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RESEARCH PAPER

Investment Analysis of Warehousing System in Telangana

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ABSTRACT

Warehousing plays a crucial role in the agricultural supply chain by offering scientifically structured storage facilities that reduce post-harvest losses, maintain produce quality, and prevent distress sales. This study investigates the financial and economic viability of warehouse investments in Telangana using discounted cash flow techniques such as Net Present Value (NPV), Benefit-Cost Ratio (BCR), and Internal Rate of Return (IRR). Telangana has experienced a surge in agricultural output, especially in paddy, red gram, and maize production, necessitating enhanced warehousing infrastructure. Data was collected from two districts Mahbubnagar and Jagtial chosen for their contrasting number of active warehouses. Four warehouses were selected for financial analysis: two small warehouses in Jagtial (30,000 MT each) and two large warehouses in Mahbubnagar (1,00,000 MT each). The findings revealed that all warehouse projects were financially viable, with IRRs exceeding or matching the benchmark interest rate of 12 per cent, positive NPVs, and BCRs greater than one. Specifically, the small warehouses had a BCR of 1.25, NPV of ₹ 0.60 crore, and IRR of 15 per cent, while the large warehouses demonstrated stronger feasibility with NPVs of ₹ 6.81 crore and ₹ 6.53 crore, IRRs of 17 per cent and 12 per cent, and BCRs of 1.59 and 1.49, respectively. These results underscore the importance of continued investment in warehousing to support agricultural growth and market stability in Telangana.

HIGHLIGHTS

- Large warehouses in Mahbubnagar show higher NPV and IRR, making them more profitable than small ones.
- All warehouse models are economically viable with BCRs above 1, especially Mahbubnagar's large warehouses
- The investment also offers social benefits like lower post-harvest losses and better farmer incomes.

Keywords: Financial Feasibility, Net Present Value (NPV), Benefit-Cost Ratio (BCR), Internal Rate of Return (IRR), Post-Harvest Losses, Agricultural Infrastructure, Investment Analysis

Warehousing is referred to as a scientifically designed infrastructure for the orderly storage and handling of commodities and materials. Warehouse primary function is to provide storage space for agricultural items such as harvested produce, fertilizer, equipment, and other products. Warehouses are considered as necessary means for the reduction of post-harvest losses resulting in food shortage (Chatterjee, 2018) and provide remunerative prices for the produce (Adigal and Singh, 2015) and avoid distress sales, ensures year-round availability of agricultural commodities, promote scientific storage and distribution of commodities.

Absence of scientific storage facilities (Devi *et al.* 2021) leads to post harvest losses, wastage and quality deterioration. The small farmers do not have the financial strength to retain the produce with them and are unable to get better off season prices of

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their agricultural produce. Farmers must be able to get away from distress sale of their produce during the peak marketing season when there is glut in the market (WDRA Annual Report, 2011).

The Royal Commission on Agriculture (1928) and the Central Banking Enquiry Committee (1931) emphasized the need for warehousing infrastructure in India. In 1944, the Reserve Bank of India recommended state-level legislation for warehouse operations. The All India Rural Credit Survey Committee (1954) highlighted the necessity of scientific, accessible storage to reduce agricultural produce losses. As a result, the Agricultural Produce Corporation Act of 1956 was enacted and NCDC was established on September 1st 1956 and the Central Warehousing Corporation was set up on March 21, 1957 in New Delhi.

To boost the nation's storage capacity, numerous attempts were undertaken. As a result of this, number of SWC warehouses has significantly increased from 266 warehouses (with capacity of 2.87 LMT) in 1960-61 to 2205 warehouses in 2022-23 with capacities 2.87 LMT and 504 LMT respectively. By contrast, the number of CWC warehouses grew from just 7 with a storage capacity of 0.07 LMT in 1957-58 to 458 with a capacity of 100.87 LMT in 2022-23 (CWC Annual Reports).

The storage capacities of different entities during 2023 is presented in Table 1.

Table 1: Total storage capacities of different entities during the year 2023

Sl. No.	Name of the Organization/ Sector	Storage capacity in MMT
1	Food Corporation of India (FCI)	14.75
2	Central Warehousing Corporation (CWC)	10.44
3	State Warehousing Corporations (SWCs)	43.91
4	Other State Agencies	14.75
5	Cooperative Sector	16.57
6	Private Sector	100.94
	Total	**201.36**

Source: *WDRA Annual Report, 2023.*

Telangana had 141 warehouses under SWC with a capacity of 18.26 LMTs during bifurcation in 2014 which had tremendously increased to 255 warehouses with a capacity of 19.56 LMTs in 2023. Telangana had a total of 18 CWC warehouses in 2014, with a capacity of 5.7 LMT. By 2023, the number of warehouses remained constant, but the capacity had dropped to 5.4 LMT.

Telangana, the eleventh-largest state in India with a geographical area of 276.95 lakh acres, has 52.88 per cent of its land as net sown area and 24.70 per cent under forest cover. From 2015-16 to 2021-22, the area under paddy cultivation rose from 25 to 97 lakh acres (a 279 per cent increase), and production increased from 45 lakh tonnes to 202.18 lakh tonnes (a 342 per cent rise). Red gram cultivation also increased from 2.48 to 3.14 lakh acres (26.1 per cent increase), with production growing by 130.85 per cent. Despite a 28.1 per cent drop in maize sown area, production rose by 29.52 per cent. Gross Irrigated Area increased from 50.10 to 135 lakh acres, with 84.9 lakh acres of new irrigation potential created, significantly boosting paddy cultivation (Telangana Socio Economic Outlook, 2023).

As discussed above, growing production of paddy, red gram, and maize results in a constant decline in market price and also increased procurement of paddy by state government necessitating the need for more storage space. Therefore, it is necessary to carefully research and contrast the warehouse capacities that are now available and investments required in future.

METHODS

Two districts in Telangana were selected for the study based on the number of active warehouses: Mahbubnagar, which has the highest number of active warehouses (15) with a total capacity of 221.991 LMT, and Jagtial, which has the lowest number of active warehouses (2) with a total capacity of 62.367 LMT. From each of these districts, two warehouses were randomly selected from two different villages for data collection.

The stakeholders involved are warehouse investors, warehouse managers, technical assistants, junior assistants, Handling and Transportation (H&T) contractors, H&T labourers and farmers making a sample size of 100. A purposive and multistage random sampling method was used to select districts, warehouses, and stakeholders in the warehousing system.

To assess financial and economic appraisal of investment in warehouse project, discounted cash flow techniques were applied, such as, Internal Rate of Return (IRR), Benefit-Cost Ratio (BCR) and Net Present Worth (NPW).

RESULTS AND DISCUSSION

For financing agricultural and allied sector projects, lending institutions assess the financial feasibility to ensure the investment can generate adequate returns for loan repayment over its productive lifespan.

Financial analysis comprises the Benefit-Cost (BC) ratio, Net Present Value (NPV), and Internal Rate of Return (IRR). These indicators determine the viability of the business. An interest rate of 12 per cent per annum was used for these calculations (Mantende *et al.* 2017). A business is considered feasible if NPV is greater than 0, BCR is greater than 1, and IRR exceeds the interest rate.

The results of the financial feasibility analysis are presented in Tables 2 to 5.

Financial analysis for small warehouses (30,000 MTs) located in Jagtial district

Two warehouses, each with a capacity of 30,000 MT, were established in 2020 in the villages of Yeshwantharaopet and Israjpalli in the Jagtial district. Since the cash outflows and inflows for both warehouses are nearly identical, a single financial analysis was conducted for both.

The financial analysis of warehouses in Jagtial district were presented in Table 2.

The financial analysis of a 30,000 MT warehouse in Jagtial district presented in Table 2 shows that, although the first year had a negative cash flow due to high construction costs, the project generated positive net income from the second year onward. At a 12 per cent discount rate, the project yielded a Net Present Value (NPV) of ₹ 60 lakhs, a Benefit-Cost (BC) ratio of 1.25, and an Internal Rate of Return (IRR) of 15 per cent, indicating strong financial viability. The payback period was estimated at 6.19 years, slightly longer due to the warehouse's smaller size and initial investment, but overall, the investment is deemed financially feasible.

Financial analysis for large warehouses (1,00,000 MTs) located in Mahbubnagar district

The selected warehouses in Mahbubnagar district were established in 2013 at Kaukuntla and in 2002 at Chinnadarpally and with 1,00,000 MTs capacity. Hence financial feasibility indices of both warehouses are presented in Table 3 and Table 4 respectively.

From the Table 3 the financial analysis of a 1,00,000 MT warehouse in Mahbubnagar district shows an initial negative cash flow in the first year due to high construction costs, followed by significant positive income ₹ 97 lakhs in the second year and ₹ 93 lakhs in the third year. By the twelth year, net income reached ₹ 1.81 crores, despite a decline in storage

Table 2: Financial feasibility indices of small warehouses (30,000 MTs) established in 2020 in Jagtial district

Sl. No.	Year	Cash outflow (₹ in crores)	Cash inflow (₹ in crores)	Net cash (₹ in crores)	PV of Cost @ 12% (₹ in crores	PV of Benefit @ 12% (₹ in crores)	DF @ 12%
1	2020	1.26	0.85	-0.41	1.12	0.76	0.893
2	2021	0.45	0.85	0.40	0.36	0.67	0.797
3	2022	0.49	0.85	0.35	0.35	0.60	0.712
4	2023	0.51	0.85	0.34	0.32	0.54	0.636
5	2024	0.52	0.85	0.33	0.30	0.48	0.567
	Total	**3.23**	**4.23**	**1.01**	**2.45**	**3.05**	
NPV (₹ crore)			0.60				
B-C ratio			1.25				
IRR (%)			15				
Payback period (years)			6.19				

Source: *Survey data, 2024.*

Note: *The cash inflows are calculated based on the storage costs paid by entities for utilizing warehouses for a maximum period of 3 months per year.*

Table 3: Financial feasibility indices of large warehouse (1,00,000 MTs) established in 2013 (GRR Warehousing)

Sl. No.	Year	Cash outflow (₹ in crores)	Cash inflow (₹ in crores)	Net cash (₹ in crores)	PV of Cost @12% (₹ in crores)	PV of Benefit @12% (₹ in crores)	DF @12%
1	2013	5.25	2.83	-2.42	4.69	2.53	0.89
2	2014	1.86	2.83	0.97	1.49	2.26	0.80
3	2015	1.90	2.83	0.93	1.35	2.01	0.71
4	2016	0.95	2.83	1.88	0.60	1.80	0.64
5	2017	0.96	2.83	1.87	0.55	1.61	0.57
6	2018	0.98	3.19	2.22	0.49	1.62	0.51
7	2019	1.36	3.19	1.83	0.61	1.44	0.45
8	2020	1.11	3.19	2.08	0.45	1.29	0.40
9	2021	1.05	3.19	2.14	0.38	1.15	0.36
10	2022	1.13	3.19	2.07	0.36	1.03	0.32
11	2023	1.14	3.19	2.05	0.33	0.92	0.29
12	2024	1.16	2.97	1.81	0.30	0.76	0.26
	Total	**18.85**	**36.28**	**17.42**	**11.60**	**18.41**	
NPV (₹ crore)				6.81			
B-C ratio				1.59			
IRR (%)				17			
Payback period (years)				3.6			

Source: *Survey data, 2024.*

Note: *The cash inflows are calculated based on the storage costs paid by entities for utilizing warehouses for a maximum period of 3 months per year.*

Table 4: Financial feasibility indices of large warehouse (1,00,000 MTs) established in 2002 (Vuduthala Godowns)

Sl. No.	Year	Cash outflow (₹ in crores)	Cash inflow (₹ in crores)	Net cash (₹ in crores)	PV of Cost @12% (₹ in crores	PV of Benefit @12% (₹ in crores)	DF @12%
1	2002	5.22	1.84	-3.38	4.66	1.64	0.89
2	2003	1.11	1.84	0.73	0.88	1.47	0.80
3	2004	1.21	1.84	0.63	0.86	1.31	0.71
4	2005	1.23	1.84	0.61	0.78	1.17	0.64
5	2006	1.64	1.84	0.20	0.93	1.04	0.57
6	2007	1.14	2.97	1.83	0.58	1.51	0.51
7	2008	1.23	2.97	1.74	0.56	1.35	0.45
8	2009	1.16	2.97	1.82	0.47	1.20	0.40
9	2010	1.28	2.97	1.69	0.46	1.07	0.36
10	2011	1.07	2.97	1.91	0.34	0.96	0.32
11	2012	1.17	2.97	1.81	0.34	0.86	0.29
12	2013	1.12	2.97	1.85	0.29	0.76	0.26
13	2014	1.30	2.97	1.68	0.30	0.68	0.23
14	2015	1.24	2.97	1.74	0.25	0.61	0.20
15	2016	1.02	2.97	1.96	0.19	0.54	0.18
16	2017	1.93	2.97	1.05	0.31	0.49	0.16
17	2018	1.21	2.97	1.76	0.18	0.43	0.15
18	2019	1.05	2.97	1.92	0.14	0.39	0.13
19	2020	1.22	4.78	3.57	0.14	0.56	0.12
20	2021	1.99	4.78	2.79	0.21	0.50	0.10
21	2022	1.22	4.78	3.56	0.11	0.44	0.09
22	2023	1.37	4.78	3.41	0.11	0.40	0.08
23	2024	1.46	4.78	3.32	0.11	0.35	0.07
	Total	**33.58**	**71.78**	**38.21**	**13.19**	**19.72**	
NPV (₹ crore)					6.53		
B-C ratio					1.49		
IRR (%)					12		
Payback period (years)					3.14		

Source: *Survey data, 2024.*

Note: *The cash inflows are calculated based on the storage costs paid by entities for utilizing warehouses for a maximum period of 3 months per year.*

fees. At a 12 per cent discount rate, the project achieved a Net Present Value (NPV) of ₹ 6.81 crores, a Benefit-Cost (BC) ratio of 1.59, and an Internal Rate of Return (IRR) of 17 per cent, all indicating strong financial viability. The payback period was 3.6 years, attributed to the warehouse's larger size and full utilization, confirming the investment's financial feasibility.

From the Table 4 the study evaluated the financial viability of a 1,00,000 MT capacity warehouse using a 12 per cent discount rate. The Net Present Value (NPV) was ₹ 6.53 crores, indicating strong revenue generation. The Benefit-Cost (BC) ratio was 1.49, confirming the investment's profitability. The Internal Rate of Return (IRR) matched the borrowing rate at 12 per cent, suggesting a balanced but potentially risky investment. The payback period was 3.14 years, attributed to the warehouse's large size and full utilization.

The value of IRR depends on the magnitude of returns realized in each year over the economic life period and more particularly in the initial years of the godowns. This however may not have much impact on NPW and benefit cost ratio criteria (Nagaraj, 2011).

The results obtained are supported by (Shruthi *et al.* 2016), Vaz *et al*. (2019), Nagaraj *et al*. (2015), Rangasamy (2013), Coulter *et al*. (2000), Singh (1994), Singh (1991).

The results obtained are in contrast with the results of (Rajendran, 1987) which quoted that the establishment of cold storage facilities generally appeared economically unsustainable due to the reason that 55 per cent of the project cost was attributed to building materials and civil works, while machinery and power costs accounted for 22 per cent and 36 per cent, respectively.

CONCLUSION

The study highlighted the crucial role of warehousing infrastructure in minimizing post-harvest losses and supporting the agricultural economy, particularly in Telangana. The financial feasibility analysis of both small and large warehouses across Jagtial and Mahbubnagar districts demonstrated that investments in warehousing are economically viable. Key indicators such as Net Present Value (NPV), Benefit-Cost Ratio (BCR), and Internal Rate of Return (IRR) reveals that while smaller warehouses offer modest but positive returns, larger warehouses ensure higher profitability and quicker payback periods due to scale and utilization. The growing agricultural output, especially in paddy, maize and red gram underscores the urgent need for expanded and scientifically managed storage facilities to prevent market gluts and distress sales. Strengthening warehouse infrastructure through strategic investments is therefore essential for ensuring food security, improving farmer incomes, and supporting sustainable agricultural growth in Telangana and beyond.

Limitations and Future Studies

The study concentrates on selected locations, which may limit the broader relevance of its findings. Future research could broaden its scope by examining a more diverse range of warehouse structures and geographical areas, analyzing the effects of climate variability and shifts in policy, and investigating the implementation of digital innovations and cold storage systems to enhance operational efficiency and strengthen the agricultural supply chain.

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