TEA PROCESSING

1.0 INTRODUCTION

India is the second largest producer of tea, producing almost close to 1000.00 million kgs now. It is also the highest consumer of tea globally. As a result, 80% of tea produced in India is consumed locally, with the CTC variety being the most preferred. Indian tea's exports have gradually declined over the last 2 decades and now ranks below Kenya, Sri Lanka and China. However, increased domestic demand has compensated for this drop in export volumes.

Tea is India's leading beverage after water. Its huge market, has in a way, prompted many suppliers/ manufacturers & marketers of tea to overlook the finer aspects of this great beverage – in their zeal to produce & present large quantities of inferior products and pass it off as cheap “tea”. What's more, some products, claiming “superior quality” actually make huge compromises on that front to hoodwink consumers, who end up being denied the true value for the price paid. All this has overshadowed tea's core essence - its status as a classic beverage, with range of varieties & subtleties of taste.

This project profile is for production of CTC made tea with installed processing capacity of 30 lacs kg of green tea leaves, based on 300 working days per annum and 8 working hours per day.

2.0 MARKET POTENTIAL

Tea trading in India is done in two ways - auction and private selling. Market reports are obtained from six major auction centres in India - Kolkata, Guwahati, Silguri, Cochin, Coonoor and Coimbatore.

Demand supply gap has been increasing in India in recent years. While tea consumption has been growing at 3-3.5% every year, there has been no significant increase in plantation land in the last few years as per the market survey report.

According to the Indian Tea Association, India produced 985 million kg of tea in 2011, up from 966 million kg produced in 2010. But the total output missed the 1 billion kg mark due to unfavourable weather (early winter in North East and rains in South India) in the last year.

Per capita consumption is another interesting factor to look at. India's per capita consumption of 650.00 gms is still less when compared to the markets of Pakistan and UK with a consumption of 1.00 kg and 2.50 kg, respectively. Considering the gap in figures, India has bright chances of increasing its tea production. Recent surge in coffee prices has also added effervescence to the tea industry. The rise in coffee prices has forced people to shift from coffee to tea. Besides, world-over international companies like Coca Cola have plans to launch tea-based beverages.

3.0 PROCESS DETAILS

The process of manufacturing CTC tea comprises of the following different process.

(I) Spreading the leaf on Withering Trough: The collected green Leaf is spread upon the withering trough, while spreading due emphasis is laid upon to remove source and old dried leaves so that it will help to minimize the presence of stalks and help in producing fine tea.

(ii) Withering: The process of withering involves partial removal of moisture from fresh leaf and is carried out in order to condition the leaf physically for subsequent processing. Besides, some chemical changes also take place during withering and these are independent of the physical process. Thus, withering involves (a) Physical wither and (b) Chemical wither. While the physical wither can be completed even in 3-4 hours, however for completion of the chemical wither, a period of 12-16 hours is required as such the withering trough can't normally be used more than once a day. Withering is carried out either by Natural Withering or by Trough withering system.

The green leaves that are spread upon the wire mess of withering trough are charged with cold and warm air through an axial flow fan so that the moisture content is reduced to the desired level. Generally the level of reduction in moisture depends upon the grades and quality of tea, which is to be manufactured.

(iii) Rolling/Rotorvane: The withered leaf are rolled to rupture the leaf cells and release of enzymes and to give a twist to the leaf. It is achieved by processing withered leaf in Rotorvane.

During rolling operation chemical changes among the principal constituents of leaf start as soon as the juice of leaf is squeezed out in contact with the air. The chemical changes are caused by the enzyme present in the leaf. The enzyme brings about chemical changes but it does not change itself. Generally, leaf is rolled in Rotorvane before sent for further processing.

(iv) Operating on C.T.C Machines: After the leaves are rolled, they are put into the C.T.C machine (i.e. cutting, tearing and curling machine). This machine cuts the leaf into uniform size with maximum cell distortion leading to quicker and more even oxidation during fermentation. The C.T.C machine is comprised of two rollers rotating in opposite directions at the arranged speed. The speed of the two rollers are different, one of the roller is fast rotating at a speed of around 675 revolutions per minute, whereas the slow roller rotates at a speed of 60 to 73 revolutions per minute. Generally, a constant clearance between the rollers is maintained.

The roller segment is in sharp condition, which cut the leaves three times. During the process it is specifically seen that leafs are not heated as it destroys briskness and quality.

(v) Fermenting: After processing in the C.T.C machine the leaf are fermented. Fermentation of the tea leaf is a very important process in Tea manufacture for briskness, strength, colour and quality largely depend upon it.

The duration of fermentation varies according to rise and fall of temperature. A temperature of 76'F to 78'F represents the ideal temperature of the fermenting room and it takes roughly between 1 to 2 hours in the fermenting process. The leaf processed in C.T.C is spread on the fermenting floor or fermenting bed of fermenting machine. Generally, they are spread at a thickness of half a inch. Fermentation begins as soon as the juice of the leaf come into contact with the air enzyme present in the leaf being about chemical changes among the constituents of the leaf cell such as latechins (polypheno's) and caffeine. When the leaf become bright red in the fermenting room it is the best time to transfer to the drying room for firing.

(vi) Drying: After the requisite level of fermentation CTC leaf is transferred to the drying room where the leaf is fed on the trays of mechanical dryers and fermented leaf is fired at an inlet temperature of 200'F to 220'F to arrest fermentation process and to remove additional moisture present. The exhaust temperature being 120'F to 135'F. The thickness of spreading of CTC leaf being one fourth of inch. The fair revolution of the quality drying machine should be 350 and the tray speed is 200. The final moisture contained of the tea is kept at around 3%.

(vii) Sorting: The sorting process of the CTC leaf is very simple. At first tea is allowed to pass through the sorter for separation of grades, during this process tea is also made free from any foreign material, fibre and other proper grading which depend largely on size (granule) of tea. After grading tea is packed in tea chest/jute bags of standard size and sent to the auction centre.

4.0 COST OF THE PROJECT

The estimated project cost is given below:

(Rs. in lacs)

Particulars	Amount (Rs)
Land & site development	10.00
Building & civil works	133.46
Plant & Machinery	159.20
Misc. Fixed assets	39.48
Preliminary & pre-operative expenses	18.75
Contingencies & escalation @ 3%	10.26
Working capital	16.77
TOTAL	387.92

4.1 Land & Site Development: Details of land & site development are given below.

Particulars	Area (Sqm)	Rate (Rs)	Amount (Rs)
Site levelling, approach road, construction of boundary wall, etc.	LS	LS	1000000
		Say (Rs. in lacs)	10.00

4.2 Building & Civil Works: Details of building & civil works are given below.

Particulars	Area (Sqm)	Rate (Rs)	Amount (Rs)
Factory Building (Open Shed, CGI sheet roof, concrete floor)	1500	3500	5250000
Trough House (Open Shed, CGI sheet roof, concrete floor)	1800	3500	6300000
Office cum Store Building (Brick wall, CGI sheet roof, Concrete Floor)	140	4000	560000
Staff Quarters (Brick wall, CGI sheet roof, Concrete Floor)	100	4000	400000
Genset Room (Brick wall, CGI sheet roof, Concrete Floor)	50	4000	200000
		Sub total	12710000
Add: Electrification, water supply and sanitation @ 5%			635500
		TOTAL	13345500
		Say (Rs. in lacs)	133.46

4.3 Plant & Machinery: Details of plant & machinery are given below.

Particulars	Qty	Rate (Rs)	Amount (Rs)
Withering Trough (Axial flow fan model 48" diameter 3HP motor fitted)	1	3395000	3395000
Withered Green leaf Shifter with SS tray	1	85000	85000
Rotorvane (Electrical Motor 20 HP 1440 rpm with suitable starter)	1	327000	327000
Ghoogie Sifter completed fitted with aluminium pain sheet with 1 HP Motor	1	130000	130000
42" x 13" x 4 Cut CTC Machine	1	1833000	1833000
CFM Modular plenum chamber (Inclusive of Feed Conveyor, Polyester Mesh Belt, 5HP AC Drive, & Electrical parts etc)	1	975000	975000
Vibratory Fluid Bed Dryer 300 V	1	1600000	1600000
Air Heater System with accessories	1	3070000	3070000
Fabrication of M.S. Chimney	1	205000	205000

Sorting Machine & Conveyers	1	1599500	1599500
Weighbridge (40 ton PIT Mounted Fully Electronic Lorry)	1	45000	45000
Mono Rail 4 wheel overhead conveyor system with accessories	1	507500	507500
Milling Machine with accessories	1	320000	320000
Chasing Machine with accessories	1	230000	230000
Cutter grinder machine with accessories	1	55000	55000
Miscellaneous items	LS	LS	50000
		Sub total	14427000
Add: Installation, transportation, etc @ 10%			1442700
		TOTAL	15919700
		Say (Rs. in lacs)	159.20

4.4 Misc. Fixed Assets: Details of miscellaneous fixed assets are given below.

Particulars	Qty	Rate (Rs)	Amount (Rs)
Electrical Panel board with accessories	1	900000	900000
125 KVA DG Set	1	700000	700000
160 KVA DG Set	1	889000	889000
Transformer 500 KVA	1	950000	950000
Furniture & fixtures	LS	LS	100000
Miscellaneous items	LS	LS	50000
		Sub total	3589000
Add: Installation, transportation, etc @ 10%			358900
		TOTAL	3947900
		Say (Rs. in lacs)	39.48

4.5 Contingencies & Escalation: Contingencies & escalation has been assumed at 3% of the cost of land & site development, building & civil works, plant & machinery and miscellaneous fixed assets.

4.6 Preliminary & Pre-operative Expenses: Details of preliminary & pre-operative expenses are given below.

Particulars	Amount (Rs)
Travelling expenses	50000
Professional & other fees	100000
Interest during implementation	1674764
Miscellaneous expenses	50000
TOTAL	1874764
Say (Rs. in lacs)	18.75

4.7 Working Capital: Details of working capital are given below.

(Rs. in lacs)

	Period (Days)	Amount (Rs)		
		Year 1	Year 2	Year 3
Raw materials	15	11.10	12.95	14.79
Power & fuel	30	0.30	0.35	0.40
Salary	30	1.73	1.73	1.74
Finished Goods	15	12.53	14.46	16.39
Receivables	15	16.27	18.99	21.70
Total		41.93	48.47	55.02
Working capital margin in Year 1 (40%)	16.77			

5.0 MEANS OF FINANCE

The means of finance for the project is estimated as below.

(Rs. in lacs)

Particulars	Percent	Amount
EQUITY		
A. Equity from Promoters	40%	155.17
B. Subsidy from Central/State Govt.	-	
DEBT		
Term Loan from Banks/FIs	60%	232.75
TOTAL	100%	387.92

6.0 PROFITABILITY STATEMENT

(Rs. in lacs)

Particulars	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7
A. INCOME							
Production capacity (kg/annum)	600000	600000	600000	600000	600000	600000	600000
Capacity utilisation	60%	70%	80%	80%	80%	80%	80%
Production/annum at capacity utilisation	360000	420000	480000	480000	480000	480000	480000
Price of made tea (Rs/kg)	110	110	110	110	110	110	110
Total income/annum	396.00	462.00	528.00	528.00	528.00	528.00	528.00
B. OPERATING EXPENSES							
Raw materials	270.00	315.00	360.00	360.00	360.00	360.00	360.00
Power & fuel	3.65	4.26	4.86	4.86	4.86	4.86	4.86
Salary	21.00	21.11	21.21	21.32	21.42	21.53	21.64
Repair & Maintenance	4.31	4.53	4.76	4.99	5.24	5.51	5.78
Selling Expenses	3.96	4.62	5.28	5.28	5.28	5.28	5.28
Miscellaneous Expenses	1.98	2.31	2.64	2.64	2.64	2.64	2.64
Total Operating Expenses	304.90	351.82	398.75	399.10	399.45	399.82	400.20
Less: Working expenses capitalised	16.77	0.00	0.00	0.00	0.00	0.00	0.00
Operating profit	107.87	110.18	129.25	128.90	128.55	128.18	127.80
C. FINANCIAL EXPENSES							
Depreciation	15.36	15.36	15.36	15.36	15.36	15.36	15.36
Interest on Term Loan	31.90	28.38	23.26	18.14	13.01	7.89	2.77
Interest on Working Capital Loan	4.02	4.65	5.28	5.28	5.28	5.28	5.28
Net Profit	60.61	66.44	90.63	95.41	100.17	104.92	109.66
Net cash accruals	75.97	81.80	105.99	110.77	115.53	120.28	125.02
Principal Repayment	9.31	37.24	37.24	37.24	37.24	37.24	37.24

6.1 Production Capacity: Total production of made tea at 100% capacity utilization is estimated as below.

Rated plant capacity (kg/day of green tea leaves)	10000
No. of days/annum	300
Quantity of green leaves processed (kg)	3000000
Recovery rate of made tea from green leaves (%)	20%
Total production of made tea per annum at installed capacity (kg)	600000

6.2 Raw Materials: Total expenses on raw materials at 100% capacity utilization are estimated as below.

Quantity of green leaves processed (kg)	3000000
Price of green leaf (Rs/kg)	15
Expenses on raw material (green leaves) at installed capacity (Rs)	45000000

6.3 Power & Fuel: Total expenses on power & fuel at 100% capacity utilization is estimated as below.

A. Expenses on power

Particulars	Quantity	Power (Kw)	Total (Kw)	hrs/day	kwh/day
Plant & machinery (Total HP of 510)	1	380	250	8	250
General lighting	71	0.10	7	5	35
Total power requirement/day (kw)					285
Days/annum			300		
Rate/unit (Rs)			5		
Expenses on power per annum at 100% capacity			428100		

B. Expenses on fuel

Hrs/day	2
Days/annum	300
Diesel consumption (litres per hours)	6
Diesel Price per liter	50
Expenses on diesel (Rs)	180000
Expenses on power & fuel at installed capacity (Rs)	608100

6.4 Salary: Total expenses on salary in the 1st year are estimated as given below. It is assumed that salary expenses will increase @ 0.5% every subsequent year.

Particulars of Employees	Numbers	Salary/Month (Rs)	Cost/annum (Rs)
Manager	1	15000	180000
Technicians/machine operators	5	10000	600000
Semi skilled workers	10	5000	600000
Helpers	20	3000	720000
Expenses on salary in the 1st year (Rs)			2100000

6.5 Repair & Maintenance: Total expenses on repair & maintenance in the 1st year is estimated as given below. It is assumed that expenses on repair & maintenance will increase @ 5% every subsequent year.

(Rs. in lacs)

Particulars	Cost (Rs)	Rate	Amount (Rs)
Building & civil works	133.46	1.00%	1.33
Plant & Machinery	159.2	1.50%	2.39
Misc. Fixed assets	39.48	1.50%	0.59
Expenses on repair & maintenance in year 1			4.31

6.6 Selling Expenses: Selling expenses have been assumed at 1% of sales.

6.7 Miscellaneous Expenses: Miscellaneous expenses have been assumed at 0.5% of sales.

6.8 Depreciation: Depreciation has been calculated by straight line method. The details of calculation are given below.

(Rs in lacs)

Description	Cost (Rs)	Rate	Amount/ annum (Rs)
Building & civil works	133.46	3.34%	4.46
Plant & Machinery	159.20	5.28%	8.41
Misc. Fixed assets	39.48	6.33%	2.50
TOTAL			15.36

6.9 Interest on term loan & principal repayment: Interest rate has been assumed at 13.75%. Duration of Loan repayment has been considered for a period of 7 years including moratorium period of 1 year with equal monthly instalments. The details of calculation are given below.

(Rs in lacs)

Month	Year	1	2	3	4	5	6	7
Month 1	Opening balance	232.75	223.44	186.20	148.96	111.72	74.48	37.24
	Repayment	0.00	3.10	3.10	3.10	3.10	3.10	3.10
	Interest (13.75%)	2.67	2.56	2.13	1.71	1.28	0.85	0.43
	Closing balance	232.75	220.34	183.10	145.86	108.62	71.38	34.14
Month 2	Opening balance	232.75	220.34	183.10	145.86	108.62	71.38	34.14
	Repayment	0.00	3.10	3.10	3.10	3.10	3.10	3.10
	Interest	2.67	2.52	2.10	1.67	1.24	0.82	0.39
	Closing balance	232.75	217.23	179.99	142.75	105.51	68.27	31.03
Month 3	Opening balance	232.75	217.23	179.99	142.75	105.51	68.27	31.03
	Repayment	0.00	3.10	3.10	3.10	3.10	3.10	3.10
	Interest	2.67	2.49	2.06	1.64	1.21	0.78	0.36
	Closing balance	232.75	214.13	176.89	139.65	102.41	65.17	27.93
Month 4	Opening balance	232.75	214.13	176.89	139.65	102.41	65.17	27.93
	Repayment	0.00	3.10	3.10	3.10	3.10	3.10	3.10
	Interest	2.67	2.45	2.03	1.60	1.17	0.75	0.32
	Closing balance	232.75	211.03	173.79	136.55	99.31	62.07	24.83
Month 5	Opening balance	232.75	211.03	173.79	136.55	99.31	62.07	24.83
	Repayment	0.00	3.10	3.10	3.10	3.10	3.10	3.10
	Interest	2.67	2.42	1.99	1.56	1.14	0.71	0.28
	Closing balance	232.75	207.92	170.68	133.44	96.20	58.96	21.72
Month 6	Opening balance	232.75	207.92	170.68	133.44	96.20	58.96	21.72
	Repayment	0.00	3.10	3.10	3.10	3.10	3.10	3.10
	Interest	2.67	2.38	1.96	1.53	1.10	0.68	0.25
	Closing balance	232.75	204.82	167.58	130.34	93.10	55.86	18.62
Month 7	Opening balance	232.75	204.82	167.58	130.34	93.10	55.86	18.62
	Repayment	0.00	3.10	3.10	3.10	3.10	3.10	3.10
	Interest	2.67	2.35	1.92	1.49	1.07	0.64	0.21
	Closing balance	232.75	201.72	164.48	127.24	90.00	52.76	15.52
Month 8	Opening balance	232.75	201.72	164.48	127.24	90.00	52.76	15.52
	Repayment	0.00	3.10	3.10	3.10	3.10	3.10	3.10
	Interest	2.67	2.31	1.88	1.46	1.03	0.60	0.18
	Closing balance	232.75	198.61	161.37	124.13	86.89	49.65	12.41
Month 9	Opening balance	232.75	198.61	161.37	124.13	86.89	49.65	12.41
	Repayment	0.00	3.10	3.10	3.10	3.10	3.10	3.10
	Interest	2.67	2.28	1.85	1.42	1.00	0.57	0.14
	Closing balance	232.75	195.51	158.27	121.03	83.79	46.55	9.31
Month 10	Opening balance	232.75	195.51	158.27	121.03	83.79	46.55	9.31

	Repayment	3.10	3.10	3.10	3.10	3.10	3.10	3.10
	Interest	2.67	2.24	1.81	1.39	0.96	0.53	0.11
	Closing balance	229.65	192.41	155.17	117.93	80.69	43.45	6.21
Month 11	Opening balance	229.65	192.41	155.17	117.93	80.69	43.45	6.21
	Repayment	3.10	3.10	3.10	3.10	3.10	3.10	3.10
	Interest	2.63	2.20	1.78	1.35	0.92	0.50	0.07
	Closing balance	226.54	189.30	152.06	114.82	77.58	40.34	3.10
Month 12	Opening balance	226.54	189.30	152.06	114.82	77.58	40.34	3.10
	Repayment	3.10	3.10	3.10	3.10	3.10	3.10	3.10
	Interest	2.60	2.17	1.74	1.32	0.89	0.46	0.04
	Closing balance	223.44	186.20	148.96	111.72	74.48	37.24	0.00
Principal Repayment		9.31	37.24	37.24	37.24	37.24	37.24	37.24
Interest		31.90	28.38	23.26	18.14	13.01	7.89	2.77

6.10 Interest on Working Capital Loan: Interest rate on working capital loan has been assumed at 16%. The details of calculation are given below.

(Rs. in lacs)

Particulars	Year 1	Year 2	Year 3
Total current assets	41.93	48.47	55.02
Bank Loan (60%)	25.16	29.08	33.01
Interest @ 16%	4.02	4.65	5.28

7.0 DEBT SERVICE COVERAGE RATIO (DSCR)

(Rs. in lacs)

Year	1	2	3	4	5	6	7	TOTAL
Net Profit	60.61	66.44	90.63	95.41	100.17	104.92	109.66	
Depreciation	15.36	15.36	15.36	15.36	15.36	15.36	15.36	
Interest	31.90	28.38	23.26	18.14	13.01	7.89	2.77	
Total	107.87	110.18	129.25	128.90	128.55	128.18	127.80	860.72
Interest	31.90	28.38	23.26	18.14	13.01	7.89	2.77	
Loan repayment	9.31	37.24	37.24	37.24	37.24	37.24	37.24	
Total	41.21	65.62	60.50	55.38	50.25	45.13	40.01	358.10
DSCR	2.62	1.68	2.14	2.33	2.56	2.84	3.19	

Average DSCR = 2.40

8.0 BREAK EVEN POINT (BEP)

(Rs. in lacs)

Year	1	2	3
A. Net sales	396.00	462.00	528.00
B. Variable cost			
Raw materials	270.00	315.00	360.00
Power & fuel	3.65	4.26	4.86
Selling expenses	3.96	4.62	5.28
Other expenses	1.98	2.31	2.64
Interest on Working Capital Loan	4.02	4.65	5.28
Total variable cost	283.61	330.84	378.07
C. Contribution (A-B)	112.39	131.16	149.93
D. Fixed & Semi-fixed Costs			
Salary	21.00	21.11	21.21

Repair & maintenance	4.31	4.53	4.76
Interest on Term Loan	31.90	28.38	23.26
Depreciation	15.36	15.36	15.36
Total fixed cost	72.57	69.37	64.59
E. BREAK EVEN POINT	64.57%	52.89%	43.08%
F. BEP at operating capacity	38.74%	37.02%	34.46%
G. Cash BEP	30.54%	28.83%	26.26%

9.0 INTERNAL RATE OF RETURN (IRR)

(Rs. in lacs)

Year	0	1	2	3	4	5	6	7
CASH OUTFLOW								
Capital Expenditure	352.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Working Capital	0.00	41.93	6.55	6.55	0.00	0.00	0.00	0.00
Total (A)	352.40	41.93	6.55	6.55	0.00	0.00	0.00	0.00
CASH INFLOW								
Profit After Tax		60.61	66.44	90.63	95.41	100.17	104.92	109.66
Add: Depreciation		15.36	15.36	15.36	15.36	15.36	15.36	15.36
Add: Interest		31.90	28.38	23.26	18.14	13.01	7.89	2.77
Add: Salvage Value								
Total (B)	0.00	107.87	110.18	129.25	128.90	128.55	128.18	127.80
NET FLOW (B-A)	-352.40	65.94	103.63	122.70	128.90	128.55	128.18	127.80

IRR = 23%

MACHINERY SUPPLIERS

(a) Commercial Enterprises
No. 136, Jnan Goswami Sarani, Formerly No. 13 N, Block A, New Alipore, Kolkata - 700053, West Bengal, India

(b) Bhargab Engineering Works
P-292, Benaras Road, Belgachia, Howrah - 711 108, West Bengal, India

(c) Workson Industries
No. 2, Russel Street, Suite No. 11, 1st Floor, Kolkata - 700 071, West Bengal, India