An Economic Analysis of Processing of Cotton Crop Produce

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Abstract

This study was conducted in 2011 covering 30 cotton growers, fifteen each commission agents and Cotton Corporation of India agents, twenty ginners and five spinners in six mandals of Adilabad and four mandals of Guntur district. Findings of the study revealed that, the average total cost of cultivation and net returns of Bt cotton was higher in Adilabad district (₹ 69607 and ₹ 36781.15 ha^{-1} respectively) as compared to Guntur district (₹ 63793.2 and ₹ 21901 ha^{-1} respectively). The average total cost incurred in the processing of kapas to lint and lint to yarn worked out to be ₹ 4630.87 and ₹ 17201.64 q^{-1} of kapas. The gross returns obtained from ginning one quintal of kapas were ₹ 4970.41, of which the returns from main product (lint) were ₹ 3978.81 and that from by product (seed) were ₹ 991.6. The value addition to the product in the process was ₹ 732.41. The net value added as a result of processing of kapas to lint was ₹ 339.54 q^{-1} of kapas processed. The gross returns obtained from processing (spinning) of one quintal of lint were ₹ 20435, which comprised of mainly returns from yarn (₹ 18250) and wastage (₹ 2185). The value addition in the process was ₹ 8435. The net value added as a result of processing of lint to yarn was ₹ 5933.36 q^{-1} of lint processed. The ginners have maximum financial profitability (1.86) followed by spinners (1.62) and farmers (1.39).

Keywords: Cotton, cost, return, ginning, spinning, profitability

1. Introduction

Cotton is an important fibre crop in the world. Being a prime supplier of raw material for the textile industry, it plays a vital role in the Indian economy. Besides sustaining the country's textile industry, it also earns precious foreign exchange for the country from the export of raw cotton and finished goods. Although cotton is primarily fibre crop, it is also used as a food and feed crop. Cotton seed being the world's second most oilseeds used for culinary purposes and the oil cake residue is a protein rich feed for ruminate livestock.

Cotton production in India engages more than 6 million farmers. Besides, indirectly it employs an additional 40 to 50 million people in activities related to its cultivation, processing and trade.

The area under cotton in India is around 121.91 lakh ha, with the production and productivity of 356 lakh bales and 496 kg ha^{-1} respectively in 2010–11. After Maharashtra and Gujarat, Andhra Pradesh ranks third position in the country in cotton cultivation with an area of around 17.84 lakh hectares, and production and productivity of 53 lakh bales and 505 kg ha^{-1} respectively in 2010–11. The main cotton growing districts in Andhra Pradesh are Adilabad, Guntur, Warangal, Karimnagar, Khammam and Nalgonda. Adilabad is one of the leading districts in Andhra Pradesh with largest area accounting for 18.67% of state's total area and it ranked second in production with 6.43 lakh bales during 2008.

The processing of cotton is a business which is undertaken for the purpose of value addition to the product. The value addition to cotton takes place at three main stages of processing viz., ginning, spinning and weaving. The end product in cotton processing is the cloth which will result at the weaving stage of cotton processing.

The cotton processing industry, in fact, is the largest labour intensive economic activity next to agriculture and provides employment to Indian population either directly or indirectly. It is the largest organised and unorganised sector constitutes integral part of the urban and rural life of the country. India like other countries in the world preserves its ancient and time honoured traditions of ginning, spinning, weaving, dyeing and printing crafts.

Knowing the commercial importance of cotton at the country and state levels, it is felt that there is need to map the cotton chain (consisting of producer and various processors) and study the same through functional and financial analysis.

Hence, the present study was undertaken with the specific objectives i.e., 1) to identify and outline the cotton chain using functional analysis, 2) to determine the value added, production-trading accounts and the consolidated account of the chain and 3) to workout the financial profitability of the various agents in the cotton chain.

2. Materials and Methods

Multistage purposive sampling technique was adopted in the selection of the districts, mandals, villages, and cultivators for the present study. The study was conducted in Adilabad and Guntur districts of Andhra Pradesh covering six and four major cotton growing mandals respectively. From each selected mandal one village was selected and three farmers were selected randomly from each village for collection of data. Thus a total of 30 cotton farmers formed the sample size for the study. Besides, a sample of fifteen commission agents, fifteen CCI agents, twenty ginners and five spinners were selected as sample market intermediaries for the present study.

The data were collected through personal interview of selected cotton growers and marketing intermediaries like traders and processors with the help of pre-tested schedules designed for the purpose. The data regarding cropping pattern, cost of cultivation, net returns, gross returns, input costs, buying price, selling price etc are collected from farmers. Traders or the commission agents are the middle men between farmers and processors. Marketing costs, selling and buying price, fixed and variable costs are calculated. Related information was taken from processors also. The data collected was subjected to various analytical tools apart from simple averages.

The value addition on cotton occurs at three stages of processing *viz.,* ginning, spinning and weaving. Out of these three stages of processing two stages *viz.,* ginning and spinning stages were considered for the present study. Conventional, functional and financial analytical tools were employed for estimating the costs and returns in cotton production, cost of processing, returns and value addition to cotton in each stage of processing.

3. Results and Discussion

3.1. Identify and outline the cotton chain

The various agents involved in the cotton chain of the study area are identified as farmers, commission agents, CCI agents, ginning mills, oil mills, spinning mills.

3.1.1. Farmer

Seed cotton producers (Farmers) are the starting point in the chain. Production of cotton was the first stage in cotton chain. Farmer is willing to do activities like production and marketing of cotton. They sell output (kapas) to commission agents or Cotton Corporation of India (CCI) agents.

3.1.2. Commission agent

Commission agents act as a direct link between the farmers and the ginning mills. The commission agents mostly work for the ginneries on commission of ₹ 500 to ₹ 1000 t^{-1} of seed cotton purchased. It has been identified that the activities of the agents do not directly affect the existing price but indirectly affect the income of the farmers and that of the traders. These activities of the agents' were noticed to be as a result of re-adjustment of weighing scale, and adulteration of seed cotton with impurities. The effect of adulteration is contributing to the low ginning capacity of the ginneries, thereby reducing output as well as income of the farmers, traders and the ginning companies since market price is affected in the process.

3.1.3. CCI agent

Cotton Corporation of India as a Nodal Agency of Government of India undertakes price support operations and keeps itself in preparedness to meet the eventualities of price support operations. As and when kapas prices touch the level of Minimum Support Price (MSP), kapas purchases are made under MSP operations without any quantitative limits. Under these MSP operations, cotton farmers are free to offer their kapas produce to CCI and Corporation continues purchases of such kapas till the prices rule at MSP level. In the event of kapas prices ruling above MSP level, Corporation undertakes commercial operations at its own cost for supply of cotton to mills in the State sector as well as private sector.

3.1.4. Ginning mill

Ginning means separation of cotton seed from raw cotton**.** Ginning mills are two types i.e., private and co-operative ginning mills. The processing of seed cotton into lint and seed is done at the ginneries which are located at the cotton growing areas of the country. At the ginneries, after extracting the seed from the seed cotton, the lint is graded, made into bales and then conveyed to the textile mills where it is spun into yarn before being woven into assorted fabric.

Processing refers to value addition for the commodity in the process. Ginning is concluded as primary processing. It makes possible to recover valuable by products. Processed products provide better returns to processor. The main output of ginning (lint) will be send to spinning mills and the by product (seed) to oil mills. Some part of main product (lint) is exported to other states like Maharashtra, Gujarat, Tamilnadu, etc.

The raw cotton harvested by various farmers makes its way to various ginneries either directly by the cotton farms if they own the ginner or through local collectors. Ginners are pivotal in the cotton chain as the lint output from them links the cotton sector with the textile and garment factories both in the domestic and international markets, while the cottonseeds go to edible oil mills and oil cake residues as animal feed.

3.1.5. Oil mill

The factory utilizes cottonseed as raw material in addition to other oil crops like sesame, groundnut, niger seed (*Nug*). The oil mill produces oil and seed cake from cottonseed. The

main function of oil mills is the separation of oil from cotton seed. During this processing the byproduct is seed cake. Cotton seed composed of 10% of oil, 64% of seed cake and remaining 26% is the wastage. The main product oil will be sold to local oil consumers and the byproduct seed cake is used as feed for livestock. The oil produced from cottonseed is then used for human consumption, while the oilseed cake is used for dairy and fattening animals as feed. The oil produced from cottonseed by the oil mill is consumed by a number of consumers from different parts of the country in addition to the local consumers. However, shortage in supply of cottonseed is reported as a serious problem.

3.1.6. Spinning mill

Spinning is the next stage of ginning in the processing. Spinning means making yarn or thread from fibrous material (cotton lint).The act of fishing with a light rod and a reel having a bail or similar device that guides the line around a stationary spool and that can be disengaged to let the line run freely, as when casting. Also called spin casting, spin fishing. After processing yarn is sent to textile mills and some part is exported to other countries like Pakistan and Bangladesh (Figure 1).

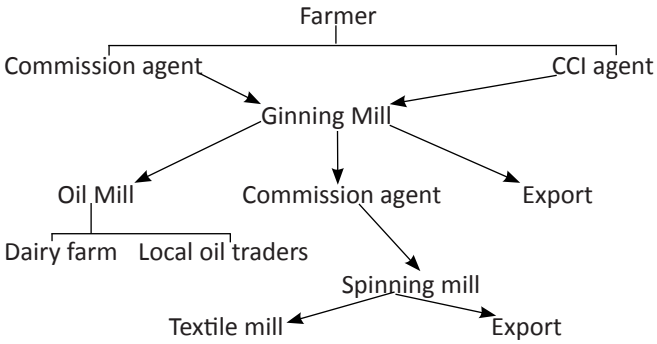

Figure 1: Flow diagram of cotton chain

The different stages of the cotton chain, agents involved in chain, the functions of each agent and the output of each stage is presented in Table 1.

3.2. Value added, production-trading and consolidated accounts of cotton chain

3.2.1. Cotton producer

3.2.1.1. Cost and returns of cotton cultivation

The cost of cultivation of cotton computed from the data collected from the sample farmers (Table 2) reveals that the cost of cultivation is higher by (₹ 5813.8) in Adilabad as compared to Guntur district. This is because of incurrence of higher expenditure on labour component and also increased fixed costs by the sample respondents in Adilabad district.

The average total cost per hectare of cotton was ₹ 69607 in Adilabad of which 79.24% was towards variable expenditure and 20.76% was the fixed cost. The total cost of cultivation incurred to produce one quintal of cotton was ₹ 2577.98,

Table 1: Functional analysis of cotton chain

Stage of the chain	Function	Agent	Output
Production	Cultivation	Small and Large farmers	Cotton seed
Primary marketing	Marketing Transport to mill	Commission agent CCI agent	Cotton seed
Millers Ginning mill	Milling	Private and co-operative millers	Lint and Seed
Spinning mill	Milling	Private and co-operative millers	Yarn
Oil mill	Processing	Private and co-operative millers	Oil Seed cake
Textile industry	Weaving	Private and co-operative weavers	Cloth
Exports	Marketing	Exporters	Lint, Yarn, cloth

which comprised of variable cost (₹ 2042.8) and fixed cost (₹ 535.18).

Similarly, the average total cost per hectare of cotton in Guntur district was ₹ 63793.2 of which 75.63% was variable cost 24.37% was fixed cost. The total cost of cultivation incurred to produce one quintal of cotton was ₹ 2542.1, which comprised of variable cost (Rs. 1922.44) and fixed cost (₹ 619.7).

Per hectare cost of marketing and per quintal cost of marketing of cotton in Adilabad and Guntur districts are presented in Table 3. The sample farmers in Adilabad district has incurred ₹ 7011.9 as the marketing cost of cotton, of which packing material and packing charges (₹ 2710.8) was the major component accounting for 38.66 % followed by commission charges (₹ 2149.2), transportation cost (₹ 1404), loading and unloading charges (₹ 558.9) and weighing charges (₹ 189) accounting for 38.66%, 30.65%, 20.02%, 7.97% and 2.7% of the total cost of marketing respectively. The marketing cost per quint Similarly, the marketing cost of cotton in Guntur district was ₹ 6805, in which packing material and packing charges (₹ 2897.5), commission charges (₹ 1636.25), transportation cost (Rs.1630), loading and unloading charges (₹ 466.25) and weighing charges (₹ 175) accounted for 42.59%, 24.04%, 23.95%, 6.85% and 2.57% respectively. The marketing cost per quintal of cotton was ₹ 272.2. These results are in conformity with the results of Mundinamani (2000).

The gross returns ha^{-1} of cotton cultivation were ₹ 113400 and ₹ 92500 with gross returns q^{-1} of cotton being ₹ 4200 and ₹ 3700 in Adilabad and Guntur respectively (Table 4). The net returns obtained per hectare and per quintal of cotton over cost was found more in Adilabad (₹ 36781.15 ha^{-1}, ₹ 1362.32

Table 2: Cost of cultivation of cotton

Sl. No.	Particulars	Adilabad			Guntur		
		₹ ha^{-1}	₹ q^{-1}	%	₹ ha^{-1}	₹ q^{-1}	%
I.	Variable cost						
1.	Human labour	17152.8	635.28	24.64	15542.5	621.7	24.45
2.	Bullock labour	2500	92.59	3.59	2125	85	3.34
3.	Tractor power	5250	194.44	7.54	4575	183	7.19
4.	Seeds	3697.9	136.95	5.31	3750	150	5.9
5.	Farm yard manure	16515	611.66	23.72	13312.5	532.5	20.94
6.	Fertilizers	3135.95	116.14	4.50	3831.65	153.26	6.02
7.	Plant protection chemicals	2583.32	95.67	3.71	1927.07	77.08	3.03
8.	Irrigation charges	927.00	34.33	1.33	0	0	0
9.	Interest on working capital	3395.00	125.74	4.87	3237	119.9	4.72
	Sub total (I)	55157.00	2042.8	79.24	48300.7	1922.44	75.63
II.	Fixed cost						
1.	Rental value of own land	11500	425.92	16.52	12800.00	512.00	20.14
2.	Depreciation	1500	55.55	2.15	1350.00	54.00	2.12
3.	Interest on fixed capital	1450	53.7	2.09	1342.5	53.70	2.11
	Sub total (II)	14450	535.18	20.76	15492.5	619.70	24.37
III.	Total cost of cultivation (I+II)	69607	2577.98	100	63793.2	2542.10	100.00

Table 3: Cost of marketing of cotton

Sl. No	Particulars	Adilabad			Guntur		
		₹ ha^{-1}	₹ q^{-1}	%	₹ ha^{-1}	₹ q^{-1}	%
1.	Packing material and packing charges	2711.00	100.40	38.66	2897.5	115.9	42.59
2.	Loading and unloading charges	558.9	20.70	7.97	466.25	18.65	6.85
3.	Transportation cost	1404.00	52.00	20.02	1630.00	65.2	23.95
4.	Weighing charges	189.00	7.00	2.70	175.00	7.00	2.57
5.	Commission charges	2149.00	79.60	30.65	1636.30	65.45	24.04
Total	7012	259.70	100.00	6805.00	272.20	100.00	

Table 4: Returns from cotton production

Sl. No	Particulars	Adilabad		Guntur	
		₹ ha^{-1}	₹ q^{-1}	₹ ha^{-1}	₹ q^{-1}
1.	Gross return	113400	4200	92500	3700
2.	Total cost	76618.85	2837.68	70598.22	2814.34
3.	Net return	36781.15	1362.32	21901.78	885.66
4.	B-C Ratio	1.48	1.48	1.31	1.31

q^{-1}) when compared to Guntur (Rs.21901.78 ha^{-1}, Rs.885.66 q^{-1}). The benefit cost ratio obtained was 1.48 and 1.31 in Adilabad and Guntur respectively. This is also on par with the results of Mundinamani (2000).

3.2.2. Ginning Units

The cost of ginning process i.e., processing of kapas to lint is presented in Table 5. On an average, the total cost incurred in the processing of kapas to lint worked out to Rs.4630.87 per quintal of kapas. It is worth noting that the total variable cost (Rs.4545.75 per quintal) formed a substantial component (98.2%) of the total cost of processing of kapas to lint. The total fixed cost being Rs.85.12 per quintal, accounted for only 1.8 % of the total cost of processing. Considering variable cost, cost of raw material comprises about 91.51% of total cost of processing. In the total fixed cost, salaries to permanent staff

Table 5: Cost of processing of kapas to lint (ginning process)

Sl. No.	Particulars	₹ q^{-1}	Percentage
A.	Fixed Cost		
1.	Depreciation		
	(a) Building @ (5%)	2.16	0.04
	(b) Machinery @ (15%)	7.81	0.16
2.	Salary to permanent staff	33.56	0.72
3.	License fee	1.15	0.03
4.	Insurance	15.85	0.34
5.	Taxes	4.33	0.09
6.	Interest on fixed capital	20.26	0.43
Total fixed cost		85.12	1.8
B.	Variable Cost		
1.	Cost of raw material	4238	91.51
2.	Electricity charges	49.97	1.08
3.	Repair and maintenance	15.91	0.36
4.	Wages to casual labour	22.3	0.48
5.	Telephone charges	2.82	0.09
6.	Interest on working capital	216.75	4.68
	Total Variable Cost	4545.75	98.2
	Total Processing Cost (A+B)	4630.87	100

(₹ 33.56) were found to be the major component (0.72%). Similar results are observed with Bawa and Kainath (1989), Mundinamani (2000) and Shivakumar et al. (2001).

The gross returns obtained from ginning one quintal of kapas were ₹ 4970.41, of which the returns from main product (lint) were ₹ 3978.81 and that from byproduct (seed) were ₹ 991.6 (Table 6). The value addition to the product in the process was ₹ 732.41. The net value added as a result of processing of kapas to lint was ₹ 339.54 q^{-1} of kapas processed.

The benefit cost ratio worked out to be 1.86 in kapas processing. Among all the marketing costs of ginned cotton, the maximum cost was incurred on packing material ₹ 30.36 q^{-1} (37.47%). As the packing material was very important in case of lint marketing, it constituted the maximum % followed by sales tax, miscellaneous costs and selling expenditure (Table 7).

Table 6: Returns from processing of kapas to lint (for one quintal of kapas ginned)

S.No	Particulars	Amount (₹)
1.	Returns from main product (lint)	3978.81
2.	Returns from by-product (seed)	991.6
3.	Gross returns	4970.41
4.	Raw material cost (kapas)	4238
5.	Value addition	732.41
6.	Processing cost	392.87
7.	Net value addition	339.54
8.	Benefit-cost ratio	1.86

Table 7: Cost of marketing of lint

Sl. No.	Particulars	₹ q^{-1}	Percentage
1.	Packing material	30.36	37.47
2.	Selling expenditure	13.92	17.18
3.	Sales tax	20.26	25.02
4.	Miscellaneous cost	16.46	20.33
	Total	81.01	100

3.2.3. Spinning unit

As evident from Table 8, the average total cost incurred in the processing of lint to yarn was ₹ 17201.64 q^{-1}, of which the total variable cost was ₹ 15497.16 (90.09%) and total fixed cost being ₹ 1704.48 q^{-1} (9.91%).

Table 8: Cost of processing of lint to yarn (spinning process)

Sl. No.	Particulars	₹ q^{-1}	Percentage
A	Fixed cost		
1.	Depreciation		
	(a) Building @5%	123.14	0.71
	(b) Plant and Machinery @ 15%	1292.81	7.51
	(c) Computers and soft-ware @60%	4.45	0.02
	(d) Furniture @10%	2.51	0.01
	(e) Vehicles @ 15%	4.15	0.02
2.	Salary to permanent staff	176.9	1.02
3.	License fee	3	0.01
4.	Insurance	19.43	0.11
5.	Taxes	9	0.06
6.	Interest on fixed capital	69.09	0.4
Total fixed cost		1704.48	9.91
B	Variable Cost		
1.	Cost of raw material	12000	69.76
2.	Electricity charges	1690	9.82
3.	Repair and maintenance	21.08	0.12
4.	Office maintenance	220.54	1.28
5.	Wages to casual labour	560	3.25
6.	Telephone charges	20.54	0.11
7.	Interest on working capital	985	5.72
	Total Variable Cost	15497.16	90.09
	Total Processing Cost (A+B)	17201.64	100

Of the variable cost the major component is cost of raw material (₹ 12000 q^{-1}) accounting for 69.76%. In total fixed cost, depreciation was found to be major component (8.27% of total cost of processing). These results are in line with the results of Mundinamani (2000) and Shivakumar et al. (2001).

The gross returns obtained from processing (spinning) of one quintal of lint were ₹ 20435, which comprised of mainly returns from yarn (₹ 18250), wastage (₹ 2185). The value addition in the process was ₹ 8435 (Table 9). The net value added as a result of processing of lint to yarn was ₹ 5933.36 q^{-1} of lint processed. The resultant benefit-cost ratio was 1.62.

Table 9: Returns in processing of lint to yarn (For one quintal of lint spinned)

Sl. No.	Particulars	Amount (₹)
1.	Returns from main product(yarn)	18250.00
2.	Returns from wastage	2185.00
3.	Gross returns	20435.00
4.	Raw material cost (kapas)	12000.00
5.	Value addition	8435.00
6.	Processing cost	5201.64
7.	Net value addition	5933.36
8.	Benefit-cost ratio	1.62

Among all the costs incurred in marketing of spinned cotton, the maximum cost was incurred on packing material ₹ 275.48 q^{-1} (47.9%). This was followed by commission charges ₹ 246.45 (42.85%) and export expenses, yarn sale expenses, yarn freight together accounting for 9.22% of the total cost of marketing of one quintal yarn (Table 10).

Table 10: Cost of marketing of yarn

Sl. No.	Particulars	₹ q^{-1}	Percentage
1.	Packing material	275.48	47.9
2.	Commission	246.45	42.85
3.	Export expenses	30.64	5.32
4.	Yarn sale expenses	12.06	2.09
5.	Yarn freight	10.46	1.81
	Total	575.09	100

The results indicated that an additional value to the extent of ₹ 2297.54 was created in the course of processing kapas in to yarn. The breakup of the same at different levels of processing was ₹ 339.54 (14.78%) at ginning and ₹ 1958 (85.22%) at spinning. These results are on par with the results of Dodamani (2007).

1.3. Financial profitability of agents

Kudi et al. (2007) from their study on cotton commodity chain indicated that cotton production, marketing and processing under the current price and cost setting is profitable. Of all the members in the chain, ginner posses benefit-cost ratio of 1.86 with first profitability rank followed by spinners with 1.62 benefit-cost ratio and farmer with 1.39 benefit-cost ratio possessing 2nd and 3rd profitability ranks among themselves (Table 11). Kenkel and Tilley (1993) also indicated that larger gins have significantly lower cost per bale and higher profit per bale.

Table 11: Profitability of the agents

Sl. No.	Members in cotton chain	B-C ratio	Profitability rank
1.	Farmer	1.39	3
2.	Ginner	1.86	1
3.	Spinner	1.62	2

3. Conclusion

Education on recommended doses of inputs to reduce cost of cultivation is needed. Cotton processing is profitable. Motivation to take up value addition at farm level is required to enhance returns. Establishment of ginning mills on custom hire basis and spinning units on cooperative basis is needed to reduce transportation cost and have value addition. To avoid shortage of raw material during off season, it is necessary to establish cotton storage facilities by government as well as co-operative and private sectors.

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