CHAPTER IV

ANALYSIS AND INTERPRETATION OF DATA

4.1 COLLECTION AND REPRESENTATION OF DATA.

4.2 ANALYSIS AND INTERPRETATION OF DATA.

4.3 DEVELOPMENT OF A SUITABLE MODEL FOR CERTAIN FACTORS.

Table 4.1

SHARE CAPITAL FROM A CLASS MEMBERS
(Cane   Producer   Members)

Year	Members	Capital
1987-88	3529	67,09,843
1988-89	3664	74,28,013
1989-90	3664	77,08,889
1990-91	6363	84,94,484
1991-92	6363	85,59,395
1992-93	6811	99,69,929

From   the   above table it is   Observed   that there   is   Increase   in" A " class Members   which Indicates   Sufficient growth of share Capital.

Table 4.2

FITTING OF REGRESSION LINE

YEAR	X=1/2 Yrs.	Y Capital (Rs in lakhs)	XY	x^2
1987-88	-5	67.10	-335.50	25
1988-89	-3	74.28	-222.84	09
1989-90	-1	77.08	-077.08	01
1990-91	1	84.94	084.94	01
1991-92	3	85.60	256.80	09
1992-93	5	99.70	498.50	25

$$\sum x = 0 \qquad \sum y = 488.7 \qquad \sum xy = 206.8 \qquad \sum x^2 = 70$$

$$Y = a + bx$$
$$\sum y = n.a + b \sum x \quad \& \quad \sum xy = a\sum x + b\sum x^2$$

As $\sum x = 0$ we get

$$a = \frac{\sum y}{n} \qquad \& \quad b = \frac{\sum xy}{\sum x^2}$$

$$\Rightarrow a = \frac{488.7}{6} \qquad b = \frac{206.8}{70}$$

$$= 81.45 \qquad b = 2.95$$

Hence the Regression Equation

$$Y = 81.45 + 2.95 \ (x)$$

Table 4.3

TABLE SHOWING THE ACTUAL & TREND VALUES

*For Share Capital by Cane Producers
(A Grade Members)*

Year	Capital (in Rs. lakhs)	Trend Value
1987-88	67.28	66.67
1988-89	74.28	72.60
1989-90	77.08	78.50
1990-91	84.94	84.40
1991-92	85.60	90.30
1992-93	99.70	96.20
1993-94		102.10
1994-95		108.00
1995-96		113.90
1996-97		119.80
1997-98		125.70

From above table it is observed that trend for share capital from cane produced ('A' class) member is rising one and hence there will be sufficient supply of share capital.
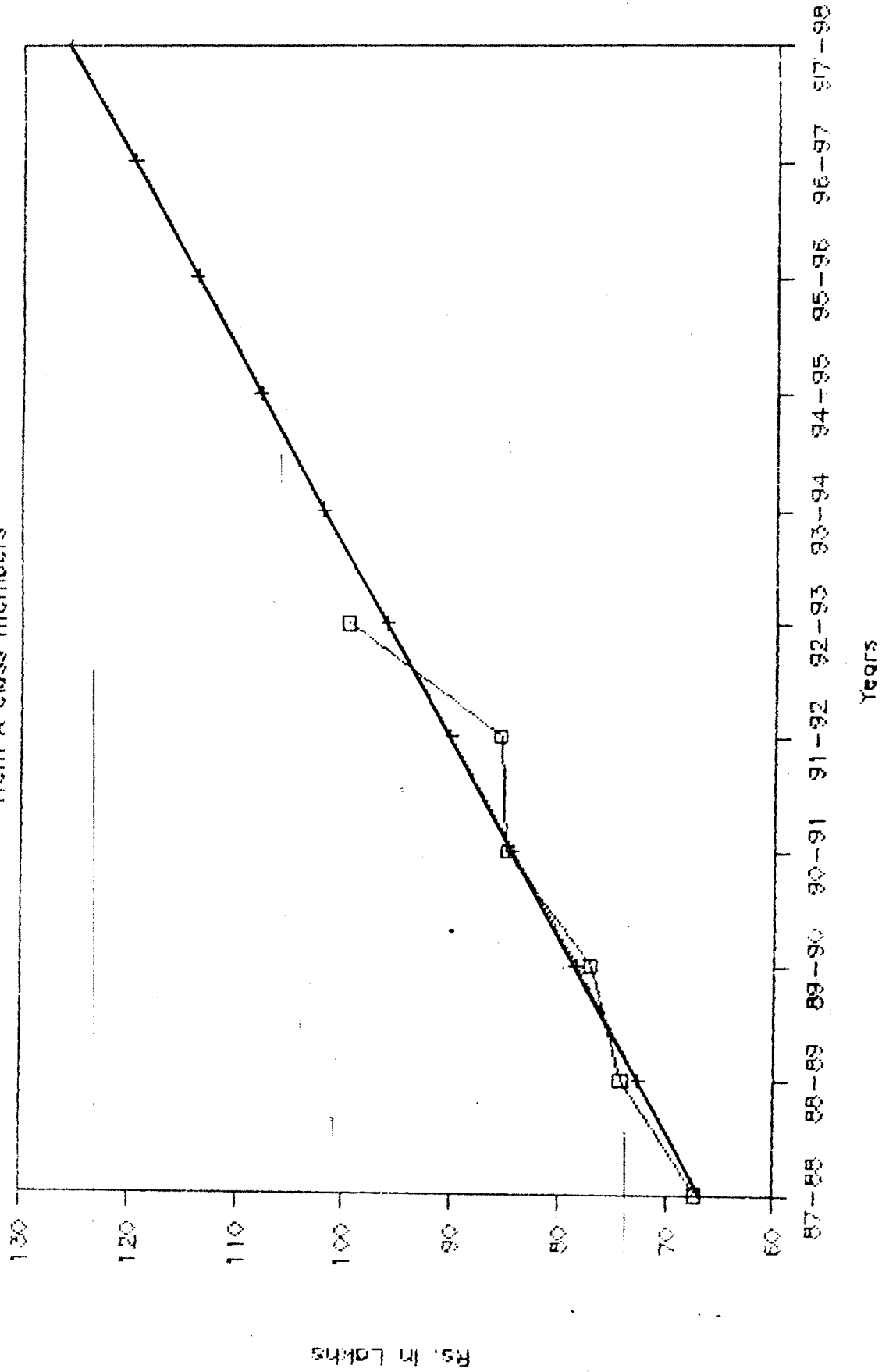
4.3

Graph of Share Capital

from A class members

Years

87-88 88-89 89-90 90-91 91-92 92-93 93-94 94-95 95-96 96-97 97-98

130 120 110 100 90 80 70 60

Rs. In Lakhs

Table 4.4

Ratio of Available Sugarcane from the working Zone
to total Sugarcane Crushed (in %). ->

Year	Percentage (%)
1985-86	03.58
1986-87	01.76
1987-88	03.05
1988-89	36.00
1989-90	41.24
1990-91	38.19
1991-92	31.00
1992-93	44.39

From the above table it is observed that in the year 88-89 there is a sudden increase in the area under sugarcane cultivation from working zone.

Table 4.5

FITTING OF REGRESSION LINE

YEAR	X	Y	XY	x^2
1985-87	-7	03.58	-025.06	49
86-87	-5	01.76	-008.80	25
87-88	-3	03.05	-009.15	09
88-89	-1	36.00	-036.00/-79.01	01
89-90	1	41.24	041.24	01
90-91	3	38.19	114.57	09
91-92	5	31.00	115.00	25
92-93	7	44.39	310.73/621.54	49

$$\Sigma x \qquad \Sigma y \qquad \Sigma xy \qquad \Sigma x^2$$

$$=0 \qquad =199.21 \qquad 542.53 \qquad =168$$

$$Y = a + bx$$
$$\Sigma y = n.a + b\Sigma x \qquad \Sigma xy = a\Sigma x + b\Sigma x^2$$

$$\Rightarrow \quad a = \frac{\Sigma Y}{8} \qquad \Rightarrow \quad b = \frac{\Sigma XY}{\Sigma x^2}$$

$$= \frac{199.21}{8} \qquad = \frac{542.53}{168}$$

$$= 24.90 \qquad = 3.23$$

$\therefore$ Regression Equation
$$Y = 24.90 + 3.23 * X$$

Table 4.6

ACTUAL   AND   TREND   VALUES

Year	Observed Value	Trend Value
1985-86	03.58	02.29
1986-87	01.76	08.75
1987-88	03.05	15.21
1988-89	36.00	21.67
1989-90	41.24	28.13
1990-91	38.19	34.59
1991-92	31.00	41.05
1992-93	44.39	47.51
1993-94		53.97
1994-95		60.43
1995-96		66.89
1996-97		
1997-98		

It is observed that the difference between the observed values and trend values is more.

To test whether this significant or not, χ^2 test is applied. With the help of this test, decisions regarding the fitting of trend by least square method can be determined.

Table 4.7

Application of χ^2 for goodness of fit

Oi	Ei	(Oi-Ei)	$\dfrac{(Oi-Ei)^2}{Ei}$
3.58 }	2.29}	1.29}	0.73}
+ }5.34	+ }11.04	+ }-5.7	+ }2.9
1.76 }	8.75}	-6.99}	5.58}
3.05	15.21	12.16	9.72
36	21.67	14.63	9.88
41.24	28.13	13.11	6.10
38.19	34.59	3.6	0.37
31.0	41.05	-10	2.43
44.39	47.05	-2.66	0.1

$$\Sigma \dfrac{(Oi - Ei)^2}{Ei} = 31.55$$

Tab. χ^2 for six degrees of Freedom for 95% Confidence level is 14.03

Calculated χ^2 value = 31.55

Tabulated χ^2 value = 14.03

Hence Cal. χ^2 > Tab χ^2.

Reject the Hypothesis.

i.e.   Y = 24.00 + 3.23 x line is not fitting as far as the Ratio of available sugarcane from the working zone to total sugarcane crushed is concerned.

The Linear Trend by least Square Method is not fitting to the Observed values because of

1. Seasonal Variations are more.

2. Cyclical Fluctions are Observed for Sugarcane Crop.

Hence the future values can not be Predicted for this Ratio of Available Sugarcane from Zonal

area to the total cane crushed , with the help of

time series Model.

Table 4.8

*Table showing the area under Sugarcane Cultivation
in Working Zone.* —

Year	Area In Hectors
1988-89	1592-82
1989-90	2480
1990-91	2161.60
1991-92	1804
1992-93	2311

From the above table it is observed that in year
91-92 there is a reduction in area under sugarcane
cultivation, but in the year 92-93 there is increase
in the area under sugarcane cultivation from working
zone.

Table 4.9

FITTING OF REGRESSIONS

YEAR	X	AREA Y	XY	x^2
88-89	-2	1592.82	3185.64	4
89-90	-1	2480	- 2480	1
90-91	0	2161.60	0	0
91-92	1	1804	1804	1
92-93	2	2311	4622	4

$$\sum X = 0 \qquad \sum Y = 10249.42 \qquad \sum XY = 760.34 \qquad \sum x^2 = 10$$

$$a = \frac{\sum Y}{n} = \frac{10349.42}{5}$$

$$= 2069.9$$

$$b = \frac{\sum XY}{\sum x^2} = \frac{760.34}{10}$$

$$= \frac{760.3}{10}$$

$$= 76.03$$

$$Y = 2069.9 + 76.03 \, x$$

Tabel 4.10

Actual and Trend values for the area under Cultivation
in working zone

Year	Observed Values Hectare	Trend Values Hectare
88-89	1592.82	1917.8
89-90	2480.00	1993.8
90-91	2161.60	2069.9
91-92	1804.00	2145.9
92-93	2311.00	2221.9
93-94		2298.0
94-95		2374.0
95-96		2450.0
96-97		2526.0
97-98		2602.0
98-99		2678.0

It is observed that the trend is rising.

TABLE 4.10

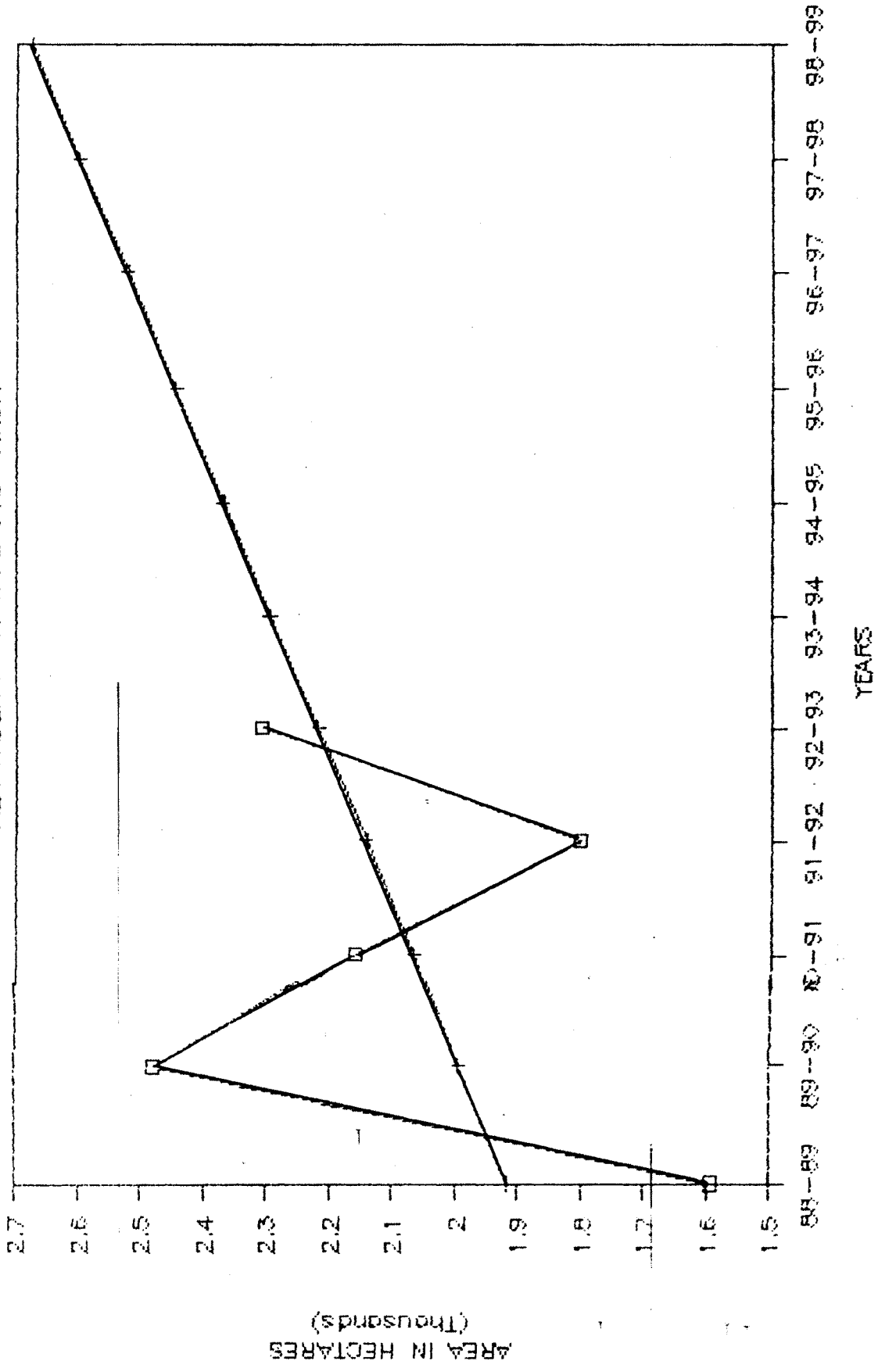ZONAL AREA UNDER SUGARCANE CULTIVATION

Table 4.11

Sugarcane Production in Zonal Area.

Year	Area Heactare	Sugarcane Produced in M.T.	Average M.T./Hectare
88-89	1592.8	83528	52.4
89-90	2480.0	124125	50.0
90-91	2161.0	103275	47.0
91-92	1804.0	93630	51.0
92-93	2311.0	77072	42.0

Sugarcane Production per Hectare is Fluctuating. In the year 88-89 it was 52.4 Tones per Hectare. but it came down to 42 Tons per Hector in the year 92-93.

For the fitting of the trend for the sugarcane production in zonal area, first the averages are taken in movingaverage method since the attribute under study is having impact of season variations.Thus,

Table 4.12

Fitting of trend with the help of Moving AverageMethod

Year	Average	x	Moving Averages y
88-89	52.4		
89-90	50.0	-1	49.8
90-91	47.0	0	49.3
91-92	51.0	1	46.66
92-93	42.0		

$$a = \frac{\Sigma\ y}{n} = 48.58 \qquad b = \frac{\Sigma\ xy}{\Sigma\ x^2} = -1.6$$

Regression line is $Y = 48.58 - 1.6\ x$

Table 4.13

TABLE SHOWING ACTUAL AND TREND VALUES OF SUGARCANE YIELD PER HECTARE

Year	Sugarcane Yield	Trend by moving Avg.+ least Sq.
88-89	52.40	54.80
89-90	50.00	50.10
90-91	47.00	48.58
91-92	51.00	46.98
92-93	42.00	45.38
93-94		43.78
94-95		42.18
95-96		20.58

Since the Slope (b) Value is Negative, the trend is decreasing one, so some Corrective Measures must be done mainly for water Supply.

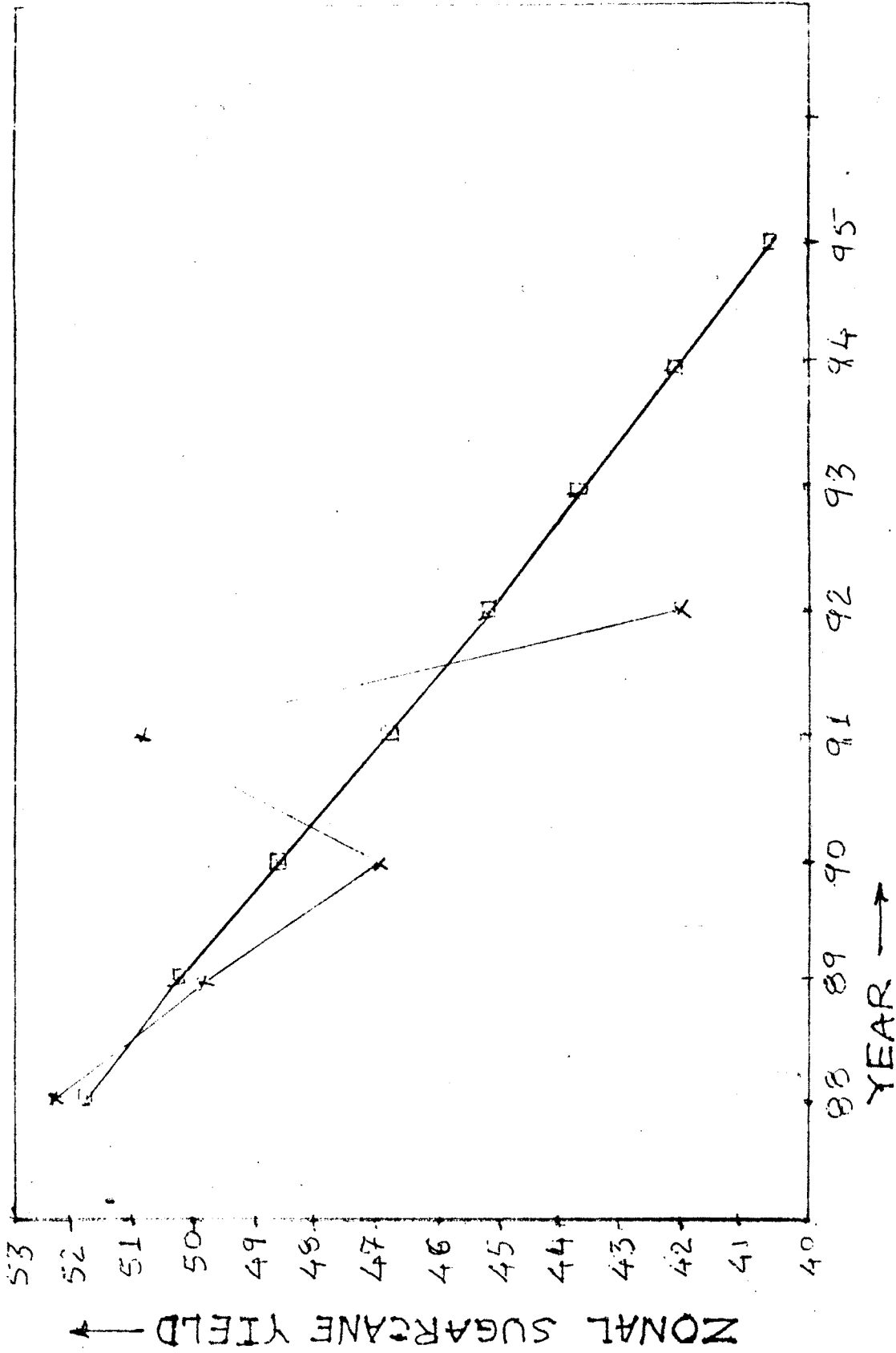SUGARCANE - YIELD.

TREND BY MOVING AVERAGE LEAST SQUARE

TABLE - 4-13.

Table 4.14

PER DAY SUGARCANE CRUSHING

Year	Sugarcane crushed M.T	Hours in the season	Crushing Per day in (M.T)
88-89	2,33,333	3348	1672
89-90	3,00,912	4312	1674
90-91	2,70,407	3563	1821
91-92	3,01,820	4030	1797
92-93	2,18,664	2863	1833

NOTE :- It should be Considered w.r.t. this table that the Installed Capacity for this Factory is 1250 M.T. / Day.

Table 4.15

FITTING OF TREND

Year	X	Crushing per Day	XY	x^2
88-89	-2	1672	-3344	4
89-90	-1	1674	-1674	1
90-91	0	1821	0	0
91-92	1	1797	1797	1
92-93	2	1833	3666	4

$$\Sigma X = 0 \qquad \Sigma Y = 8797 \qquad \Sigma XY = 445 \qquad \Sigma x^2 = 10$$

$$a = \frac{\Sigma Y}{n} = \frac{8797}{5} = 1759.4$$

$$b = \frac{\Sigma XY}{\Sigma x^2} = \frac{445}{10} = 44.5$$

$$Y = 1759.4 + 44.5\,(x)$$

Table 4.16

TREND VALUES FOR CANE CRUSHING / DAY.

Year	Observed Values	Trend Values
88-89	1672	1670.4
89-90	1674	1714.9
90-91	1821	1759.4
91-92	1797	1803.9
92-93	1833	1848.4
93-94		1892.9
94-95		1937.4
95-96		1981.9
96-97		2026.4
97-98		2070.9
98.99		2115.4

The trend for cane crushing per day is an increasing trend but to assign maximum limit 3 σ control limit is adopted for $\bar{x}$ chart.
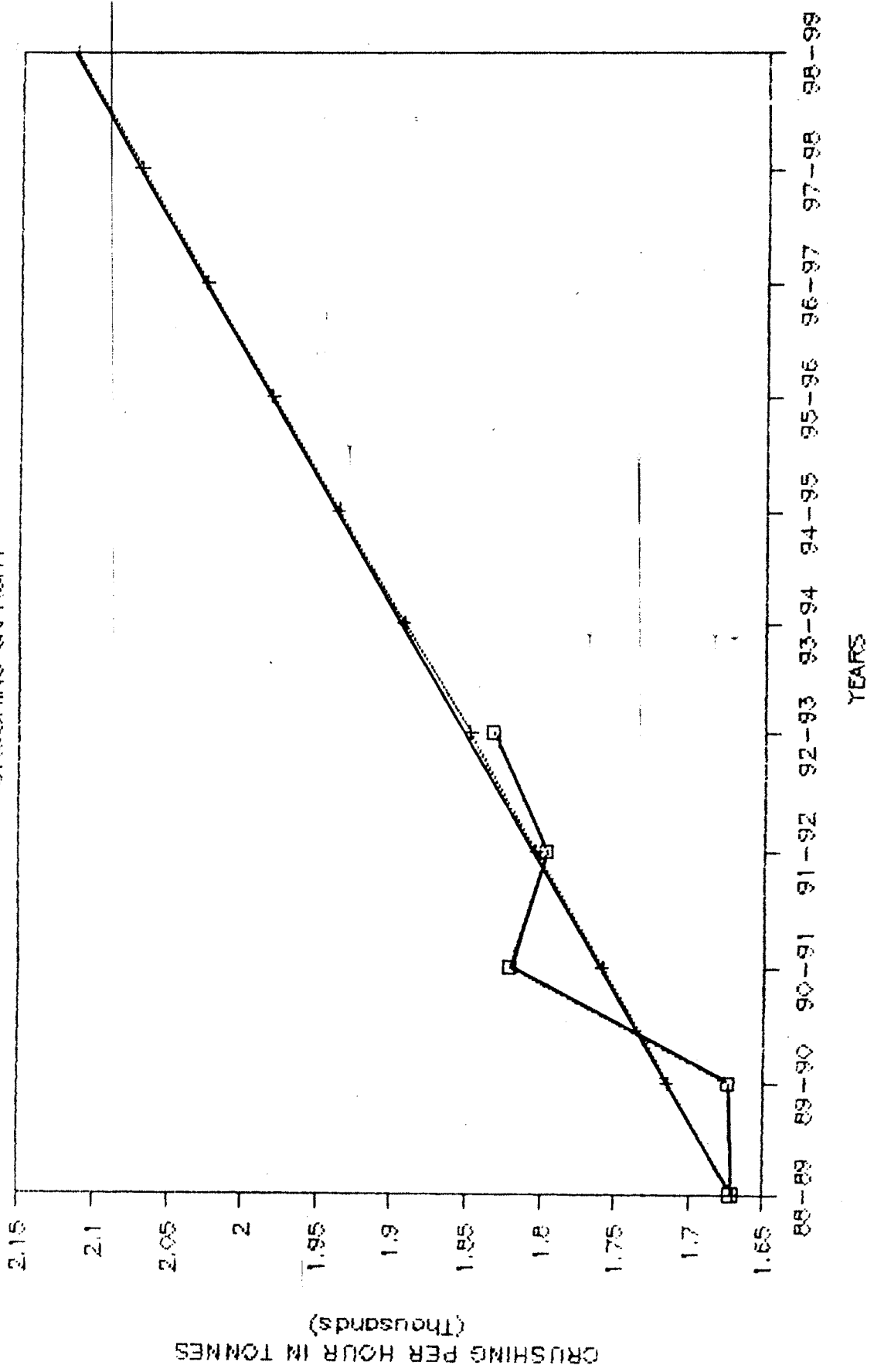
TABLE 4.16

CRUSHING CAPACITY

CRUSHING PER HOUR IN TONNES
(Thousands)

YEARS

Table 4.17

TO ASSIGN MAX VALUE OF CURSHING /DAY

CRUSHING IN 100 TONS

Year	X	$(X - \bar{X})$	$(X - \bar{X})^2$
85-86	12.02- 4.32		18.66
86-87	14.34- 2.00		4.
87-88	16.37- 0.03		0.0009
88-89	16.30	0.46	0.21
89-90	17.15	0.81	0.65
90-91	17.59	1.25	1.56
91-92	18.03	1.69	2.85
92-93	18.48	2.14	4.58

$$\sum X = 130.72 \qquad \sum (Xi-\bar{X})^2 = 32.52$$

Mean = $\bar{x}$ = 130.72 /8 = 16.34

$$S.D. = \sigma = \sqrt{(X - \bar{X})^2/n} = \sqrt{\frac{32.52}{8}} = 2.016$$

Upper Limit (Maximum Value for crushing)

$$= \bar{x} + 3\,\sigma$$

$$= 16.34 + 3 \times 2.016$$

$$= 2236 \text{ M.T./day}$$

Hence the crushing capacity can be increased upto

2236 M.T./ day.

1

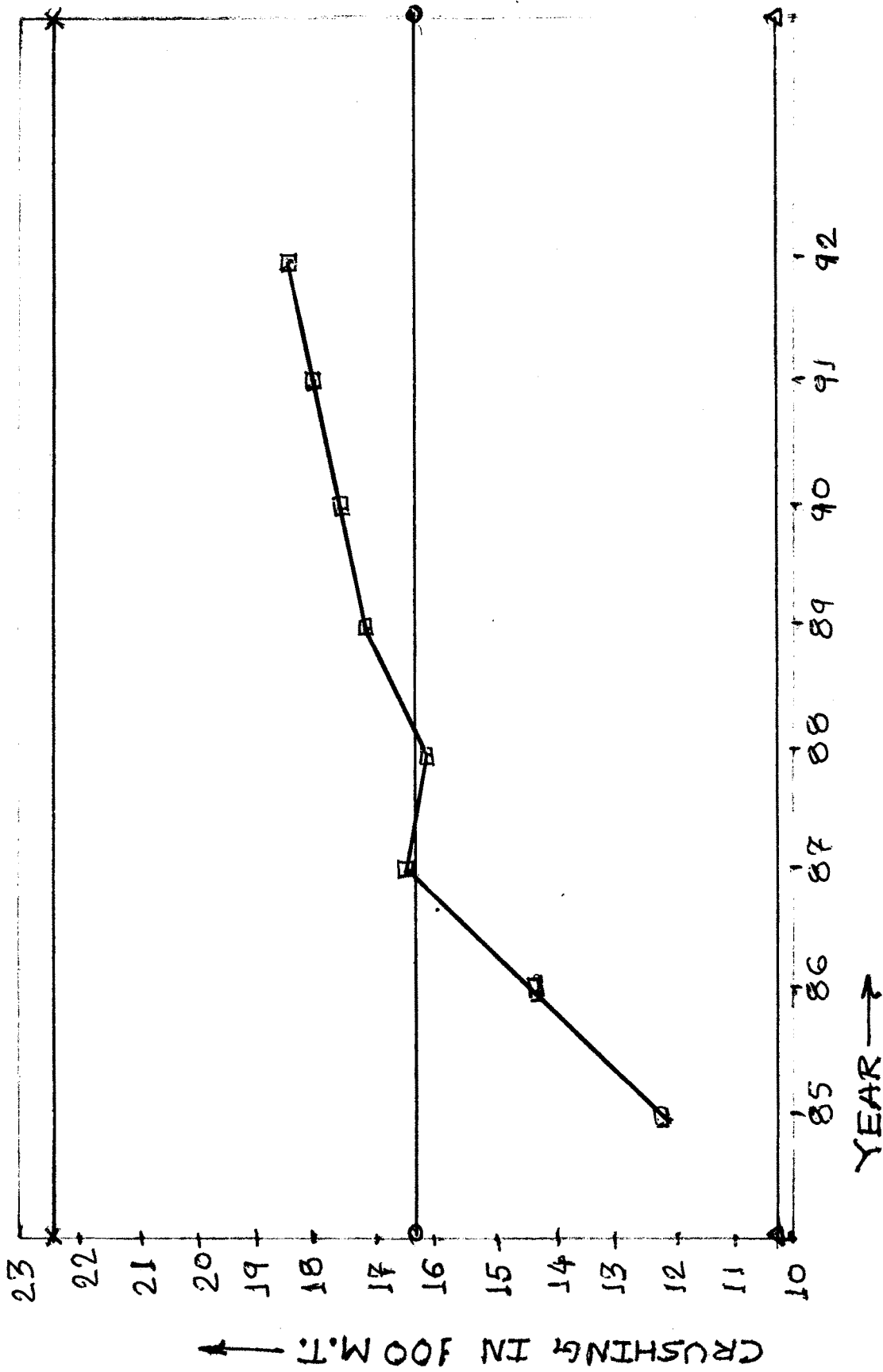TO ASSIGN MAXIMUM VALUE FOR
SUGARCANE CRUSHING PER DAY.

YEAR ⟶

CRUSHING IN 100 M.T.

TABLE - 4.17

Table 4.18

TABLE SHOWING RECOVERY

Year	Recovery in %
85-86	10.10
86-87	10.34
87-88	10.93
88-89	11.67
89-90	11.24
90-91	11.20
91-92	11.65
92-93	11.65

From the above table it is observed that the variations are less as far as recovery is concerned.

TABLE 4.18
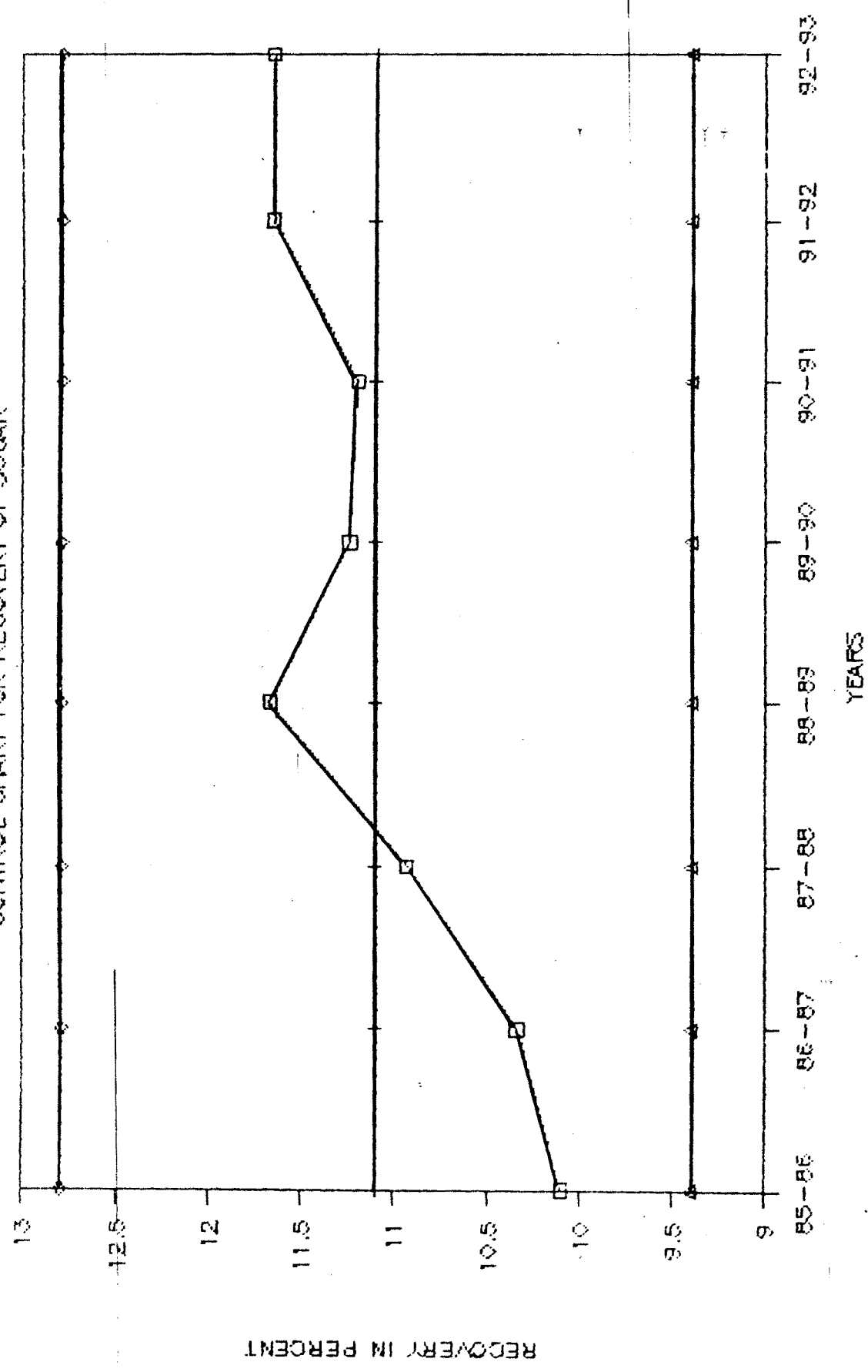
CONTROL CHART FOR RECOVERY OF SUGAR

RECOVERY IN PERCENT

YEARS

Table 4.19

CALCULATION OF MEAN AND STANDARD DEVIATION

X	$X - \bar{X}$	$(X - \bar{X})^2$
10.10	-.998	.98
10.34	-.758	.58
10.93	-.168	.03
11.67	.57	.32
11.24	.142	.02
11.20	.102	.01
11.65	.55	.03
11.65	.55	.30

$\sum X$ $\sum (X-\bar{X})^2$

$= 88.78$ $= \quad 2.55$

$= \dfrac{\sum X}{N}$

$= \text{Mean} = \dfrac{88.78}{8} = 11.098$

$= \text{S.D.} = \sqrt{2.55/8} = 0.5645.$

3 σ Limits

Upper Limit $= 11.098 + 3 * .5645$

$= 12.79$

Lower Limits $= 11.098 - 3 * .5645$

$= 9.40$

Interpretation:- Max Recovery will be up to 12.79 %

While if the Recovery is less than 9.40% Process should be checked once again , as it will go out of Control.

Table 4.20

TABLE SHOWING PURCHASING PRICE FOR SUGARCANE

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------------------------------------------------------
   Year                Purchasing  Price / Tons
------------------------------------------------------
   85-86                    278
   86-87                    286
   87-88                    320
   88-89                    360
   89-90                    375
   90-91                    400
   91-92                    428
   92-93                    525
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The very important feature of the table is the price per tone of sugarcane is increasing. So the Farmer are getting benificials form M.S.S.K. which is the prime objective of M.S.S.K.

Table 4.21

TABLE SHOWING PRODUCTION COST / QUINTAL OF SUGAR IN RS.

Year	Production cost/Quintal without sugarcane cost	with cane cost
85-86	469.65	768.60
86-87	261.13	556.04
87-88	191.31	516.28
88.89	204.78	543.50
89-90	203.84	636.73
90-91	279.76	756.61
91-92	279.98	729.98
92-93	410.00	1085.17

From the above table it is observed that there is increase in production cost in 85-86 and in 92-93.

Table 4.22

TABLE SHOWING SELLING PRICE / QUINTAL IN RS.

Year	Levy(fair price)	Open in the country	Export	Additional	Avg.
85-86	372.9	505.70	—	—	438.17
86-87	380.7	517.12	—	—	456.29
87-88	385.66	554.74	—	558	542.30
88-89	406.28	564.87	—	555	539.79
89-90	456.49	720.91	—	675.5	640.63
90-91	455.9	687.05	—	687.6	661.19
91-92	494.40	708.36	652	689.07	622.29
92-93	617.64	800.83	840	768.64	776.44

For the selling of sugar Government of India plays an important role for fixing of the sugar prices.

For both the pricing for leavy and open sugar the trend is rising one.

Table 4.23

TOTAL PRODUCTION OF SUGAR IN QUINTALS.

Year	SUGAR (QT.)
88-89	2,72,947
89-90	3,38,865
90-91	3,03,055
91-92	3,52,230
92-93	2,55,245

From the above table it is observed that in the
year 91-92 the production is increased because of
availability of sugarcane.

Table 4.24

TABLE SHOWING TOTAL SALES IN RS. AND ALSO IN QTY.

Year	Sales in Rs.	Sales in QT	Selling Price in Rs.
88-89	555,48,362	3,40,287	539
89-90	2167,26,920	2,65,461	640
90-91	1700,44,772	3,04,231	661
91-92	2475,45,840	3,54,723	622
92-93	2519,53,748	2,49,607	776

From the above table it is observed that the sales
in quantity is more in the year 91-92. In the year
92-93,though the sales quantity is less than the
previous three years M.S.S.K. is getting more sales
revenue because of increase in the price.

Table 4.25

TABLE SHOWING PERCENTAGE OF STOCKS IN TOTAL SALES

Year	Stock Rs.	Sales Rs.	Percent
88-89	2,07,64,863	55,5,48,362	37%
89-90	8,08,74,600	21,67,26,920	37%
90-91	8,73,81,000	17,00,44,772	51%
91-92	13,71,74,100	24,75,45,840	55%
92-93	13,75,32,500	25,19,53,748	54%

The stock has occupied major proportion in total sales & the Proportion of stock in the total sales has varied from 37 to 55 percent.

Thus the factory is having very high finished stock inventory. But the management is helpless in respect of sugar stock because it can not sell the sugar quota both controlled & open market without the permission from the Government.

Table 4.26

COMPARITIVE STATEMENT OF PRODUCTION STOCK AND SALES OF SUGAR IN QUINTALS.

Year	Production	Stock	Sales
88-89	2,72,977	83,516	3,40,287
89-90	3,38,865	15,612	2,65,461
90-91	3,20,305	88,346	3,04,231
91-92	3,52,230	86,700	3,54,723
92-93	2,55,245	83,682	2,49,607

From the above table it is observed that in the year 88-89, 91-92 Sales are more than the production of sugar.

Table 4.27

TABLE SHOWING PROFITS OF THE M.S.S.K

Year	Profit in Rs. Lakh
88-89	275.88
89-90	179.96
90-91	000.31
91-92	000.17
92-93	012.58

From the above table it is observed that there is reduction in profits in the years 90-92 due to shortage of sugarcane,extra transportation cost and increase in sugarcane cost.

Table 4.28

SUGAR   PRODUCTION   & SUGARCANE CRUSHED IN THE   M.S.S.K

Year	Sugar Production in Quintals	Sugarcane Crushed in M.T.
85-86	1,18,540	1,17,366
86-87	1,82,775	1,76,764
87-88	2,96,265	2,71,056
88-89	2,72,277	2,33,333
89-90	3,38,865	3,00,912
90-91	3,20,305	2,70,407
91-92	3,52,230	3,01,820
92-93	2,55,245	2,18,664

From the above table it is observed that in the
year 89-90.   The   sugar   produced   is
Comparatively more as more sugarcane is available
for crushing.

Table 4.29

FITTING OF TREND LINE FOR PRODUCTION OF SUGAR

Year	X	Y	XY	x^2
86-87	-3	182775	- 548325	9
87-88	-2	296265	- 592530	4
88-89	-1	272277	- 272277 /	1
			/ -141332	
89-90	0	338865	0	0
90-91	1	320305	320305	1
91-92	2	352230	704460	4
92-93	3	255245	765735 /	9
			179050	

$$\sum X = 0 \qquad \sum Y = 2017962 \qquad \sum XY = 377368 \qquad \sum x^2 = 28$$

$$a = \sum Y/n = 288280.28$$

$$b = \sum xy/\sum x^2 = 377368/28 = 13477$$

$$y = 245423 + 13477 \; x$$

Table 4.30

TABLE SHOWING ACTUAL AND TREND VALUES FOR SUGAR
PRODUCTION

Year	Actual values	Trend values
86-87	1,82,775	2,47,849
87-88	2,96,265	2,61,326
88-89	2,72,277	2,74,803
89-90	3,38,865	2,88,280
90-91	3,20,305	3,01,757
91-92	3,52,230	3,15,234
92-93	2,55,245	3,28,711
93-94		3,42,188
94-95		3,55,665
95-96		3,69,142
96-97		3,82,619

Observing the trend values it can be predicted that
the trend of sugarproduction is rising one.
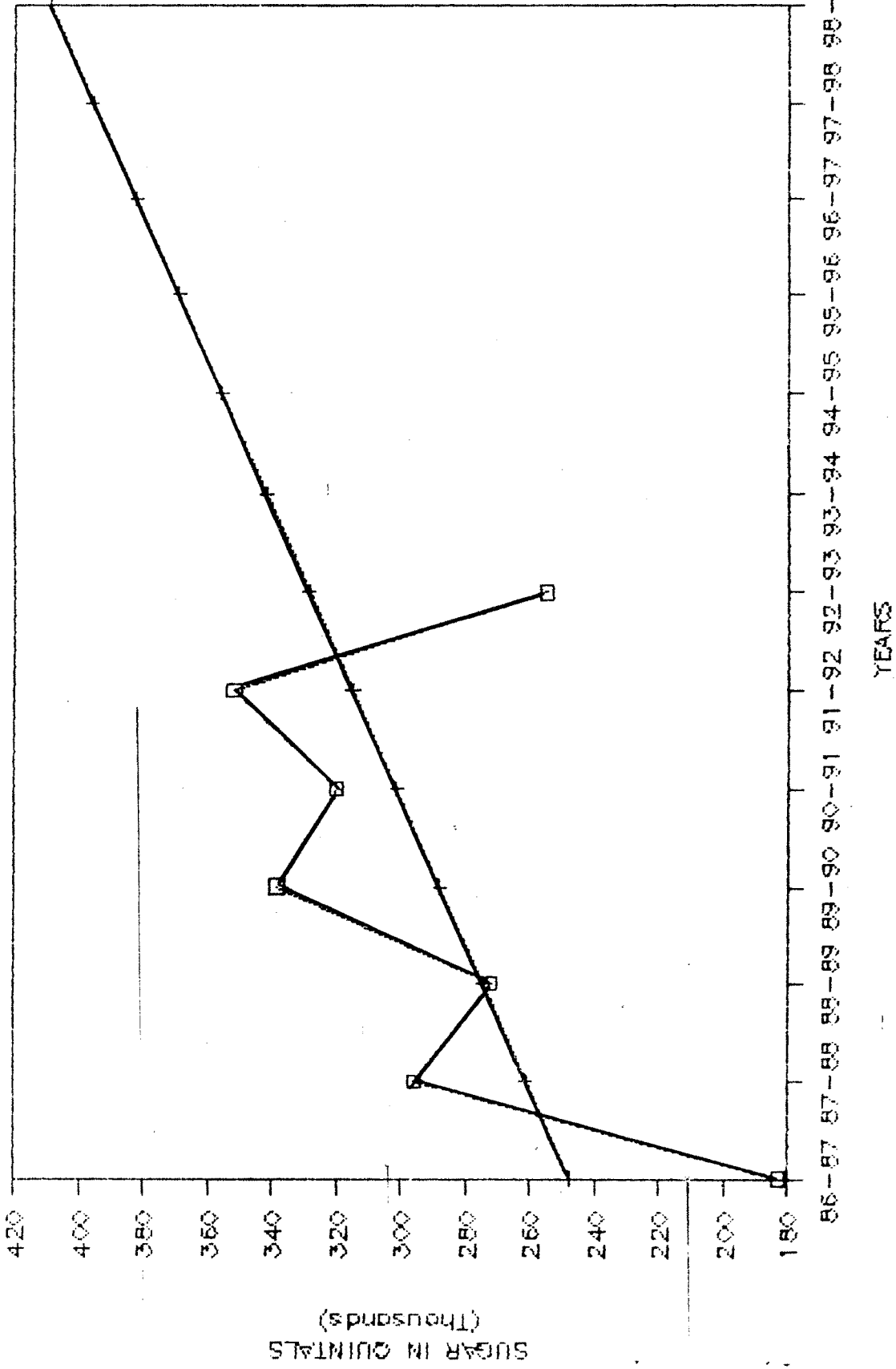
TABLE 4.30

SUGAR PRODUCTION IN M S S K

SUGAR IN QUINTALS (Thousands)

YEARS

Table 4.31

Comparative statement of the sugarcane available form Zonal & out of Zonal area.

Year	Cane from Zonal Area	Cane from Out of Zonal Area
86-97	3117.22	1,73,559
87-88	8281.80	2,62,830
88-89	83529.42	1,49,803
89-90	124124.00	1,76,788
90-91	103275.00	1,67,132
91-92	93671.00	2,08,149
92-93	97072.00	1,21,592
Total	513069.00	12,59,853

Average cane from zonal area

= 73295 M.T.

Average cane from Out of zonal area

= 179979 M.T.

Above table shows that in the year 87-88, 91-92 the quantity for gate cane (cane from out of zone area) is more. The comparative figures for zonal sugarcane are less Hence the factory has to incurve more transportation cost for gate cane.

For the reduction of gate cane, measures should be taken regarding water, good seeds, fertilizers harvesting & planting at a proper time.
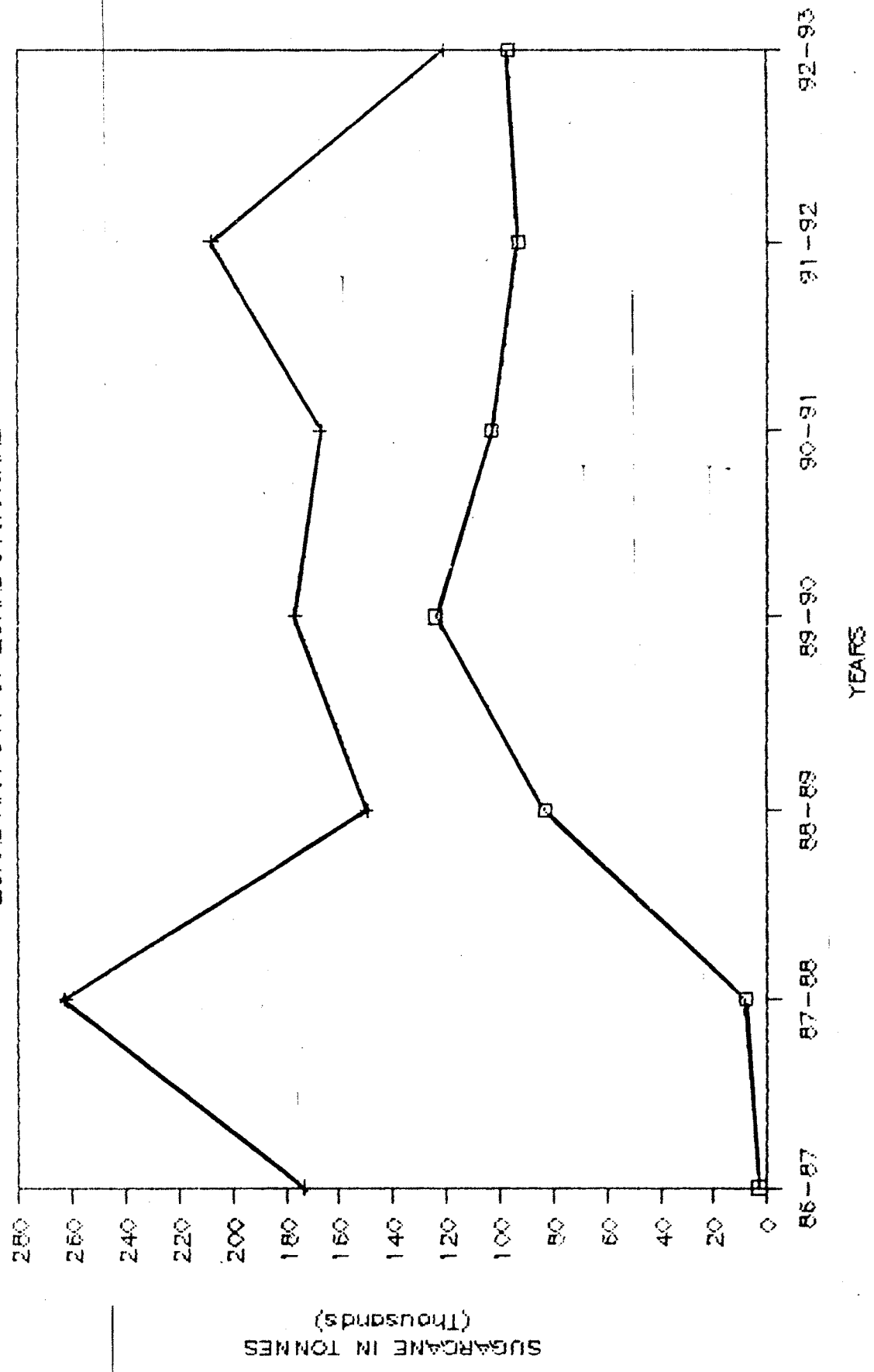
TABLE 4.31

ZONAL ANA. OUT OF ZONAL SUGARCANE

YEARS

SUGARCANE IN TONNES
(Thousands)

79

Table 4.32

CAPACITY UTILIZATION FOR CRUSHING

Year	No.of hrs available	No.of hrs.used	Average crushing M.T./hr	Capacity hrs	Not used M.T.lost
85-86	2568	2357	50	211	10550
86-87	3216	2955	60	261	15660
87-88	4344	3989	67	355	23785
88-89	3648	3348	70	300	21000
89-90	4704	4312	69	392	27048
90-91	3864	3563	75	301	22575
91-92	4392	4030	74	362	26788
92-93	3120	2863	76	257	19617

The crushing season in sugar factory is generally from November to April when cane is available for crushing. If there are stoppages in the working of sugar factory during crushing season, the factory has to bear huge losses of revenue due to deterioration of raw material (sugarcane) already harvested prolonged crushing season & crushing of low recovery cane.

The following factors contribute to stoppages in crushing season.

1. Short supply of sugarcane or non-availability of cane.

2. Mechanical break-down.

3. Cleaning of machinery (timely maintenance).

4. Stoppages due to jamming.

Table 4.33

TABLE SHOWING SALES REVENUE LOST DUE TO UNUSED CAPACITY

Year	Extra sugarcane could be crushed	Recovery in %	Sugar could be produced in Qtl	Price in Rs/Qtl	sales revenues lost in Lakh
85-86	10550	10.10	1097	438.2	4.8
86-87	15660	10.34	1619	456.3	7.38
87-88	23785	10.93	3583	542.3	19.43
88-89	21000	11.67	2450	539.8	13.22
89-90	27048	11.24	3040	640.6	19.47
90-91	22575	11.20	2528	661.19	16.71
91-92	26788	11.65	3120	662.3	20.66
92-93	19617	11.65	2285	776.4	17.74

Average sales revenue lost Rs. 14.96 Lakhs

The table shows maximum sales revenue lost in the year 87-88 ,89-90 & 91-92. On an average sales revenue are lost due to stoppages ae Rs. 14.96 lakhs

     The following reasons are given for stoppages

1. Lack of preventive maintenance .

2. Failure of Electric supply.

3. Quality of spare parts & availability of the same

4. Failure of control system in the overall process.

Table 4.34

CALCULATIONS FOR MEAN AND S.D. FOR UNUSED CAPACITY IN HOURS.

Available but not used hours		
X	$(X-\bar{X})$	$(X-\bar{X})^2$
211	− 93.87	8812.51
261	− 43.87	1925.01
355	50.12	2512.51
300	− 4.87	23.76
392	87.125	7590.76
301	− 3.875	15.015
362	57.125	3263.26
257	− 47.87	2292.015
2439		$\Sigma(X-\bar{X})^2$ = 26434.84

Mean for unused hrs. = 304.87

$$\text{Standard deviation} = \sqrt{\frac{(Xi-\bar{X})^2}{n}}$$

$$= \frac{26434.84}{8} = 3304.35$$

$$= 57.48$$

U.C.L = $\bar{X} + 3\sigma$ = 304.87 + 3 * 57.58
        = 304.87 + 172.44 = 477.31 Hrs.

L.C.L = $\bar{X} - 3\sigma$
      = 304.87 − 172.44
      = 132.43 hrs.

The above results show the observed values for unused capacity in hours are within the control limits (3 σ limits). But the factory should have corrective measures for maintenance and supply of sugarcane at proper time to minimise the unused capacity as 132.43 hours.

If the stoppages are going beyond 477.31 hrs. i.e. 19.75 days the process should be rechecked & preventive measures must be taken.

TABLE 4.34
CONTROL CHART FOR IDLE CAPACITY
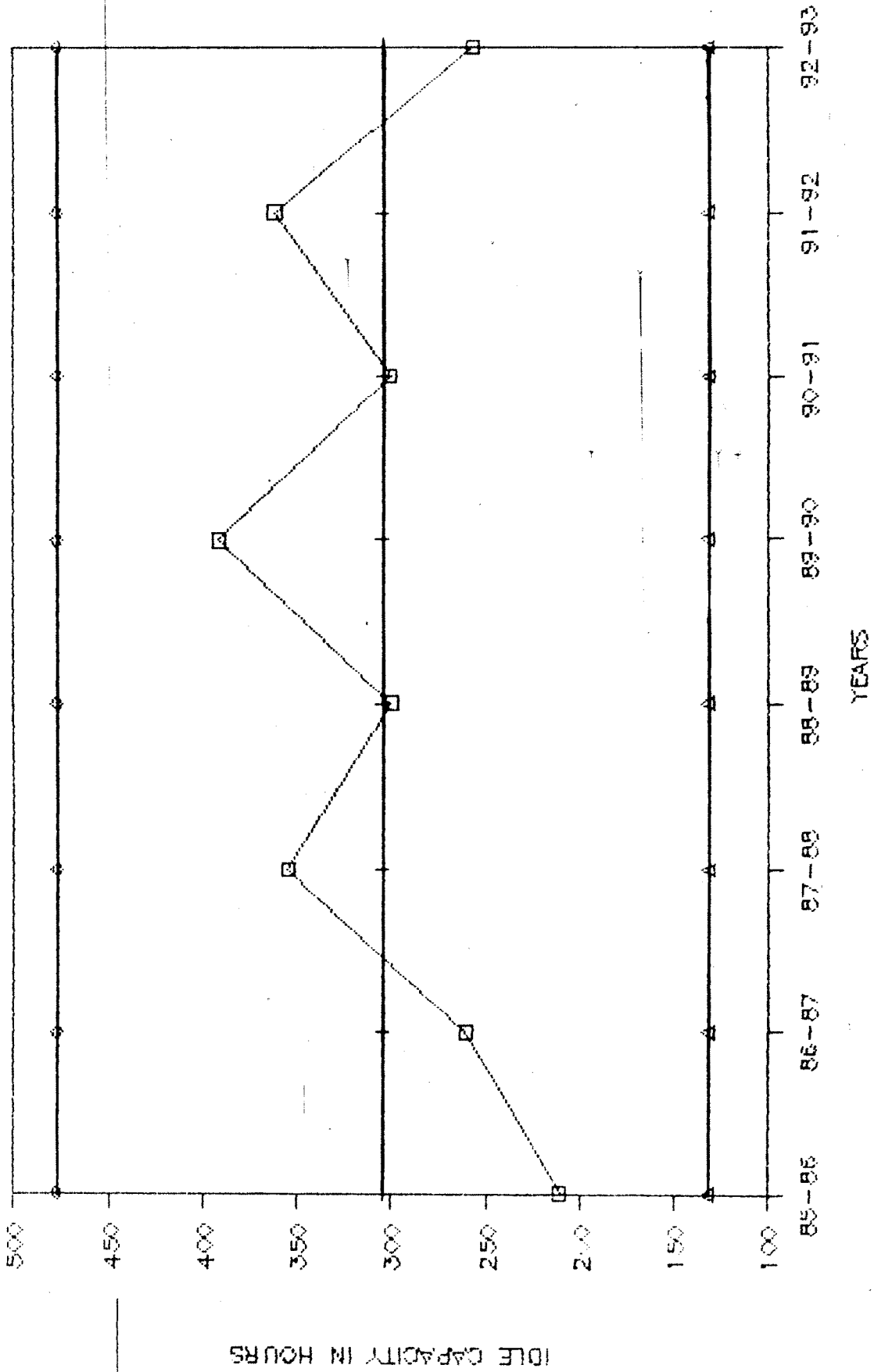
TRANSPORTAION OF SUGARCANE

For the calculation of transportation cost in all 700 villages are studied. These villages are out of zonal area from where M.S.S.K. is purchasing gate cane. These villages are first divided into different divisions i.e. strata and the systematic sampling is done for the selection of villages from each division. The number of villages selected are according to the size of division. Mostly 10% villages are selected from each division.

Total 700 villages are divided into 6 divisions namely

1.Athani

2.Jath

3.Sangola

4.Tasgaon/Atpadi

5.Pandharpur/Mangalvedha

6.Miraj/Kolhapur

For Athani division there are 248 villages from
where gatecane is available
so, 24 villages are selected for the study of
distance & transportation cost per ton.

Athani Division - Total number of villages - 248

24 villages are selected by systematic sampling
method for the distance from M.S.S.K. & the
transportation cost per ton

Table 4.35

Sr.No	Village	Distance(Km)	Transportation cost / ton
1.	Alabad	140	113
2.	Daudwad	84	83
3.	Galgali	146	116
4.	Halsangi	150	118
5.	Holi sukh	146	116
6.	Havinal	137	111
7.	Harogiri	88	85
8.	Jambagi	32	45
9.	Jamgi	32	45
10.	Kowali	82	82
11.	Kokatnur	80	81
12.	Kardaga	85	84
13.	Khilegaon	22	34
14.	Linghalli	130	107
15.	Madbhaivi	29	42
16.	Nagnur	33	46
17.	Nandeshwar	84	33
18.	Padsalaga	138	111
19.	Pandegaon	21	34
20.	Sadalage	86	84
21.	Shambari	32	45
22.	Shivanur	35	48
23.	Surpali	35	83
24.	Taashi	35	48
	TOTAL	2226	1892

Average Transportation cost / ton / km =
= 1892
------ = 0.84 Rs.
2226

JATH DIVISION -
_____

Total villages 139 . 14 villages selected as sample for the study.

Table 4.36

Sr.No.	villages	Distance	Transportation cost
1.	ANKALAGI	80	81
2.	ASANGI	97	90
3.	BALGAON	97	90
4.	BELDONGI	102	93
5.	CHAMKERI	60	65
6.	DEVANAL	56	61
7.	NIGADI	56	61
8.	KHOJANWADI	58	62
9.	BELONKI	32	44
10.	DAPHALAPUR	35	48
11.	GIRGYAL	36	47
12.	TAKEWADI	42	52
13.	JAKRATI	25	38
14.	MIKHAD	28	41
	TOTAL	799	870

Average Transportation cost per ton per Km.

$$= \frac{870}{799} = 1.08 \text{ Rs.}$$

SANGOLA DIVISION
_____

Total villages 12 ,3 villages are selected for study

Table 4.37

No.	Village	Distance	Cost/ton
1.	KHARDI	85	84
2.	SANGOLA	60	65
3.	KIDBISARI	27	40
	TOTAL —	172	189

Average transportation cost/ton/km

$$= \frac{189}{172} = 1.09 \text{ Rs.}$$

Table 4.38

MIRAJ - KOLHAPUR DIVISION & TASGAON - ATPADI

Total villages 260 , 26 are selected for study.

Sr.No.	Villages	Distance	cost/ton
1.	ALAS	72	75
2.	BAGNI	68	70
3.	BEDAG	46	55
4.	DHAVALI	45	54
5.	DIGRAJ	58	62
6.	DUDHONDI	71	75
7.	HASUR	61	66
8.	HERWAD	62	67
9.	KADAMWADI	30	43
10.	KARNAL	52	59
11.	KHIDRAPUR	80	81
12.	MOLAWDI	48	56
13.	MHAISAL	48	56
14.	MIRAJ	35	48
15.	NARASOAWADI	61	66
16.	NANDANI	53	59
17.	RAMANANDNAGAR	61	66
18.	SAVALI	40	51
19.	SHEDBAL	70	72
20.	SHIPUR	45	54
21.	TANANG	32	45
22.	TAMALAGE	59	63
23.	UDAGAON	46	55
24.	VASWADE	60	65
25.	YELAVI	45	54
26.	YAGEWADI	18	32
	TOTAL -	1366	1490

Average transportation cost / ton / km
= 1490
------- = 1.09 Rs.
1366

Table 4.39

MANGALVEDHA — PANDHARPUR DIVISION —
Total villages — 188 , 18 are selected

No.	Villages	Distance	cost /ton
1.	BALAGINAGAR	118	101
2.	BHALVANI	112	98
3.	CHINCHAPUR	138	111
4.	DHONDWADI	115	100
5.	HASBEWADI	130	108
6.	JOLIHAL	110	97
7.	KUMTHE	158	122
8.	KOUTHOLI	110	97
9.	KUSUR	171	128
10.	LAVANGI	133	109
11.	MOHOL	142	114
12.	MAHAMMADABAD	132	109
13.	NARKHED	140	113
14.	PANDHARPUR	100	92
15.	SHIRASI	119	102
16.	SHIRAGAON	115	100
17.	TALSANGI	111	98
18.	VAKHARI	105	94
	Total	2371	1991

Average transportation cost/ton/km
$= \frac{1991}{2371} = 0.83$ Rs.

Determination of capacity of each division for sugarcane to be transported to M.S.S.K.

KARNATAK   DIVISION

Table 4.40

Year	Sugarcane Transported to M.S.S.K.
88-89	28572.850
89-90	32947.605
90-91	---
91-92	66926.05
92-93	70060.698

TOTAL –   1985072

Average = 39701.44

$\cong$ 40000 M.T.

JATH –   DIVISION

Table 4.41

Year	Sugarcane Transported to M.S.S.K.
88-89	35882.888
89-90	49834.171
90-91	63101.378
91-92	54360.981
92-93	23146.194

TOTAL – 226325.61

Average – 45265.12

$\cong$ 45000 M.T.

TASGAON ATFADI DIVISION

Table 4.42

Year	Sugarcane Transported to M.S.S.K.
88-89	19694.675
89-90	15201.074
90-91	11086.156
91-92	18.186
92-93	900.166

TOTAL – 46900.257

Average – 9380.051

$\cong$ 9000

MANGALVEDHA – PANDHARPUR DIVISION

Table 4.43

Year	Sugarcane Transported to M.S.S.K.
88-89	10385.048
89-90	43637.541
90-91	55234.43
91-92	38906.639
92-93	27164.584
TOTAL –	175328.24
Average –	35065
≅	36000 M.T.

MIRAJ – KURUNDWAD –KOLHAPUR DIVISION

Table 4.44

Year	Sugarcane Transported to M.S.S.K.
88-89	54784.863
89=90	31591.843
90-91	25525.802
91-92	25871.745
92-93	22476.745
TOTAL –	160250.79
Average –	32050
≅	32000 M.T.

SANGOLA DIVISION

Table 4.45

Year	Sugarcane Transported to M.S.S.K.
88-89	198.338
89-90	893.039
90-91	528.838
91-92	2412.598
92=93	260.005
TOTAL –	7292.818
Average –	1458
≅	1400 M.T.

Table 4.46

Table showing transportation cost & capacity
from different divisions (for gate cane
sugar)

From \ To--> ↓ Division	K.mahankal	Dummy	Capacity M.T.
Athani	.84	0	40,000
Jat	1.08	0	45,000
Sangola	1.09	0	1400
Tasgaon Atpadi	1.09	0	9000
Pandharpur Mangalvedha	.83	0	36,000
Miraj-kolhapur	1.09	0	32,000
Demand M.T.	1,50,000	13400	163400

Since only M.S.S.K. is under study the
distances from 700 villages from M.S.S.K. &
the related transportation cost is considered.
The costs are per ton per kilometer sugarcane
transported to M.S.S.K. All the
transportation costs are beared by M.S.S.K.

The allocations are made by North West corner rule & then MODI method is applied for the optimality test

Table 4.47

Initial basic feasible solution
By North West Corner Rule

From\to->	M.S.S.K.	Other factories Dummy	Capacity M.T.
Division			
ATHANI	.84 (40,000)	O	40,000
JAT	1.08 (45,000)	O	45,000
SANGOLA	1.09 (1400)	O	1,400
TASGAON-ATPADI	1.09 (9000)	O	9,000
PANDHARPUR - MANGALVEDHA	.83 (36,000)	O	36,000
MIRAJ-KOLHAPUR	1.09 (23,600)	O	32,000
DEMAND	1,50,000	13400	1,63,400

No. of rows   = 6
No, of Coloumns = 2
No. of allocations = 7   = m+n-1

The feasible solution is non degenerate.

Table 4.48

OPTIMALITY   TEST
_____

Determination of ui & Vj from occupied cell.

Division	M.S.S.K	Other factories	Ui
I	.84	—	Ui =0
II	1.08	—	U 2 =.24
III	1.09	—	U 3 =.25
IV	1.09	—	U 4 =.25
V	.83	—	U 5 =.01
VI	1.09	—	U 6 =.25

Vj   V 1 = .84   V 2   = -.25

        Determination of Δij for non-occupied cells.

Δij = ui + vj - cij

Table 4.49

From\To->	M.S.S.K.	Dummy
Division		
I	—	-.25
II	—	-.01
III	—	O
IV	—	O
V	—	-.26
VI	—	—

▼ Δij ≤ o which indicates the allocations made are optimal.

It can be concluded that M.S.S.K should try for transporting sugarcane from various divisions on an average by the following pattern.

Table 4.50

DIVISION	SUGARCANE TO BE TRANSPORTED (M.T.)	TRANSPORTATION COST/TON/KM	TRANSPORTATION COST/DIV.IN RS
ATHANI	40,000	0.84	33600
JAT	45,000	1.08	48600
SANGOLA	1,400	1.09	1526
TASGAON-ATPADI	9,000	1.09	9810
PANDHARPUR - MANGALVEDHA	36,000	0.83	29880
MIRAJ-KOLHAPUR	23,600	1.09	25740

= 149140

Total Transportation and Harvesting Cost

For finding Total transportation cost following costs are considered.
1. Zonal sugarcane in M.T. $\cong$ 70,000
2. Out of zone sugarcane in M.T. $\cong$ 1,50,000
3. Harvesting cost per ton $\cong$ 80
4. Zonal transportaion cost per ton/km $\cong$ .70 Rs.

Table 4.51

	Harvesting cost			Transportation	Total
	Qt.	H.C./TON	Total	cost	cost
Zonal Area	70000	80	5600000	49000	5649000
Out of Zone	150000	80	12000000	149140	12149140
Total	220000		17600000	198140	17798140

Hence total possible minimum transportation cost

= Rs. 17798140.

Table 4.52

*TABLE SHOWING THE COST OF HARVESTING &
TRANSPORTATION IN RS.*

Year	Transportation & harvesting cost in (Rs)
88-89	30989922
89-90	17980415
90-91	2533435
91-92	27926204
92-93	28810983

From the above table it is observed that the
suggested transportation cost is less than any of
the observed value for transportation.