

Appendix 1

This Questionnaire has been prepared for conducting a study titled “A study of Sales Planning in DDC” as a partial fulfillment for the degree of Master in Business Studies. Please choose the best which you think is the appropriate on your opinion.

Questionnaire

Personal Details

Name :

Post, (please specify the field):

1) Are the goals/objectives of DDC definite?

Yes [] No. []

2) The goal/objectives are committed to:

a. Top level management []

b. Middle level management []

c. Lower level management []

d. All of the above []

3) Does the board of directors interfere in the following policies?

Yes [] No []. If yes, to what extent?

Day-to-day transaction []

Weekly []

Monthly []

Quarterly []

Long term policies []

4) Please rank to what extent do you think the following objectives are achieved?

Objectives	Min1	2	3	4	Max5
a. Profit maximization					
b. Share price maximization					
c. Sales maximization					
d. Value maximization					

5) Duties and responsibilities of employee:

- a. Well defined []
- b. Ambiguously defined []
- c. Inadequately defined []
- d. Not defined at all []
- e. Unknown []

6) Rank the following operational activities of sales plan in DDC. (5 for top priority and 1 for least priority)

Operational Activities	Min 1	2	3	4	Max 5
a) Information system					
b) Technology use					
c) Trained sales force					
d) Managerial knowledge of market					
e) Effective sale strategy					
f) Quality of product					
g) Political system					
h) Motivation of employees					
i) Location of sales centre					

7) Who is responsible in preparing sales budget?

- Chief executive
- Marketing manager
- Project manager
- All of them

8) Who evaluates/ monitor the sales budget?

- Chief executive
- Marketing manager
- Both of them

9) Which one is given more priority and less priority in preparing sales budget?

(Please rank them)

components	Min 1	2	3	4	Max 5
Sales forecast					
The advertising plan					
Marketing plan					
Selling expense budget					

10) What promotional media's does your organization mainly use?

- | | | | |
|----------------|----------------------|---------------|----------------------|
| a) Paper media | <input type="text"/> | b) Radio | <input type="text"/> |
| c) Television | <input type="text"/> | d) Bill board | <input type="text"/> |
| e) All of them | <input type="text"/> | | |

11). What major steps should be taken to improve the performance of Co.? State the working environment of your organization.

Comment, Suggestion for the overall development of the DDC

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Appendix 2

Milk Sales Variance

(in Ltrs)

Fiscal Year	target Sales Amt.	Actual Sales Amt.	Variance amount	% of Variance	Remarks
2058/59	59741000	55645157	4095843	6.86	Unfavourable
2059/60	59812000	56357176	3454824	5.78	Unfavourable
2060/61	61961000	57764000	4197000	6.77	Unfavourable
2061/62	64217000	60276000	3941000	6.14	Unfavourable
2062/63	65495000	57492000	8003000	12.22	Unfavourable
2063/64	69050000	59317000	9733000	14.10	Unfavourable
2064/65	61481000	56983000	4498000	7.32	Unfavourable

Appendix 3

Makhan Sales Variance

(in Kgs)

Fiscal Year	Target Sales Amt.	Actual Sales Amt.	Variance amount	% of Variance	Remarks
2058/59	358500	300192	58308	16.264	Unfavourable
2059/60	361700	285314	76386	21.119	Unfavourable
2060/61	351800	302000	49800	14.156	Unfavourable
2061/62	311000	287000	24000	7.717	Unfavourable
2062/63	318000	232000	86000	27.044	Unfavourable
2063/64	288000	170000	118000	40.972	Unfavourable
2064/65	195500	189600	5900	3.018	Unfavourable

Appendix 4

Curd Sales Variance

(in Lit)

Fiscal Year	Target Sales Amt.	Actual Sales Amt.	Variance amount	% of Variance	Remarks
2058/59	980000	890538	89462	9.13	Unfavourable
2059/60	889500	981575	92075	10.35	favourable
2060/61	935000	1006000	71000	7.59	favourable
2061/62	951000	1057000	106000	11.15	favourable
2062/63	1101000	1102000	1000	0.09	favourable
2063/64	1182000	985000	197000	16.67	Unfavourable
2064/65	850150	904000	53850	6.33	favourable

Appendix 5
Cheese Sales Variance

(in Kgs)

Fiscal Year	Target Sales Amt.	Actual Sales Amt.	Variance Amount	% of Variance	Remarks
2058/59	182750	146785	35965	19.68	Unfavourable
2059/60	227400	140038	87362	38.42	Unfavourable
2060/61	225000	145000	80000	35.56	Unfavourable
2061/62	181000	150000	31000	17.13	Unfavourable
2062/63	184000	161000	23000	12.50	Unfavourable
2063/64	241000	143000	98000	40.66	Unfavourable
2064/65	230800	184000	46800	20.28	Unfavourable

Appendix 6
Ghee Sales Variance

(in Kgs)

Fiscal Year	Target Sales Amt.	Actual Sales Amt.	Variance Amount	% of Variance	Remarks
2058/59	958038	479904	478134	49.91	Unfavourable
2059/60	736000	709786	26214	3.56	Unfavourable
2060/61	752000	931000	179000	23.80	Favourable
2061/62	899000	842000	57000	6.34	Unfavourable
2062/63	943000	704000	239000	25.34	Unfavourable
2063/64	917000	644000	273000	29.77	Unfavourable
2064/65	983100	913000	70100	7.13	Unfavourable

Appendix 7
Paneer Sales Variance

(in Kgs)

Fiscal Year	Target Sales Amt.	Actual Sales Amt.	Variance amount	% of Variance	Remarks
2058/59	31000	30660	340	1.10	Unfavourable
2059/60	39000	29500	9500	24.36	Unfavourable
2060/61	43360	49000	5640	13.01	Favourable
2061/62	48000	62000	14000	29.17	Favourable
2062/63	67000	70000	3000	4.48	Favourable
2063/64	132000	50000	82000	62.12	Unfavourable
2064/65	120960	83000	37960	31.38	Unfavourable

Appendix 8
Ice-Cream Sales Variance

(in Ltrs)

Fiscal Year	Target Sales Amt.	Actual Sales Amt.	Variance amount	% of Variance	Remarks
2058/59	50266	32750	17516	34.85	Unfavourable
2059/60	38500	27620	10880	28.26	Unfavourable
2060/61	35000	31000	4000	11.43	Unfavourable
2061/62	39000	32000	7000	17.95	Unfavourable
2062/63	42000	38000	4000	9.52	Unfavourable
2063/64	81600	39000	42600	52.21	Unfavourable
2064/65	100700	85000	15700	15.59	Unfavourable

Appendix 9
Cream Sales Variance

(in Ltrs)

Fiscal Year	Target Sales Amt.	Actual Sales Amt.	Variance Amount	% of Variance	Remarks
2058/59	28000	33000	5000	17.86	Unfavourable
2059/60	41000	31000	10000	24.39	Unfavourable
2060/61	38000	27500	10500	27.63	Unfavourable
2061/62	32000	24700	7300	22.81	Unfavourable
2062/63	28000	21500	6500	23.21	Unfavourable
2063/64	39000	53700	14700	37.69	favourable
2064/65	22800	17300	5500	24.12	Unfavourable

Appendix 10

Calculation of Mean, S.D, C.V And Correlation coefficient of DDC's Targeted And Actual Milk Sales (In Lakhs)

Year	Targeted (X)	Actual (Y)	$x = X - \bar{X}$	$y = Y - \bar{Y}$	x^2	y^2	xy
2058/59	597.41	556.45	-33.67	-20.455	1133.7362	418.4070	688.7403
2059/60	598.12	563.571	-32.96	-13.335	1086.4275	177.8222	439.5349
2060/61	619.61	577.64	-11.47	0.735	131.5838	0.5402	-8.4312
2061/62	642.17	602.76	11.089	25.855	122.9659	668.4810	286.7061
2062/63	654.95	574.92	23.869	-1.985	569.7292	3.9402	-47.3800
2063/64	690.5	593.17	59.419	16.265	3530.6176	264.5502	966.4500
2064/65	614.81	569.83	-16.27	-7.075	264.7454	50.0556	115.1173
	4417.570	4038.341			6839.806	1583.797	2440.738

Targeted Data

$$\text{Mean}(\bar{X}) = \frac{\sum X}{n} = \frac{4417.57}{77} = 631.081$$

$$\begin{aligned} S.D(\sigma) &= \sqrt{\frac{1}{n} \sum x^2} = \sqrt{\frac{6839.726}{7}} = \sqrt{977.1037} \\ &= 31.258 \end{aligned}$$

$$C.V = \frac{\sigma}{\bar{X}} \times 100\% = \frac{31.258}{631.081} \times 100\% = 4.95\%$$

$$\begin{aligned} \text{Correlation}(r_{xy}) &= \frac{\sum xy}{\sqrt{\sum x^2 \sum y^2}} \\ &= \frac{2440.733}{\sqrt{6839.726 \times 1583.795}} \\ &= 0.741 \end{aligned}$$

Actual Data

$$\text{Mean}(\bar{Y}) = \frac{4.38.34}{7} = 576.905$$

$$\begin{aligned} S.D(\sigma) &= \sqrt{\frac{1}{n} \sum y^2} = \sqrt{\frac{1583.795}{7}} \\ &= 15.041 \end{aligned}$$

$$\begin{aligned} C.V &= \frac{\sigma}{\bar{Y}} \times 100\% = \frac{15.041}{576.905} \times 100\% \\ &= 2.607\% \end{aligned}$$

The above result shows that there is positive correlation between targeted and actual milk sales data. Calculation of Probable Error (P.E) of Karl Person's Coefficient of Correlation.

$$\begin{aligned} \text{Calculation of P.E} &= 0.6745 \times \frac{(1-r^2)}{\sqrt{n}} = 0.6745 \times \frac{(1-(0.741)^2)}{\sqrt{7}} \\ &= 0.1149 \end{aligned}$$

6 P.E. = 0.6894; Hence it is significant.

Appendix 11

Calculation of mean, S.D, Coefficient of variation and correlation of DDC's Targeted and Actual Makhan Sales (in Lakhs.)

Year	Targeted (X)	Actual (Y)	$x = X - \bar{X}$	$y = Y - \bar{Y}$	x^2	y^2	xy
2058/59	3.585	3.001	0.465	0.479	0.2162	0.2294	0.2227
2059/60	3.617	2.853	0.497	0.331	0.2470	0.1096	0.1645
2060/61	3.518	3.02	0.398	0.498	0.1584	0.2480	0.1982
2061/62	3.11	2.87	-0.01	0.348	0.0001	0.1211	-0.0035
2062/63	3.18	2.32	0.06	-0.202	0.0036	0.0408	-0.0121
2063/64	2.88	1.7	-0.24	-0.822	0.0576	0.6757	0.1973
2064/65	1.955	1.896	-1.165	-0.626	1.3572	0.3919	0.7293
	21.845	17.660			2.040	1.8165	1.49642

Targeted Data

Actual Data

$$Mean(\bar{X}) = \frac{\sum x}{n} = \frac{21.845}{77} = 0.283713120$$

$$S.D(\sigma) = \sqrt{\frac{1}{n} \sum x^2} = \sqrt{\frac{2.0401}{7}} = \sqrt{0.2914} = 0.539$$

$$C.V = \frac{\sigma}{x} \times 100\% = \frac{0.539}{3.120} \times 100\% = 17.27\%$$

$$Mean(\bar{Y}) = \frac{17.66}{7} = 2.522$$

$$S.D(\sigma) = \sqrt{\frac{1}{n} \sum y^2} = \sqrt{\frac{1.8158}{7}} = 0.5093$$

$$C.V = \frac{\sigma}{y} \times 100\% = \frac{0.5093}{2.522} \times 100\% = 20.19\%$$

$$Correlation(r_{xy}) = \frac{\sum xy}{\sqrt{\sum x^2 \sum y^2}}$$

$$= \frac{1.52738}{\sqrt{2.0401 \times 1.8158}}$$

$$= 0.793$$

The above result shows that there is positive relation between targeted and actual makhan sales data. Calculation of Probable Error (P.E) of Karl Person's Coefficient of Correlation.

$$\text{Calculation of P.E} = 0.6745 \times \frac{(1-r^2)}{\sqrt{n}} = 0.6745 \times \frac{(1-(0.793)^2)}{\sqrt{7}}$$

$$= 0.0946$$

Here 'r' is greater than P.E. It is significant.

Appendix 12

Calculation of mean, S.D, Coefficient of variation and correlation of DDC's Targeted and Actual Curd Sales (in Lakhs.)

Year	Targeted (X)	Actual (Y)	$x = X - \bar{X}$	$y = Y - \bar{Y}$	x^2	y^2	xy
2058/59	9.8	8.9	-0.04	-0.989	0.0016	0.9781	0.03956
2059/60	8.895	9.815	-0.945	-0.0742	0.8930	0.0055	0.07012
2060/61	9.35	10.06	-0.49	0.1708	0.2401	0.0292	-0.08369
2061/62	9.51	10.57	-0.33	0.6808	0.1089	0.4635	-0.22466
2062/63	11.01	11.02	1.17	1.1308	1.3689	1.2787	1.323036
2063/64	11.82	9.85	1.98	-0.0392	3.9204	0.0015	-0.077616
2064/65	8.5	9.04	-1.34	-0.8492	1.7956	0.7211	1.13793
	$\Sigma x = 68.885$	$\Sigma y = 9.255$			$\Sigma x^2 = 8.32853$	$\Sigma y^2 = 3.47767$	$\Sigma XY = 2.184671$

Targeted Data:

$$\text{Mean}(\bar{X}) = \frac{68.885}{7} = 9.840$$

$$S.D(\sigma_x) = \sqrt{\frac{\sum x^2}{n}} = \sqrt{\frac{8.3285}{7}} = 1.0907$$

$$C.V = \frac{\sigma_x}{x} \times 100\% = \frac{1.0907}{9.840} \times 100\% = 11.08\%$$

$$\begin{aligned} \text{Correlation}(r_{xy}) &= \frac{\sum xy}{\sqrt{\sum x^2 \sum y^2}} \\ &= \frac{2.184668}{\sqrt{8.3285 \times 3.47747}} \\ &= 0.405947 \end{aligned}$$

Actual Data:

$$\text{Mean}(\bar{Y}) = \frac{69.225}{7} = 9.8892$$

$$S.D(\sigma_y) = \sqrt{\frac{\sum y^2}{n}} = \sqrt{\frac{3.47747}{7}} = 0.7048$$

$$C.V = \frac{\sigma_y}{y} \times 100\% = \frac{0.7048}{9.885} \times 100\% = 7.1299\%$$

The above result shows that there is positive relation between targeted and actual curd sales data.

$$\begin{aligned} \text{Calculation of P.E} &= 0.6745 \times \frac{(1 - (0.41239)^2)}{\sqrt{7}} \\ &= 0.21158 \end{aligned}$$

Appendix 13

Calculation of mean, S.D, Coefficient of variation and correlation of DDC's Targeted and Actual Cheese Sales (in Lakhs.)

Year	Targeted (X)	Actual (Y)	$x = X - \bar{X}$	$y = Y - \bar{Y}$	x^2	y^2	xy
2058/59	1.827	1.4678	-0.275	-0.0604	0.0756	0.00365	0.0166
2059/60	2.274	1.40	0.1713	-0.1282	0.0293	0.0164	-0.02196
2060/61	2.25	1.45	0.1473	-0.0782	0.0216	0.0061	-0.0115
2061/62	1.81	1.50	-0.2927	-0.0282	0.0856	0.0008	0.00825
2062/63	1.84	1.61	-0.2630	0.0818	0.0691	0.0067	-0.0215
2063/64	2.41	1.43	0.3073	-0.0982	0.0944	0.0096	-0.03018
2064/65	2.308	1.84	0.2053	0.3118	0.0421	0.0972	0.0640
	14.719	10.6978			0.4177	0.14047	0.0038625

Targeted Data

$$\text{Mean}(\bar{X}) = \frac{14.719}{7} = 2.1027$$

$$S.D(\sigma_x) = \sqrt{\frac{\sum x^2}{n}} = \sqrt{\frac{0.4177}{7}} = 0.2442$$

$$C.V = \frac{\sigma_x}{\bar{X}} \times 100\% = \frac{0.2442}{2.1027} \times 100\% = 11.61\%$$

$$\begin{aligned} \text{Correlation}(r_{xy}) &= \frac{\sum xy}{\sqrt{\sum x^2 \sum y^2}} \\ &= \frac{0.0038625}{\sqrt{0.4177 \times 0.14047}} \\ &= 0.01594 \end{aligned}$$

Actual Data

$$\text{Mean}(\bar{Y}) = \frac{10.6978}{7} = 1.5282$$

$$S.D(\sigma_y) = \sqrt{\frac{\sum y^2}{n}} = \sqrt{\frac{0.14047}{7}} = 0.14165$$

$$C.V = \frac{\sigma_y}{\bar{Y}} \times 100\% = \frac{0.14165}{1.5282} \times 100\% = 9.26\%$$

The above result shows that there is positive relation between targeted and actual cheese sales data. Calculation of Probable Error (P.E) of Karl Person's Coefficient of Correlation.

$$\begin{aligned} \text{Calculation of P.E} &= 0.6745 \times \frac{(1-r^2)}{\sqrt{n}} = 0.6745 \times \frac{(1-(0.01594)^2)}{\sqrt{7}} \\ &= 0.25487 \end{aligned}$$

Here 'r' is greater than P.E (0.01594 < 0.25487). It is not significant.

Appendix 14

Calculation of mean, S.D, Coefficient of variation and correlation of DDC's Targeted and Actual Ghee Sales (in Lakhs.)

Year	Targeted (X)	Actual (Y)	$x = X - \bar{X}$	$y = Y - \bar{Y}$	x^2	y^2	xy
2058/59	9.58	4.7990	0.74	-2.663	0.5476	7.0916	-1.9706
2059/60	7.36	7.10	-1.48	-0.365	2.1904	0.1332	0.5402
2060/61	7.52	9.31	-1.32	1.2476	1.7424	1.5565	-1.6468
2061/62	8.99	8.42	0.1500	0.958	0.0225	0.9178	0.1437
2062/63	9.43	7.04	0.5900	-0.422	0.3481	0.1781	-0.2490
2063/64	9.17	6.44	0.3300	-1.022	0.1089	1.0445	-0.3373
2064/65	9.831	9.13	0.991	1.668	0.9820	2.7822	1.6530
	61.881	52.236			5.9419	13.7039	-1.8667

Targeted Data

Actual Data

$$Mean(\bar{X}) = \frac{61.881}{7} = 8.840$$

$$Mean(\bar{Y}) = \frac{52.236}{7} = 7.462$$

$$S.D(\sigma_x) = \sqrt{\frac{\sum x^2}{n}} = \sqrt{\frac{5.9419}{7}} = 0.921$$

$$S.D(\sigma_y) = \sqrt{\frac{\sum y^2}{n}} = \sqrt{\frac{13.735}{7}} = 1.462$$

$$C.V = \frac{\sigma_x}{\bar{X}} \times 100\% = \frac{0.921}{8.840} \times 100\% = 10.418\%$$

$$C.V = \frac{\sigma_y}{\bar{Y}} \times 100\% = \frac{1.399}{1.462} \times 100\% = 18.74\%$$

$$\begin{aligned} \text{Correlation}(r_{xy}) &= \frac{\sum xy}{\sqrt{\sum x^2 \sum y^2}} \\ &= \frac{-1.86672}{\sqrt{5.9419 \times 13.7035}} \\ &= -0.2068 \end{aligned}$$

The above result shows that there is positive relation between targeted and actual ghee sales data. Calculation of Probable Error (P.E) of Karl Person's Coefficient of Correlation.

$$\begin{aligned} \text{Calculation of P.E} &= 0.6745 \times \frac{(1-r^2)}{\sqrt{n}} = 0.6745 \times \frac{(1-(0.2068)^2)}{\sqrt{7}} \\ &= 0.244035 \end{aligned}$$

Here 'r' is smaller than P.E(-0.2068 < 0.244035). It is not all significant.

Appendix 15

Calculation of mean, S.D, Coefficient of variation and correlation of DDC's Targeted and Actual Paneer Sales (in Lakhs.)

Year	Targeted (X)	Actual (Y)	$x = X - \bar{X}$	$y = Y - \bar{Y}$	x^2	y^2	xy
2058/59	31	30.66	-37.76	-22.79	1425.82	519.384	860.5504
2059/60	39	29.50	-29.76	-23.95	885.658	573.60	712.7520
2060/61	43.36	49.00	-25.4	-4.45	645.16	19.80	113.0300
2061/62	48	62.00	-20.7600	8.55	430.98	73.10	-177.4980
2062/63	67	70.00	-1.7600	16.55	3.0976	273.90	-29.1280
2063/64	132	50.00	63.2400	-3.45	3999.298	11.90	-218.1780
2064/65	120.96	83.00	52.2	29.55	2724.840	873.20	1542.5100
	481.32	374.16			10114.848	2344.90	2804.04

Targeted Data

$$Mean(\bar{X}) = \frac{481.32}{7} = 68.76$$

$$S.D(\sigma_x) = \sqrt{\frac{\sum x^2}{n}} = \sqrt{\frac{10114.824}{7}} = 38.01$$

$$C.V = \frac{\sigma_x}{\bar{X}} \times 100\% = \frac{38.01}{68.76} \times 100\% = 55.27\%$$

$$\begin{aligned} \text{Correlation}(r_{xy}) &= \frac{\sum xy}{\sqrt{\sum x^2 \sum y^2}} \\ &= \frac{-2804.0384}{\sqrt{10114 \times 2344.88}} \\ &= 0.5757 \end{aligned}$$

Actual Data

$$Mean(\bar{y}) = \frac{374.16}{7} = 53.45$$

$$S.D(\sigma_y) = \sqrt{\frac{\sum y^2}{n}} = \sqrt{\frac{2344.88}{7}} = 18.3025$$

$$C.V = \frac{\sigma_y}{\bar{y}} \times 100\% = \frac{18.302}{53.45} \times 100\% = 34.241\%$$

The above result shows that there is positive relation between targeted and actual paneer sales data. Calculation of Probable Error (P.E) of Karl Person's Coefficient of Correlation.

$$\begin{aligned} \text{Calculation of P.E} &= 0.6745 \times \frac{(1-r^2)}{\sqrt{n}} = 0.6745 \times \frac{(1-(0.5757)^2)}{\sqrt{7}} \\ &= 0.17044 \end{aligned}$$

Appendix 16

Calculation of mean, S.D, Coefficient of variation and correlation of DDC's Targeted and Actual Ice-Cream Sales (in Lakhs.)

Year	Targeted (X)	Actual (Y)	$x = X - \bar{X}$	$y = Y - \bar{Y}$	x^2	y^2	xy
2058/59	50.266	32.75	-5.029	-8.017	25.29	64.272	40.3175
2059/60	38.5	27.62	-16.795	-13.147	282.072	172.84	220.8039
2060/61	35	31.00	-20.295	-9.767	411.89	95.39	198.2213
2061/62	39	32.00	-16.295	-8.767	265.53	76.86	142.8583
2062/63	42	38.00	-13.295	-2.767	176.7570	7.66	36.7873
2063/64	81.6	39.00	26.305	-1.767	691.953	3.12	-46.4809
2064/65	100.7	85.00	45.405	44.233	2061.614	1956.56	2008.3994
	387.07	285.37			3915.101	2376.71	2600.91

Targeted Data

$$\text{Mean}(\bar{X}) = \frac{387.066}{7} = 55.295$$

$$S.D(\sigma_x) = \sqrt{\frac{\sum x^2}{n}} = \sqrt{\frac{3915.1}{7}} = 23.649$$

$$C.V = \frac{\sigma_x}{\bar{X}} \times 100\% = \frac{23.649}{55.295} \times 100\% = 42.768\%$$

$$\text{Correlation}(r_{xy}) = \frac{\sum xy}{\sqrt{\sum x^2 \sum y^2}}$$

$$= \frac{2600.902}{\sqrt{3915.1 \times 2376.105}}$$

$$= 0.8527$$

Actual Data

$$\text{Mean}(\bar{Y}) = \frac{285.376}{7} = 40.767$$

$$S.D(\sigma_y) = \sqrt{\frac{\sum y^2}{n}} = \sqrt{\frac{2376.105}{7}} = 18.423$$

$$C.V = \frac{\sigma_y}{\bar{Y}} \times 100\% = \frac{18.423}{40.767} \times 100\% = 45.1909\%$$

The above result shows that there is positive relation between targeted and actual ice-cream sales data. Calculation of Probable Error (P.E) of Karl Person's Coefficient of Correlation.

$$\text{Calculation of P.E} = 0.6745 \times \frac{(1-r^2)}{\sqrt{n}} = 0.6745 \times \frac{(1-(0.8527)^2)}{\sqrt{7}}$$

$$= 0.0375$$

Appendix 17

Calculation of mean, S.D, Coefficient of variation and correlation of DDC's Targeted and Actual Cream Sales (in Lakhs.)

Year	Targeted (X)	Actual (Y)	$x = X - \bar{X}$	$y = Y - \bar{Y}$	x^2	y^2	xy
2058/59	28	33.00	-4.68	3.18	21.90	10.112	-14.8824
2059/60	41	31.00	8.32	1.186	69.222	1.41	9.8675
2060/61	38	27.50	5.32	-2.314	28.30	5.35	-12.3105
2061/62	32	24.70	-0.68	-5.114	0.46	26.15	3.4775
2062/63	28	21.50	-4.68	-8.314	21.9024	69.12	38.9095
2063/64	39	53.70	6.32	23.886	39.942	570.54	150.9595
2064/65	22.8	17.30	-9.88	-12.514	97.614	156.60	123.6383
	228.80	208.70			279.349	839.29	299.66

Targeted Data

$$\text{Mean}(\bar{X}) = \frac{228.8}{7} = 32.68$$

$$S.D(\sigma_x) = \sqrt{\frac{\sum x^2}{n}} = \sqrt{\frac{279.332}{7}} = 6.317$$

$$C.V = \frac{\sigma_x}{\bar{X}} \times 100\% = \frac{6.317}{32.68} \times 100\% = 19.32\%$$

$$\begin{aligned} \text{Correlation}(r_{xy}) &= \frac{\sum xy}{\sqrt{\sum x^2 \sum y^2}} \\ &= \frac{299.659}{\sqrt{279.332 \times 839.272}} \\ &= 0.61889 \end{aligned}$$

Actual Data

$$\text{Mean}(\bar{Y}) = \frac{285.376}{7} = 40.767$$

$$S.D(\sigma_y) = \sqrt{\frac{\sum y^2}{n}} = \sqrt{\frac{2376.105}{7}} = 18.423$$

$$C.V = \frac{\sigma_y}{\bar{Y}} \times 100\% = \frac{18.423}{40.767} \times 100\% = 45.1909\%$$

The above result shows that there is positive relation between targeted and actual cream sales data. Calculation of Probable Error (P.E) of Karl Person's Coefficient of Correlation.

$$\text{Calculation of P.E} = 0.6745 \times \frac{(1-r^2)}{\sqrt{n}} = 0.6745 \times \frac{(1-(0.6188)^2)}{\sqrt{7}} = 0.1573$$

It shows that correlation coefficient 'r'(i.e. 0.6188) is greater than its probable error (0.1573). Hence it is significant.

Appendix 18

Calculation of correlation coefficient of total actual sales and total budgeted sales of Milk and Milk Products (Rs. in lakhs)

Year	Targeted (X)	Actual (Y)	$x = X - \bar{X}$	$y = Y - \bar{Y}$	x^2	y^2	xy
2058/59	15611.35	13483.99	-1709.40	-1899.84	2922048.36	3609392.026	3247586.496
2059/60	16722.68	14847.72	-598.252	-536.114	357905.455	287418.221	320731.273
2060/61	16405.02	15519.11	-915.912	135.276	838894.79	18299.596	-123900.911
2061/62	15959.06	15454.48	-1361.872	70.65	1854695.34	4991.122	-96216.257
2062/63	17393.45	15358.10	72.52	-25.73	5259.15	662.0329	-1865.9396
2063/64	19281.64	15896.63	1960.71	512.796	3844383.70	262959.737	1005444.25
2064/65	19873.33	17126.81	2552.4	1742.976	6514745.76	3037965.64	4448771.25
	1212246.53	107686.84			16337932.56	7221688.371	8800550.854

$$\text{Mean}(\bar{X}) = \frac{1212.53}{7} = 17320.932$$

$$\text{Mean}(\bar{Y}) = \frac{107686.84}{7} = 15383.834$$

$$\begin{aligned} \text{Correlation}(r_{xy}) &= \frac{\sum xy}{\sqrt{\sum x^2 \sum y^2}} \\ &= \frac{8800550.854}{\sqrt{16337932.56 \times 7221688.371}} \\ &= 0.810 \end{aligned}$$

The above result shows that there is highly positive correlation between Total Targeted and Total Actual Sales in DDC.

Appendix 19

Milk and Milk Product tactical (Short-Term) plan 2063/64

S.No.	Month	Milk (Ltrs)	Makhan (Kgs)	Curds (Ltrs)	Cheese (kgs)	Ghee (Kgs)	Paneer (Kgs)	Ice Cream (Ltrs)
1	Baisakh	5457000	28900	110000	15300	78500	5400	3800
2	Jestha	5132000	35800	95000	16000	78000	5350	4000
3	Ashad	5672000	30200	96000	14800	81500	5200	3700
4	Shrawan	5832000	24700	93000	15400	77000	5050	3300
5	Bhadra	6122000	23300	89000	15500	76400	5150	3800
6	Aswin	6831000	31700	90000	14700	78000	5600	3850
7	Kartik	5324500	31800	91000	15100	80000	6400	3650
8	Mangsir	5124500	28300	93500	16200	85500	6300	3200
9	Poush	6847000	28200	90500	15300	72100	4400	2800
10	Magh	4853000	19200	91000	16000	82000	6100	3000
11	Phalgun	4272000	16900	96000	16200	78000	6300	3350
12	Chaitra	4028000	18000	76000	13500	70000	5650	3550