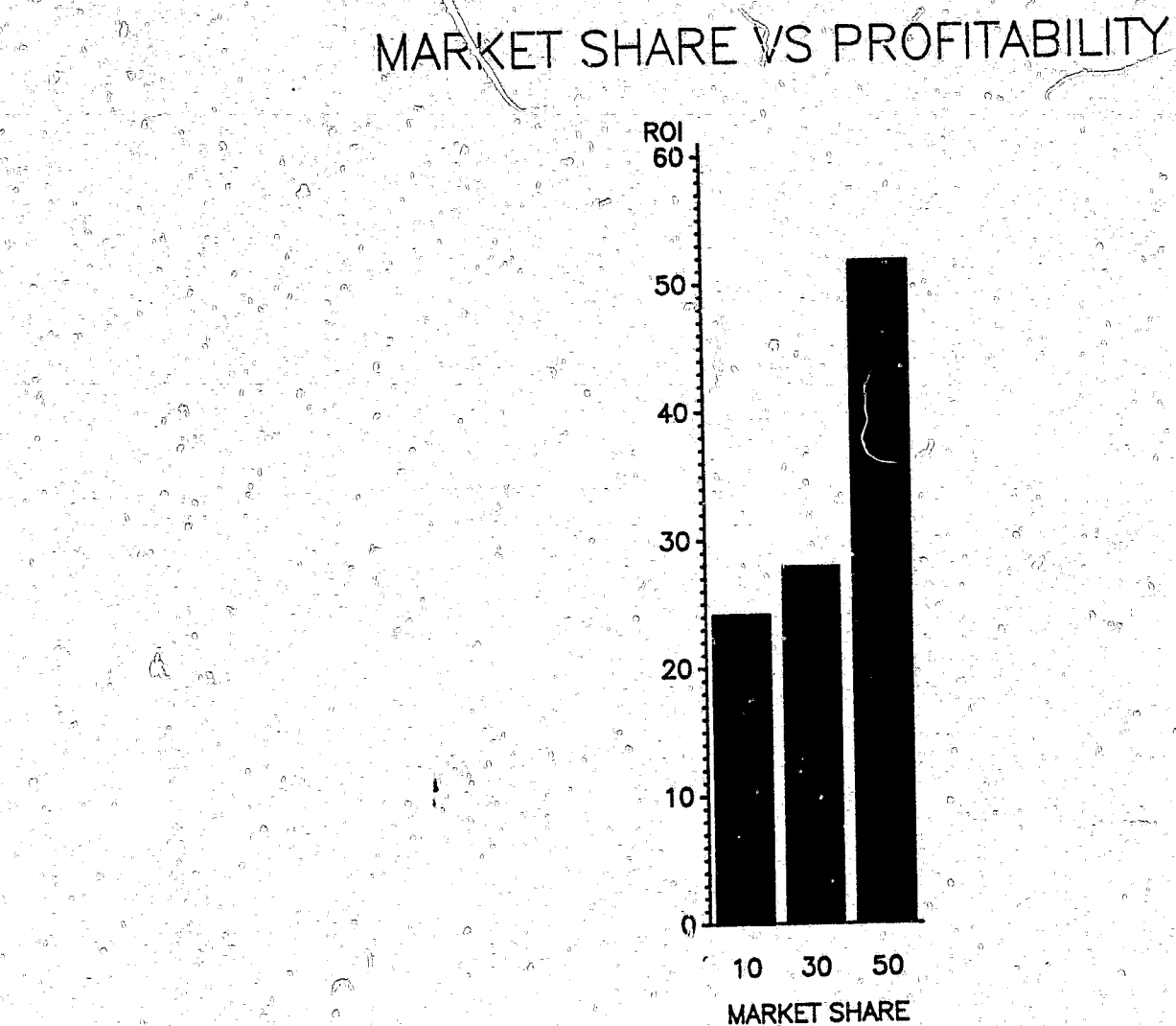

Fig A3.36b Chart of Market Share vs ROI

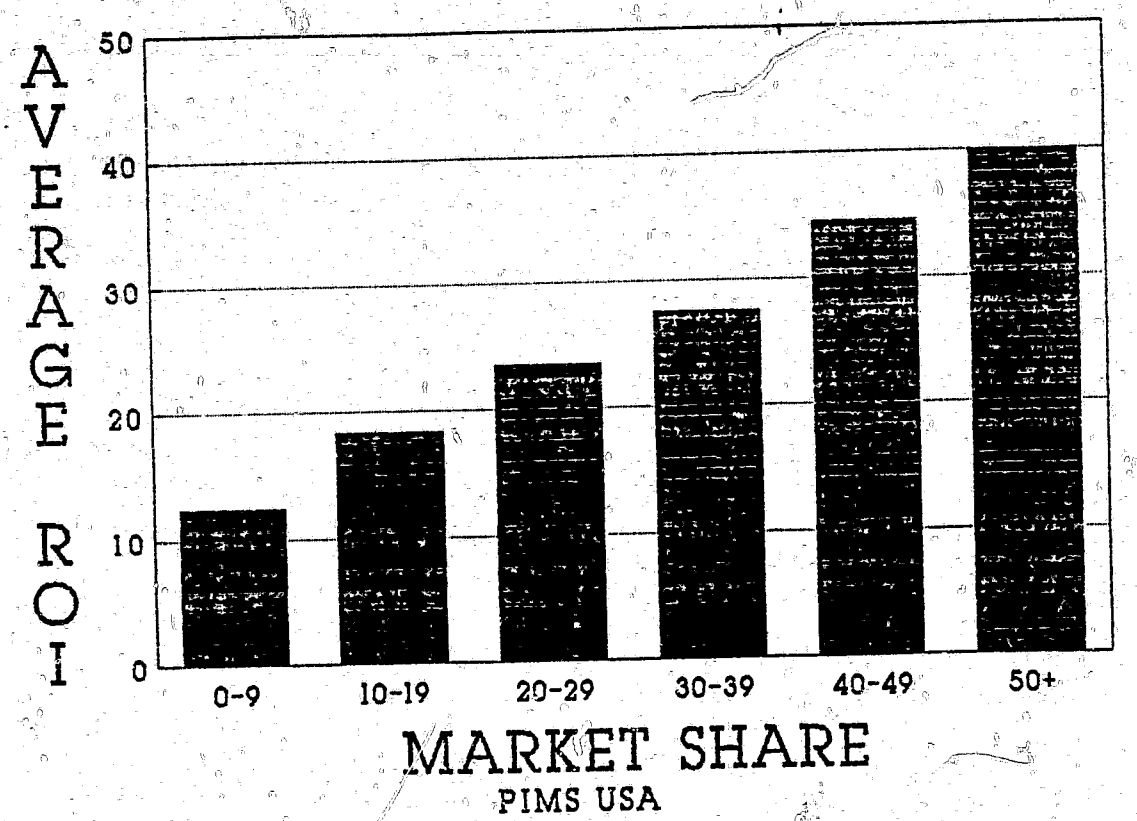

Fig A3.36c Chart of Market Share vs ROI

REG (SIMPLE) ON ARI AND MSH USING ALL DATA

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	5625.79440	5625.79440	6.762	0.0108
Error	96	79871.45877	831.99436		
C Total	97	85497.25316			

Root MSE	28.84431	R-square	0.0658
Dep Mean	32.31939	Adj R-sq	0.0561
C.V.	89.24771		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	20.755526	5.31656975	3.904	0.0002
MSH	1	0.324856	0.12492763	2.600	0.0108

Fig A3.37 Regression of Market Share on Profitability

Appendix IV DETAILED ANALYSIS

Appendix IV : Detailed Analysis

Appendix IV gives more details of the factorial analysis that was performed on the data.

The outline of the appendix is as follows:

Exhibit A4.01 is the programme and A4.02 the output of the SAS procedure for performing the factor analysis.

Exhibit A4.03 and A4.04 give the programme and output for the SAS procedure which performed the cluster analysis on the factors.

Exhibit A4.05 and A4.06 give the programme and selected outputs for the factorial analysis that is summarised in Table 5.2 of Chapter 5. The output for the first half of the table is given in detail and also the clusters relating to ICU (the customer concentration variable) showing that it is the dominating clustering variable. For more information on the clustering algorithms used by SAS see Hartigan (1975) and MacQueen (1967).

Exhibit A4.07 gives the output of a cluster analysis performed on ICU with a detailed printout so that the individual SBUs could be identified and compared to the intitial cluster analysis.

```
FILE: FCTRG1    SAS       A1  VM/XA CMS for WITSVMA

PROC STANDARD DATA= STORE.PIMSM
OUT= PMSS
STD=1;
DATA PIMSS;SET PMSS;
IDEN=_N_;

PROC FACTOR DATA=PIMSS OUTSTAT=FACT_ALL SCREE
      MINEIGEN=0 SCORE;
  VAR INS VAD  CUT MGR ICU PCU ICO;

PROC SCORE DATA=PIMSS  SCORE=FACT_ALL OUT=FSCORE;
  VAR INS VAD  CUT MGR ICU PCU ICO;
PROC FACTOR DATA=FACT_ALL OUTSTAT=FACT_3 SCREE  N=3
    ROTATE=PROMAX ROUND REORDER  MINEIGEN=0 SCORE;
  VAR INS VAD  CUT MGR ICU PCU ICO;
PROC SCORE DATA=PIMSS  SCORE=FACT_3   OUT=FSCOR3;
  VAR INS VAD  CUT MGR ICU PCU ICO;
PROC PRINT DATA=FSCOR3 (OBS=20);TITLE OUTPUT FROM SCORE ROUTINE;
DATA STORE.PIST;
SET FSCOR3;
```

Exhibit A4.01 SAS Programme for Factor Analysis

Exhibit A4.02 Output from Factor Analysis Program

SAS 13:41 MONDAY, MARCH 14

INITIAL FACTOR METHOD: PRINCIPAL COMPONENTS

PRIOR COMMUNALITY ESTIMATES: ONE

EIGENVALUES OF THE CORRELATION MATRIX: TOTAL = 9 AVERAGE = 1

	1	2	3	4	5	6	7	8	9
EIGENVALUE	1.973913	1.875898	1.339097	1.004999	0.908562	0.800813	0.541474	0.345808	0.209436
DIFFERENCE	0.098015	0.536801	0.334098	0.096438	0.107748	0.259339	0.195665	0.136373	
PROPORTION	0.2193	0.2084	0.1488	0.1117	0.1010	0.0890	0.0602	0.0384	0.0233
CUMULATIVE	0.2193	0.4278	0.5765	0.6882	0.7892	0.8781	0.9383	0.9767	1.0000

9 FACTORS WILL BE RETAINED BY THE NFACTOR CRITERION

SCREE PLOT OF EIGENVALUES

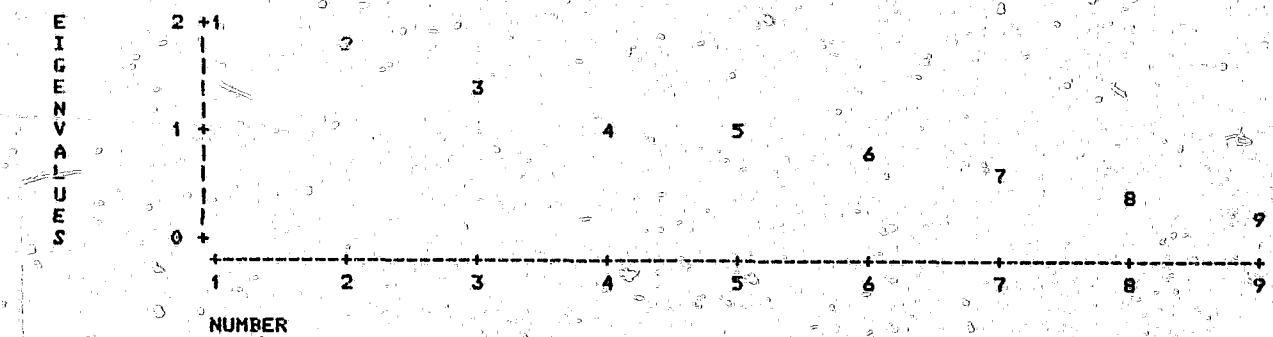

Exhibit A4.02 Output from Factor Analysis Program

SAS 13:41 MONDAY, MARCH

INITIAL FACTOR METHOD: PRINCIPAL COMPONENTS

FACTOR PATTERN

	FACTOR1	FACTOR2	FACTOR3	FACTOR4	FACTOR5	FACTOR6	FACTOR7	FACTOR8	FACTOR9
INS	0.42[illegible]	0.59930	0.31639	0.10962	-0.29140	-0.34634	0.07090	0.34915	0.66313
VAD	0.[illegible]849	[illegible]0756	0.05267	0.[illegible]373	0.38706	0.65722	-0.10171	0.15339	0.02200
GVS	0.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
RSL	-0.10705	0.09547	0.85809	0.16015	-0.13518	0.20077	0.32950	-0.22019	-0.01684
CUT	-0.[illegible]	-0.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	170	0.06655
MGR	-0.28705	-0.24614	0.[illegible]28	0.38955	0.67974	-0.31204	-0.06907	0.09182	-0.00412
ICU	0.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-0.28105
PCU	0.6[illegible]	0.[illegible]796	0.03420	0.03531	0.03792	0.03660	0.06682	-0.04108	0.33180
ICO	0.09990	0.53529	-0.57297	0.31898	0.20210	-0.13395	0.43379	-0.15552	0.04795

VARIANCE EXPLAINED BY EACH FACTOR

FACTOR1	FACTOR2	FACTOR3	FACTOR4	FACTOR5	FACTOR6	FACTOR7	FACTOR8	FACTOR9
1.973913	1.875898	1.339097	1.004999	0.908562	0.800813	0.541474	0.345808	0.209436

FINAL COMMUNALITY ESTIMATES: TOTAL = 9.000000

INS	VAD	GVS	RSL	CUT	MGR	ICU	PCU	ICO
1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000

SCORING COEFFICIENTS ESTIMATED BY REGRESSION

SQUARED [illegible]

FACTOR1	FACTOR2	FACTOR3	FACTOR4	FACTOR5	FACTOR6	FACTOR7	FACTOR8	FACTOR9
1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000

STANDARDIZED SCORING COEFFICIENTS

	FACTOR1	FACTOR2	FACTOR3	FACTOR4	FACTOR5	FACTOR6	FACTOR7	FACTOR8	FACTOR9
INS	0.[illegible]	0.31[illegible]	0.[illegible]	0.10707	-0.32073	-0.43249	0.13094	1.00966	0.30143
VAD	0.17148	0.27062	0.03934	0.09346	0.42601	0.82069	-0.18784	0.44357	0.10505
GVS	0.38806	0.17190	-0.07800	0.14330	0.02042	-0.24701	-0.66633	-0.91035	-0.44935
RSL	-0.05525	0.05089	0.64080	0.15935	-0.15318	0.25070	0.60853	-0.63675	-0.08042
CUT	-0.18086	-0.04874	-0.11369	0.78350	-0.42173	0.12741	-0.39004	0.03383	0.31777
MGR	-0.13529	-0.13121	0.26307	0.38761	0.74815	-0.42711	-0.12755	0.26553	-0.01967
ICU	0.31531	-0.33010	-0.08287	0.24977	-0.05996	0.11321	0.39324	0.39165	-1.34193
PCU	0.[illegible]1	-0.34009	0.02479	0.03514	0.04174	0.04570	0.12340	-0.11880	1.58426
ICO	0.05061	0.28535	-0.42788	0.31739	0.22244	-0.16727	0.80112	-0.44973	0.22895

METHOD: VARIMAX

ORTHOGONAL TRANSFORMATION MATRIX

	1	2	3
1	0.68847	0.69065	-0.22141
2	-0.72195	0.62343	-0.30021
3	-0.06930	0.36653	0.92782

ROTATED FACTOR PATTERN

	FACTOR1	FACTOR2	FACTOR3
PCU	93 *	9	7
ICU	88 *	0	-5
INS	-15	79 *	2
GVS	29	77 *	-17
VAD	-14	57 *	-18
CUT	-17	-36	-3
RSL	-20	30	79 *
MGR	-3	-21	46 *
ICO	-28	19	-71 *

NOTE: PRINTED VALUES ARE MULTIPLIED BY 100 AND ROUNDED TO THE NEAREST INTEGER
VALUES GREATER THAN 0.438385 HAVE BEEN FLAGGED BY AN '*'

VARIANCE EXPLAINED BY EACH FACTOR

FACTOR1	FACTOR2	FACTOR3
1.919777	1.850535	1.418596

FINAL COMMUNALITY ESTIMATES: TOTAL = 5.188908

INS	VAD	GVS	RSL	CUT	MGR	ICU	PCU	ICO
0.652197	0.375068	0.701648	0.757333	0.158994	0.255997	0.783131	0.879731	0.624810

SCORING COEFFICIENTS ESTIMATED BY REGRESSION

SQUARED MULTIPLE CORRELATIONS OF THE VARIABLES WITH EACH FACTOR

FACTOR1	FACTOR2	FACTOR3
1.000000	1.000000	1.000000

STANDARDIZED SCORING COEFFICIENTS

	FACTOR1	FACTOR2	FACTOR3
PCU	0.48333	0.03735	0.04807
ICU	0.46114	-0.01840	-0.04761
INS	-0.09381	0.43946	0.07404
GVS	0.13766	0.40377	-0.06516
VAD	-0.08004	0.30157	-0.08271
CUT	-0.08145	-0.19697	-0.05080
RSL	-0.11919	0.22845	0.59150
MGR	-0.01665	-0.07881	0.31343
ICO	-0.14151	0.05602	-0.49386

Exhibit A4.02 Output from Factor Analysis Program

SAS 13:41 MONDAY

MAX

TARGET MATRIX FOR PROCRUSTEAN TRANSFORMATION

	FACTOR1	FACTOR2	FACTOR3
PCU	98 *	0	0
ICU	100 *	0	0
INS	-1	100 *	0
GVS	4	82 *	-1
VAD	-1	85 *	-3
CUT	-8	-77 *	0
RSL	-1	4	100 *
MGR	0	-7	100 *
ICO	-4	2	-98 *

NOTE: PRINTED VALUES ARE MULTIPLIED BY 100 AND ROUNDED TO THE NEAREST INTEGER
VALUES GREATER THAN 0.5419 HAVE BEEN FLAGGED BY AN '*'

PROCRUSTEAN TRANSFORMATION MATRIX

	1	2	3
1	0.95781	0.00781	0.00432
2	0.03815	1.19377	0.08073
3	0.01531	-0.01559	1.39206

NORMALIZED OBLIQUE TRANSFORMATION MATRIX

	1	2	3
1	0.71267	0.69938	-0.11913
2	-0.70215	0.62383	-0.26616
3	-0.03988	0.35464	0.94840

INTER-FACTOR CORRELATIONS

	FACTOR1	FACTOR2	FACTOR3
FACTOR1	100 *	-5	-2
FACTOR2	-5	100 *	-4
FACTOR3	-2	-4	100 *

NOTE: PRINTED VALUES ARE MULTIPLIED BY 100 AND ROUNDED TO THE NEAREST INTEGER
VALUES GREATER THAN 0.578187 HAVE BEEN FLAGGED BY AN '*'

Exhibit A4.02 Output from Factor Analysis Program

SAS 13:41 MONDAY,

OMAX

ROTATED FACTOR PATTERN (STD REG COEFS)

	FACTOR1	FACTOR2	FACTOR3
PCU	94 *	9	8
ICU	88 *	1	-5
INS	-12	79 *	6
GVS	32	77 *	-12
VAD	-12	57 *	-15
CUT	18	-36	-6
RSL	-18	29	81 *
MGR	-3	-22	45 *
ICU	-28	20	-70 *

NOTE: PRINTED VALUES ARE MULTIPLIED BY 100 AND ROUNDED TO THE NEAREST INTEGER
VALUES GREATER THAN 0.438608 HAVE BEEN FLAGGED BY AN '*'

REFERENCE AXIS CORRELATIONS

	FACTOR1	FACTOR2	FACTOR3
FACTOR1	100 *	5	2
FACTOR2	5	100 *	4
FACTOR3	2	4	100 *

NOTE: PRINTED VALUES ARE MULTIPLIED BY 100 AND ROUNDED TO THE NEAREST INTEGER
VALUES GREATER THAN 0.578234 HAVE BEEN FLAGGED BY AN '*'

REFERENCE STRUCTURE (SEMIPARTIAL CORRELATIONS)

	FAC	FACTOR3
PCU	93 *	9 8
ICU	88 *	1 -5
INS	-12	79 * 6
GVS	31	77 * -12
VAD	-12	57 * -15
CUT	-18	-36 -6
RSL	-18	29 81 *
MGR	-3	-21 45 *
ICO	-28	20 -70 *

NOTE: PRINTED VALUES ARE MULTIPLIED BY 100 AND ROUNDED TO THE NEAREST INTEGER
VALUES GREATER THAN 0.437944 HAVE BEEN FLAGGED BY AN '*'

[illegible] EXPLAINED BY EACH FACTOR ELIMINATING OTHER FACTORS

FACTOR1	FACTOR2	FACTOR3
1.924704	1.856406	1.397356

Exhibit A4.02 Output from Factor Analysis Program

SAS 13:41 MONDAY, M

PROMAX

FACTOR STRUCTURE (CORRELATIONS)

	FACTOR1	FACTOR2	FACTOR3
PCU	93 *	5	6
ICU	88 *	-3	-7
INS	-16	80 *	3
GVS	28	77 *	-16
VAD	-14	58 *	-17
CUT	-17	-35	-4
RSL	-21	26	80 *
MGR	-3	-23	46 *
ICO	-28	24	-71 *

NOTE: PRINTED VALUES ARE MULTIPLIED BY 100 AND ROUNDED TO THE NEAREST INTEGER
VALUES GREATER THAN 0.438819 HAVE BEEN FLAGGED BY AN '*'

VARIANCE EXPLAINED BY EACH FACTOR IGNORING OTHER FACTORS

FACTOR1	FACTOR2	FACTOR3
1.918865	1.867375	1.412935

FINAL COMMUNALITY ESTIMATES: TOTAL = 5.188908

INS	VAD	GVS	RSL	CUT	MGR	ICU	PCU	ICO
0.65[illegible]	0.375068	0.701648	0.757333	0.158994	0.255997	0.783131	0.879731	0.624810

SCORING COEFFICIENTS ESTIMATED BY REGRESSION

SQUARED MULTIPLE CORRELATIONS OF THE VARIABLES WITH EACH FACTOR

FACTOR1	FACTOR2	FACTOR3
1.000000	1.000000	1.000000

STANDARDIZED SCORING COEFFICIENTS

	FACTOR1	FACTOR2	FACTOR3
PCU	0.48294	0.01573	0.04057
ICU	0.46138	-0.03351	-0.05545
INS	-0.09690	0.43776	0.08136
GVS	0.13518	0.40121	-0.06210
VAD	-0.08180	0.30872	-0.07740
CUT	-0.08001	-0.19040	-0.05204
RSL	-0.12230	0.19837	0.59635
MGR	-0.01698	-0.09607	0.31259
ICO	-0.14053	0.08989	-0.49068

Exhibit A4.02 Output from Factor Analysis Program

OUTPUT FROM SCORE ROUTINE 13:41 MONDAY, MARCH 14, 1988

OBS	MSH	RSH	PQL	UNI	NFR	RAD	MKT	INS	INV	VAD	OPE	GVI	GVS	RIN
1	65.0	186.0	60	70	10.0	0.9	2.0	23.2	53.5	43.4	83.3	89.1	46.5	51.7
2	65.0	186.0	70	69	20.0	0.6	2.2	24.8	56.9	43.6	83.2	64.5	16.0	48.4
3	11.6	21.6	8	70	13.0	1.1	2.1	46.9	111.1	42.2	67.2	81.0	38.0	29.9
4	11.0	19.9	10	70	8.0	0.7	3.6	39.5	93.8	42.1	72.0	87.3	34.5	30.4
5	21.0	95.0	35	20	3.0	0.0	4.6	24.7	49.2	50.2	66.2	230.4	56.9	68.8
6	18.0	72.0	25	30	3.9	0.0	5.8	25.7	47.1	54.6	74.0	228.4	58.7	66.1
7	70.0	233.0	32	68	40.0	1.0	9.0	51.0	87.0	58.0	63.7	78.4	40.0	32.7
8	32.0	47.0	20	68	39.0	1.0	25.0	31.0	64.6	48.0	103.9	54.8	17.0	38.7
9	76.0	316.0	61	68	0.0	1.0	17.0	38.0	105.6	36.0	51.9	26.3	10.0	34.2
10	60.0	150.0	40	0	2.0	0.0	7.0	18.0	41.9	43.0	87.7	105.6	19.0	46.7
11	80.0	400.0	70	0	3.0	0.0	13.6	31.5	53.4	59.0	74.2	76.2	24.0	32.7
12	99.0	10000.0	0	0	0.0	0.0	0.0	33.6	97.7	34.4	58.5	86.3	29.0	32.7
13	50.0	111.0	22	0	3.0	0.0	6.4	28.8	72.0	40.0	68.7	62.2	17.9	32.7
14	7.5	11.0	0	0	100.0	0.7	0.0	26.8	43.3	61.9	275.0	56.0	15.0	56.0
15	5.0	6.0	0	0	0.0	0.0	0.0	57.0	190.0	30.0	47.2	17.5	10.0	68.4
16	55.0	150.0	70	0	0.0	0.0	0.0	16.7	16.7	100.0	166.0	377.2	63.0	47.9
17	36.0	80.0	20	0	20.0	2.0	2.5	43.7	120.1	36.4	43.1	57.2	25.0	59.5
18	14.0	30.0	30	0	5.0	0.0	0.0	7.8	78.0	10.0	59.9	25.6	2.0	320.5
19	7.0	12.0	-20	0	50.0	0.0	0.0	48.0	97.4	49.5	130.2	37.5	18.0	52.1
20	12.0	15.0	10	0	100.0	0.0	0.0	105.0	203.9	51.5	72.0	100.0	105.0	23.8

OBS	RSL	CUT	MGR	ICO	ICU	PCU	IRI	ARI	DUMMMY	FACTOR1	FACTOR2	FACTOR3
1	12.0	60	4.2	100.0	5	5	54.5	55.0	D	-0.18533	0.13114	-0.66138
2	12.0	65	5.0	100.0	6	6	52.9	59.0	D	-0.17864	0.08546	-0.66594
3	14.0	44	4.2	65.4	14	5	4.5	2.0	D	0.11504	0.15793	0.42289
4	12.0	44	4.2	66.3	14	5	6.7	19.0	D	0.13893	0.11261	0.25043
5	17.0	60	10.5	43.0	30	5	28.3	33.0	D	0.19783	-0.03258	1.23129
6	17.6	70	0.5	43.0	30	5	25.3	11.0	D	0.16428	-0.05958	1.13478
7	15.1	68	18.0	100.0	13	5	35.2	25.0	D	-0.25581	0.10519	-0.35169
8	12.0	75	6.0	100.0	4	4	30.2	0.0	D	-0.26800	-0.00728	-0.68680
9	13.0	80	-2.0	100.0	4	4	40.4	2.0	D	-0.29889	-0.00937	-0.68215
10	8.4	80	2.0	100.0	10	4	55.8	109.0	D	-0.22089	-0.13294	-0.99734
11	15.1	80	0.0	100.0	1	4	49.5	92.0	D	-0.33639	0.03865	-0.51060
12	15.1	80	0.0	100.0	10	5	32.6	53.0	D	-0.29834	0.03843	-0.51023
13	15.1	80	8.0	96.0	10	4	39.8	60.0	D	-0.29595	0.00089	-0.35076
14	15.0	55	0.0	80.0	1	6	28.0	22.0	D	-0.04412	0.16560	0.06592
15	39.0	100	3.0	70.0	1	6	7.9	16.6	D	-0.50654	0.30532	2.02662
16	8.0	90	15.0	91.0	10	4	86.6	117.0	D	-0.19046	-0.30364	-0.72421
17	26.0	80	15.0	80.0	36	5	21.7	36.0	D	-0.28223	0.17751	0.92476
18	25.0	80	10.0	62.0	25	4	43.6	54.0	D	-0.17234	0.07867	1.28122
19	25.0	80	15.0	68.0	30	5	26.3	9.0	D	-0.18699	0.09633	1.16271
20	25.0	100	25.0	92.0	100	6	5.6	18.6	D	-0.31233	0.00288	0.55242

Exhibit A4.02 Output from Factor Analysis Program

```
PROC FASTCLUS DATA=STORE.FIST  OUT=CLICU MAXC=5 MAXITER=3;
  VAR FACTOR1 FACTOR2 FACTOR3;
  ID IDEN;
TITLE1 'FASTCLUS ON 3 FACTORS';
DATA CUT;SET CLICU;
PROC SORT DATA=CUT OUT =CUS; BY CLUSTER IDEN;

PROC PRINT DATA=CUS;BY CLUSTER ;ID IDEN;
DATA PLOT;SET CLICU;
*ROC PRINT DATA=CLICU (OBS=11);
IF CLUSTER=1 THEN DELETE;
IF CLUSTER=4 THEN DELETE;

PROC SORT DATA=PLOT OUT=PLOS;BY CLUSTER;
PROC  PLOT DATA=PLOS;BY CLUSTER;
  PLOT ARI*MSH;
PROC  PLOT DATA=PLOS;BY CLUSTER;
  PLOT ARI*RSH;
```

Exhibit A4.03 SAS Programme for Cluster Analysis

FASTCLUS ON 3 FACTORS 15:33 TUESDAY, SEPTEM

FASTCLUS PROCEDURE

REPLACE=FULL RADIUS=0 MAXCLUSTERS=7 MAXITER=5 CONVERGE=0.02

INITIAL SEEDS

CLUSTER	FACTOR1	FACTOR2	FACTOR3
1	-3.57134	0.72581	-1.16007
2	-1.86140	1.26771	1.90610
3	0.33177	-0.93202	1.15253
4	0.58736	2.37000	1.84206
5	1.12506	1.22441	-0.71638
6	2.09604	-1.77530	-1.57393
7	-0.99441	-3.49191	2.70853

MINIMUM DISTANCE BETWEEN SEEDS = 2.778966

ITERATION	CHANGE IN CLUSTER SEEDS 1	2	3	4	5	6	7
1	1.3855	0.812265	1.04508	0.961557	1.15145	1.48262	0.966506
2	0.450961	0.546649	0.141791	0.484617	0.155606	0.200853	0
3	0.159357	0	0.0452015	0	0.178198	0.253538	0
4	0.0813139	0	0.0455278	0	0.0715307	0.117425	0
5	0	0	0.0651952	0	0.0589173	0.0938115	0

ITERATION LIMIT EXCEEDED

CLUSTER SUMMARY

CLUSTER NUMBER	FREQUENCY	RMS STD DEVIATION	MAXIMUM DISTANCE FROM SEED TO OBSERVATION	NEAREST CLUSTER	CENTROID DISTANCE
1	15	0.5845	2.0144	5	1.8989
2	3	0.6253	0.9614	4	2.2888
3	25	0.5523	1.8986	6	1.3266
4	13	0.5864	1.3344	5	1.8520
5	25	0.4623	1.3951	3	1.3663
6	20	0.4482	1.9104	3	1.3266
7	2	0.7891	0.9665	3	3.8294

STATISTICS FOR VARIABLES

VARIABLE	TOTAL STD	WITHIN STD	R-SQUARED	RSQ/(1-RSQ)
FACTOR1	1.0000000	0.5491095	0.7162153	2.5237980
FACTOR2	1.0000000	0.5654620	0.6990613	2.3229363
FACTOR3	1.0000000	0.4575982	0.8029213	4.0741146
OVER-ALL	1.0000000	0.5262017	0.7393993	2.8372883

Exhibit A4.04 Output from Cluster Programme

FASTCLUS ON 3 FACTORS 15:33 TUESDA

FASTCLUS PROCEDURE

PSEUDO F STATISTIC = 45.40
APPROXIMATE EXPECTED OVER-ALL R-SQUARED = 0.75788
CUBIC CLUSTERING CRITERION = -1.273
WARNING: THE TWO ABOVE VALUES ARE INVALID FOR CORRELATED VARIABLES

CLUSTER MEANS

CLUSTER	FACTOR1	FACTOR2	FACTOR3
1	-1.57312	0.49454	-1.26656
2	-1.31565	0.26893	1.54132
3	0.15964	-0.76451	0.34067
4	0.76429	1.12046	1.40837
5	-0.04757	0.49915	-0.13572
6	0.91158	-0.44528	-0.70462
7	-1.70766	-3.02573	2.07018

CLUSTER STANDARD DEVIATIONS

CLUSTER	FACTOR1	FACTOR2	FACTOR3
1	0.82251	0.48463	0.33724
2	0.59225	0.69717	0.57580
3	0.50364	0.63960	0.50205
4	0.52846	0.65162	0.53642
5	0.47831	0.52231	0.37362
6	0.38515	0.48451	0.46648
7	1.00865	0.18924	0.90277

Exhibit A4.04 Output from Cluster Programme

Exhibit A4.04 Output from Cluster Programme

FASTCLUS ON 3 FACTORS 15:33 TUESDAY, SEPTEMBER 27, 1988

CLUSTER=.

IDEN	MGR	ICO	ICU	PCU	INS	CUT	VAD	FACTOR1	FACTOR2	FACTOR3	MSH	RSH	ARI
104	4	100	20	4	35	80	38	.	.	.	70	233	22
105	4	84	20	5	50	50	40	.	.	.	46	121	28
106	0	100	10	6	53	80	38	.	.	.	70	300	18
107	3	100	15	6	52	85	35	.	.	.	40	67	20
108	15	100	3	6	33	80	58	.	.	.	55	122	38
109	15	100	2	4	41	50	68	.	.	.	90	900	31
110	30	100	4	4	28	70	79	.	.	.	70	233	71
111	15	100	3	6	41	80	58	.	.	.	55	122	34
112	0	100	4	4	108	45	38	.	.	.	23	30	-24
113	3	100	2	4	46	35	56	.	.	.	65	185	48
114	8	100	2	4	88	40	61	.	.	.	95	1900	23
115	8	100	2	4	45	40	50	.	.	.	100	10000	39
116	8	100	2	4	152	40	61	.	.	.	94	1900	14
CLUSTER	116	1284	89	61	772	775	680	0	0	0	873	16113	362

N= 13

CLUSTER=1

IDEN	MGR	ICO	ICU	PCU	INS	CUT	VAD	FACTOR1	FACTOR2	FACTOR3	MSH	RSH	ARI
17	15.0	80.0	36	5	43.7	80.0	36.4	-0.856	0.35580	-1.906	36.0	80.0	36.0
23	2.0	82.5	5	5	27.3	60.0	69.0	-1.076	0.08861	-1.230	37.5	83.3	24.8
40	-17.0	95.0	25	4	14.6	75.6	48.0	-0.452	0.35600	-1.406	23.0	32.0	.
42	5.0	70.0	20	3	71.8	75.6	80.0	-1.111	-0.38241	-1.056	27.0	63.0	.
45	5.0	74.0	10	5	20.0	100.0	19.0	-0.914	-0.18200	-0.762	19.0	35.0	16.0
55	3.0	58.0	4	5	58.0	45.0	34.0	-0.896	0.17697	-1.128	65.0	185.0	0.0
58	0.0	100.0	1	5	28.0	80.0	33.0	-1.535	-0.05455	-0.960	20.0	25.0	18.0
63	4.0	41.0	414	156	18.0	40.0	43.0	-2.063	0.84597	-1.523	9.0	28.0	12.0
64	4.5	97.0	1	5	19.0	60.0	25.7	-2.088	0.87550	-1.316	25.0	35.0	30.0
86	11.0	70.0	5	4	31.0	100.0	44.0	-0.795	0.58715	-1.814	57.0	407.0	33.0
87	11.0	70.0	5	4	20.0	100.0	53.0	-2.338	0.75673	-1.545	57.0	407.0	44.0
88	5.0	100.0	300	4	35.0	60.0	87.0	-2.130	0.94807	-1.002	80.0	400.0	72.0
89	8.0	80.0	200	5	28.0	70.0	50.0	-2.160	1.26152	-0.809	24.0	43.0	61.0
90	3.0	81.0	10	5	24.0	75.0	49.0	-3.571	0.72581	-1.160	23.0	40.0	69.0
91	3.0	85.0	6	5	37.0	75.0	75.0	-1.611	0.65889	-1.387	23.0	37.0	62.0
CLUSTER	62.5	1183.5	1042	220	475.6	1096.2	726.1	-23.597	7.41812	-19.004	525.5	1900.3	477.8

N= 15

CLUSTER=2

IDEN	MGR	ICO	ICU	PCU	INS	CUT	VAD	FACTOR1	FACTOR2	FACTOR3	MSH	RSH	ARI
38	5	88	1	5	8.6	40	20	-1.3997	-0.26481	2.38601	3	3.5	47
68	4	85	4	5	36.0	60	42	-0.6859	0.01390	1.23165	79	376.0	35
79	4	60	10	5	58.0	60	43	-1.8614	1.05771	1.90610	15	30.0	4
CLUSTER	13	233	15	15	102.6	160	105	-3.9470	0.80680	5.52395	97	409.5	86

FASTCLUS ON 3 FACTORS 15:33 TUESDAY, SEPTEMBER 27, 1998

CLUSTER=3

IDEN	MGR	ICO	ICU	PCU	INS	CUT	VAD	FACTOR1	FACTOR2	FACTOR3	MSH	RSH	ARI
3	4.2	65.4	14	5	46.9	44	42.2	-0.07488	-1.007	-0.03750	11.6	21.6	2.0
4	4.2	66.3	14	5	39.5	44	42.1	-0.05475	-0.946	-0.18458	11.0	19.9	19.0
6	0.5	43.0	30	5	25.7	70	54.6	-0.97354	-0.517	-0.36722	18.0	72.0	11.0
8	6.0	100.0	4	4	31.0	75	48.0	0.15087	0.091	0.44931	32.0	47.0	0.0
9	-2.0	100.0	4	4	38.0	80	36.0	-0.00380	-0.646	0.03887	76.0	316.0	2.0
11	0.0	100.0	1	4	21.5	80	59.0	0.01388	-0.263	0.80656	80.0	400.0	92.0
13	8.0	96.0	10	4	28.8	80	40.0	0.82952	-0.689	0.17189	50.0	111.0	60.0
20	25.0	92.0	100	6	105.0	100	51.5	0.14132	-0.036	0.44468	12.0	15.0	18.6
22	7.5	72.0	20	6	33.0	82	25.5	0.25867	-0.424	0.72610	34.0	90.0	25.0
26	3.0	81.0	3182	153	28.0	70	35.0	1.10508	-0.472	0.45719	20.0	33.0	11.0
28	-5.0	100.0	1	7	20.0	30	20.0	0.18436	-0.588	-0.45096	65.0	185.0	40.0
36	-3.0	100.0	1	5	9.0	64	30.0	-0.57725	-1.777	-0.20455	19.0	23.0	44.0
44	5.0	81.0	10	4	20.0	100	13.0	0.01059	-2.546	0.56026	24.0	42.0	-10.0
47	5.0	80.0	10	3	30.0	80	38.0	0.07056	-0.069	0.63758	3.0	4.0	88.0
49	330.0	76.0	10	5	10.0	90	30.0	-0.20679	-1.311	-0.21710	30.0	65.0	152.0
50	330.0	75.0	20	5	9.0	80	27.0	0.87067	-1.439	1.00241	25.0	50.0	132.0
54	5.0	89.5	3	5	22.5	100	46.1	1.33550	-0.784	0.67812	67.0	297.8	40.0
60	-1.0	99.0	2	6	72.0	60	47.0	0.41786	-0.497	-0.07478	87.0	725.0	12.0
69	4.0	100.0	2	5	17.0	55	29.0	-0.44755	-0.386	0.34282	25.0	41.0	22.0
71	6.0	65.0	200	4	3.0	80	25.0	-0.25695	-0.763	0.12651	12.0	22.0	38.0
82	6.0	100.0	20	5	51.0	100	60.0	0.29734	-0.133	0.39964	30.0	43.0	45.0
94	10.0	80.0	150	6	24.0	60	55.0	0.01666	-0.166	0.25134	35.0	78.0	88.0
96	2.0	60.0	200	4	21.0	100	18.4	0.33735	-0.800	0.14166	15.0	33.0	26.0
102	4.0	100.0	20	4	29.0	80	38.0	0.21437	-1.823	1.66560	70.0	233.0	29.0
103	4.0	100.0	20	4	51.0	80	33.0	0.33177	-0.932	1.15293	70.0	300.0	10.0
CLUSTER	759.4	2121.2	4048	268	795.9	1884	943.4	3.99088	-15.113	8.51676	921.6	3267.3	996.6

N= 25

CLUSTER=4

IDEN	MGR	ICO	ICU	PCU	INS	CUT	VAD	FACTOR1	FACTOR2	FACTOR3	MSH	RSH	ARI
7	18	100	13	5	51.0	68	58.0	0.96012	1.0652	1.1522	70	233.0	25.0
15	3	70	1	6	57.0	100	30.0	-0.10433	1.7195	2.0987	5	6.0	16.6
19	15	68	30	5	48.0	80	49.3	0.81301	2.4143	1.6657	7	12.0	9.0
65	5	87	1	5	19.1	50	17.0	1.31869	0.8136	1.7385	35	67.0	22.0
66	4	60	100	4	39.0	80	21.0	1.29515	0.5407	1.7662	6	12.5	9.0
67	3	92	8	5	35.0	66	36.0	0.08988	0.6007	1.2449	39	73.0	41.0
70	14	80	3	5	37.0	75	42.0	0.43754	0.5378	1.2762	20	33.0	75.0
72	6	65	200	4	25.0	90	19.0	0.50940	0.2592	1.3214	15	26.0	41.0
73	8	100	5	6	53.0	85	82.0	0.44470	0.5244	1.0224	70	233.0	58.0
74	8	100	5	6	53.0	90	83.0	0.53566	0.7988	1.0291	70	233.0	68.0
99	3	36	200	3	18.0	100	31.0	1.52250	1.2913	0.4921	12	24.0	31.0
100	5	60	100	4	20.0	100	21.0	0.58736	2.3700	1.8421	13	28.0	46.0
101	4	100	20	4	35.0	80	33.0	1.52590	1.2306	0.6583	70	300.0	15.0
CLUSTER	96	1018	686	62	490.1	1064	522.3	9.93581	14.5660	18.3089	432	1280.5	456.6

N= 13

Exhibit A4.04 Output from Cluster Programme

FASTCLUS ON 3 FACTORS 15:33 TUESDAY, SEPTEMBER 27, 1988

CLUSTER=5

IDEN	MGR	ICO	ICU	PCU	INS	CUT	VAD	FACTOR1	FACTOR2	FACTOR3	MSH	RSH	ARI
5	10.5	43	30	5	24.7	60.0	50.2	-0.7278	0.1150	-0.4273	21.0	95.0	33.0
10	2.0	100	10	4	18.0	80.0	43.0	0.0135	-0.0617	-0.0686	60.0	150.0	109.0
12	0.0	100	10	5	33.6	80.0	34.4	0.0375	0.3519	0.0591	99.0	10000.0	53.0
16	15.0	91	10	4	16.7	90.0	100.0	0.2139	0.9697	-0.1263	55.0	150.0	117.0
18	10.0	62	25	4	7.8	80.0	10.0	-0.0738	0.9446	0.3196	14.0	30.0	54.0
24	8.0	50	1	4	26.0	85.0	22.0	0.3721	-0.0561	-0.3362	23.0	85.0	13.5
33	0.0	78	1	6	26.0	67.0	26.0	1.1251	1.2244	-0.7164	32.0	70.0	-37.0
35	0.0	100	1	5	22.0	60.0	26.0	0.0920	0.7932	0.0742	36.0	56.0	-50.0
41	-23.0	81	25	4	162.3	75.6	50.0	-0.0281	0.4732	-1.4922	20.0	33.0	.
43	-15.0	35	30	3	10.0	-15.0	100.0	-1.0417	-0.1338	0.0229	15.0	75.0	.
48	0.0	86	1	4	95.0	20.0	19.0	0.3725	0.7033	-0.2198	6.0	9.0	8.0
51	4.0	62	10	4	33.0	85.0	28.0	0.1555	0.1000	0.1924	6.0	11.0	26.0
53	6.5	80	32	5	68.4	80.0	45.3	-0.1527	0.3056	0.3464	18.5	30.9	20.8
62	0.0	67	100	5	32.7	95.0	26.0	0.4263	0.7217	-0.0359	23.0	52.0	48.0
76	8.0	70	20	4	53.0	70.0	65.0	0.2631	1.7775	-0.1326	30.0	75.0	25.0
77	4.0	60	30	5	57.0	70.0	50.0	-0.6311	0.9582	-0.0529	15.0	40.0	14.0
78	4.0	100	30	5	66.0	100.0	59.0	-0.6510	1.1068	0.0629	20.0	25.0	41.0
80	4.0	100	30	5	38.0	75.0	74.0	-1.0135	0.9647	-0.0635	70.0	233.0	51.0
81	4.0	100	30	5	63.0	100.0	54.0	0.1728	-0.0825	-0.1484	200.0	25.0	42.0
83	65.0	4	5	48	40.0	3.0	22.2	-0.3360	0.5263	0.0491	15.0	30.0	.
84	5.0	97	10	6	22.0	70.0	40.0	0.1944	-0.0921	-0.5914	22.0	30.0	52.0
85	15.0	89	150	6	29.0	80.0	49.0	0.0094	0.8842	-0.1231	25.0	39.0	46.0
92	8.0	80	100	5	33.0	70.0	49.0	0.0092	-0.0444	-0.0811	24.0	43.0	53.0
93	3.0	58	10	6	25.0	75.0	50.0	-0.0017	0.0373	-0.0145	18.0	45.0	69.0
95	8.0	65	100	5	22.0	100.0	12.5	0.0038	-0.0082	0.1102	5.0	8.0	17.0
CLUSTER	146.0	1858	801	162	1024.2	1755.6	1104.6	-1.1992	12.4789	-3.3931	692.9	11439.9	805.3

N= 25

CLUSTER=6

IDEN	MGR	ICO	ICU	PCU	INS	CUT	VAD	FACTOR1	FACTOR2	FACTOR3	MSH	RSH	ARI
1	4.2	100	9	5	23.2	60	43.4	0.7925	-0.2902	-0.111	65.0	186	55
2	5.0	100	6	6	24.8	65	43.6	1.3934	0.0047	-0.306	65.0	186	59
14	0.0	80	1	6	26.8	55	61.9	0.5015	0.1468	-0.601	7.5	11	22
21	8.0	100	20	4	24.7	60	50.1	0.5886	0.3531	-1.170	55.0	122	10
25	2.5	88	1	5	51.6	93	28.0	2.0360	-1.7753	-1.574	20.0	30	28
27	-5.0	87	1	6	7.0	100	70.0	0.7853	-0.1948	-0.522	40.0	85	344
29	-5.0	100	1	6	75.0	100	41.0	0.7860	-0.6659	-1.267	[illegible]	122	-7
30	-5.0	100	1	6	41.0	50	62.0	0.7710	-0.8828	-0.616	[illegible]	566	27
31	4.0	100	1	5	37.0	75	26.0	0.7663	-0.7994	-0.845	[illegible]	82	-5
32	0.0	78	1	5	54.0	67	26.0	0.6780	-0.8449	-1.003	[illegible]	8	-18
34	0.0	100	1	5	33.0	60	26.0	0.6473	-0.8349	-1.396	24.0	32	-32
46	5.0	52	10	4	40.0	80	19.0	1.3352	-0.6604	-0.198	6.0	13	-23
52	3.0	100	23	6	30.6	44	42.9	0.6698	-0.3145	-0.495	60.0	159	60
56	2.0	100	4	5	86.0	42	38.0	0.7763	-0.3909	-0.905	17.0	20	20
57	6.0	100	4	4	26.0	75	44.0	0.5875	-0.7016	-1.325	32.0	47	7
59	6.5	90	5	4	44.0	90	42.0	0.5347	-0.4267	-0.269	30.0	50	19
61	0.0	99	2	6	38.0	50	63.0	0.9522	-0.4971	-0.780	70.0	241	82
75	8.0	100	5	4	53.0	85	83.0	1.2725	0.1200	-0.550	70.0	233	55
97	3.0	68	200	4	23.0	100	28.8	1.2249	-0.3225	-0.022	11.0	19	37

Exhibit A4.04 Output from Cluster Programme

FASTCLUS ON 3 FACTORS 15:33 TUESDAY, SEPTEMBER 27, 1988

CLUSTER=6

IDEN	MGR	ICO	ICU	PCU	INS	CUT	VAD	FACTOR1	FACTOR2	FACTOR3	MSH	RSH	ARI
99	6.0	65	200	4	21.0	100	35.0	1.2326	0.0719	-0.139	23.0	55	48
CLUSTER	48.2	1807	492	100	759.7	1451	873.7	18.2317	-8.9055	-14.092	796.5	2267	788

N= 20

CLUSTER=7

IDEN	MGR	ICO	ICU	PCU	INS	CUT	VAD	FACTOR1	FACTOR2	FACTOR3	MSH	RSH	ARI
37	20.0	100.0	1	5	9.0	64.0	31.0	-0.9944	-3.4919	2.70853	24.0	31.0	45.0
39	10.0	77.0	20	5	28.5	85.0	52.3	-2.4209	-3.7595	1.43182	31.0	67.0	.
CLUSTER	30.0	177.0	21	10	37.5	149.0	83.3	-3.4153	-7.2515	4.14035	55.0	98.0	45.0
	1270.1	9681.7	7194	898	4457.6	8334.8	5038.4	-0.0000	0.0000	0.00000	4393.5	36775.5	4017.3

N= 2

Exhibit A4.04 Output from Cluster Programme

```
FILE: PCL4     SAS      A1  VM/XA CMS for WITSVMA

PROC STANDARD DATA= STORE.PIMSM
OUT= PIMSS
STD=1;
VAR MGR ICO ICU PCU;

PROC FASTCLUS DATA=PIMSS OUT=CLCU MAXC=3 MAXITER=6 NOPRINT;
  VAR MGR ICU PCU ICO       ;
  ID IDEN;
TITLE1 'FASTCLUS ON MGR ICU  ICO PCU ';
DATA TEMP2;SET CLCU;KEEP IDEN CLUSTER;
PROC SORT ;BY IDEN;
DATA TEMP1;SET STORE.PIMSM;
PROC SORT ;BY IDEN;
DATA CLICU;MERGE TEMP2 TEMP1;BY IDEN;

DATA CUT;SET CLICU;
PROC SORT DATA=CUT OUT =CUS; BY CLUSTER IDEN;
PROC REG DATA=CUS  ;MODEL ARI=MSH; BY CLUSTER;

GOPTIONS DEVICE=IBM3279;
PROC GPLOT  DATA = CUS ;
PLOT ARI*MSH;BY CLUSTER;
SYMBOL V=STAR I=RLCLM95;
PROC GPLOT  DATA = CUS ;
PLOT ARI*RSH;BY CLUSTER;
SYMBOL V=STAR I=RLCLM95;
```

Exhibit A4.05 SAS Programme for one variable combination for for factorial analysis

FASTCLUS ON MGR 14:24 FRIDA

CLUSTER=2

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	1	1062.13619	1062.13619	1.151	0.3113
ERROR	9	8307.90017	923.10002		
C TOTAL	10	9370.03636			

ROOT MSE	30.38256	R-SQUARE	0.1134
DEP MEAN	46.78182	ADJ R-SQ	0.0148
C.V.	64.94523		

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0	PROB > |T|
INTERCEP	1	29.21318998	18.76621908	1.557	0.1540
MSM	1	0.45047765	0.41995961	1.073	0.3113

Exhibit A4.06 Details of Factorial Analysis (Table 5.2)

FASTCLUS ON MGR 14:24 FRIDAY, DECEMBE

CLUSTER=3

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	1	4296.27318	4296.27318	5.274	0.0241
ERROR	85	69239.25947	814.57952		
C TOTAL	86	73535.53264			

ROOT MSE	28.54084	R-SQUARE	0.0584
DEP MEAN	30.4908	ADJ R-SQ	0.0473
C.V.	93.60474		

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0	PROB > T
INTERCEP	1	19.96234008	5.51180815	3.622	0.0005
MSM	1	0.29938762	0.13036309	2.297	0.0241

Exhibit A4.06 Details of Factorial Analysis (Table 5.2)

PASTELUS ON MGR ICO 14:24 FRIDAY, DE

CLUSTER=1

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	1	54.36075073	54.36075073	0.068	0.7952
ERROR	34	26885.22230	783.97713		
C TOTAL	35	27049.58306			

ROOT MSE	28.1776	R-SQUARE	0.0020
DEP MEAN	26.91389	ADJ R-SQ	-0.0273
C.V.	104.6954		

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0	PROB > |T|
INTERCEP	1	25.20267606	8.05133954	3.130	0.0036
MSM	1	0.08467857	0.32361959	0.262	0.7952

Exhibit A4.06 Details of Factorial Analysis (Table 5.2)

FASTCLUS ON MGR ICO 14:24 FRIDAY, DECEMBER 30

CLUSTER=2

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	1	4082.23342	4082.23342	4.806	0.0331
ERROR	49	41617.98403	849.34682		
C TOTAL	50	45700.22745			

ROOT MSE	29.14356	R-SQUARE	0.0893
DEP MEAN	33.01569	ADJ R-SQ	0.0707
C.V.	88.27184		

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0	PROB > |T|
INTERCEP	1	15.10601355	8.13182464	1.654	0.1045
MSN	1	0.39167809	0.17865818	2.192	0.0331

Exhibit A4.06 Details of Factorial Analysis (Table 5.2)

FASTCLUS ON MGR ICO 14:24 FRIDAY

CLUSTER=3

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	1	1062.13619	1062.13618	1.151	0.3113
ERROR	9	8307.90017	923.10002		
C TOTAL	10	9370.03636			

ROOT MSE	30.38256	R-SQUARE	0.1134
DEP MEAN	46.78182	ADJ R-SQ	0.0148
C.V.	64.94523		

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0	PROB > T
INTERCEP	1	29.21318898	18.76621808	1.557	0.1540
MSH	1	0.45047765	0.41985961	1.073	0.3113

Exhibit A4.06 Details of Factorial Analysis (Table 5.2)

FASTCLUS ON NGK ICU 14:24 FRIDAY, DEC

CLUSTER=1

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	1	2381.28469	2381.28469	3.981	0.0512
ERROR	53	31706.01240	598.22665		
C TOTAL	54	34087.29709			

ROOT MSE	24.45867	R-SQUARE	0.0699
DEP MEAN	33.05273	ADJ R-SQ	0.0523
C.V.	73.99895		

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0	PROB > T
INTERCEP	1	22.02634190	6.43587486	3.422	0.0012
MSM	1	0.28200474	0.14134603	1.995	0.0512

Exhibit A4.06 Details of Factorial Analysis (Table 5.2)

FASTCLUS ON MCP ICU 14:24 FRIDAY, D

CLUSTER=2

: ARI

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	1	2943.95867	2943.95867	14.034	0.0024
ERROR	13	2726.97466	209.76728		
C TOTAL	14	5670.93333			

ROOT MSE	14.48334	R-SQUARE	0.5191
DEP MEAN	44.06667	ADJ R-SQ	0.4821
C.V.	32.86689		

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0	PROB > |T|
INTERCEP	1	26.82837489	5.92942453	4.525	0.0006
MSM	1	0.80053987	0.21369088	3.746	0.0024

Exhibit A4.06 Details of Factorial Analysis (Table 5.2)

FASTCLUS ON MGR.TCO 14:24 FRIDAY,

CLUSTER=3

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	1	3895.68914	3895.68914	2.661	0.1149
ERROR	26	38069.10514	1464.19635		
C TOTAL	27	41964.79429			

ROOT MSE	38.26482	R-SQUARE	0.0928
DEP MEAN	24.58571	ADJ R-SQ	0.0579
C.V.	155.6384		

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0	PROB > T
INTERCEP	1	6.18468080	13.39981103	0.462	0.6482
NSM	1	0.50761472	0.31120153	1.631	0.1149

Exhibit A4.06 Details of Factorial Analysis (Table 5.2)

FASTCLUS ON MGR PCU 14:24 FRIDAY,

CLUSTER=1

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	1	1935.77958	1935.77958	2.160	0.1514
ERROR	32	28677.22777	896.16337		
C TOTAL	33	30613.00735			

ROOT MSE	29.93599	R-SQUARE	0.0632
DEP MEAN	31.19118	ADJ R-SQ	0.0340
C.V.	95.97582		

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0	PROB > |T|
INTERCEP	1	20.42900570	8.94305699	2.284	0.0291
MSM	1	0.28903144	0.19665760	1.470	0.1514

Exhibit A4.06 Details of Factorial Analysis (Table 5.2)

FASTCLUS ON MGR PCU 14:24 FRIDAY, DECE

CLUSTER=2

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	1	2378.40728	2378.40728	2.936	0.0928
ERROR	50	40507.82041	810.15641		
C TOTAL	51	42886.22769			

ROOT MSE	28.46325	R-SQUARE	0.0555
DEP MEAN	29.98462	ADJ R-SQ	0.036[illegible]
C.V.	94.92617		

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0	PROB > T
INTERCEP	1	19.33213254	7.36430782	2.625	0.0115
MSM	1	0.31751290	0.18239346	1.713	0.0928

Exhibit A4.06 Details of Factorial Analysis (Table 5.2)

FASTCLUS ON MGR PCU 14:24 FRIDA
CLUSTER=3

ARI

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	1	1208.32743	1208.32743	1.450	0.2563
ERROR	10	8335.81923	833.58192		
C TOTAL	11	9544.14667			

ROOT MSE	28.87182	R-SQUARE	0.1266
DEP MEAN	45.63333	ADJ R-SQ	0.0393
C.V.	63.26914		

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0	PROB > T
INTERCEP	1	28.10576147	16.77505132	1.675	0.1248
MSH	1	0.46740192	0.38821500	1.204	0.2563

Exhibit A4.06 Details of Factorial Analysis (Table 5.2)

FASTCLUS ON MGR ICO ICO 14:24 FRIDAY, DECEMBER

CLUSTER=1

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	1	1920.97674	1920.97674	3.241	0.0839
ERROR	25	14819.18993	592.76760		
C TOTAL	26	16740.16667			

ROOT MSE	24.34682	R-SQUARE	0.1148
DEP MEAN	32.72222	ADJ R-SQ	0.0793
C.V.	74.40454		

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0	PROB > T
INTERCEP	1	22.33720855	7.43194676	3.006	0.0060
MSM	1	0.51298092	0.28495900	1.800	0.0839

Exhibit A4.06 Details of Factorial Analysis (Table 5.2)

FASTCLUS ON MGH ACO ICU 14:24 FRIDAY, DE

CLUSTER=2

EP VARIABLE: ARI

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	1	5874.26985	5874.26985	4.054	0.0559
ERROR	23	33327.30775	1449.01338		
C TOTAL	24	39201.57760			

ROOT MSE	38.06591	R-SQUARE	0.1499
DEP MEAN	24.336	ADJ R-SQ	0.1129
C.V.	156.4181		

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0	PROB > T
INTERCEP	1	0.32909160	14.14655341	0.023	0.9816
MSH	1	0.65664410	0.32612891	2.013	0.0559

Exhibit A4.06 Details of Factorial Analysis (Table 5.2)

FASICLUS ON MGR ICO ICO 14:24 FRIDAY, D

CLUSTER=3

RI

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	1	505.01161	505.01161	0.833	0.3664
ERROR	44	26678.60666	606.33197		
C TOTAL	45	27183.61828			

ROOT MSE	24.62381	R-SQUARE	0.0186
DEP MEAN	36.42174	ADJ R-SQ	-0.0037
C.V.	67.60745		

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0	PROB > T
INTERCEP	1	28.84405430	8.07016126	3.688	0.0006
MSH	1	0.14920534	0.16348914	0.913	0.3664

Exhibit A4.06 Details of Factorial Analysis (Table 5.2)

FASTCLUS ON MGR ICO PCU 14:24 FRIDA

CLUSTER=1

DEP VARIABLE: ARI

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	1	12.41765691	12.41765691	0.022	0.8843
ERROR	27	15529.58234	575.16972		
C TOTAL	28	15542.00000			

ROOT MSE	23.9827	R-SQUARE	0.0008
DEP MEAN	26.5	ADJ R-SQ	-0.0362
C.V.	90.50074		

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0	PROB > T
INTERCEP	1	27.32405673	7.16149805	3.815	0.0007
MSM	1	-0.04301232	0.29273257	-0.147	0.8843

Exhibit A4.06 Details of Factorial Analysis (Table 5.2)

FASTCLUS ON MGR ICO PCU 14:24 FRIDAY, DECEMBI

CLUSTER=2

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	1	505.52869	505.52869	0.721	0.4008
ERROR	41	28757.26759	701.39677		
C TOTAL	42	29262.79628			

ROOT MSE	26.4839	R-SQUARE	0.0173
DEP MEAN	41.5907	ADJ R-SQ	-0.0067
C.V.	63.67745		

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0	PROB > T
INTERCEP	1	34.17253187	9.62610522	3.550	0.0010
MSM	1	0.16013913	0.18862812	0.849	0.4008

Exhibit A4.06 Details of Factorial Analysis (Table 5.2)

FASTCLUS ON MGR_ICO PCU 14:24 FRIDAY

ARI CLUSTER=3

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	1	4030.40041	4030.40041	3.230	0.0849
ERROR	24	29950.88575	1247.95357		
C TOTAL	25	33981.28615			

ROOT MSE	35.32639	R-SQUARE	0.1186
DEP MEAN	23.47692	ADJ R-SQ	0.0819
C.V.	150.4728		

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0	PROB > T
INTERCEP	1	4.12112124	12.80633081	0.322	0.7504
MSM	1	0.53480430	0.29759115	1.797	0.0849

Exhibit A4.06 Details of Factorial Analysis (Table 5.2)

FASTCLUS ON NGH ICU FCU 14:24 FRIDAY, DE

CLUSTER=1

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	1	2845.42267	2845.42267	3.141	0.0814
ERROR	60	56256.04572	937.60076		
C TOTAL	61	59201.46839			

ROOT MSE	30.62027	R-SQUARE	0.0498
DEP MEAN	25.92258	ADJ R-SQ	0.0339
C.V.	118.122		

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0	PROB > T
INTERCEP	1	15.43073859	7.08261089	2.178	0.0333
MSN	1	0.29124433	0.16432084	1.772	0.0814

Exhibit A4.06 Details of Factorial Analysis (Table 5.2)

FASTCLUS ON MGR ICU PCU 14:24 FRIDAY,

CLUSTER=2

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F-VALUE	PROB>F
MODEL	1	1737.78846	1737.78846	2.898	0.1042
ERROR	20	11992.76654	599.63833		
C TOTAL	21	13730.55500			

ROOT MSE	24.48751	R-SQUARE	0.1266
DEP MEAN	43.05	ADJ R-SQ	0.0829
C.V.	56.88156		

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0	PROB > |T|
INTERCEP	1	24.79770631	11.92523194	2.079	0.0507
MSN	1	0.42047169	0.24699206	1.702	0.1042

Exhibit A4.06 Details of Factorial Analysis (Table 5.2)

FASTCLUS ON MGR ICU PCU 14:24 FRIDAY, DE

CLUSTER=3

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	1	2935.54361	2935.54361	12.957	0.0036
ERROR	12	2718.81353	226.56779		
C TOTAL	13	5654.35714			

ROOT MSE	15.05217	R-SQUARE	0.5192
DEP MEAN	43.78571	ADJ R-SQ	0.4791
C.V.	34.3769		

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0	PROB > |T|
INTERCEP	1	26.65152458	6.23235168	4.276	0.0011
MSM	1	0.79959552	0.22213918	3.600	0.0036

Exhibit A4.06 Details of Factorial Analysis (Table 5.2)

FASTCLUS ON MGR ICU PCU ICO 14:24 FRIDAY,

CLUSTER=1

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	1	2246.59273	2246.59273	9.823	0.0120
ERROR	9	2058.31636	228.70182		
C TOTAL	10	4304.90909			

ROOT MSE	15.12289	R-SQUARE	0.5219
DEP MEAN	45.90909	ADJ R-SQ	0.4687
C.V.	32.94095		

PARAMETER ESTIMATES

VARI		PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0	PROB > T
INT	1	28.89145556	7.09028737	4.075	0.0028
MSH	1	0.72836128	0.23239748	3.134	0.0120

Exhibit A4.06 Details of Factorial Analysis (Table 5.2)

FASTCLUS ON MGR ICU PCU ICU 14:24 FRIDAY, D

CLUSTER=2

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	1	5543.12217	5543.12217	6.121	0.0160
ERROR	64	57860.35904	905.63061		
C TOTAL	65	63503.48121			

ROOT MSE	30.0937	R-SQUARE	0.0873
DEP MEAN	32.55758	ADJ R-SQ	0.0730
C.V.	92.43224		

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0	PROB > |T|
INTERCEP	1	15.45352815	7.84331932	1.970	0.0531
MSE	1	0.40477005	0.16360881	2.474	0.0160

Exhibit A4.06 Details of Factorial Analysis (Table 5.2)

FASTCLUS ON MGR_ICU PCU_ICO 14:24 FRID
CLUSTER=3

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	1	2.86019503	2.86019503	0.004	0.9507
ERROR	19	14350.99219	755.31538		
C TOTAL	20	14353.85238			

ROOT MSE	27.483	R-SQUARE	0.0002
DEP MEAN	24.45238	ADJ R-SQ	-0.0524
C.V.	112.394		

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0	PROB > T
INTERCEP	1	24.91138541	9.47234070	2.630	0.0165
MSN	1	-0.02177834	0.34787946	-0.063	0.9507

Exhibit A4.06 Details of Factorial Analysis (Table 5.2)

FASTCLUS ON ICU 14:24 FRIDAY,

CLUSTER=1

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	1	5938.14886	5938.14886	6.662	0.0117
ERROR	80	71307.98395	891.34980		
C TOTAL	81	77246.13280			

ROOT MSE	29.85548	R-SQUARE	0.0769
DEP MEAN	30.3378	ADJ R-SQ	0.0653
C.V.	98.41016		

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0	PROB > |T|
INTERCEP	1	16.29281341	6.36240768	2.561	0.0123
MSE	1	0.36520986	0.14149498	2.581	0.0117

Exhibit A4.06 Details of Factorial Analysis (Table 5.2)

FASYCLUS ON ICU 14:24 FRIDAY

CLUSTER=2

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	1	4365.37056	4365.37056	57.688	0.0001
ERROR	13	983.73877	75.67221305		
C TOTAL	14	5349.10933			

ROOT MSE	8.698978	R-SQUARE	0.8161
DEP MEAN	40.50667	ADJ R-SQ	0.8019
C.V.	21.47542		

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0	PROB > T
INTERCEP	1	4.21752262	5.27947552	0.799	0.4387
MSR	1	2.13465553	0.28105121	7.595	0.0001

Exhibit A4.06 Details of Factorial Analysis (Table 5.2)

FASTCLUS ON ICU 10:42 WEDNESDAY

FASTCLUS PROCEDURE

REPLACE=FULL RADIUS=0 MAXCLUSTERS=5 MAXITER=3 CONVERGE=0.02

INITIAL SEEDS

CLUSTER	ICU
1	1.00
2	300.00
3	414.00
4	3182.00
5	150.00

MINIMUM DISTANCE BETWEEN SEEDS = 114

ITERATION	CHANGE IN CLUSTER SEEDS 1	2	3	4	5
1	9.18367	0	0	0	3.33333
2	0	0	0	0	0

CLUSTER SUMMARY

CLUSTER NUMBER	FREQUENCY	RMS STD DEVIATION	MAXIMUM DISTANCE FROM SEED TO OBSERVATION	NEAREST CLUSTER	CENTROID DISTANCE
1	93	9.8571	25.8163	5	143.1
2	1	.	0	3	114.0
3	1	.	0	2	114.0
4	1	.	0	3	2768.0
5	15	48.0575	53.3333	1	143.1

STATISTICS FOR VARIABLES

VARIABLE	TOTAL STD	WITHIN STD	R-SQUARED	RSQ/(1-RSQ)
ICU	299.92689	19.39584	0.99596	246.73574
OVER-ALL	299.92689	19.39584	0.99596	246.73574

PSEUDO F STATISTIC = 6846.92

APPROXIMATE EXPECTED OVER-ALL R-SQUARED = 0.96368

CUBIC CLUSTERING CRITERION = 17.470

Exhibit A4.07 Details of Customer Concentration Cluster

FASTCLUS ON ICU 10

FASTCLUS PROCEDURE

CLUSTER MEANS

CLUSTER	ICU
1	10.16
2	300.00
3	414.00
4	3182.00
5	153.33

CLUSTER STANDARD DEVIATIONS

CLUSTER	ICU
1	9.8571
2	.
3	.
4	.
5	48.0575

Exhibit A4.07 Details of Customer Concentration Cluster

FASTCLUS ON ICU 10:42 WEDNESDAY, JULY 27, 1988

CLUSTER=2

IDEN	MSH	RSH	PQL	UNI	NPR	RAD	MKT	INS	INV	VAD	OPE	GVI	GVS	RIN	RSL	CUT	MGR	ICG	ICU	PCU	IRI	ARI	DUMMY	DISTANCE
88	80	400	50	75	48	0	8	35	40.2	87	89.5	102.9	36	68.6	24	60	5	100	300	4	55.7	72	D	0

CLUSTER=3

IDEN	MSH	RSH	PQL	UNI	NPR	RAD	MKT	INS	INV	VAD	OPE	GVI	GVS	RIN	RSL	CUT	MGR	ICO	ICU	PCU	IRI	ARI	DUMMY	DISTANCE
63	9	28	2	8	3	1.1	1	18	41.9	43	63.1	444.4	80	22.2	4	40	4	41	414	156	8.9	12	D	0

CLUSTER=4

IDEN	MSH	RSH	PQL	UNI	NPR	RAD	MKT	INS	INV	VAD	OPE	GVI	GVS	RIN	RSL	CUT	MGR	ICO	ICU	PCU	IRI	ARI	DUMMY	DISTANCE
26	20	33	0	8	0	0.3	1	28	80	35	58.1	285.7	80	14.3	4	70	3	81	3182	153	7.1	11	D	0

CLUSTER=5

IDEN	MSH	RSH	PQL	UNI	NPR	RAD	MKT	INS	INV	VAD	OPE	GVI	GVS	RIN	RSL	CUT	MGR	ICO	ICU	PCU	IRI	ARI	DUMMY	DISTANCE
20	12	15.0	10	0	100	0	0.0	105.0	203.9	51.5	72.0	100.0	105	23.8	25.0	100	[illegible]	92	100	6	5.6	18.6	D	53.3333
62	23	52.0	20	55	0	0	1.0	32.7	125.8	26.0	42.2	61.2	20	47.1	15.4	95	[illegible]	67	100	5	6.8	48.0	D	53.3333
66	6	12.5	40	10	50	0	3.0	39.0	185.7	21.0	97.8	2.6	1	95.0	19.0	80	4	60	100	4	32.4	9.0	D	53.3333
71	12	22.0	15	0	5	0	5.0	3.0	12.0	25.0	187.6	66.7	2	500.0	15.0	80	6	65	200	4	61.2	38.0	D	46.6667
72	15	26.0	10	0	0	0	5.0	25.0	131.6	19.0	63.8	8.0	2	60.0	15.0	90	6	65	200	4	22.4	41.0	D	46.6667
85	25	39.0	0	80	0	0	0.0	29.0	59.2	49.0	101.3	144.8	42	75.9	22.0	80	15	89	150	6	31.9	46.0	D	3.3333
89	24	43.0	20	60	0	0	8.0	28.0	56.0	50.0	84.4	100.0	28	67.9	19.0	70	8	80	200	5	27.7	61.0	D	46.6667
92	24	43.0	10	63	0	0	8.0	33.0	67.3	49.0	74.9	84.8	28	48.5	16.0	70	8	80	100	5	20.3	53.0	D	53.3333
94	35	78.0	10	60	0	0	4.0	24.0	43.6	55.0	103.9	54.2	13	62.5	15.0	60	10	80	150	6	35.2	88.0	D	3.3333
95	5	8.0	0	0	0	0	3.0	22.0	176.0	12.5	46.9	104.5	23	63.6	14.0	100	8	65	100	5	2.7	17.0	D	53.3333
96	15	33.0	0	0	5	0	4.0	21.0	114.1	18.4	63.3	28.6	6	71.4	15.0	100	2	60	200	4	25.2	26.0	D	46.6667
97	11	19.0	-5	0	25	0	4.0	23.0	79.9	28.8	83.4	21.7	5	65.2	15.0	100	3	68	200	4	30.2	37.0	D	46.6667
98	23	55.0	10	0	40	0	10.0	21.0	60.0	35.0	93.0	28.6	6	71.4	15.0	100	6	65	200	4	42.7	48.0	D	46.6667
99	12	24.0	20	0	0	0	13.5	18.0	58.1	31.0	77.7	27.8	5	83.3	15.0	100	3	36	200	3	35.7	31.0	D	46.6667
100	13	28.0	10	0	0	0	6.0	20.0	95.2	21.0	73.9	30.0	6	65.0	13.0	100	5	60	100	4	30.1	46.0	D	53.3333

Exhibit A4.07 Details of Customer Concentration Cluster

Appendix V Initial Field Study

Exhibit A5.1 Questionnaire

Exhibit A5.2 Introductory material

PART I

1.1 Do you have a clearly defined "served market"?

1.2 Is there a single "critical success factor" in this industry? If so, what is it?

1.3 What differences are there between this business and that of your competition?

1.4 What is stopping you from taking market share from a competitor (or losing it)?

1.5 What major strengths does this business have?

1.6 Is market share important in this industry?

1.7 What is the most important advantage that the competition has?

1.8 Do you aim to be the lowest cost producer in the industry? If not, how do you add value over and above the lowest priced equivalent product?

1.9 Are there any barriers to competition which inhibit you from competing (or others from competing with you)?

1.10 Is this a stable competitive environment, and at what stage did this business enter the industry? Has your strategy changed significantly over the past 5 years? If so, why?

Exhibit A5.1 Questionnaire

PART 2

Competitive Position

2.1	Market Share	.....%	
2.2	Relative Market Share (see notes)	.....	
2.3	Market Share Rank (i.e. biggest = 1, second biggest = 2, etc)	.....	
2.4	Relative Price (see notes)		
2.5	Relative Product Quality (see notes)	.....	
2.6	% Employees Unionised	.....%	
2.7	% New Products/Sales (products brought in over last 3 years)	.....%	
2.8	R & D Expenses/Sales	.....%	
2.9	All Advertising expenses	.....	.....% of sales
2.10	Media advertising expenses	.....	.....% of sales
2.11	Salesmen/sales office expenses	.....	.....% of sales
2.12	Other marketing expenses	.....	.....% of sales

2.13 Relative to competition did this business spend on marketing expenses as a percentage of sales.

Relatively much more	.....
Relatively more	.....
About the same	.....
Relatively less	.....
Relatively much less	.....

Exhibit A5.1 Questionnaire

2.14 Approximately what percentage of your sales are

Direct to end users	.....%
To wholesalers	.....%
To retailers	.....%

2.15 Number of final sales/distribution points relative to your leading competitor (e.g. if you have 9 and the competitor has 10, answer 90%). .....%

2.16 Relative to the product line of your leading competitor, estimate the breadth of product line of this business

Less Broad	.....
Same	.....
Broader	.....

Structure

2.17 Investment/sales (Investment = Working Capital + Net Plant & Equipment + other assets) .....

2.18 Vertical integration (see note)

Value added/sales	.....%

Compared to competitors

More	.....
Same	.....
Less	.....

2.19 Is the "experience curve" effect significant in this business? (Yes/No) .....

If so, have major savings been obtained by this business due to the "learning process"? (Yes/No) .....

Exhibit A5.1 Questionnaire

2.20 Are advantages of scale important in this industry? (Yes/No) .....
(i.e. Would a business double the size of this business have significantly better return on investment?).

2.21 Are your costs per ton of raw materials

Higher than competitors .....

About the same .....

Lower than competitors .....

Is this an important factor? (Yes/No) .....

2.22 Fixed capital intensity (see notes) .....%

2.23 Capacity utilization .....%

2.24 Investment/Value added .....%

2.25 Value added/Employee (R000) .....

Market Environment

2.25 Real Market Growth Rate .....%

2.27 % share of 4 largest firms .....%

2.28 Number of customers = 50% of sales .....

2.29 % of customers = 50% of sales .....%

2.30 Typical purchase amount of immediate customer (index : see notes) .....

2.31 Frequency of purchase of immediate customer (index : see notes) .....

Exhibit A5.1 Questionnaire

2.32 Importance of product to customer

This business product as a percentage of the customers total purchases

Less than 0,25%	.....
0,25% to 5%	.....
1% to 5%	.....
5% to 25%	.....
Over 25%	.....

2.33 Importance of auxiliary services to the end user

of little importance	.....
of some importance	.....
of great importance	.....

2.34 Stage of the product life cycle

Introductory	.....
Growth	.....
Maturity	.....
Decline	.....

2.35 Capacity Additions

What is the minimum economically efficient amount by which the capacity of this business could be increased, expressed as a percentage of the capacity reported in 2.23 .....%

2.36 What is the maximum market share that this business could achieve in 5 years, through adopting a very aggressive growth strategy .....%

Exhibit A5.1 Questionnaire

- 5 -

Performance

2.37 What was the Return on Investment for this business for this year and the previous year?

This year .....

Previous year .....

2.38 What was the Return on Sales for this business for this year and the previous year?

This year .....

Previous year .....

2.39 What was the Return on Equity for this business for this year and the previous year?

This year .....

Previous year .....

Exhibit A5.1 Questionnaire

Notes and Definitions

2.2	Relative Market Share	=	The share of this business divided by the combined share of the three largest competitors.
2.4	Relative Price	-	parity with competition = 100 i.e. an average of a 5% premium over competition = 105
2.5	Relative Product Quality	-	list all the attributes of the product that are important to customers other than price, then rate yourself (as the customer sees you) relative to competition. Using this as a basis give yourself an overall rating with 100 being parity with competition and greater than 100 being superior quality.
2.18	Value-added	=	Sales - Purchases.
2.22	Fixed Capital Intensity	=	Gross Plant and Equipment as a percentage of sales.
2.24	Investment	=	Working Capital + Net Plant and Equipment + Other Assets.

2.30 Purchase amount index

Index	Typical Purchase Amount
1	R0 - 1
2	R1 - 10
3	R10 - 100
4	R100 - 1 000
5	R1 000 - 10 000
6	R10 000 - 100 000
7	R100 000 - R1m
8	R1m - R10m
9	Over R10m

2.31 Purchase Frequency

How often do immediate customers typically buy the products or services of your business?

Index	Frequency
1	Weekly or more frequently
2	Between once/week and once/month
3	Between once/month and once/6 months
4	Between once/6 months and once/year
5	Between once/year and once/5 years
6	Between once/5 years and once/10 years

Exhibit A5.1 Questionnaire

ABOUT THE RESEARCH

Every business is different to every other business and each has its own unique position and circumstances. There are different critical success factors in every industry, competitors are different, and perhaps most important, the people are different. However the central premise of the PIMS (Profit Impact of Market Strategies) approach is that there are general principles which apply to all businesses. These principles, explain not all, but a large proportion of the variance in performance between businesses. The central belief is that while these principles are not exact "laws of nature" they are useful to practising managers, and give them a frame of reference to use in evaluating their own options.

By participating in the research the managers from the different business units will be forced to think through the concepts that are critical to successful strategic management. These include:

- market share strategies
- relative product quality
- investment intensity and investment strategy
- new product development strategies and R & D strategies.

The PIMS data base gives objective information from a range of businesses which can be used to evaluate strategic plans and possible future moves. We are currently building up a PIMS format data base in South Africa and have over one hundred business units which can be used as a bench mark for evaluating strategies. However the process of thinking through the issues involved is perhaps more important for management, than is the output from the data base. We believe that this exercise can best be performed by gathering the management team together and interactively discussing the key concepts. In this way a robust view of the strategic concepts can be obtained, and the understanding and effectiveness of participating managers enhanced. We believe that this type of exercise will be highly beneficial to participating companies.

The research data will be treated as <u>totally</u> <u>confidential</u> and will only be reported in aggregate without any reference to the company or the industry.

GRAHAM EDWARDS
Ph.D Research

Exhibit A5.2 Introductory Material

MARKET SHARE - THE KEY TO PROFITABILITY OR THE ROAD TO RUIN ?

A review of current literature on the relationship between profit and market share and its effect on strategy formulation.

The relationship between market share and profitability has been at the heart of strategic planning ever since the Boston Consultings Group Matrix first impacted on the subject in the early 70's. The implicit assumption in the BCG grid is that profit increases as market share increases and this relationship is used the BCG grid, to distinguish between for example "cash cows" and "dogs".

The question of causality in the relationship has been raised from time to time and is crucial for strategy formulation. Does increased market share cause higher profitability or does improved profitability result in increased market share? or are they both the result of some spurious third factor or factors. Also, if profit does increase with market share, is the relationship linear or are there local maxima and minima in the relationship?

These are questions that have been addressed by various authors under different conditions and different assumptions over the past 10 to 15 years, and while not all questions have been answered to the total satisfaction of all concerned, the following is a a discussion of the current thinking.

The correlation between profit and market share.

The initial work on the subject using the PIMS data base was done by Buzzell et al in 1975 and showed that profit and market share are positively correlated (See Fig. 1).

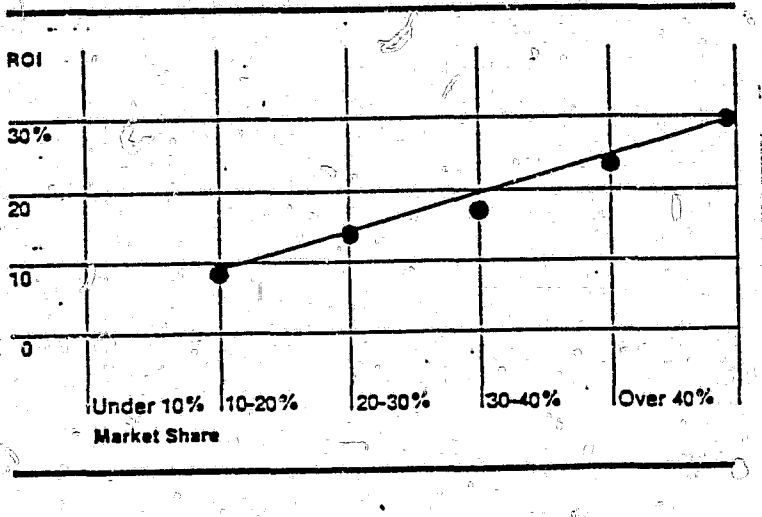

FIG 1 Relationship between market share and ROI
(source : Buzzell et al 1975)

Buzzell showed that on average profit, as measured by ROI, increased 1% for every 5% increase in market share. Only average points were quoted and no measure of scatter or correlation coefficient was mentioned in the article. Similar studies done later also using the PIMS data base (Hambrick and MacMillan - 1982, Ziethalm and Fry 1984), quote correlation coefficients of at best 0,23 which gives an idea of the scatter of the data and the weakness of the correlation.

Factors causing the correlation between market share and profit.

The literature (Buzzel et al 1975, Wiseman and MacMillan 1984), quote various reasons for the positive (albeit weak) correlation between market share and profitability. These are :

: Advantages of scale and the experience curve effect. By virtue of the market leaders high volumes he benefits from the experience curve far quicker than any of the other competitors. This effect, combined with advantages of scale give the market leader a lower cost position than this competitors, which can either result in higher profitability immediately or can be translated into a competitive advantage by lowering prices.

: Market factors. Because the leader is dominant in the market place he is able to define standards in the industry which suit his competitive strengths. He is also able to use his dominant position to obtain leverage with suppliers and buyers.

: Quality of Management. The theory has been put forward that both market share and profitability depend on the quality of management and that good management will result in higher market share and improve profitability.

: Market Information. One of the most important factors in the strategic decision making process is information concerning the market. Market trends, customer preferences, market size and potential are all crucial inputs to strategic decisions and clearly the market leader would have better information than his competitors.

The extent to which any one of these factors influences the relationship between market share and profit depends on the specific industry. For example, some studies (Woo and Cooper 1982, Page 1979) have shown that low price strategies are not common among market leaders, thus casting doubt on the validity of the scale effect.

Theoretical Relationship

The relationship between market share and profitability has been examined within the framework of game theory by Wernerfelt 1986. Fig. 2. shows the theoretical relationship between profit and market share for a non-cooperative, non zero sum, two person game.

Exhibit A5.2 Introductory Material

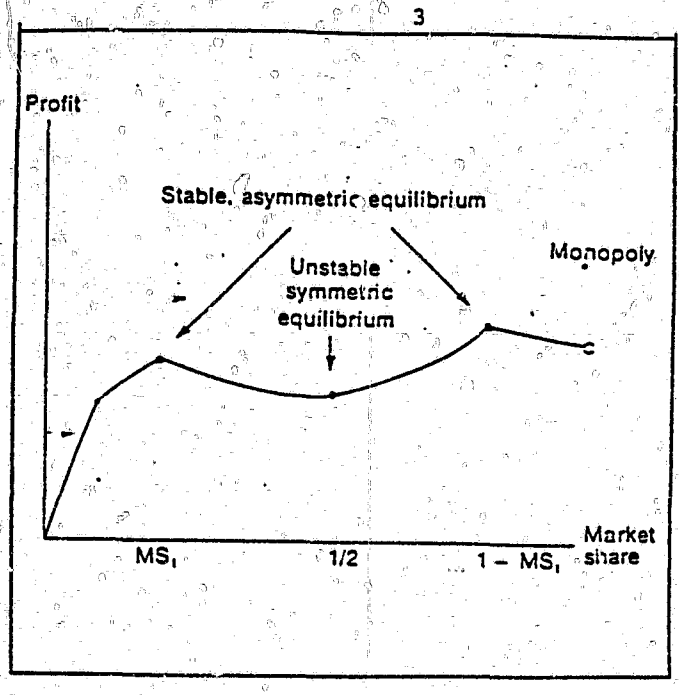

Fig. 2. Equilibriam Profit for Different Market Shares
(Source : Wernerfelt 1986)

The shape of the curve in Fig. 2 is not unlike the "U" shaped curve quoted by Porter 1980 for the electric motor industry in the U.S.A.

It is interesting to note that this curve has two local maxima which would represent stable equilibrium points for the two firms competing. This would mean that if two identical firms started out in a new market, the market would soon be divided inequally between the two, with one firm growing into the market leader (at say 75% share) and the other taking the remaining 25%. It is also interesting to note that the equilibrium in the middle, where each firm has 50% market share, is unstable and a small change in the balance of the competitors would cause one to grow and the other to fall until the local maxima were reached. This would cause an increase in profitability for both firms.

Some empirical evidence of the existence of local maxima is presented by Henderson in his "rule of three and four". He claims that there tends to be a natural market structure where the largest competitor holds approximately 50% of the market and each other competitor is approximately half the size of the next biggest competitor, with the smallest (serious) competitors having at least 15% of the market. This leads to 3 major competitors in the market, each at a local optimum in terms of profit.

The idea of natural market structures is supported by Baggell and Weirsema (1981) however they believe that participants form a progression in which each is between 60% and 65% as large as the next highest value. This gives a natural structure where the market leader has 40% market share and numbers 2,3, and 4 have 25%, 15% and 10% respectively. (Note the top 4 participants account for 90% of the market).

Viewed graphically this would lead to a profit curve as shown in Fig. 3.

4

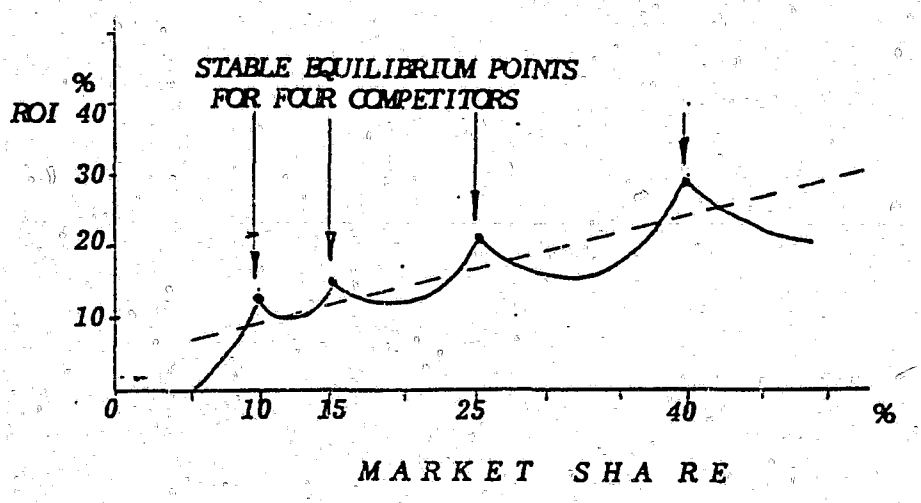

FIG. 3 NATURAL MARKET STRUCTURE

Fig. 3

Causality

The extent to which market share causes increase profitability is the subject of much debate and has been studied by many authors. The early work of Buzzell Gale and Sutton (1975) was confirmed by Gale and Branch (1982) and the PIMS Par ROI equation indicates that a 1% increase in market share leads to a 0,6% increase in ROI.

More recently a study by Jacobson and Aaker (1985) has shown that the causal effect of market share on profitability has been over emphasised by previous studies. Their initial model showed that the correlation between market share and profitability is almost exactly the same as that quoted by Buzzell et al (1975) but then went on to estimate the causal effect of market share on profitability. This they did by introducing a lagged variable into their model i.e. by saying that ROI at time t depends not only on market share at time t but also on ROI at time t-1 and on ROI at time t-2

i.e. $ROI = B_0 + B_1 MS + B_2 ROILAG1 + B_3 ROILAG2 + E$

They argue that lagged ROI tends to act as a surrogate for firm specific factors occurring in the previous period that tends to be constant on a year to year basis. (e.g. quality of management).

They found that lagged ROI had a major impact across all the business units that they studied and was able to substantially increase the explanatory power of their model. They also were able to deduce that a 1% change in market share would only be associated with a 0,1% change in profitability (not a 0,5% change in profitability as previously thought). They point out that their estimate of 0,1% is 21 standard deviations less than the commonly cited estimate of 0,5 and ascribe this difference to spurious factors causing the correlation between market share and profitability to be high while the causality between the two is actually much lower.

Exhibit A5.2 Introductory Material

5

Significance of Strategy Formulation

From the foregoing argument it can be seen that strategies aimed at capturing increased market share at any cost are unlikely to lead to higher profitability. There is clearly a strong correlation between market share and profitability but this is largely the result of other factors which are probably different for different business units. These could include factors like management quality (e.g. ability to generate effective advertising) or other factors such as brand loyalty, product quality, distribution strategy and factors such as prime sites in retailing chains .

The implication for strategy formulation is clear; management must focus on these other factors and use both market share and ROI as a gauge to monitor the effectiveness of their strategies. The identification of these critical factors in each business unit is a crucial task of strategic management and will clearly depend on the industry and the competive environment. It is an area where good judgement and insight from an experienced MD could outway volumes of analysis and theories and an indication that success has been achieved will be when profit and market share increase simultaneously. The idea that these two objectives are mutually exclusive has largely been disproved.

Ziethalm and Fry (1984) showed that a large number of business units were able to increase profitability and market share simultaneously and Buzzell and Wiersema (1981) identified product quality, innovation of new products and marketing expenditure as being critical factors for effectively gaining market share. Clearly the selection of these factors and the formulation and implementation of strategies in these areas will largely dictate the effectiveness of a particular firm.

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GNE3:market share

Exhibit A5.2 Introductory Material

Appendix VI Simulation of Market Share Effect

A single, large scale printing works was visited and the demand for paper products was examined. Detailed demand data was available for a 7 month period with less detailed manual records going back 5 years.

Figure A6.1 below shows the number of times that the items were ordered in the 7 month period i.e. 3 items were ordered more than 5 times during the 7 month period, and 12 items were ordered 3, 4 or 5 times during the 7 month period, etc.

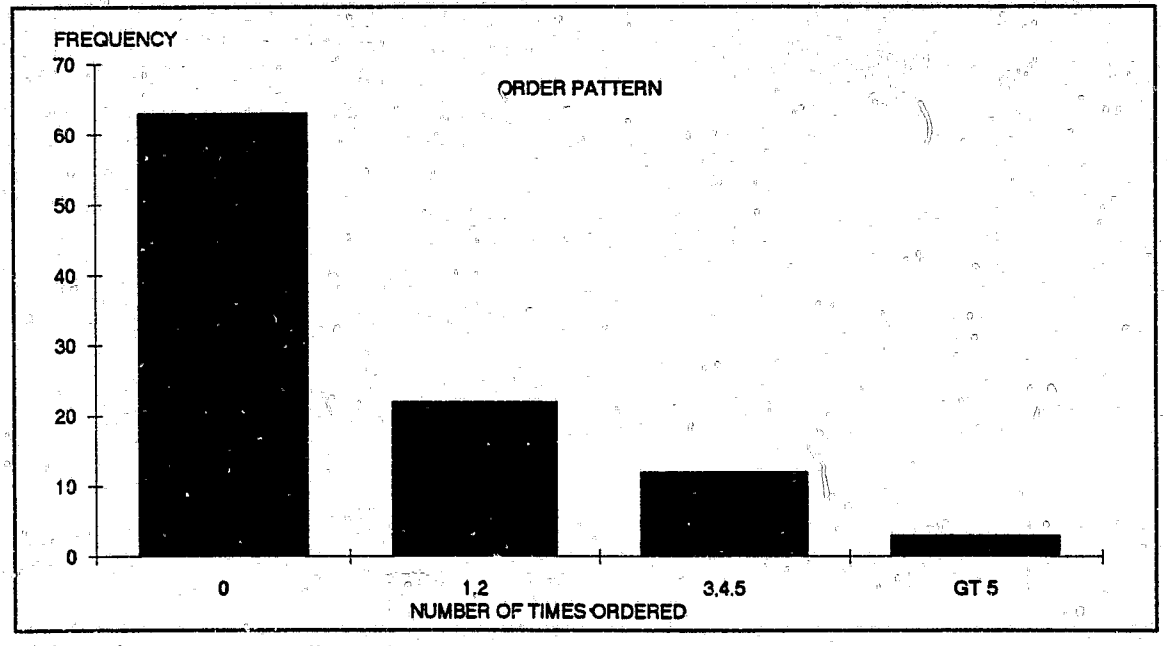

Fig A6.1 Number of times items ordered in 7 months

Of the 63 items that were not ordered in the 7 month period, 10 were taken at random and were traced back in the records until the date that they were last ordered was found. Table A6.1 shows the number of months since last being ordered and the quantities ordered for the 10 items concerned.

SLOW MOVING STOCK

ITEM	MONTHS SINCE LAST ORDER	QUANTITY	AVERAGE PER MONTH
1	9	45000	5000
2	13	1500	115
3	14	5000	357
4	8	35000	4375
5	11	10000	909
6	8	65000	8125
7	36	8000	222
8	10	30000	3000
9	12	12000	1000
10	17	13000	765
AVERAGE	13.8		2387
TOTAL IN 7 MONTHS			108602

Table A6.1 Analysis of items not ordered in the 7 month period

Figure A6.2 shows the volume of paper associated with each category. For the 63 items that were not ordered in the 7 month period the volume was calculated by averaging the monthly usage of the 10 items in Table A6.1 and assuming that they were representative of the remaining

53 items. The volumes are expressed as percentages in Table A6.2.

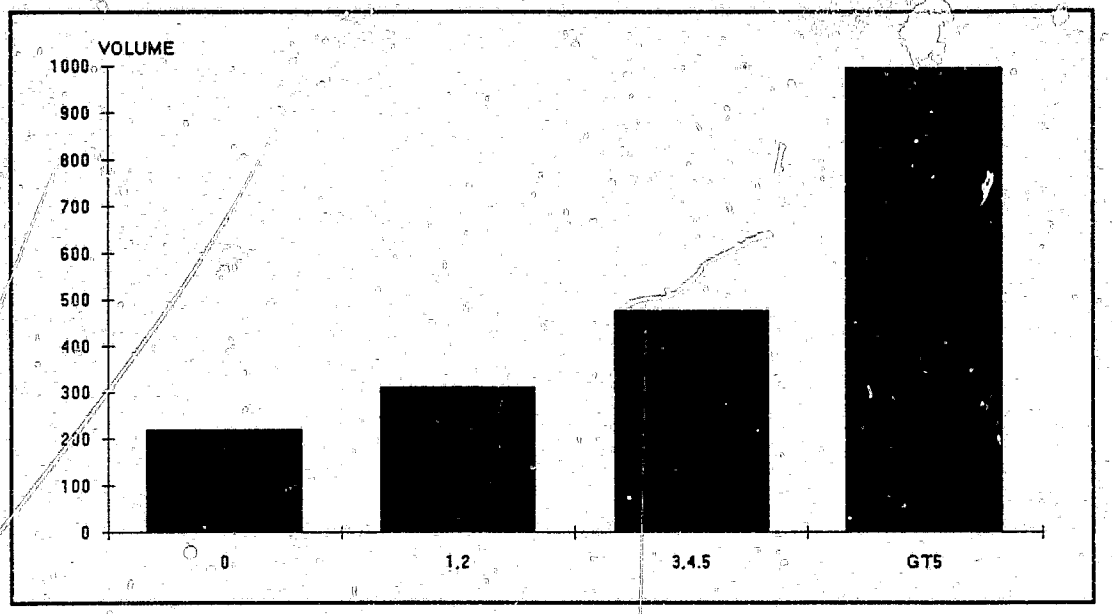

Fig A6.2 Volume vs order quantity

CATAGORY	VOLUME	PERCENT
GT5	996	49.70%
3,4.5	476	23.75%
1,2	312	15.57%
0	220	10.98%
TOTAL	2004	100.00%

Table 2 Percentage and volume of paper in each category

As can be seen from Table A6.2 the three fast moving items (greater than 5 orders in the 7 month period) accounted for approximately 50% of the total volume ordered. Table A6.3 shows the actual demand for these items, as well as their means, standard deviations and coefficients of variation (CV's).

FAST MOVING ITEMS

AUGUST	2800	13000	190000
SEPTEMBER	2000	1000	95000
OCTOBER	0	12000	190000
NOVEMBER	2000	0	190000
DECEMBER	1000	0	0
JANUARY	10000	2000	190000
FEBRUARY	0	0	95000
MEAN	2543	4000	135714
STANDARD DEVIATION	3454	5859	74746
COEF. OF VARIATION (CV)	1.36	1.46	0.55

Table A6.3 Analysis of Fast Moving Items

The remaining items were classed as slow moving items and lumped together for the remainder of this analysis. To do this an average CV had to be obtained. This was done by calculating typical CV's from a sample in each of the categories and then calculating a weighted average. Table 4 gives an analysis of demands and CV's for typical items in the 3, 4, 5 category.

SLOW ER MOVING ITEMS

AUGUST	3000	10000	5000	0	0	50000
SEPTEMBER	6000	0	10000	40000	20000	50000
OCTOBER	0	15000	0	40000	0	0
NOVEMBER	0	0	15000	0	0	45000
DECEMBER	0	0	0	37500	0	0
JANUARY	4000	15000	0	40000	10000	60000
FEBRUARY	0	0	0	0	0	0
MEAN	1857	5714	4286	22500	4286	29286
STANDARD DEVIATION	2478	7319	6075	21065	7868	27753
COEF. OF VARIATION (CV)	1.33	1.28	1.42	0.94	1.84	0.95
AVERAGE CV	1.29					

Table A6.4 Analysis of slower moving stocks

The calculation of the weighted average CV is shown in Table A6.5.

CALCULATION OF WEIGHTED AVERAGE
CV FOR SLOW MOVING STOCKS

NUMBER OF MOVEMENTS	QUANTITY	%AGE	AVERAGE CV	
GT 5	996 NOT INCLUDED			
3,4.5	476	47.22%	1.29	614.99
1,2	312	30.95%	2.04	635.54
0	220	21.83%	3.60	792.00
TOTAL	2004			
WEIGHTED AVERAGE CV				2.03

Table A6.5 Weighted average CV for slow moving items

To proceed with the simulation assume that there are two identical firms except firm A has 10 customers and firm B has 1 customer. Assume each customer has a mean demand for slow moving items of 3 with standard deviation 6 (CV = 2 as per Table 5). i.e. $\bar{x}_B = 3$, $\sigma_B = 6$.
then firm A has demand

$\bar{x}_A = 3 \times 10 = 30$ $\sigma_A^2 = 10 \times 36 = 360$

i.e. $\sigma_A = \sqrt{360} = 18,97$.

Order Quantity

The order quantity that each company will order is given by the economic order quantity formula i.e.

$$EOQ = \sqrt{\frac{2\ Co\ a}{Cu}}$$

where EOQ = economic order quantity
Co = ordering costs

a = annual demand
Cu = holding costs

(Wagner, 1972, p378)

Since two identical firms are being compared the value of $\sqrt{\frac{2\ Co}{Cu}}$ will be the same for both firms (and will be constant = C say)

i.e. $EOQ = C\sqrt{a}$

For convenience let C = 1 which means that

$EOQ = \sqrt{a}$ where a = annual demand

Therefore $EOQ_A = \sqrt{70} = 5,47$ (5 say)

and $EOQ_B = \sqrt{3} = 1,73$ (2 say)

Safety Stock

The procedure for calculating safety stock was taken from course notes on inventory control from a course by P E consulting group and is attached to the end of this appendix.

As shown

Safety stock = SS = $K\sigma$

where $f(k) = \frac{(1 - 3)\ q}{\sigma}$

where s = service level
q = EOQ = quantity

For the two firms assuming the service level required is 0,9 (typically) then

$$f(k) = \frac{(1-3)q}{\sigma} \quad \begin{matrix} A \\ \frac{(1-0,9)5}{19} \\ = 0,026 \end{matrix} \quad \begin{matrix} B \\ \frac{(1-0,9)1}{6} \\ = 0,033 \end{matrix}$$

From the table	K = 1,6	K = 1,5
and safety stock	SS = Kσ	SS = Kσ
	= 1,6 x 19	= 1,5 x 6
	= 30,4	= 9

Average Stock

Average stock	= ss + $q/_2$	= SS + $q/_2$
	= 30,4 + $5/_2$	= 9 + $2/_2$
	= 32,9	= 10
Average stock/average demand	= $\frac{32,9}{30}$	= $\frac{10}{3}$
	= 110%	= 333%

Fast Moving Stocks

Similarly for fast moving stocks (with a CV of 0,67 typically).

	A	B
$\bar{x}$	30	3
σ	$\sqrt{10 \times 4} = 6,3$	2
q	5	2
f(k)	= 0,08	0,10
k	= 1,05	0,95
SS = Kσ	1,05 x 6,3	0,95 x 2
SS	6,61	1,9
Average Stock	9,1	2,9
Average stock/total demand	30%	97%

Stock Holding Costs

In table 6.4 the stock holding costs are quoted based on the following calculation.

	A	B
Assumed purchase amount	300	30
Assumed proportion fast moving	50%	50%
For fast moving items : Total demand	150	150
Average stock total demand (as calculation above)	30%	97%
Average stock	45	14,6
Holding cost (at 30%)	13,5	4,36

	A	B
Similarly for slow moving items		
Total demand	150	15
Average stock/total demand (as calculated above)	110%	333%
Average stock	165	49,95
Holding Costs (at 30%)	49,5	14,99

Note: Although the above analysis is fairly crude and lacking in rigour in terms of the averaging required to get typical values and the other assumptions made, nevertheless, the argument was found to be compelling when put before management from the industry concerned. A more precise analysis was done by the management concerned, which for reasons of confidentiality was not shared with the author, but the principles established by the above analysis were found to hold true.

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TABLE 10
Average Extent of Stock-outs vs K

No. of standard deviations of safety Stock K	Average extent of a stock-out in standard deviations
3.4	-
3.3	0.100
3.2	0.172
3.1	0.220
3.0	0.257
2.9	0.289
2.8	0.311
2.7	0.332
2.6	0.347
2.5	0.363
2.4	0.375
2.3	0.386
2.2	0.398
2.1	0.409
2.0	0.420
1.9	0.434
1.8	0.450
1.7	0.460
1.6	0.477
1.5	0.491
1.4	0.507
1.3	0.523
1.2	0.541
1.1	0.557
1.0	0.576
0.9	0.598
0.8	0.620
0.7	0.643
0.6	0.668
0.5	0.692
0.4	0.723
0.3	0.751
0.2	0.780
0.1	0.815
0.0	0.849

time period (say one year). If the risk level is 84% (safety stock equal to one standard deviation) then the probability of a stock-out during any one order cycle is (1 — 0,84) = 0,16. Therefore if there are ten orders per year there are likely to be 1,6 stock-outs per year. Or expressed algebraically, the number of stock-outs per year = N_o (1 — R), where N_o is the number of order cycles per year, and R is the risk level.

We can determine the "demand not met" during a year by multiplying the number of stock-outs per year by the average extent of a stock-out (X). Consequently, the "demand not met" = N_o (1 — R)X pieces per year. This "demand not met" must be expressed in standard deviations so that we can use standard statistical tables.

$$\text{Demand not met} = \frac{N_o (1-R) X}{\sigma} \text{ standard deviations per year}$$

As discussed in Section 3 of this paper, the real service level S is given by:

$$\text{Service level} = \left(1 - \frac{\text{Demand not met}}{\text{Total demand}}\right) \times 100$$

Given that the total demand in standard deviations = a/σ, then:

$$S = \left\{1 - \left[\frac{N_o (1-R) X}{\sigma} \div \frac{a}{\sigma}\right]\right\} = \left\{1 - \left[\frac{(1-R) X}{\sigma} \times \frac{N_o \sigma}{a}\right]\right\}$$

But $N_o/a = 1/q$, so it becomes possible to rewrite this equation as:

$$S = \left\{1 - \left[\frac{(1-R) X}{\sigma} \times \frac{\sigma}{q}\right]\right\}$$

But for any value of K, we can determine R, the risk level, from Table 5, and X/σ, the average extent of a stock-out in standard deviations, from Table 10. We can therefore determine a value for the expression (1 — R) X/σ for any value of K. For example suppose K = 1,0, then:
From Table 5, the risk level = 0.841
From Table 10, the average extent of a stock-out in standard deviations = X/σ = 0,576 standard deviations.
Therefore (1 — R) X/σ = 0.091.

Table 11 shows the relationship between (1 — R)X/σ and K. We have now seen how (1 — R)X/σ is a function of K. This relationship can be written as:

$$\frac{(1-R) X}{\sigma} = f(K)$$

TABLE 11
The Relationship Between K and (1-R)x/σ

K	$\frac{(1-R)x}{\sigma}$
3.4	0
3.3	0.00005
3.2	0.00012
3.1	0.00022
3.0	0.00036
2.9	0.00055
2.8	0.00081
2.7	0.00116
2.6	0.00163
2.5	0.00225
2.4	0.00306
2.3	0.00413
2.2	0.0060
2.1	0.0073
2.0	0.0100
1.9	0.0126
1.8	0.0162
1.7	0.0207
1.6	0.0262
1.5	0.0329
1.4	0.0411
1.3	0.0507
1.2	0.0622
1.1	0.0758
1.0	0.092
0.9	0.110
0.8	0.131
0.7	0.156
0.6	0.183
0.5	0.214
0.4	0.249
0.3	0.287
0.2	0.328
0.1	0.375
0.0	0.425

As a result, the equation for the real service level can be written as:

$$S = \left\{1 - f(K) \times \frac{\sigma}{q}\right\}$$

We want to be able to determine K because we know that SS = Kσ. So we will rearrange the service level equation to read:

$$f(K) = \frac{(1-S) q}{\sigma} \text{ standard deviations}$$

The above equations allow us to calculate the safety stock of an item. For example, assume that an item has an order quantity of 100 units, and the standard deviation of lead time demand is 80 units. The required service level is 98%. The first step is to calculate f(K).

$$f(K) = \frac{(1-S) q}{\sigma} = \frac{(1-0{,}98) \times 100}{80} = 0{,}025$$

The second step is to select the nearest value of K from Table 11. In this case, K = 1.62. Finally, calculate the safety stock required as follows:

$$SS = K\sigma = 1.62 \times 80 = 130 \text{ pieces}$$

7. THE EFFECT OF LEAD TIME

We have now discussed the effect of the service level, the demand variability and the order quantity on safety stock requirements. Furthermore we have referred only to the standard deviation of demand during the lead time. In some situations it may be possible to calculate the standard deviation or the mean absolute deviation from the lead time demands. However, because it is usual to calculate the MAD during the

Fig A6.3 Safety stock calculation table

Appendix VII QUESTIONNAIRE FOR PHASE V FIELD STUDY

Exhibit A7.1 Initial questionnaire for phase V (used for methodology test).

Exhibit A7.2 Final questionnaire for phase V (used for all interview reported on in Chapter 9).

QUESTIONNAIRE

Company : **Date :**

Business :

Name of person : **Years Service :**

1.

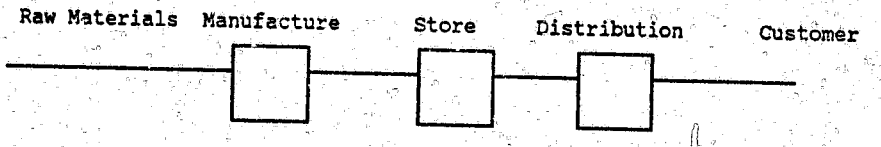
1.1 Could you briefly describe the business including a broad outline of who you sell to, what you manufacture and distribute, and what raw materials you buy?

.....

.....

.....

Shared:



1.2 What facilities are shared with other companies in the group?

None/Some

1.3 Do you have a clearly defined target market? Yes/No

1.4 How do you define your market; in terms of:

a) products that you make
b) customer groupings
c) other (specify)?

1.5 Do you segment your market? Yes/No

1.6 Who are your direct competitors?

.....

.....

.....

Exhibit A7.1 Initial Questionnaire for phase V (used for methodology test)

2. A key success factor is an element of the business where superior performance in that one area leads to superior performance for the business as a whole (i.e. the critical things that must be done right in an industry in order to have a successful business).

2.1 What are the top two success factors in your industry?

a) Most critical .....

.....

.....

b) Second critical .....

.....

.....

2.2 Which is the most important? a / b

2.3 How significant is this?

a) Absolutely critical
b) Very important
c) Fairly important
d) Slightly more important than other factors
e) One of many factors.

3. Some success factors are specific to an industry - this means that the resources/inputs that are needed to succeed in this area are spread across this particular industry only.

For the most significant success factor mentioned above:

3.1 What resources/inputs are needed to succeed?

a) .....

b) .....

c) .....

3.2 Are they specific to this industry?

a) Yes/No

b) Yes/No

c) Yes/No

Exhibit A7.1 **Initial Questionnaire for phase V (used for methodology test)**

4. Again for the most significant success factor:

4.1 Is there any inherent advantage of scale involved, i.e. is big better?

Yes/No

4.2 If you doubled the volume/size of your business would this have any effect on

a) your cost per unit Yes/No
b) your price Yes/No
c) your ability to improve in key success areas Yes/No

4.3 If so, how significant would this be?

	Very significant	Moderate	Not significant
a) cost			
b) price			
c) KSF			

5. Do you have any specialists in your organisation - by this I mean highly paid people who are not managers but who do a specific activity which is important to your business?

Yes/No

Exhibit A7.1 **Initial Questionnaire for phase V (used for methodology test)**

QUESTIONNAIRE

Company : Date :

Business :

Name of perzon :

1. DESCRIPTION OF BUSINESS

1.1 Could you briefly describe the business including a broad outline of who you sell to, what you manufacture/distribute, and what raw materials you buy?

.....

.....

.....

....

....

....

1.2 Do you share any facilities with other companies in the group?

2. Key success factors are defined as variables which management can influence that can effect significantly the overall competitive positions of the various firms in an industry, i.e. The critical few things that managers must do right in an industry in order to have a successful business.

2.1 What are the 3 most critical success factors in your industry?

1. .....

.....

.....

2. .....

.....

.....

Exhibit A7.2 Final questionnaire for phase V

3. .....

.....

.....

2.2 Please give an indication of the relative importance of these factors by dividing 10 points between them (e.g. A 8,1,1 rating would show the first factor to be vastly more important than the others whereas a 4,3,3 rating would put them all at approximately equal importance).

1. .....

2. .....

3. ==========
10

3. Some success factors are specific to an industry - this means that the resources, inputs or systems that are needed to succeed in this area are unique to this particular industry only.

3.1 For the first success factor please describe what is needed for superior performance in this area (probe).

.....

.....

.....

Are these (on balance) specific to the industry?

1 ..... 2 ..... 3 ..... 4 5
Not specific Specific

3.2 For the second success factor please describe what is needed for superior performance in this area (probe).

.....

.....

.....

Are these (on balance) specific to the industry?

1 ..... 2 ..... 3 ..... 4 5
Not specific Specific

Exhibit A7.2 Final questionnaire for phase V

3.3 For the third success factor please describe what is needed for superior performance in this area (probe).

.....

.....

.....

Are these (on balance) specific to the industry?

1 ..... 2 ..... 3 ..... 4 5
Not specific Specific

4. In some businesses the size of the business relative to others in the same market is important because cost decrease (or price/volume increases) as the business get bigger.

4.1 Are advantages of scale important in the first KSF?

1 ..... 2 ..... 3 ..... 4 5
Not important Very Important

If so, how?.....

If not, why not? (probe).....

.....

Would advantages of scale affect costs, volume or price?

.....

4.2 Are advantages of scale important in the second KSF?

1 ..... 2 ..... 3 ..... 4 5
Not important Very Important

If so, how?.....

If not, why not? (probe).....

.....

Would advantages of scale affect costs, volume or price?

.....

Exhibit A7.2 Final questionnaire for phase V

- 4 -

4.3 Are advantages of scale important in the third KSF?

1 ..... 2 ..... 3 ..... 4 5
Not important Very Important

If so, how?.....

If not, why not? (probe).....

.....

Would advantages of scale affect costs, volume or price?

.....

Exhibit A7.2 Final questionnaire for phase V

Appendix VIII List of KSFs

KEY SUCESS FACTORS	NUMBER OF TIMES OCCURED
PRICE / COSTS	26
VALUE FOR MONEY	4
EFFICIENCY / PRODUCTIVITY / ON-LINE-TIME	5
DISTRIBUTION / TRUCK UTILIZATIION	6
SCRAP / WASTE CONTROL	1
PURCHASING	11
QUICK RESPONSE	13
MEETING PROMISED DELIVERY DATES	11
TECHNICAL ADVICE	2
SECURITY OF SUPPLY	6
FLEXIBILITY	4
MARKETING	5
ACCURACY OF DELIVERY	7
REPRESENTATION (COM'S & RELATIONSHIP W CUSTOMER)	3
QUALITY - MOTIVATOR	13
QUALITY - HYGIENE	8
MOTIVATION	1
SHOP FLOOR MANAGEMENT	1
IR PRACTICES	1
PEOPLE (TRAINING & MOTIVATION)	7
TECHNOLOGY (PRODUCTION PROCESS)	5
AUTOMATION	1
SUPPLIER RESEARCH / IDENTIFICATION	1
NATIONAL COVERAGE	1
NEW PRODUCT DEVELOPMENT	1
CASH FLOW	1
ORGANISATIONAL STRUCTURE	1
PRODUCTION PLANNING	1
INFORMATION SYSTEMS	1
BRANDING	3
CAPACITY UTILISATION	1
PARTNERSHIP WITH SUPPLIERS	6
TOAL	158

Exhibit A8.1 Summary of KSFs from phase V of research

Appendix IX ANALYSIS OF RESULTS

95% CONFIDENCE LIMIT FOR SLOPE ESTIMATE				
	QUAD1	QUAD2	QUAD3	
CLUSTER	-0.15	0.02	-0.59	LOWER LIMIT
	0.75	0.97	0.48	UPPER LIMIT
DISCRIM	-0.48	0.26	-0.34	LOWER LIMIT
	0.76	0.95	0.49	UPPER LIMIT
MEDIAN	-0.12	0.33	-0.29	LOWER LIMIT
	0.89	1.4	0.48	UPPER LIMIT
MIDPNT	-0.14	0.3	-0.26	LOWER LIMIT
	0.87	1.49	0.55	UPPER LIMIT

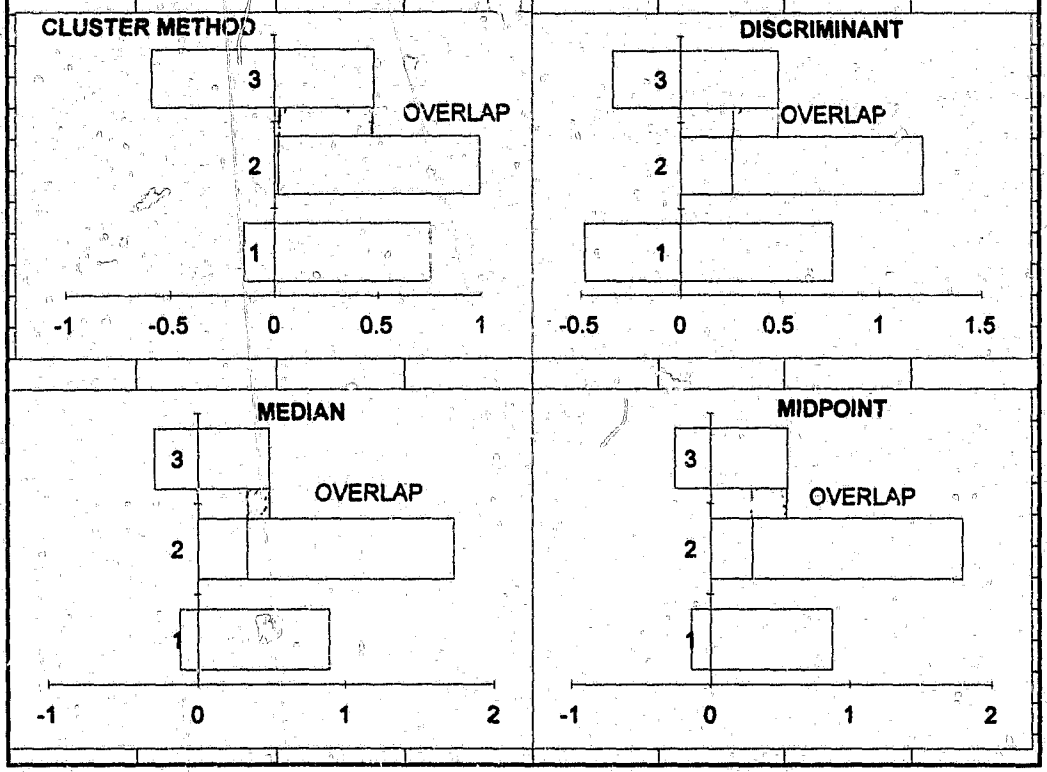


Exhibit A9.1 Test of H2 (strong)

QUAD=1

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	2278.76832	2278.76832	2.499	0.1399
Error	12	10940.66025	911.72169		
C Total	13	13219.42857			

Root MSE	30.19473	R-square	0.1724
Dep Mean	43.42857	Adj R-sq	0.1034
C.V.	69.52734		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	23.159884	15.14891089	1.529	0.1522
MKTSH	1	0.368044	0.23279859	1.581	0.1399

Exhibit A9.2 Regression analysis for midpoint method.

QUAD=2

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	5235.78468	5235.78468	10.411	0.0066
Error	13	6537.94865	502.91913		
C Total	14	11773.73333			

Root MSE	22.42586	R-square	0.4447
Dep Mean	47.46667	Adj R-sq	0.4020
C.V.	47.24549		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	14.170455	11.83288878	1.198	0.2525
MKTSH	1	0.893458	0.27690607	3.227	0.0066

Exhibit A9.2 Regression analysis for midpoint method.

QUAD=3

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	500.06973	500.06973	0.555	0.4624
Error	28	25212.89694	900.46061		
C Total	29	25712.96667			

Root MSE	30.00768	R-square	0.0194
Dep Mean	30.96667	Adj R-sq	-0.0156
C.V.	96.90315		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	22.915630	12.11335384	1.892	0.0689
MKTSH	1	0.146827	0.19702632	0.745	0.4624

Exhibit A9.2 Regression analysis for midpoint method.

```
;
proc standard data=store.pas1 out=pass std=1;
  var spec aos;
proc fastclus data=pass out=pasc mean=mean maxclusters=3 maxiter=10;
  var spec aos;
proc plot data=pasc; plot aos*spec=cluster;
proc sort data=pasc; by cluster mktsh;
proc reg simple data=pasc;
  model roi=mktsh;
  output out=pasr p=roihat;
  by cluster;
data chng;set pasr;cluster=cluster+10;
  if cluster=11 then cluster=1;
  if cluster=12 then cluster=3;
  if cluster=13 then cluster=2;
proc sort data= chng;by cluster;

proc plot data=chng;by cluster;
  plot roi*mktsh='a'  roihat*mktsh='p' /overlay;
proc cluster data=pass outtree=ccc method=ward;
 var spec aos;
data tree;
 set ccc;
 if _ncl_<=15;
proc plot data=tree;
 plot _ccc_*_ncl_=_ncl_;

data one;set store.pas1;
 if aos gt 29 and spec gt 29 then q1=2;
 if aos gt 29 and spec le 29 then q1=1;
 if aos le 29  then q1=3;
proc plot data=one;
 plot aos*spec=q1;
data two;set store.pas1;
 if aos gt 29 and spec gt 26 then q2=2;
 if aos gt 29 and spec le 26 then q2=1;
 if aos le 29  then q1=3;
proc plot data=one;
 plot aos*spec=q1;
data store.ph15;set chng;
```

Exhibit A9.3 **SAS programme for cluster method.**

```
goptions device=a4ab   ;


goptions                gunit=pct border ftext=simplex htitle=3
   htext=2;
proc gplot data=chng  gout=grafcat uniform;
 plot roi*mktsh=1  roihat*mktsh=2     /overlay;
 by cluster;
SYMBOL1 c=red   v=star;
SYMBOL2 c=blue  v=none i=spline;
TITLE1 CLUSTER ANALYSIS;

goptions display;
goptions                gunit=pct border ftext=simplex htitle=3
   htext=2;
proc greplay tc=tempcat nofs igout=grafcat;
  tdef newthree
   1/llx=20 lly=50
     ulx=20 uly=100
     urx=50  ury=100
     lrx=50  lry=50
   2/llx=50  lly=50
     ulx=50   uly=100
     urx=80    ury=100
     lrx=80    lry=50
   3/llx=35    lly=0
     ulx=35    uly=50
     urx=65     ury=50
     lrx=65    lry=0;
template newthree;
treplay
        1:gplot
        2:gplot1
        3:gplot2;

template newthree;list template;

data chnn;
 set chng;
 drop aos spec;
proc sort data=chnn;by ident;
proc sort data=store.pas1;by ident;

data comb;
 merge chnn store.pas1;
 by ident;


symbol1 c=red v=star;
symbol2 c=red  v=square i=;
symbol3 c=red  v=triangle;
proc gplot data=comb ;
 plot aos*spec=cluster /frame href=30 vref=30;
 label spec=specificity ;
```

Exhibit A9.3 SAS programme for cluster method.

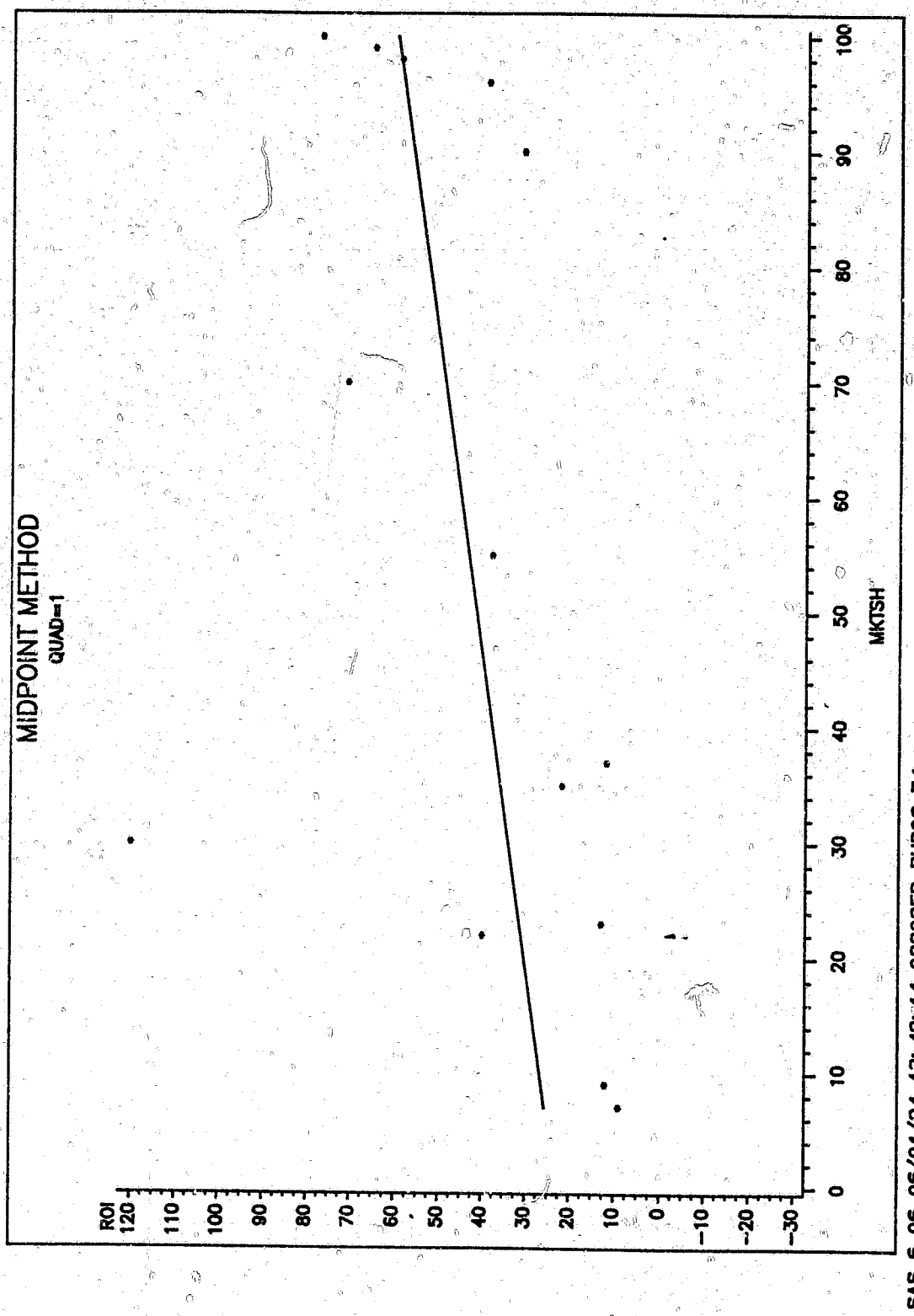


Exhibit A9.4 Market share vs ROI : midpoint method.

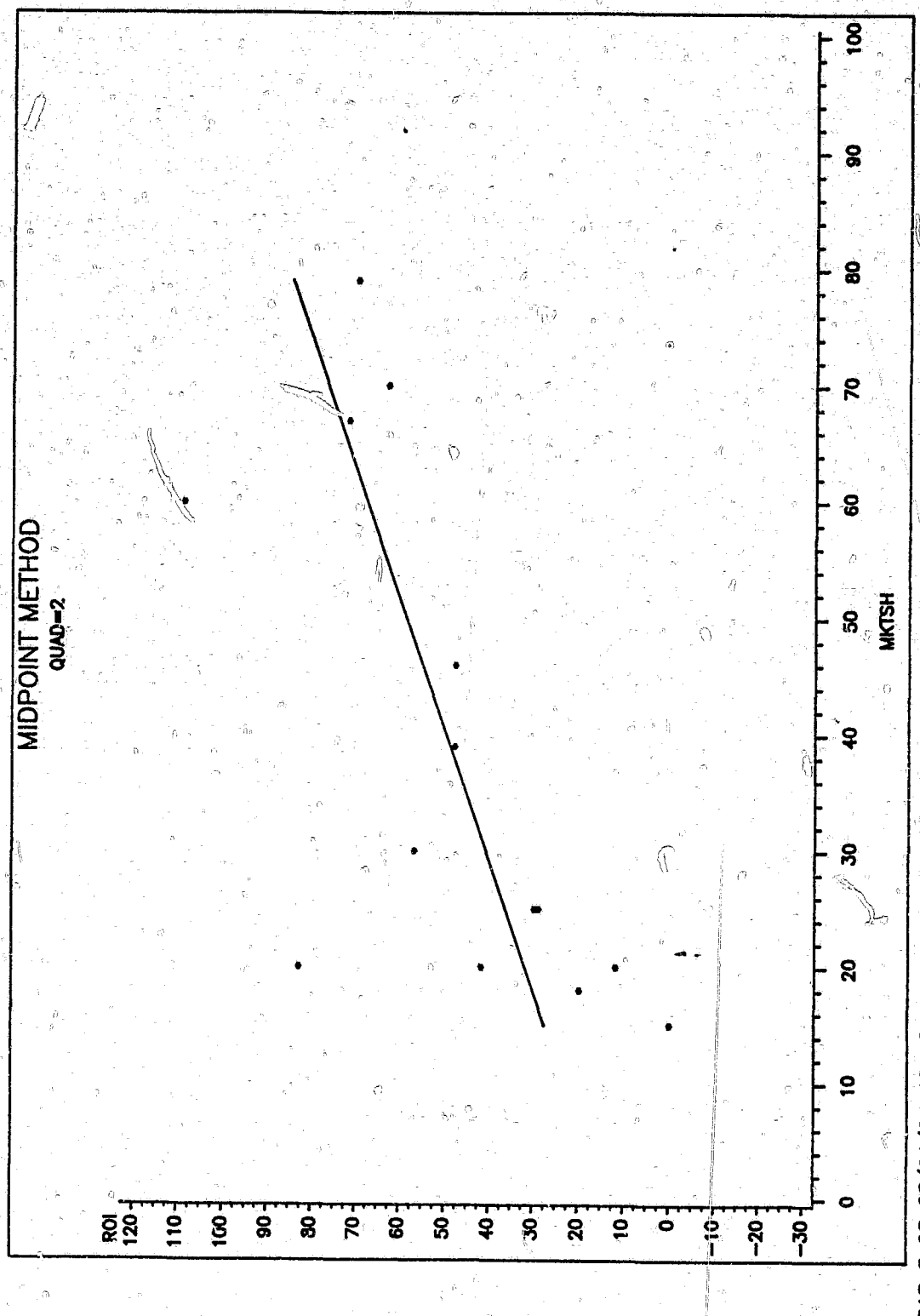


Exhibit A9.4 Market share vs ROI : midpoint method.

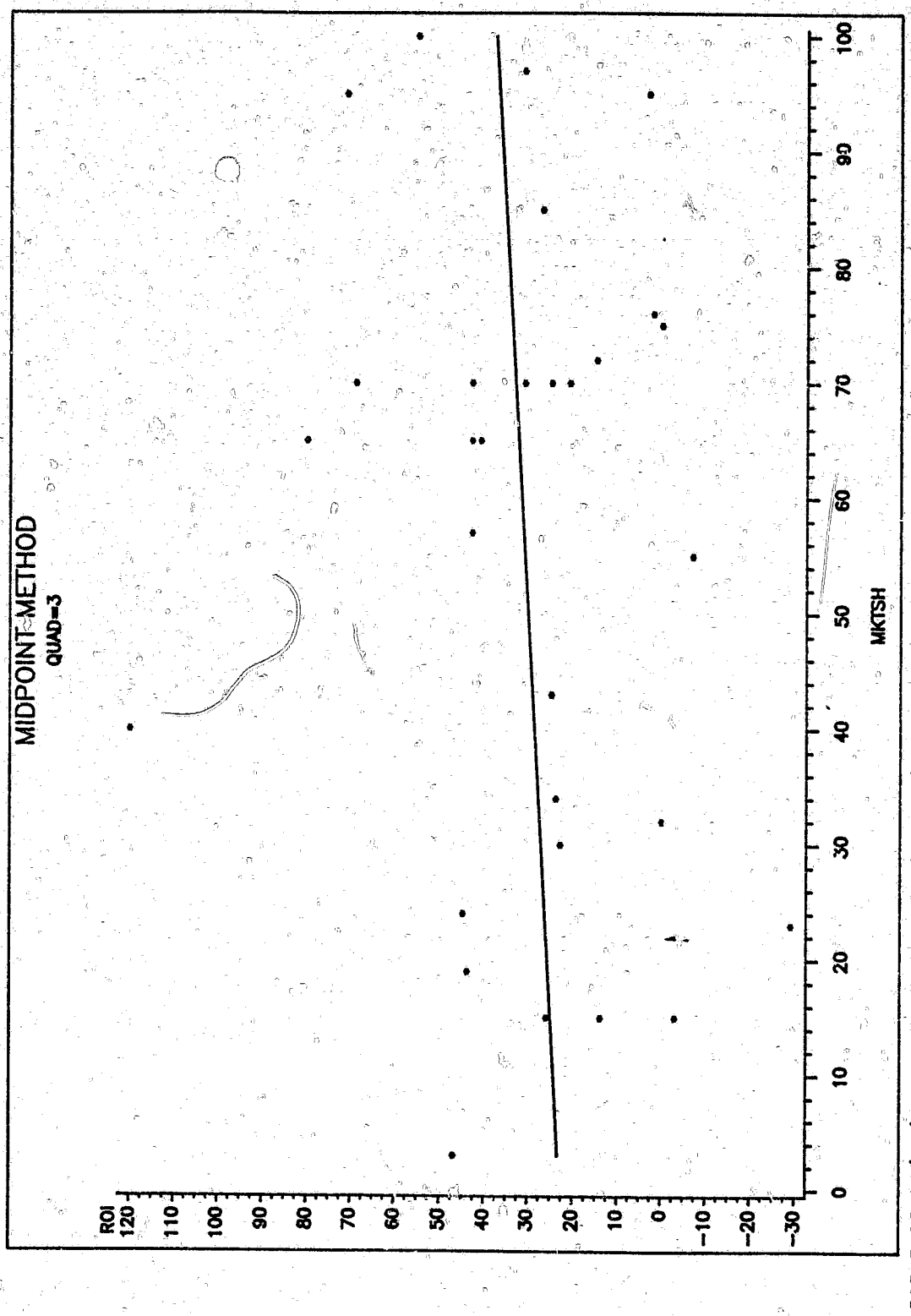


Exhibit A9.4 Market share vs ROI : midpoint method.

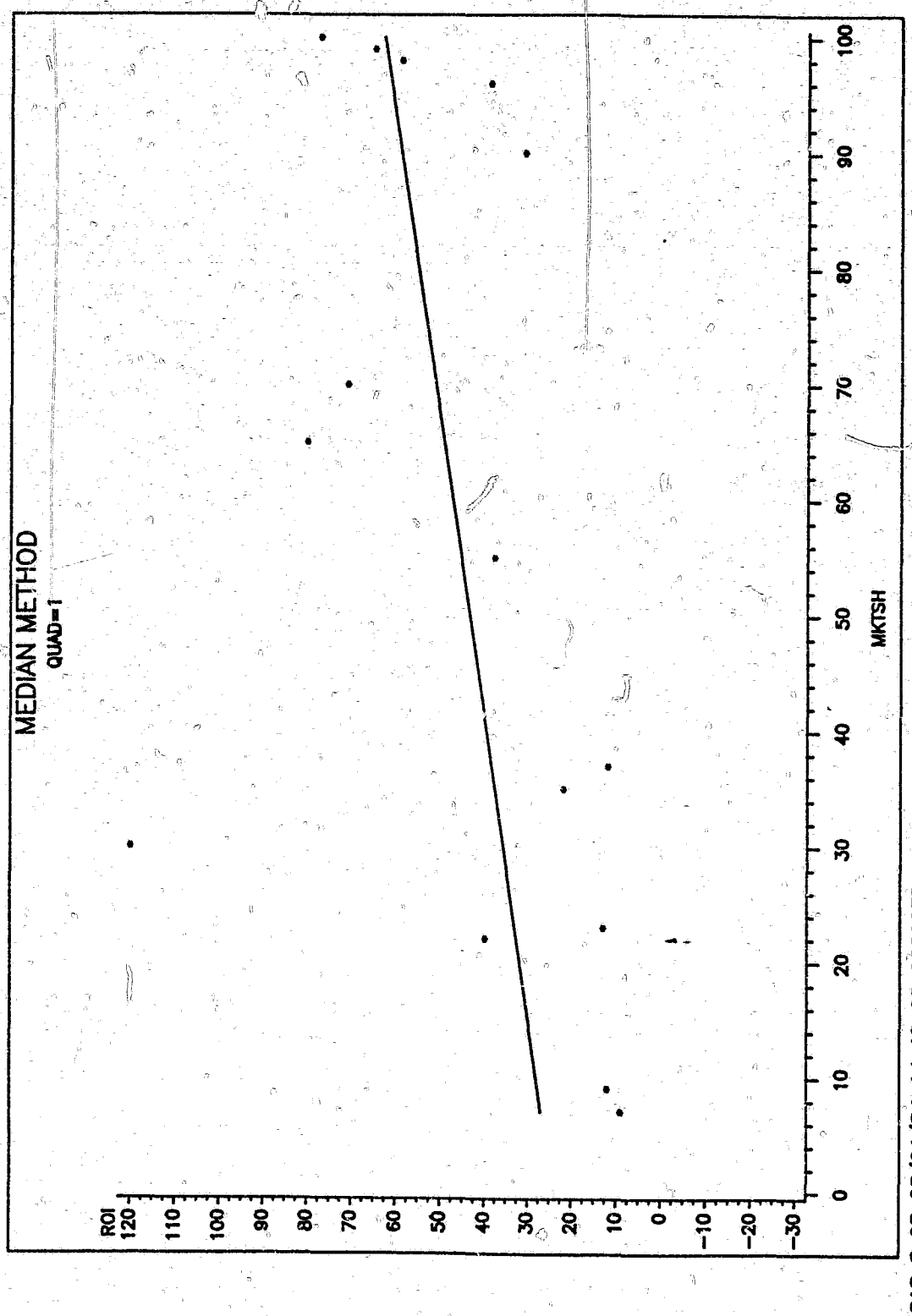


Exhibit A9.5 Market share vs ROI : median method.

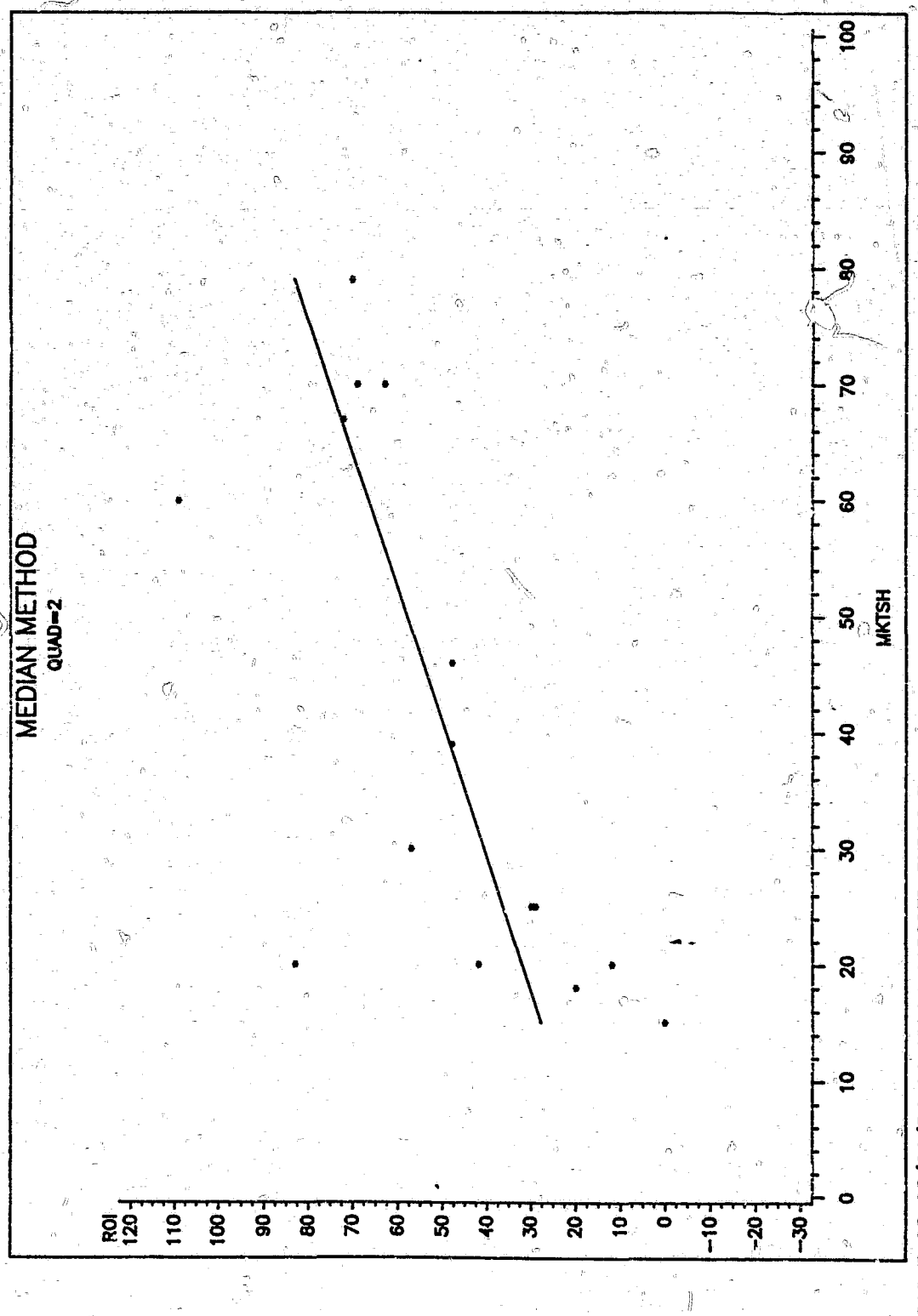


Exhibit A9.5 Market share vs ROI : median method.

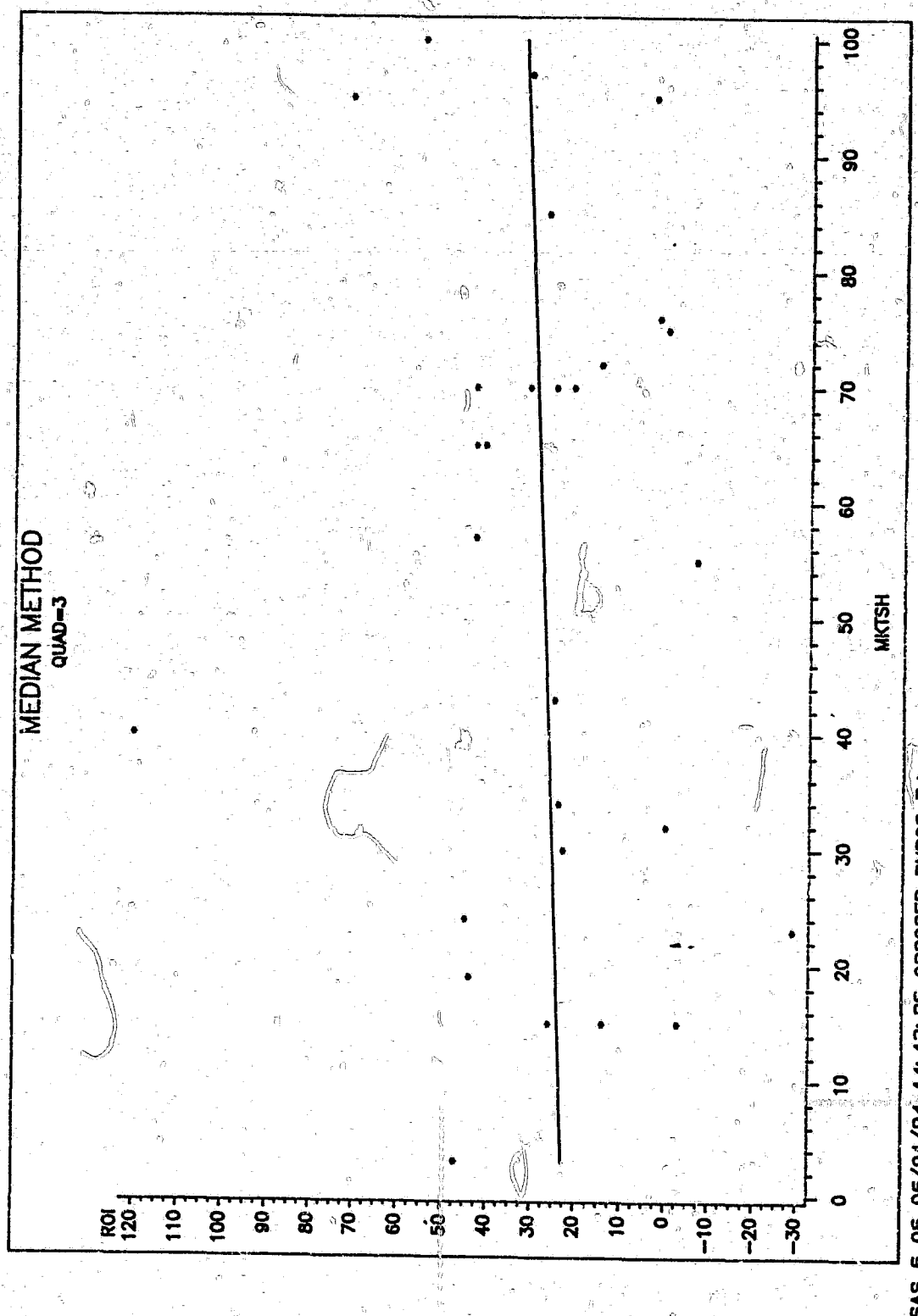


Exhibit A9.5 Market share vs ROI : median method.

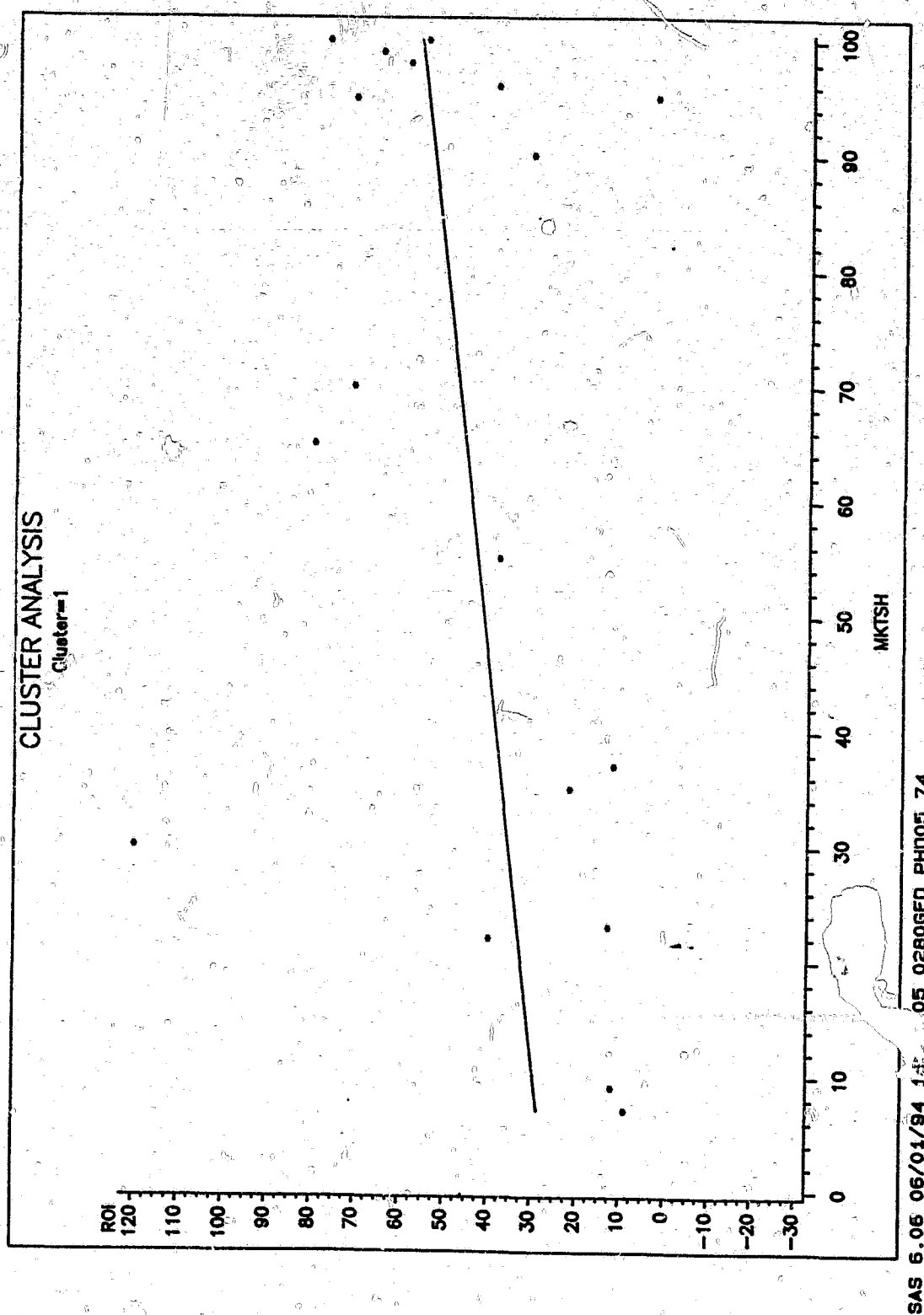


Exhibit A9.6 Market share vs ROI : cluster method.

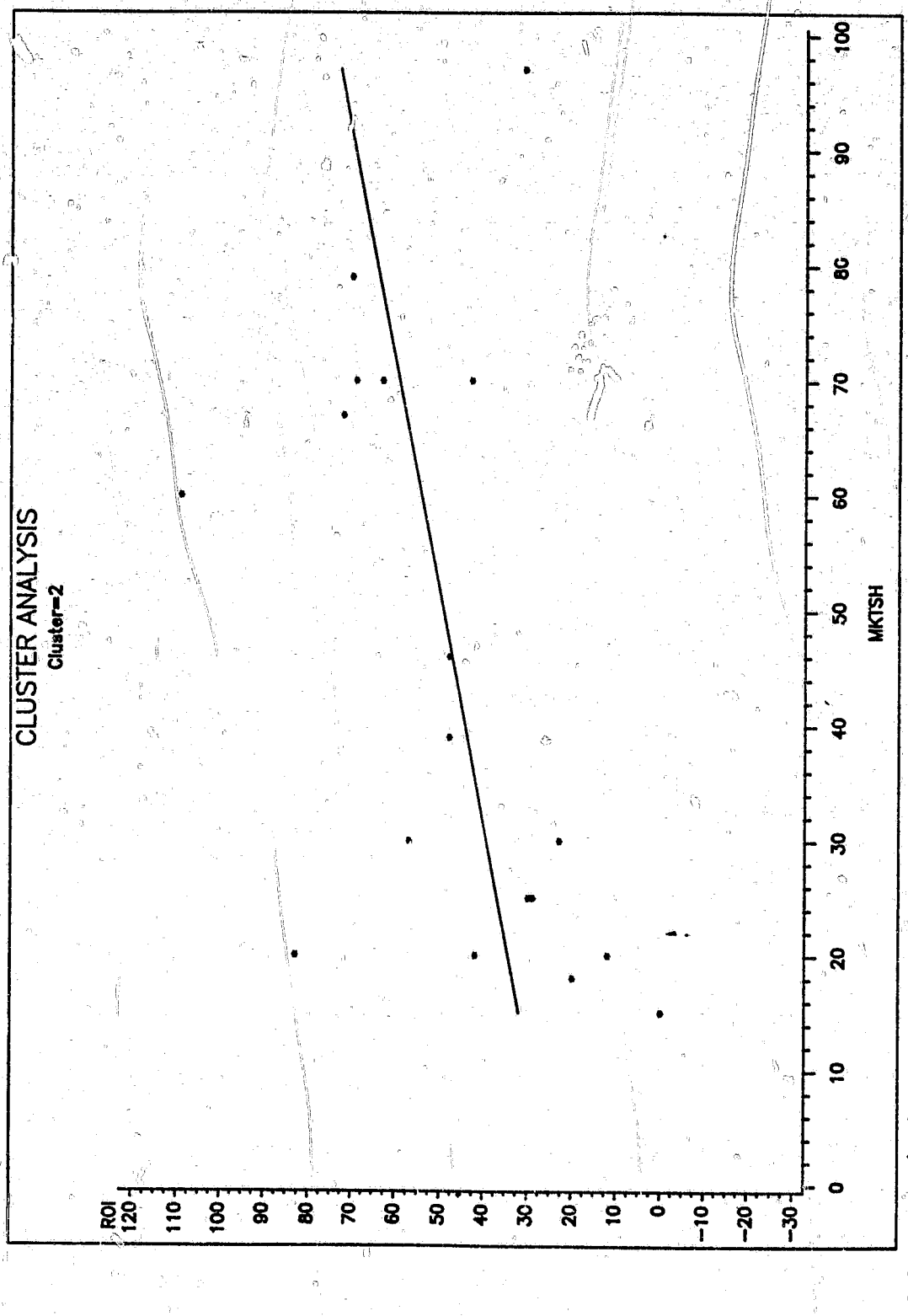


Exhibit A9.6 Market share vs ROI : cluster method.

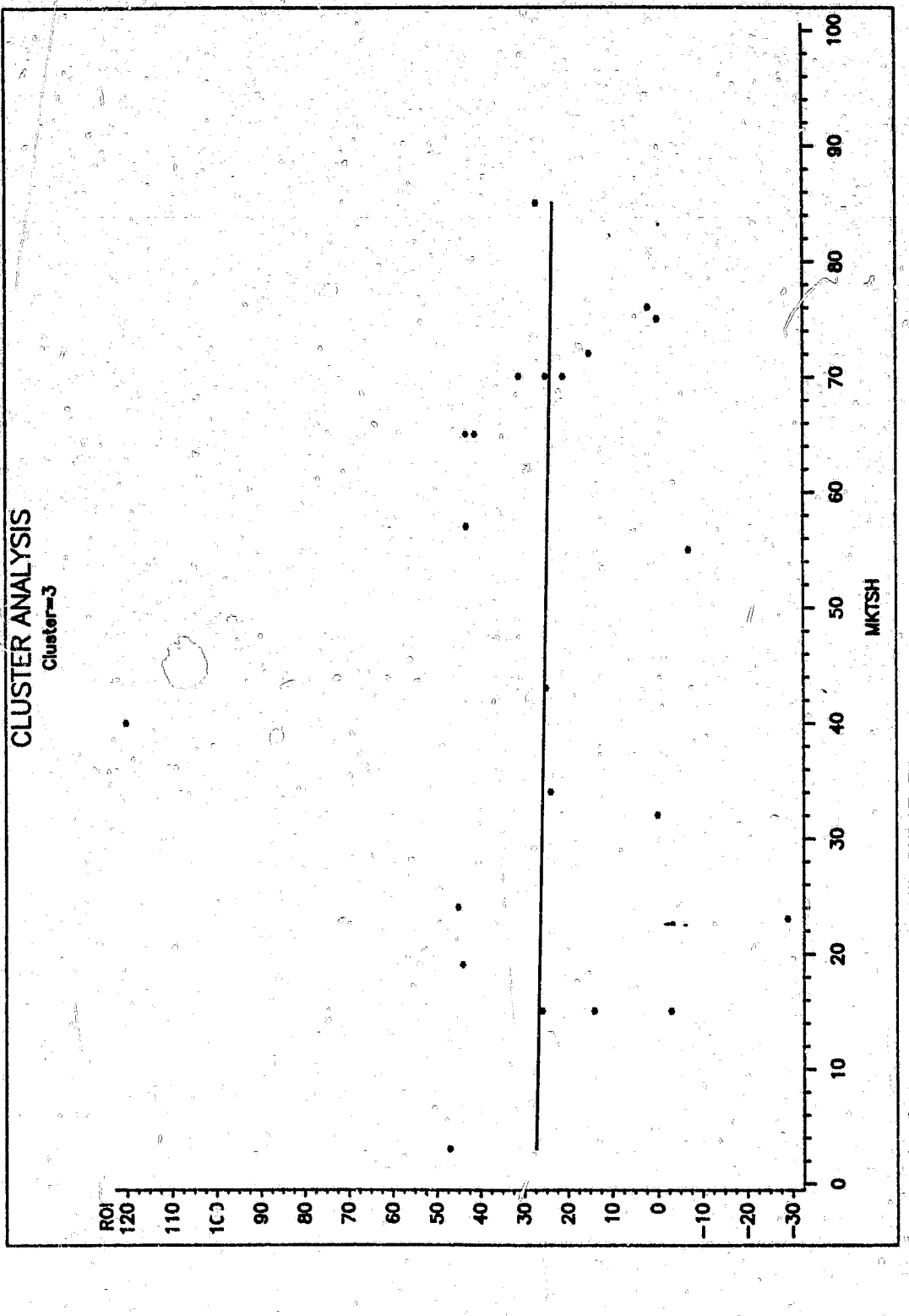


Exhibit A9.6 Market share vs ROI : cluster method.

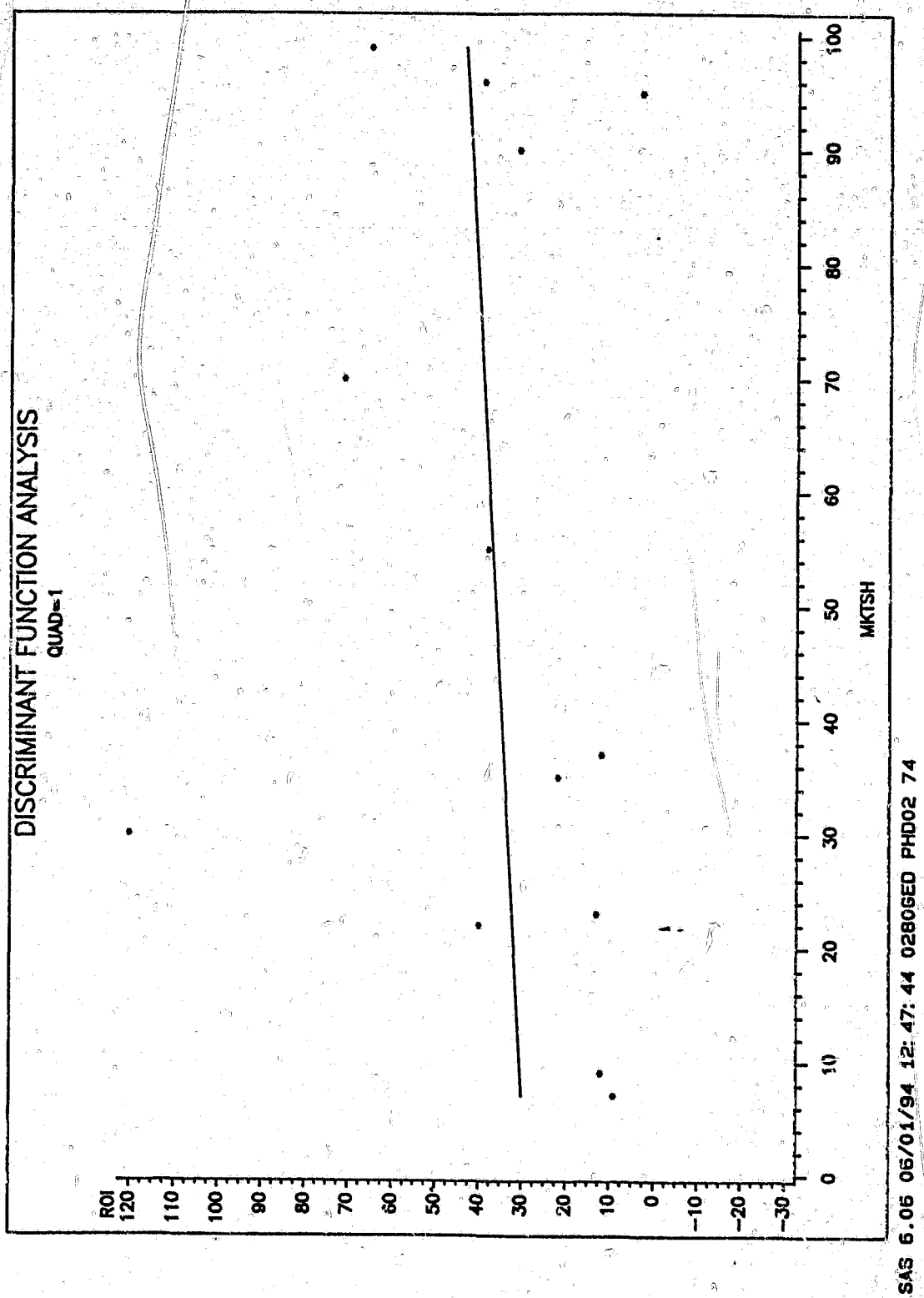


Exhibit A9.7 Market share vs ROI : discriminant function method.

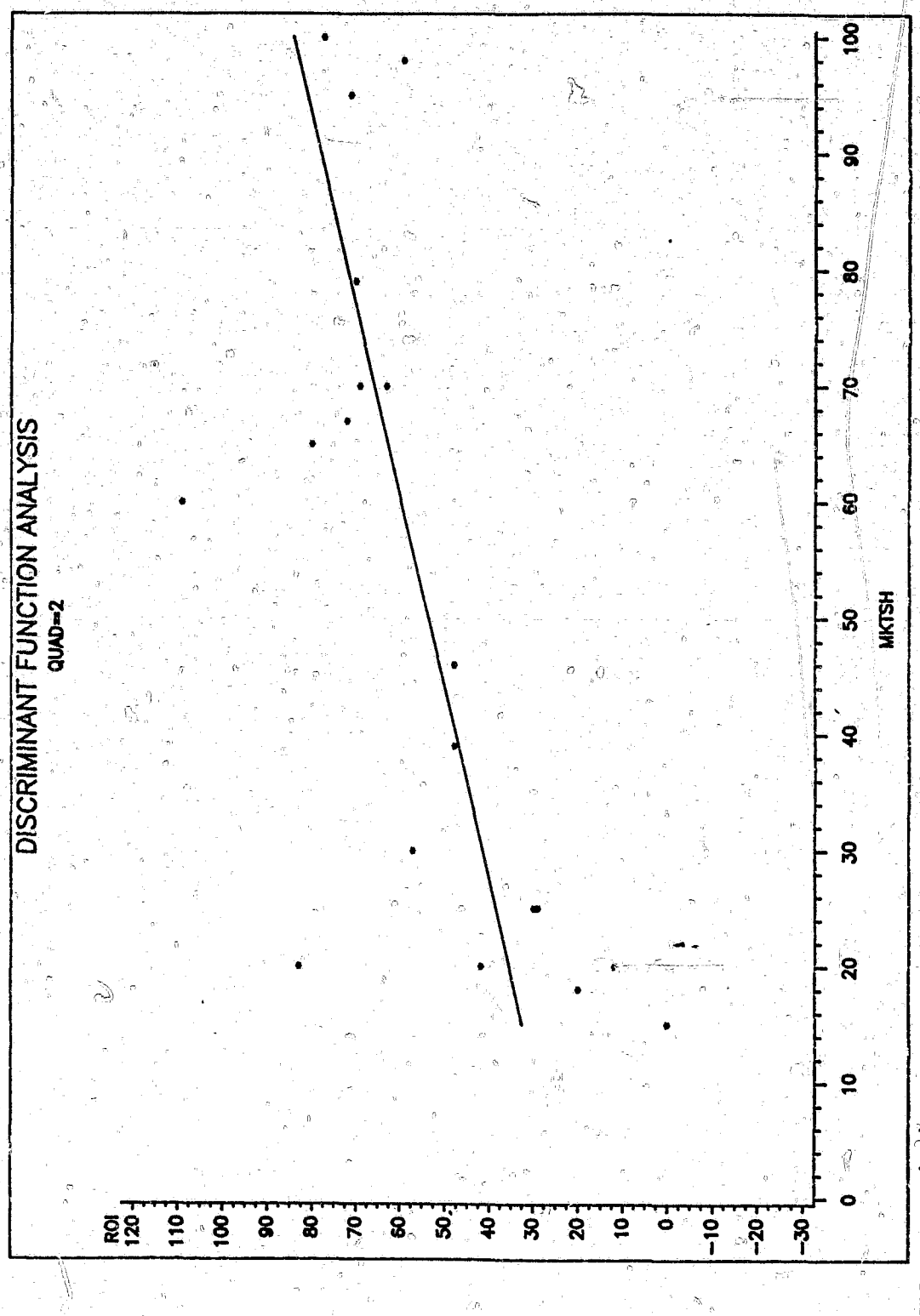


Exhibit A9.7 Market share vs ROI : discriminant function method.

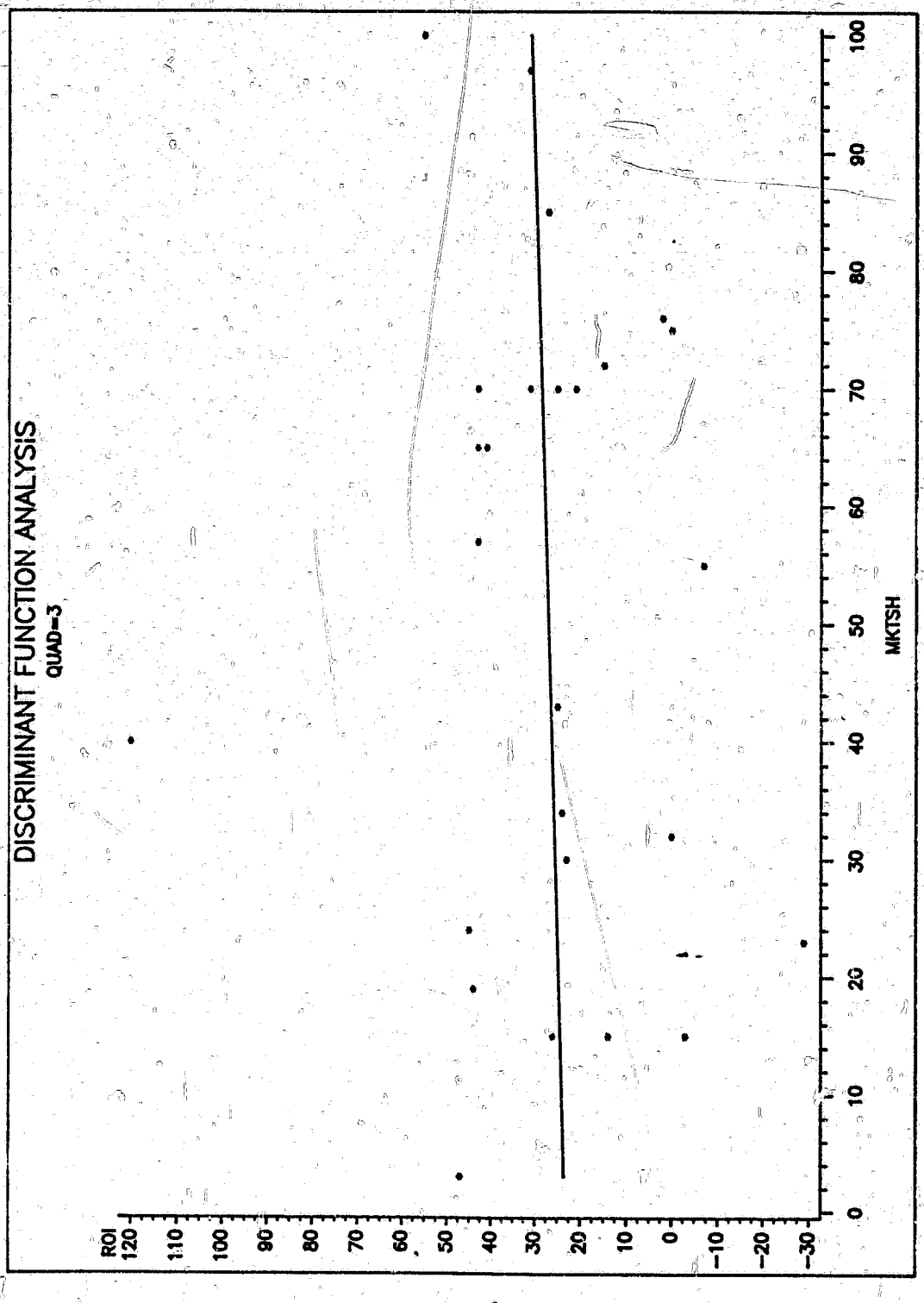


Exhibit A9.7 Market share vs ROI : discriminant function method.

APPENDIX X

Definition of market share and profitability

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Definition of market share and profitability

a) Profitability

Profitability is measured by ROI, which, for the purposes of this study is defined as:

"ROI = pre-tax income/average investment, where income is averaged over three years and is after deduction of corporate expenses, but prior to interest charges, and "investment" equals working capital plus fixed capital at book value, also averaged over three years".

b) Market share

The market share of a particular firm is defined as that firm's share of the served market. Abell and Hammond (1979, pp 326-327) give an extract from the PIMS DATA Manual to help with defining the served market:

"What is a served market?

The term "market" refers to a set of customers with similar requirements for products and/or services. A business may elect to serve only certain customers in the total market. For example, it may focus its entire marketing effort on:

* customers located in the same geographic area (e.g., the Eastern half of the U.S: all of Canada; Canada and the United States; all homes within the broadcast range of a radio station)

* customers with annual purchases in excess of $1 million

* customers with one national purchasing office

* customers that emphasize high product quality rather than low price

* customers in search of a certain size product (e.g., TV sets with screen sizes under 12")

* customers interested in products reflecting a given technology (e.g., *color* television sets; *nuclear* power plants; *hermetically* sealed motors; *fluorescent* lamps)

* customers seeking to replace all or part of a product already owned.

A "served market" is usually smaller than the "total market."

Serving a market means that the business develops, manufactures, distributes, and/or services products appropriate to that segment of the total market. It addresses its sales efforts, direct or indirect, to particular customers or responds to "requests for bids."

Served markets can differ greatly even for products which appear identical. For example, kitchen appliances may be bought by a housewife or by