation. Both BCR and NPW rely on the discount (interest) rate employed.

$$IRR = \sum_{i=1}^n \frac{B_n}{(1+i)^n} - \sum_{i=1}^n \frac{C_n}{(1+i)^n} = 0$$

Profit Rate

The average revenue received throughout the course of the project's lifetime is compared to the capital investment's depreciation. The profit rate is the amount of revenue over depreciation that is stated as a percentage.

$$\text{Profit Rate} = \frac{\text{Total return} - \text{Depreciation}}{\text{Total cost}} \times 100$$

For an economically viable project the profit rate must be more than 100.

Break Even Analysis

It is a powerful management tool that is based on the connection between cost and revenue. When revenue matches total costs, a company enters its break-even point. There is no gain. When sales are lower than the breakeven point, losses are maintained; however, when sales are higher than the breakeven point, profits are realized. Profits are nonexistent during the break-even phase. Breakeven point in

years where TR - TC is equal to 0.

Results and Discussion

All the cold storage was given more than one ratio. This indicates that cold storage business was profitable and viable. Average Benefit Cost Ratio for all the cold storage was 1.664 and range of benefit cost ratio in between 1.53 to 1.84.

BC Ratio of cold storages

Cold storage	BC Ratio
1	1.59
2	1.53
3	1.59
4	1.62
5	1.65
6	1.57
7	1.73
8	1.81
9	1.84
10	1.71
Average	1.664

Net Present Worth (NPW) of the Cold Storages

Number of cold storages	Net Present Value
1	3,904,699.13
2	2,887,957.39
3	4,130,520.86
4	4,002,046.95
5	4,156,043.47
6	3,395,019.13
7	4,312,713.04
8	2,783,582.60
9	8,256,834.78
10	5,039,366.95
Average	4,286,878.43

Projects with a benefits-cost ratio greater than one must also have positive NPW, as this is a requirement for an economically feasible project. NPV was calculated at 15% of interest rate. Here all cold storage has positive NPV. This indicated that all the cold storage were economically viable, we can see that for ninth cold storage has highest NPW and eight has lowest. When all cold storage taken together NPW was 4286878.43.

Internal Rate of Return of the Cold Storages

Cold storage	Internal rate of return (in %)
1	38.58
2	40.11
3	42.95
4	97.14
5	31.67
6	38.16
7	51.36
8	61.23
9	22.61
10	48.19
Average	47.2

All ten cold storage internal rate of return indicated, all the ten cold storage shows the positive and more than 20% internal rate of return. Fourth cold storage shows 97.14%

which was highest and ninth cold storage show 22.61% which was lowest, similarly seventh and eighth cold storage shows more than fifty i.e., 51.36 and 61.23 respectively. And for combined of all cold storage internal rate of return was 47.2%, all cold storage shows the good rate of IRR. This approved that cold storage business was profitable.

Profit Rate % of the Cold Storages

Cold storage	Profit rate (in %)
1	146.15
2	136.16
3	148.06
4	144.28
5	149.55
6	144.87
7	156.36
8	157.21
9	173.37
10	158.84
Average	151.48

It was observed that profit rate was ranged from 136.16 to 173.37. From above table 4.14 we can see that the different rate of profit for different cold storages, all ten cold storage shows the more than 100 profit rates. This indicated that all cold storage project was economically viable and profitable because for the profitable business we require more than 100 profit rates. Average profit rate of all cold storage was 151.48.

Break Even Period of the Cold Storages

Cold storages	Break-Even year
1	5
2	4
3	4
4	2
5	4
6	3
7	5
8	4
9	5
10	4

We observed that the break-even year of different cold storages and we can concluded that fourth cold storage cover all the cost in just 2 years and sixth cold storage in just 3 years. Break-even period is the period when all the total cost that incurred in business equal to total revenue.

Conclusion

The analysis findings demonstrated the solvency of cold storages since their benefit-cost ratios were determined to be greater than unity for all the ten cold storages. Benefit cost ratio of cold storage ranged from 1.53 to 1.84 and the average of all storages was 1.664. More than one benefit cost ratio indicated the project was economically profitable and viable. Net present value of all ten cold storages was also positive and indicated that project was again economically viable and profitable. All ten cold storage internal rate of return indicated, all the ten cold storage shows the positive and more than 20% internal rate of return. And for combined of all cold storage internal rate of

return was 47.2%, all cold storage shows the good rate of IRR. This approved that cold storage business was profitable. Profit rate was more than 100 for all the cold storages and profit rate was ranged from 136.16 to 173.37. Average profit rate of all cold storage was observed 151.48. Between two and five years were needed for cold storage to break even. The numerous investment assessment methods that were utilised to analyse cold storage facilities revealed that these facilities are always economically feasible. It was discovered that the cold storage industry was lucrative in every situation. Cold storages displayed favorable results for the cost-benefit analysis's metrics, and on average, they generated a profit of 151.48%. IRR and NPW both have positive ratios.

It was found to be that in cold storage business there was heavy capital investment, high cost of storages.

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