C H A P T E R V

FACTOR ANALYSIS

"Organizations are tools which help man to survive. They are created by man. Man can change them to facilitate individual growth".

- CHRIS ARGYRIS

'Individual Actualization in Complex Organizations'. In Fred D. Carver and Thomas J. Sergiovanni, (Eds.), Organizations and Human Behaviour Focus on Schools, McGraw-Hill Book Company, New York, 1969, p. 197.

C O N T E N T S

CHAPTER V

FACTOR ANALYSIS

5.1 INTRODUCTION

The preceding chapter was devoted for administering the sample. This chapter deals with the factor analysis. One of the objectives of the present investigation is to study the internal structure of the inventory prepared by the investigator. Keeping this in view, the factor analytical approach has been applied. The main purpose in the factor analysis is to identify or to determine various groups or clusters of items which correlate highly with items within that group. It should be mentioned here that all the 31 variables relating to innovative proneness have been described in the earlier chapter, based on these variables. factor analysis technique has applied. The principal component method was used for the analysis of the data in the present study. This method was applied for some reasons. By this method each factor extracted the minimum amount of variance and derives the smallest possible residuals.

First of all, 31 x 31 factor intercorrelation matrix based on the respondents factor scores was computed. Based on these variables, factor analysis of the correlation matrix 31 x 31 was carried out. The

TABLE 5.1

Intercorrelation Matrix (31 x 31)

	Individualization	Curriculum Organization	Teaching-Learning Process	Teaching Resources	Internal School Organization	Staff Development	School Community Relationships	Section I - The I.A.I.	Rank of Section I	Administrative Support	Staff Norms	System Norms	Section IIA - The S.C. Scale	Complexity	Compatibility	Riskness	Localiteness	Cosmopoliteness
Individualization		.47	.54	.51	.51	.65	.48	.79	-.74	.13	.02	.02	.06	.08	.36	.25	.25	.12
Curriculum Organization			.51	.41	.45	.59	.47	.70	-.68	.17	.05	.13	.11	.20	.36	.35	.34	.17
Teaching Learning Process				.49	.42	.51	.48	.77	-.73	.12	.05	.08	.08	.11	.37	.30	.38	.18
Teaching Resources					.53	.47	.45	.74	-.68	.12	.02	.06	.06	.08	.29	.28	.28	.15
Internal School Organization						.66	.50	.76	-.68	.23	.10	.07	.14	.18	.31	.23	.29	.12
Staff Development							.59	.92	-.73	.12	.02	.05	.06	.24	.38	.30	.31	.10
School Community Relationships								.75	-.68	.14	.01	.09	.07	.17	.26	.27	.36	.18
Section I - The I.A.I.									-.92	.19	.05	.09	.11	.20	.44	.36	.40	.19
Rank of Section I										-.14	-.06	-.08	-.10	-.24	-.43	-.37	-.39	-.16
Administrative Support											.71	.75	.87	.15	.41	.21	.18	.76
Staff Norms												.83	.85	.05	.30	-.04	.00	.77
System Norms													.92	.15	.33	.02	.03	.77
Section IIA - The S.C. Scale														.11	.37	.05	.06	.83
Complexity															.30	.43	.39	.15
Compatibility																.63	.64	.38
Riskness																	.79	.07
Localiteness																		.07
Cosmopoliteness																		
Section IIB - The I.C. Scale																		
Section II - The S.& I.C.Scale																		
Rank of Section II																		
Traditionalism																		
Progressivism																		
Dogmatism																		
Venturesomeness																		
Conservatism																		
Change Proneness																		
Section III - The C-R. V.Q.																		
Rank of Section III																		
Sections I, II & III (Total Score)																		
Rank of Sections I, II & III (Total																		

Section IIA - The S.C. Scale	Complexity	Compatibility	Rigidness
.06	.08	.36	.25
.11	.20	.36	.35
.08	11	.37	.30
.06	.08	.29	.28
.14	.18	.31	.23
.06	.24	.38	.20
.07	.17	.26	.27
.11	.20	.44	36
.10	.24	-.43	-.37
.87	.15	.41	.21
.95	.05	.30	-.04
.92	.15	.33	.02
	.11	.37	.05
		.30	.43
			.63

Localiteness	Cosmopoliteness	Section IIB - The I.C.S.	Section II - The S.& I.C.Scale	Rank of Section II	Traditionalism	Progressivism	Dogmatism	Venturesomeness	Conservatism	Change Proneness	Section III - The C-R.V.Q.	Rank of Section III	Sections I, II & III	Rank of Sections I,II & III (Total)
.25	.12	.31	.38	-.17	.05	.32	-.04	.29	-.13	.33	.15	-.13	.38	-.35
..34	.17	.41	.27	-.25	.17	.41	.00	.34	-.05	.35	.26	-.24	.45	-.43
38	.18	.41	.25	-.22	.15	.36	-.06	.28	-.14	.33	.17	-.18	.42	-.37
.28	.15	.32	.19	-.17	.16	.36	-.01	.27	-.12	.28	.21	-.20	.39	-.37
.29	.12	.32	.25	-.24	.11	.29	-.03	.30	-.11	.39	.18	-.16	.42	-.41
..31	.10	.36	.21	-.20	.22	.45	.08	.34	00	.41	.33	-.29	.48	-.44
.36	.18	.33	.20	-.18	.12	.27	00	.30	-.03	.27	.19	-.17	.39	-.35
.40	.19	.46	.29	-.27	.18	.46	-.02	.39	-.12	.46	.27	-.25	.55	-.51
-.39	-.16	-.45	-.28	.24	-.18	-.44	00	-.34	.08	-.45	-.27	.25	-.52	.47
.18	.76	.55	.37	-.84	.26	.26	.20	.24	.18	.20	.38	-.33	.73	-.71
00	.77	.35	.33	-.82	.22	.16	.37	.05	.40	.02	.36	-.36	.68	-.65
.03	.77	.41	.83	-.82	.11	.14	.22	.18	.26	.01	.25	-.27	.64	-.62
.06	.83	.46	.91	-.89	.22	.20	.31	.15	.33	.07	.36	-.36	.74	-.71
.39	.15	.47	.29	-.29	.16	.25	.04	.15	.04	.26	.20	-.18	.32	-.31
.64	.38	.84	.65	-.61	.19	.37	.02	.32	.01	.45	.29	-.27	.63	-.65
.79	.07	.81	.41	-.38	.17	.33	-.13	.39	-.19	.44	.18	-.17	.42	-.40
	.07	.80	.41	-.39	.24	.37	-.02	.29	-.11	.45	.24	-.23	.46	-.43
		.53	.83	-.80	.21	.19	.26	.15	.30	.09	.33	-.32	.70	-.68
			.78	-.74	.28	.43	.04	.39	.03	.47	.36	-.34	.75	-.73
				-.97	.28	.34	.24	.28	.24	.27	.41	-.41	.86	-.84
					-.27	-.32	-.25	-.27	-.24	-.26	-.41	.40	-.84	.82
						.53	.65	-.04	.56	.40	.84	-.80	.59	-.53
							.29	.31	.14	.68	.70	-.68	.63	-.59
								-.17	.77	.07	.50	-.75	.49	-.44
									-.24	.39	.20	-.20	.36	-.33
										-.10	.68	-.65	.41	-.35
											.52	-.49	.51	-.51
												-.96	.76	-.70
													-.78	.68
														-.96

3 purpose of the intercorrelation matrix was to determine the number of factors that could be considered sufficiently important and again these factors have to be rotated to facilitate the interpretation of the factors. Intercorrelation matrix is given in Table 5.1.

TABLE 5.1

Table 5.1 includes intercorrelation matrix 31 x 31. Five principal components were extracted out by the principal-axes method. The details of extraction of factors based on the original correlation matrix (vide Table 5.1) is presented in original principal component factor matrix (31 x 5) in Table 5.2.

TABLE 5.2

Table 5.2 includes original principal component matrix (31 x 5) which contains factor loadings of five factors that are extracted out. The 'Eigen Values' of each of these five factors are 11.88, 5.43, 3.17, 2.09 and 2.76 respectively. A factor was considered to be of lesser importance if 'Eigen Value' was less than 1.000. Applying this criterion all the five factors were considered for varimax rotation. The rotation of factors was done on the lines of Kaiser's (1959) computer programme

TABLE 5.2

Original Principal Component Factor Matrix (31 x 5)

Sr. No.	Name of the Variables	I	II	III	IV	V	h^2
1	Individualization	-.48	-.53	-.03	-.32	-.04	.790
2	Curriculum Organization	-.54	-.43	.01	-.14	-.05	.698
3	Teaching-Learning Process	-.52	-.50	-.05	-.20	-.12	.772
4	Teaching Resources	-.48	-.47	.02	-.23	.10	.737
5	Internal School Organization	-.51	-.45	-.05	-.27	.05	.757
6	Staff Development	-.67	-.52	.13	-.24	-.08	.817
7	School Community Relationships	-.49	-.47	-.01	-.29	-.18	.750
8	Attitude to Innovation(Total Score)	-.67	-.64	.00	-.33	-.06	.817
9	Attitude to Innovation	.62	.57	-.01	.24	.07	-470
10	Administrative Support	-.68	.45	-.31	-.07	.17	.872
11	Staff Norms	-.59	.66	-.22	-.26	.00	.954
12	System Norms	-.59	.57	-.37	-.21	.04	.920
13	Situational Characteristics	-.66	.63	-.31	-.21	.06	.954
14	Complexity	-.36	-.09	-.04	.32	-.16	.475

TABLE 5.2 Contd.

Sr. No.	Name of the Variables	I	II	III	IV	V	h^2
15	Compatibility	-.70	-.12	-.23	.35	-.12	.838
16	Riskness	-.51	-.34	-.18	.62	-.11	.813
17	Localiteness	-.54	-.32	-.09	.58	-.19	.801
18	Cosmopoliteness	-.65	.48	-.28	-.19	-.03	.830
19	Innovation Characteristics	-.81	-.08	-.27	.44	-.14	.838
20	Situational and Innovation Characteristics (Total Score)	-.84	.40	-.34	.07	-.02	.912
21	Situational and Innovation Characteristics	.81	-.40	.32	-.06	.02	.817
22	Traditionalism	-.50	.19	.67	.14	-.01	.842
23	Progressivism	-.63	-.16	.38	.13	.33	.697
24	Dogmatism	-.34	.45	.67	-.09	-.20	.798
25	Venturesomeness	-.41	-.26	-.16	.08	.29	.396
26	Conservatism	-.26	.54	.56	-.11	-.34	.771

TABLE 5.2 Contd.

Sr. No.	Name of the Variables	I	II	III	IV	V	h^2
27	Change Proneness	-.56	-.31	.22	.26	.42	.677
28	Change Related Values (Total Score)	-.66	.22	.68	.07	.08	.841
29	Change Related Values	.63	-.22	-.63	-.07	-.09	.682
30	Innovative Proneness (Total Score)	-.97	.18	.09	-.01	.00	.665
31	Innovative Proneness	.93	-.18	-.05	-.01	-.04	.817
	Per cent of Variance	39.0	18.2	10.9	7.5	3.5	
	Cumulative Per cent of Variance	39.0	57.1	68.0	75.5	79.0	

of varimax rotation. The rotated varimax factor matrix is presented in Table 5.3, with factor loadings on five factors.

TABLE 5.3

5.2 INTERPRETATION OF RESULTS

The interpretation of results is based on the varimax rotated factor matrix. Five factors were finally identified, named, and will be discussed below.

5.2.1 Varimax Factor I

Factor I consisted of the eleven variables shown below and accounted for 50.9 cumulative per cent of variance among all the factors. The significant loadings of varimax factor I, arranged in decending order are given in Table 5.4 for the sake of convenience.

Varimax Factor I is characterized by significant loadings for eleven variables. Out of which nine variables are found to be positive, whereas two variables are in negative. The significant loadings were shared by variables situational characteristics .98, system norms .92, staff norms, .91, situational and innovative characteristics .89, administrative support .85, cosmopoliteness ,85, attitude to innovation .65, innovation

TABLE 5.3

Rotated Factor Matrix (31 x 5)

Sr. No.	Name of the Variables	I	II	III	IV	V	h^2
1	Individualization	.05	.78	-.02	.07	.07	.619
2	Curriculum Organization	.09	.65	.09	.22	.10	.503
3	Teaching-Learning Process	.06	.73	.01	.20	.02	.581
4	Teaching Resources	.05	.68	.09	.07	.21	.518
5	Internal School Organization	.11	.71	00	.08	.15	.543
6	Staff Development	.01	.79	.17	.16	.08	.680
7	School Community Relationships	.06	.74	.04	.13	-.07	.576
8	Attitude to Innovation (Total Score)	.08	.96	.05	.17	.11	.977
9	Attitude to Innovation	-.06	-.85	-.07	-.20	-.09	.788
10	Administrative Support	.85	.07	.09	.14	.18	.797
11	Staff Norms	.91	-.01	.22	-.06	-.07	.894
12	System Norms	.92	.02	.06	.01	-.01	.853
13	Situational Characteristics	.98	.02	.15	.01	.02	.956
14	Complexity	.09	.12	.10	.48	.01	.266

TABLE 5.3 Contd.

Sr. No.	Name of the Variables	I	II	III	IV	V	h^2
15	Compatibility	.37	.29	.05	.68	.11	.697
16	Riskness	.03	.21	-.03	.85	.18	.812
17	Localiteness	.02	.24	.07	.84	.11	.778
18	Cosmopoliteness	.85	.11	.14	.07	-.04	.768
19	Innovation Characteristics	.45	.28	.08	.80	.13	.948
20	Situational & Innovation Characteristics (Total Score)	.89	.14	.15	.39	.07	.988
21	Situational & Innovation Characteristics	-.86	-.12	-.15	-.37	-.06	.920
22	Traditionalism	.08	.08	.83	.16	.15	.758
23	Progressivism	.10	.35	.49	.23	.52	.699
24	Dogmatism	.19	-.05	.86	-.09	-.15	.815
25	Venturesomeness	.16	.32	-.09	.23	.40	.315
26	Conservatism	.23	-.13	.78	-.10	-.33	.798

TABLE 5.3 Contd.

Sr. No.	Name of the Variables	I	II	III	IV	V	h^2
27	Change Proneness	.01	.34	.27	.34	.63	.700
28	Change Related Values (Total Score)	.22	.17	.90	.14	.24	.966
29	Change Related Values	-.23	-.15	-.84	-.13	-.24	.860
30	Innovative Proneness (Total Score)	.65	.40	.50	.34	.18	.989
31	Innovative Proneness	-.64	-.36	-.44	-.34	-.20	.901
	Per cent of Variance	50.9	23.3	13.6	9.0	3.2	
	Cumulative Per cent of Variance	50.9	74.2	87.8	96.8	100.0	

TABLE 5.4

Varimax Factor I

Sr. No.	Name of the Variables	Loading
1	Situational Characteristics	.98
2	System Norms	.92
3	Staff Norms	.91
4	Situational & Innovation Characteristics	.89
5	Administrative Support	.85
6	Cosmopoliteness	.85
7	Attitude to Innovation	.65
8	Innovation Characteristics	.45
9	Compatibility	.37
10	Attitude to Innovation	-.64
11	Situational & Innovation Characteristics	-.86

Characteristics .45, Compatibility .37, Attitude to Innovation -.64, and Situational and Innovation Characteristics -.86. This factor seems to reflect the Situational Characteristics and Innovation Characteristics, this factor can be named as 'Situational and Innovation Characteristics.

5.2.2 Varimax Factor II

Factor II accounted for 74.2 cumulative per cent of variance and was made up of 14 variables.

TABLE 5.5

Varimax Factor II

Sr. No.	Name of the Variables	Loadings
1	Attitude to Innovation	.96
2	Staff Development	.79
3	Individualization	.78
4	School Community Relationship	.74
5	Teaching-Learning Process	.73
6	Internal School Organization	.71
7	Teaching Resources	.68
8	Curriculum Organization	.65
9	Attitude to Innovation	.40
10	Progressivism	.35
11	Change Proneness	.34
12	Venturesomeness	.32
13	Innovative Proneness	-.36
14	Attitude of Innovation	-.85

Varimax Factor II consists of 14 variables. Two variables are negative loaded and 12 variables are positive loaded. The significant loadings were shared by variables Attitude to Innovation .96, Staff Development .79, Individualization .78, School Community Relationship .74, Teaching-Learning Process .73, Internal School Organization .71, Teaching Resources .68, Curriculum

Organization .65, Attitude to Innovation .40, Progressivism .35, Change Proneness .34, Venturesomeness .32, Innovative Proneness -.36, and Attitude of Innovation -.85. This factor seems to determine the attitudes to innovation, it can be named as 'Attitudes to Innovation'.

5.2.3 Varimax Factor III

Factor III comprised eight variables and accounted for 87.8 cumulative per cent of variance.

TABLE 5.6

Varimax Factor III

Sr. No.	Name of the Variables	Loading
1	Change Related Values	.90
2	Dogmatism	.86
3	Traditionalism	.83
4	Conservatism	.78
5	Innovative Proneness	.50
6	Progressivism	.49
7	Innovative Proneness	-.44
8	Change Related Values	-.84

Varimax Factor III is characterized by significant loadings for eight variables, out of which six are positively loaded and two are negatively loaded. The

significant loadings were shared by variables change related values .90, Dogmatism .86, Traditionalism .83, Conservatism .78, Innovative Proneness .50, Progressivism .49, Innovative Proneness -.44 and Change Related Values -.84. Since this factor is mostly dominated by Change Related Values, so this factor can be named as 'The Change Related Values'.

5.2.4 Varimax Factor IV

Varimax Factor IV comprised ten variables and accounted for 96.8 cumulative per cent of variance.

TABLE 5.7

Varimax Factor IV

Sr. No.	Name of the Variables	Loading
1	Riskness	.85
2	Localiteness	.84
3	Innovation Characteristics	.80
4	Compatibility	.68
5	Complexity	.48
6	Situational and Innovation Characteristics	.39
7	Change Proneness	.34
8	Innovative Proneness	.34
9	Innovative Proneness	-.34
10	Situational and Innovation Characteristics	-.37

Varimax Factor IV consists of ten variables, out of which eight are positively loaded and two are negatively loaded. The significant loadings were shared by variables Riskness .85, Localiteness .84, Innovation Characteristics, .80, Compatibility .68, Complexity .48, Situational and Innovation Characteristics .39, Change Proneness .34, Innovative Proneness .34, Innovative Proneness -.34 and Situational and Innovation Characteristics -.37. This factor seems to emphasis on Change Proneness and Related Values, so it can be named as 'Change Proneness and Related Values.'

5.2.5 Varimax Factor V

Varimax Factor V consisted of four variables and accounted for 100.0 per cent of variance among all the factors.

TABLE 5.8

Varimax Factor V

Sr. No.	Name of the Variables	Loadings
1	Change Proneness	.63
2	Progressivism	.52
3	Venturesomeness	.40
4	Conservatism	-.33

12 Varimax Factor V consists of four variables. Three variables are positively loaded and one variable is negatively loaded. The significant loadings of the variables are Change Proneness .63, Progressivism .52, Venturesomeness .40 and Conservatism -.33. This factor seems to emphasis on Change Proneness and Progressivism, it can be named as 'Change Proneness and Progressivism'.

5.3 CONCLUSION

The factor matrix (vide Table 5.2) comprising five principal axes components. It explains the correlation matrix (31 x 31) (vide Table 5.1). The five factors were extracted through factor analysis and it explains the per cent common variance. The naming and interpretation of the rotated varimax factors have shown the composition of the five important factors implicit in the 31 variables. The factors named were: (1) Situational and Innovation Characteristics, (2) Attitude to Innovation, (3) The Change Related Values, (4) Change Proneness and Related Values and (5) Change Proneness and Progressivism.

In the present study, the Internal School Organization was not identified by the respective factor. Out of these five factors 'Change Proneness and Progressivism' has covered the highest cumulative of per cent of variance and it is most dominating factor whereas Situational and Innovation Characteristics is least dominating factor.

13 In the present chapter, the internal structure of the inventory was discussed and it was done by factor analysis through principal component technique. The five factors were named and interpreted and it was found that Change Proneness and Progressivism is the most dominating factor.

The next chapter deals with the study of Innovative Proneness of Teacher-Educators of Secondary Teachers' Training Colleges of Gujarat.

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