

Models Scheme on Combine Harvesters

1. Harvesting is one of the most labour intensive operations in agriculture, which is required to be done at appropriate time so as to obtain optimum yield. Delay in harvest will have a direct impact not only on the yield but also on quality of produce. Further, the method of harvest and wastage of produce are interlinked. Traditionally, harvesting is done manually in rural areas and particularly in small land



holdings. However, in the situation where labour shortage is on a rise, harvesting through mechanical means has become inevitable. Though various machinery is available, combine harvester has been widely in use. Presently the availability of combine harvesters are not spread uniformly and therefore needs to be transported to long distance. Therefore the model schemes intends to make the machinery available locally so as to reduce the operation cost and facilitate timely harvest operation.

2. Combine Harvester:

A combine harvester is a essential equipment for the modern farm combine harvester is useful machinery invented by scientists for effective harvesting of crops and grains. The combine harvester, or simply combine, is a machine that harvests grain crops. The name derives from its combining three separate operations comprising harvesting—reaping, threshing, and winnowing—into a single process. A combine is a reaper and thresher wheel together to harvest , thresh and clean the grain from the straw in one operation. This allows the crop to be harvested more quickly and efficiently, and enables farmers to harvest larger amounts. According to the source of power used, combine harvester classified (i) one self-propelled type and (ii) pto operated type/ mount type . To be more precise of the work of a combine may be stated as follows:

1. Harvesting
2. Feeding of crops to the threshing unit
3. threshing the seed from the head
4. Separating the seed from the strong ex-line
5. Cleaning the seed from the chaff .

The first process viz., reaping, which is cutting down the from the field. As the combine harvester moves through the field, the crop is pushed into the harvester in the front portion (header). The cut crop further moves into the machine by a

pickup reel, which also holds the plants for cutting. The crop is then cut by the cutter bar, which has teeth that are sometimes called mowing fingers. These cut off the plant at the bottom near the ground.

The second process viz., threshing, is the process of separating the grain from the crop. After the crop has been cut, it is transported further into the combine harvester by a conveyor belt and deposited into a threshing drum. Inside the threshing drum, bars beat and separate the tops of the plant, containing the grain, from the straw, or the plant stems. The straw is carried up out of the combine by straw walkers, while the grain falls down through a screen for further processing.

Finally the cleaning process is accomplished using air blown on the grain or plant. The plant sits on a screen and air is blown on it forcefully. This separates and blows away lighter bits of plant material, called chaff, which may still be clinging to the grain. The grain then goes into a collecting tank. When the collecting tank is full of clean grain, it is shot out of a pipe called an unloader, into a storage bin or trailer attached to the combine harvester.

Self propelled track type Combine harvester and Tractor mounted wheel type Combine harvester are the two common types of harvesters available.

3. Scope of the Scheme :

The market size of combine harvesters in India is at the stage of infancy and is steadily growing. Presently the total population of combine harvesters is estimated roughly about 50000, which is concentrated in certain pockets and availability is not uniformly spread. Due to high capital cost, the combines are owned by merchants and private parties, who are not farmers, wherein around 90% harvest operation is done by custom hiring. Therefore, the harvesters either travels or get transported for a long distance from more mechanized States such as Punjab and Gujrat to other States. The present scheme tries to assess the economic viability of combine harvesters are for both the types that is track type and wheel type.

The own farm use of the harvester is limited hence the viability of the investment is dependent upon custom hiring of the combine harvester.

4. Financial analysis

a. Assumptions :

- a. Only the cost of the combine harvester has been considered.
- b. The cost of carriage truck not taken into account for track type combine.
- c. The cost of transportation from one place to another place has not been included.

The financial viability has been worked out based on assumptions above and is summarized as follows and presented in the tables given under:

Self Propelled combine harvester

- Net Present Worth @ 15 % discounting factor = ₹ 980051
- Benefit Cost Ratio = 1.12 : 1
- Internal Rate Return =34%.
- Average Debt Service Coverage Ratio = 1.43:1

Combine Harvester – wheel type

- Net Present Worth @ 15 % discounting factor = ₹ 1017951
- Benefit Cost Ratio = 1.17 : 1
- Internal Rate Return =46%.
- Average Debt Service Coverage Ratio = 1.71:1

Assumptions in Working of the Combine Harvester (Wheel type)			
1	Cost of Combine Harvester	1600000	Rs/ unit
	Coverage	1	Acre / hour
	Loan from Bank	85%	of total cost
2	Annual usage of Combine		
	a. Usage in own farm	50	hours
	b.Usage for custom hiring	650	hours
	Total Usage in a year	700	hours
3	Fuel		
	Consumption of Diesel	6	litre/ hour
	Cost of Diesel	55	Rs/ Litre
4	Lubricants		
	Consumption of Oil	0.18	litre/ hour
	Cost of Lubricants	200	Rs/ Litre
5	Manpower		
	a.Skilled Operator - 1	1	Man
	Wages for Skilled	1200	per day
	b.Semi-Skilled Assistant - 1	1	Man
	Wages for Semi Skilled	800	per day
6	Depreciation		
	Life of Combine Harvester	6000	hours
	Depreciation per year	11.7%	per year
7	Maintenance Cost	12%	per year
8	Insurance & Taxes	2.50%	per year
9	Rental Cost	2000	Rs/ Hour
10	Interest rate on borrowings	12.50%	

Repayment Schedule & Calculation of Interest Payment									
(Amount in ₹)									
Year	Disbursement	Net Cashflow	Outstanding			Repayment			DSCR
			Principal	Interest	Total	Principal	Interest	Total	
0	1360000		1360000	0	1360000	0	0	0	--
1		438466	1360000	170000	1530000	170000	170000	340000	1.29
2		438466	1190000	148750	1338750	170000	148750	318750	1.38
3		438466	1020000	127500	1147500	170000	127500	297500	1.47
4		438466	850000	106250	956250	170000	106250	276250	1.59
5		438466	680000	85000	765000	170000	85000	255000	1.72
6		438466	510000	63750	573750	170000	63750	233750	1.88
7		438466	340000	42500	382500	170000	42500	212500	2.06
8		438466	170000	21250	191250	170000	21250	191250	2.29
						1360000			1.71

Assumptions in Working of the Combine Harvester (Track type)			
1	Cost of Combine Harvester	2400000	Rs/ unit
	Coverage	1	Acre / hour
	Loan from Bank	85%	of total cost
2	Annual usage of Combine		
	a. Usage in own farm	50	hours
	b. Usage for custom hiring	650	hours
	Total Usage in a year	700	hours
3	Fuel		
	Consumption of Diesel	8	litre/ hour
	Cost of Diesel	55	Rs/ Litre
4	Lubricants		
	Consumption of Oil	0.24	litre/ hour
	Cost of Lubricants	200	Rs/ Litre
5	Manpower		
	a. Skilled Operator - 1	1	Man
	Wages for Skilled	1200	per day
	b. Semi-Skilled Assistant - 1	1	Man
	Wages for Semi Skilled	800	per day
6	Depreciation		
	Life of Combine Harvester	6000	hours
	Depreciation per year	11.7%	per year
7	Maintenance Cost	12%	per year
8	Insurance & Taxes	2.50%	per year
9	Rental Cost	2700	Rs/ Hour
10	Interest rate on borrowings	12.50%	

Repayment Schedule & Calculation of Interest Payment									
(Amount in ₹)									
Year	Disbursement	Net Cashflow	Outstanding			Repayment			DSCR
			Principal	Interest	Total	Principal	Interest	Total	
0	2040000		2040000	0	2040000	0	0	0	--
1		548733	2040000	255000	2295000	255000	255000	510000	1.08
2		548733	1785000	223125	2008125	255000	223125	478125	1.15
3		548733	1530000	191250	1721250	255000	191250	446250	1.23
4		548733	1275000	159375	1434375	255000	159375	414375	1.32
5		548733	1020000	127500	1147500	255000	127500	382500	1.43
6		548733	765000	95625	860625	255000	95625	350625	1.57
7		548733	510000	63750	573750	255000	63750	318750	1.72
8		548733	255000	31875	286875	255000	31875	286875	1.91
									1.43

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