

Research Paper

Feasibility Analysis of Cotton Ginning Units in Saurashtra Region

Daya Suvagiya^{1*} and K.A. Khunt²

¹ASPEE Agribusiness Management Institute, Navsari Agricultural University, Navsari, Gujarat, India

²Principal and Dean, Post Graduate Institute of Agri-Business Management, Junagadh Agricultural University, Junagadh, Gujarat, India

*Corresponding author: pateldaya1993@gmail.com (ORCID ID: 0000-0002-0331-0560)

Received: 22-08-2021

Revised: 17-11-2021

Accepted: 09-12-2021

ABSTRACT

The study has examined economics and economic viability of the ginneries. The study revealed that the difference in total investment between semi-automized and fully automized ginning units was due to the level of mechanization of units. Fully automized ginning units required more fund for management of the unit. The annual gross income was found to be ₹ 3749.87 lakhs in fully automized ginning units and ₹ 3399.03 lakhs in semi-automized ginning units whereas net income was ₹ 2409.50 lakhs and ₹ 1553.58 lakhs respectively. Under the situation of normal cost and return for all units, the net present value (NPV) was found positive indicating the financial soundness of the investment in the cotton ginning units. The pay-back period was found about 10 years which seems longer. In the varying situations of costs and returns, only situation-IV is found little hopeful with 10% increase in gross profit and 10% decrease in total cost ginneries were get highest NPV and IRR with lowest PBP in category-wise and overall sensitivity analysis of cotton ginneries.

HIGHLIGHTS

- The annual gross income was found to be highest in fully automized ginning units and the lowest in semi-automized ginning units in Saurashtra region.
- The investment on cotton ginning unit is a profitable proposal but critical in Saurashtra region because slight decrease in prices or increase in production cost might turn out into loss situations.

Keywords: Cotton Ginning, Cost and returns, sensitivity analysis, cost and price scenario

Cotton is a natural vegetable fibre assumes great economic importance as a raw material for textile industries. Though dominant position has been reduced by synthetic fibres, cotton is still a principal source of vegetable fibre for the world's textile industry. Cotton's widespread use is largely caused with its fibres are spun into yarn. Cotton's strength, absorbency and ability to be washed and dyed also make it adaptable to a large variety of textile products. India grows all the cotton species such as old world cotton (*G. Arboreum* and *G. Herbaceum*) and new world cotton variety (*G. Hirsutum* and *G. Barbardense*). The '*desi*' varieties belong to *G. Arboreum* is well known for their drought tolerance

and resistance to sucking pest. On the other hand, new world cottons have long, extra-long staple and better spinning potential than *desi* varieties of cottons. Gujarat, Maharashtra and Telangana are the three leading cotton growing states in India with the production of 125, 85 and 50 lakh bales respectively in the year 2021 (CCI, 2021).

During 2001 to 2002 and before, India could not produce sufficient cotton that's why India imported

How to cite this article: Suvagiya, D. and Khunt, K.A. (2021). Feasibility Analysis of Cotton Ginning Units in Saurashtra Region. *Economic Affairs*, 66(04): 583-591.

Source of Support: None; **Conflict of Interest:** None



cotton from other countries for mitigation of demand of textile and other Introduction 4 industries, but after 2002, India exported the good quality of cotton in various countries because of surplus quantity of cotton (Valia, 2011), and increasing trend was observed till 2011-12, then after countries export has declined to 77 lakh bales in 2020-21. The import of cotton has also increased during the period 2006-2017. Thenafter, countries imports has also declined to 11 lakh bales in 2020-21 (CCI, 2021).

Cotton ginning

The cotton ginning is the place where cotton fibre is separated from the cotton seed. The seed and lint are separated; lint is well pressed and converted into the bales (Khan *et al.* 2011). But the gin also equips to remove foreign matter, moisture and other contaminants that significantly affect the quality of the fibres and reduce the value of the ginned lint. Raw cotton is harvested manually or mechanically from the bolls on the cotton plant. Most of the cotton lint is destined for the textile industry in the form of ginned bales, while cotton seed goes to the oil extraction industry. In India, the present ginnery can be categorized into three major groups: (i) Conventional ginnery, (ii) Semi-automatic ginnery, and (iii) Automatic ginnery. The composite unit is one where both ginning and pressing activities are carried out within one premises. The integrated ginning and pressing factory is one in which ginned lint is directly transferred to the press without storing or conditioning in pala house (Agrawal *et al.* 2011).

Objectives

The present study was undertaken with the following specific objectives:

1. To analyse the economics of the ginning units in Saurashtra region.
2. To assess the economic feasibility of ginneries in various cost and price scenario.

Data and Methodology

India is the largest cotton producing and second largest cotton exporting country in the world. In Gujarat, Saurashtra region occupies the largest are under cotton cultivation. Hence, a sample of 50 functioning gin units were selected from the four

districts of Saurashtra region Viz., Junagadh, Rajkot, Bhavnagar and Surendranagar purposively.

To fulfill the requirement of the research objectives, the data on various costs and prices were collected from the audit reports prepared by the gin units for the year 2016-17.

For the estimation of economic viability, Net Present Value (NPV), Internal Rate of Return (IRR), Benefit-Cost Ration (BCR) and Payback Period (PBP) were estimated as follows:

Net Present Value:

The general formula for Net Present Value (NPV) is as follows:

$$NPV = \sum_{j=1}^n \left[\frac{F_j}{(1+i)^j} \right] - I_0$$

Where,

F_j = Annual cash inflow for j^{th} year

i = Discount rate factor

$j = 1, 2, \dots, n.$

I_0 = Initial investment

n = Life time of the investment

Internal Rate of Return

Internal rate of return is the rate of return at which the Net Present Value of a stream of payment/incomes is equal to zero (Mendhule, 2011).

IRR =

$$\text{Lower rate} + \frac{\text{NPV at lower rate}}{\text{NPV at lower rate} - \text{NPV at higher rate}} * (\text{Higher rate} - \text{Lower rate})$$

Where, Lower rate is lower discount factor

Higher rate is higher discount factor

NPV at lower rate is Net Present Value at low discount factor

NPV at higher rate is Net Present Value at high discount factor

Benefit Cost Ratio (BCR)

The benefit cost ratio (BCR) of an investment is the ratio of the discounted value of all cash inflows to

the discounted value of all cash outflows. It can be estimated as follows:

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

Where,

B_t = Benefit in t^{th} year,

C_t = Cost in t^{th} year,

$t = 1, 2, \dots, n$

n = Number of years

i = Interest (discount) rate.

Pay-Back Period

It is the most popular traditional method of evaluating the length of time required to recover an initial investment through cash flows generated by the investment. If the project generates constant annual cash flow the payback period can be computed by dividing cash out flow by annual cash inflow (Valia, 2011).

$$\text{Pay Back Period} = \frac{\text{Initial investment}}{\text{Annual Cash inflow}}$$

Amortization of fixed cost

An amortization of fixed cost was done by using the following cost formula (Zore, 2017).

$$a = P \frac{i(1+i)^n}{i(1+i)^n - 1}$$

Where,

a = Annual sum

P = Present sum of the establishment cost (in rupee)

i = Interest rate (10%)

n = Economic life of an industry (in year)

Sensitivity analysis

The sensitivity analysis was used to examine the sensitivity towards risk and uncertainty of increase or decrease in production cost and increase or decrease in price of lint produced, under existing as well as different prices and cost structure.

RESULTS AND DISCUSSION

The results of economic analysis, economic feasibility of cotton ginning units are presented and discussed in this paper:

Category-wise investment details of ginning units are given in Table 1. The total investment per unit varied from ₹ 1,43,96,096 in semi-automized ginning units to ₹ 2,02,22,083 in fully automized ginning units indicating the direct relationship between the level of mechanization of units and amount of the investments. In total investment, long term investment accounted for about 47.43 per cent in case of fully automized units and about 40.05 percent in semi-automized units. For an average unit, the major share in long term investment was of land (24.93 %) in case of fully automized units and building (29.12 %) in semi-automized units. The share of medium term investment was varied from 52.57 per cent in fully automized units to 59.95 per cent in semi-automized units. The major cost components of medium term investment were plant and machinery, tractor and truck. On an average total investment was amounted to ₹ 1,85,86,407 per unit in which long term investment (land, building, furniture etc.) and medium term investment accounted for 45.84 per cent and 54.16 per cent, respectively.

The details of cost of processing and raw materials are given in Table 2. The total material cost (cost of seed cotton) which is the major cost in cotton processing was varied from ₹ 2933.04 lakhs in semi-automized units to ₹ 3094.35 lakhs in fully automized units. The cost of packaging material was varied from ₹ 5.25 lakhs in semi-automized units to ₹ 5.40 lakhs in fully automized units. The cost of caustic soda which is used during ginning of raw cotton accounts for ₹ 1.39 lakhs in fully automized units to ₹ 1.45 lakhs in semi-automized units. Thus, the total cost of processing of cotton ginning units varied from ₹ 2939.74 lakhs in semi-automized units to ₹ 3101.14 lakhs in fully automized units. On an average, the cost of processing was ₹ 3055.95 lakhs per unit in which cost of seed cotton, cost of packaging material and cost of caustic soda accounted for ₹ 3049.18, ₹ 5.36 and ₹ 1.41 lakhs, respectively.

The details of annual management cost of different cotton ginning units are given in Table 3. The total

Table 1: Investment pattern in cotton ginning unit (Value in ₹/unit)

Particulars	Type of units					
	Automatic (n=36)		Semi-automatic (n=14)		All (n=50)	
	Value (₹)	Per cent	Value (₹)	Per cent	Value (₹)	Per cent
(A) Long term investment						
Land	50,40,850	24.93	15,03,233	10.44	40,50,317	21.79
Building	44,61,568	22.06	41,92,471	29.12	43,86,222	23.60
Furniture	64,144	0.32	51,294	0.36	60,546	0.33
Goodwill	0	0.00	1073	0.01	300	0.00
Borewell	24,444	0.12	17,143	0.12	22,400	0.12
Total (A)	95,91,006	47.43	57,65,214	40.05	85,19,785	45.84
(B) Medium term investment						
Plant and machinery	91,54,447	45.27	76,17,830	52.92	87,24,194	46.94
Air-conditioner	15,851	0.08	13,770	0.10	14,811	0.08
Car and vehicles	1,75,779	0.87	68,661	0.48	1,45,786	0.78
Computer	13,827	0.07	6438	0.04	10,133	0.05
Electric fittings	1,34,179	0.66	57,857	0.40	1,12,809	0.61
Electric scale	7550	0.04	5382	0.04	6943	0.04
Note counting machine	25,588	0.13	15,025	0.10	20,306	0.11
Truck	4,50,215	2.23	3,31,326	2.30	4,16,926	2.24
Tea machine	0	0.00	722	0.01	202	0.00
Mobile	7097	0.04	6669	0.05	6977	0.04
Boiler	0	0.00	284	0.00	79	0.00
Freez	4690	0.02	3258	0.02	4289	0.02
Tractor	4,44,158	2.20	3,98,249	2.77	4,31,303	2.32
Printer	8517	0.04	0	0.00	6132	0.03
Talpatri	486	0.00	805	0.01	575	0.00
T. V	1548	0.01	1054	0.01	1410	0.01
Moisture meter	17,493	0.09	5910	0.04	14,250	0.08
Fire safety	40,444	0.20	6635	0.05	30,977	0.17
Eraction and installment	12	0.00	0	0.00	8	0.00
Weigh bridge	1,24,472	0.62	83,639	0.58	1,13,039	0.61
CCTV camera	4723	0.02	6244	0.04	5158	0.03
Fax	0	0.00	1125	0.01	315	0.00
Total (B)	1,06,31,077	52.57	86,30,882	59.95	10,066,622	54.16
Total (A+B)	2,02,22,083	100.00	1,43,96,096	100.00	1,85,86,407	100.00

Table 2: Annual processing cost of cotton ginning units (₹ in lakhs/unit)

Particulars	Type of units		
	Automatic (n=36)	Semi-automatic (n=14)	All (n=50)
Cost of seed cotton	3094.35	2933.04	3049.18
Caustic soda	1.39	1.45	1.41
Cost of packaging material	5.40	5.25	5.36
Total	3101.14	2939.74	3055.95

Table 3: Annual management cost of cotton ginning units (Value in ₹/unit)

Particulars	Type of units					
	Automatic (n=36)		Semi-automatic (n=14)		All (n=50)	
	Value (₹)	Per cent	Value (₹)	Per cent	Value (₹)	Per cent
Appeal fees	18,622	0.13	7350	0.09	15,466	0.15
Audit fee	26,437	0.19	30,392	0.37	27,545	0.35
Bank charges	2,05,094	1.49	2,37,522	2.60	2,14,174	1.85
Bank process expense	2,08,260	1.51	1,29,531	1.45	1,86,216	1.65
Discount expense	21,53,997	15.68	15,13,596	16.48	19,74,685	15.98
Donation	6750	0.06	69,067	0.77	24,199	0.20
E.P.F expense	56,326	0.41	5100	0.08	41,983	0.42
Insurance expense	2,64,328	1.92	6,76,828	7.40	3,79,828	3.09
Legal and professional fees	65,356	0.47	22,522	0.29	53,362	0.49
Municipal tax	65,332	0.47	34,088	0.41	56,601	0.55
Office expense	47,514	0.34	27,423	0.35	41,889	0.45
Postage and courier expense	4134	0.04	4630	0.09	4273	0.08
Remuneration to partners	40,86,909	29.76	9,17,402	9.98	31,99,447	25.85
V A T	58,319	0.42	16,022	0.19	46,476	0.51
Subscription expense	1823	0.01	3138	0.05	2191	0.04
Permanent administrative staff	4,11,564	2.30	4,72,193	5.18	4,28,540	3.60
Interest to partners	14,60,005	10.63	13,68,651	14.89	14,34,426	11.65
Interest to depositors	4,45,351	3.24	2,11,675	2.35	3,79,922	3.08
Depreciation	36,28,988	26.42	29,36,455	31.98	34,35,079	25.65
Interest to late payments	1460	0.03	0	0.00	1051	0.05
Fire fighter expense	274	0.01	0	0.00	197	0.00
License fees	1393	0.02	1836	0.05	1517	0.01
Transportation expense	59,693	0.43	1,56,349	1.73	86,757	0.85
Travelling expense	4,49,450	3.27	2,59,959	2.84	3,96,392	3.25
Accountant charges	6189	0.05	35,000	0.38	14,256	0.20
Total	1,37,33,568	100.00	91,98,339	100.00	1,24,46,472	100.00

management cost varied from ₹ 91.98 lakhs in semi-automized units to ₹ 137.33 lakhs in fully automized units. In fully automized ginning units major costs were depreciation, remuneration to partners and discount expense. Remuneration to partners accounts for 29.76 per cent, depreciation 26.42 per cent and discount expense 15.68 per cent in fully automized units. In case of semi-automized ginning units, major costs were depreciation, discount expense and interest to partners. Depreciation accounts for 31.98 per cent, discount expense 16.48 per cent and interest paid to partners 14.89 per cent in semi-automized ginning units. The expenditure on total permanent administrative staff varied from ₹ 4,11,564 in fully automized units to ₹ 4,72,193 in semi-automized units which indicates the requirement of staff slightly decreased with increase in level of mechanization of units. It can be seen that as compared to semi-automized ginning units, fully automized ginning units required more fund

for management of the unit. This might be due to the difference in capacity utilization and average working days in both the categories of ginning units. On an average, the annual management cost for cotton ginning units amounted for ₹ 124.46 lakhs per unit.

Annual miscellaneous cost incurred by different cotton ginning units is given in Table 4. The miscellaneous cost worked out per unit was slightly higher in semi-automized ginning units (₹ 68,59,322) as compared to fully automized ginning units (₹ 68,21,940). The important items of miscellaneous costs were electricity bill, cotton lint kharajat expense, weight loss expense, etc. In case of fully automized ginning units, the major items of cost were of electricity (25.88 %), cotton lint kharajat expense (13.04 %) and weight loss expense (12.40%). While, in semi-automized ginning units, cost of electricity accounted for 25.90 per cent, cotton lint kharajat expense 18.39 per cent and market

Table 4: Annual miscellaneous cost of cotton ginning units (Value in ₹/unit)

Particulars	Type of units					
	Automatic (n=36)		Semi-automatic (n=14)		All (n=50)	
	Value (₹)	Per cent	Value (₹)	Per cent	Value (₹)	Per cent
Cotton lint kharajat expense	8,89,856	13.04	12,61,340	18.39	9,93,872	14.55
Factory expense	2,84,161	4.16	1,60,168	2.33	2,49,443	3.65
Factory wages expense	5,14,746	7.54	4,93,659	7.20	5,08,842	7.45
Market cess	5,53,143	8.12	6,88,314	10.03	5,90,991	8.65
Quality allowance expense	5,91,941	8.67	3,51,846	5.13	5,24,715	7.68
Sample allowance	53,182	0.77	8647	0.13	40,712	0.60
Phone bill	28,469	0.43	29,620	0.43	28,791	0.42
Cost of electricity	17,64,137	25.88	17,76,635	25.90	17,67,637	25.87
Fuel, oil, diesel	5,01,832	7.36	5,12,282	7.47	5,04,758	7.39
Stationery	13,294	0.19	57,768	0.84	25,747	0.38
Repairs and maintenance	1,30,491	1.91	2,37,824	3.47	1,60,544	2.35
Brokerage and commission expense	6,34,610	9.30	6,27,757	9.15	6,32,691	9.26
Weight loss	8,46,098	12.40	6,25,377	9.12	7,84,296	11.48
Others	15,979	0.23	28,086	0.41	19,369	0.27
Total	68,21,940	100.00	68,59,322	100.00	68,32,408	100.00

Table 5: Economics of cotton ginning units in Saurashtra region (Value in ₹/unit)

Particulars	Type of units		
	Automatic	Semi-automatic	All
Long term investments	95,91,006	57,65,214	85,19,785
Medium term investments	1,06,31,077	86,30,882	10,06,622
Processing cost	31,01,14,915	29,39,74,891	30,55,95,536
Management cost	1,37,33,568	91,36,728	1,24,46,472
Miscellaneous cost	68,21,940	68,59,322	68,32,408
Total production cost	35,08,92,506	32,43,67,037	34,34,60,823
Income			
(A) Main product			
(a) Cotton lint	29,42,83,902	27,98,60,537	29,02,45,360
(B) Byproduct			
(a) Cotton seed	8,07,03,626	6,00,42,347	7,49,18,468
Total gross income	37,49,87,528	33,99,02,884	36,51,63,828
Net income over production cost	2,40,95,022	1,55,35,847	2,17,03,005
Average bales (No.)	14,317	9757	13,040
Net income per bale	1682.96	1592.28	1664.34

Note: 1 bale = 170 kgs.

cess expense accounted for 10.03 per cent. On an average, annual miscellaneous cost was amounted to ₹ 68,32,408 per unit in the cotton ginning unit.

Break up of production cost and gross income for the different type cotton ginning units is given in Table 5. Among the various items of costs, processing cost was the major cost sharing 88.37 per cent (i.e. ₹ 3101.14 lakhs) to total production

cost. Other important costs were management cost, medium term and long term investment cost, miscellaneous cost, etc. in their order. The annual production cost was found in ranges from ₹ 3243.67 lakhs in semi-automized ginning units to ₹ 3508.92 lakhs in fully automized ginning units with an overall average of ₹ 3434.61 lakhs. The contribution of main product (lint) in gross income varied from

74.48 to 82.33 per cent. Other important byproduct cotton seeds are separated from the cotton fibre during the ginning process, which have contributed to gross income to the extent of 17.67 per cent in semi-automized ginning units and 25.52 per cent in fully automized ginning units.

The annual gross income was found to be highest i.e. ₹ 3749.87 lakhs in fully automized ginning units and the lowest ₹ 3399.03 lakhs in semi-automized ginning units. The same trend was found for the net income over production cost. The lower profit in the semi-automized ginning units may be obtained due to lack of technology up-gradation, high investment cost and lowest capacity utilization.

Economic feasibility

The economic feasibility of investment on cotton ginning units was assessed by computing the economic parameters viz., Net Present Value (NPV), Benefit Cost Ratio (BCR), Internal Rate of Return and Pay Back Period (PBP). These were worked out by conventional methods considering the economic life of cotton ginning unit. The investment made in the establishment of cotton ginning units was leisurely within a average life span of 20 years. Therefore, it was assumed that the ginning units continue to be operational for 20 years. Sensitivity analysis was also carried out to know the economic viability of cotton ginning units at various costs and return situations and to examine the sensitivity towards risk and uncertainty of changes in net returns of the unit or in cost of the cotton ginning units.

In the present study, sensitivity analysis was carried out with different situations of cost and returns as mentioned below:

- ♦ Situation I (S-I) – Normal (@ 10 %).
- ♦ Situation II (S-II) – 10 % increase in gross profit.

- ♦ Situation III (S-III) – 10 % increase in total cost.
- ♦ Situation IV (S-IV) – 10 % increase in gross profit and 10 % decrease in total cost.
- ♦ Situation V (S-V) – 10 % decrease in gross profit and 10 % increase in total cost.

The analysis was carried out separately for automatic and semi-automatic units and for all together.

The estimated values of various parameters used to test the economic viability of investment on cotton ginning units along with the sensitivity analysis of investment under varying situations are presented in Table 6. It is evident from the results that under situation of normal cost and return for all units, the net present value (NPV) was found positive (₹ 1,63,66,064) at 10 per cent rate of discount indicating the financial soundness of the investment in the cotton ginning units. The positive net present value reiterated the profitability in the cotton ginning units. The value of benefit-cost ratio (BCR) was quite reasonable and found to be greater than unity i.e. 1.16 indicating that the investment is worthwhile. The value of internal rate of return (IRR) was found 17.55 per cent, which was greater than prevailing rate of interest. It revealed that the cotton ginning units are economically feasible even at higher discount rates. The pay-back period was found to be 10 years and 2 months; it means the ginning unit took 10 years and 2 months to recover the investment.

In the varying situations of costs and returns i.e. in S-II, the value of NPV (₹ 2,81,46,338), IRR (21.33%) and BCR (1.27) increased considerably and PBP also reduced, which indicated the favourable situation. In S-III, the quite decline in values of NPV (₹ 81,76,996), IRR (14.40 %) and BCR (1.00) and increase in PBP was observed. It means S-III is critical for ginners. In S-IV, the highest rise in values

Table 6: Sensitivity analysis of cotton ginning units for all categories (n=50)

Sl. No.	Changes	NPV (in ₹)	IRR (in %)	BCR	PBP	
					Y	M
1	Normal (@ 10 %)	1,63,66,064	17.55	1.16	10	2
2	10 % increase in gross profit	2,81,46,338	21.33	1.27	8	0
3	10 % increase in total cost	81,76,996	14.40	1.00	12	5
4	10 % increase in gross profit and 10 % decrease in total cost	3,63,35,405	23.39	1.38	7	8
5	10 % decrease in gross profit and 10 % increase in total cost	-3603278	7.31	0.97	—	—

of NPV (₹ 3,63,35,405), IRR (23.39 %) and BCR (1.38) and reduction in PBP (7.8 years) was noted which indicated the most favourable situation for ginner. In case of S-V, the values of NPV found negative, IRR found less than the rate of interest and BCR is less than unity indicated worst situation for ginning industry. Thus, for all categories of gin units, in situations I, II and IV, the economic viability of investment on gin will stand stronger.

These all lead to conclude that the investment on cotton ginning unit is a profitable proposal but critical in Saurashtra region. It does not guarantee of stability and certainty of economic viability of investment, because slight decrease in prices or increase in production cost might turn out into loss situations.

To know the impact of automization in cotton ginning industries, a separate analysis for fully and semi-automized gin units was carried out. The results for fully automized gin units are given in Table 7.

Out of total sample size, majority of the ginneries found to be fully automized as mechanization took place in this sector. It is evident that under situation of normal cost and return for automatic ginneries, the NPV was found positive (₹ 2,79,53,348) at 10 per cent rate of discount indicating the financial

healthiness of the investment in the cotton ginning units. The value of BCR was found to be greater than unity (1.22) indicated the investment is worthwhile. The value of IRR was found 22.39 per cent. The pay-back period was found to be 10 years and 5 months. In S-II, the values of NPV (₹ 4,33,48,153), IRR (26.90%) and BCR (1.34) increased considerably and PBP also reduced, which indicated the favourable situation. In S-III, the considerable decline in values of NPV (₹ 1,27,86,656), IRR (18.88 %) and BCR (1.13) was observed. The increase in PBP (8.2 years) was noted. In S-IV, the highest rise in values of NPV (₹ 5,40,14,845), IRR (29.38 %) and increase in BCR (1.47) and decrease in PBP (6.4 years) was observed. It indicates that the most favourable situation for ginner is S-IV. In case of S-V, the highest decline in values of NPV (₹ 18,91,851) and IRR (11.32 %) and the lowest BCR (1.01) indicated the worst situation for ginning industry. Thus, in fully automization category of gin units, situations I, II and IV were the most economically viable situations. From the above discussion, it can be concluded that the investment on automization of cotton ginning units is profitable in Saurashtra region.

The results about economic fitness of investment on semi-automized gin units are given in Table 8. It is evident from the results that under the situation of normal cost and return for semi-automatic

Table 7: Sensitivity analysis of cotton ginning units for fully automization category (n=36)

Sl. No.	Changes	NPV (in ₹)	IRR (in %)	BCR	PBP	
					Y	M
1	Normal (@ 10 %)	2,79,53,348	22.39	1.22	7	5
2	10 % increase in gross profit	4,33,48,153	26.90	1.34	6	8
3	10 % increase in total cost	1,27,86,656	18.88	1.13	8	2
4	10 % increase in gross profit and 10 % decrease in total cost	5,40,14,845	29.38	1.47	6	4
5	10 % decrease in gross profit and 10 % increase in total cost	18,91,851	11.32	1.01	16	0

Table 8: Sensitivity analysis of cotton ginning units for semi-automization category (n=14)

Sl. No.	Changes	NPV (in ₹)	IRR (in %)	BCR	PBP	
					Y	M
1	Normal (@ 10 %)	-76,38,738	5.4	0.89	—	—
2	10 % increase in gross profit	-15,46,995	9.21	0.98	—	—
3	10 % increase in total cost	-1,24,83,640	0.59	0.83	—	—
4	10 % increase in gross profit and 10 % decrease in total cost	32,97,907	11.51	1.05	17	1
5	10 % decrease in gross profit and 10 % increase in total cost	-1,85,75,383	—	0.75	—	—

ginneries, the NPV was found negative (₹ 76,38,738) at 10 per cent rate of discount indicating the financial hardness of the investment in the cotton ginning units. The value of BCR was found less than unity (0.89) indicating that the investment is not economically viable. The value of IRR was found 5.4 per cent. In the varying situations of costs and returns i.e. in S-II, the values of NPV (₹ 15,46,995) was found negative. The value of IRR was 9.21 per cent and BCR was less than unity. The similar results were obtained in S-III and S-V. But the S-IV is found little hopeful. Looking to the results of NPV, IRR and BCR at 10 per cent rate of discount, the further analysis was done at 5 per cent rate of discount. In this situation the value of NPV (₹ 9,27,525) found positive. So, it can be inferred that semi-automized gin owner might have satisfied and continued with lower level expectation of income.

On the whole, it can be concluded that for survival of semi-automatic gin units, government should give financial support to convert these gins into fully automized unit.

CONCLUSION

In nutshell, the economics of ginning units revealed that long term and medium term investment accounted for almost equally in total investment. The major items of cost were land, building, machinery and cost of seed cotton. The net profit of fully automized ginning units found quite higher than semi-automized units. In general, ginning units were found economically viable but in particular, fully automized ginning units were found having stronger economic viability as compared to semi-automized units even in varying cost and price scenario. Increase in working days of units, repairs and maintenance cost, labour utilization and judicious use of electricity is needed to optimize the lint production.

REFERENCES

- Adanacioglu, H. and Olgun, F.A. 2011. Profitability and efficiency in the cotton ginning industry: A case study from Aegean region of Turkey. *Custose @gronegocio*, **6**(2): 163-182.
- Agrawal, F., Padole, P., Patil, P. and Dahake, A. 2011. Techno-economic feasibility of a mini cotton ginners for developing countries like India.
- Textile Committee. 2017a. Scenarios of cotton ginning of India and Gujarat. Available at <http://textilescommittee.nic.in>. Last Accessed on 2nd July, 2021.
- CCI. 2017b. Cotton Corporation of India. Available at <http://cotcorp.gov.in/TechnologyMissiononCotton.aspx>. Last Accessed on 19th August, 2021.
- Saurashtra ginners association. 2017c. Facts and figures. Available at http://www.sgaindia.org/facts_figs.html. Last Accessed on 24th June, 2021.
- Commodity Profile for Cotton. 2017d. Commodity profile for cotton. Available at http://agricoop.gov.in/sites/default/files/cott_2201.pdf. 1-9. Last Accessed on 14th June, 2021.
- Ashu, Bishnoi, D., Bhatia, J. and Sheoran O.P. 2018. An economic analysis of potato seed production in Haryana. *Indian J. Eco. and Dev.*, **14**(1a): 113-119.
- Charyulu, D. 2010. Technical, allocative and economic efficiency of organic input units in India. *Ind. J. Agric. Eco.*, **65**(4): 722-738.
- Mendhule, K. 2011. Feasibility study for linkage of farmers through contract farming with turmeric processing unit in Aurangabad district. MBA (AB) Unpublished Project report, Junagadh Agricultural University, Junagadh.
- Valia, H. 2011. Growth, development and performance of Amizara Cotton Pvt. Ltd. MBA (AB) Unpublished Project report. Junagadh Agricultural University, Junagadh.
- Zore, R. 2017. Pomegranate production economics and preference pattern of farmers toward agricon products – A conjoint analysis. MBA (AB) Unpublished Project report. Junagadh Agricultural University, Junagadh.

