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Advertising and Social Indicators: A Reappraisal after Two Decades

By
Takeshi Shimizu

Abstract

This paper presents a new type of social indicator analysis in order to determine the relation between society and advertising cost. First, through principal component analysis, each prefecture as a regional society will be represented by three synthetic social indicators, categorized as urbanization, saturation and pettiness.

Then, we will examine the relation between these three indicators and the advertising. Based on a three-term analysis over a period of about 20 years, we will trace changes in the properties in each prefecture, thereby building a model for area developmental stages that can explain and predict changes in advertising cost. This paper proposes that this new analytical method can be applied not only to advertising, but also to marketing in general.

Key Words

advertising cost, social indicators, principal component analysis, multiple regression analysis, area developmental stages model, retail labor productivity

I. The Purpose and Tasks of Research

This research is based on the assumption that there exists a certain relation between advertising and society. Traditionally, however, studies on this relation has been advanced as a problem of how advertising influences the society. In other words, while extensive amounts of logical and positive research have been conducted on the socioeconomic effects of advertising, few researches have explicitly dealt with the influence of society on advertising.

Advertising is not a solitary existence, and as far as it functions in a society where people carry out activities to fulfill one purpose or another, we cannot ignore the influence social properties have on advertising. Advertising is not independent from society; rather, it should be regarded as an existence that inputs such social properties, develops based on those properties, while on another hand also presents new advertising outputs into society.

Based on this understanding, the writer once attempted to determine the influence society has on advertising, by categorizing society as prefectures, measuring social properties by social indicators, and measuring advertising through the advertising cost

per capita in each prefecture.[1] As a result, we discovered that I. Social properties can be summarized into a few basic synthetic social indicators, and II. There is a statistically significant correlation between such social indicators and advertising cost in each prefecture.

The data used then was the total advertising cost of four advertising media in 1976 and the statistical book Minryoku 1977.[2] If we call that our first term research, then this paper represents a follow-up research, in which we will examine the validity of the analysis results obtained then. In doing so, we will use the following as reference: advertising cost of 1979 and 1997, three years and about 20 years after the first research respectively, together with the Minryoku data of 1980 (second term research) and 1998 (third term research).

Therefore, the principal task in this research is to examine if the analysis results obtained in the first research can be replicated in the second and third term research. Below are the two hypotheses that will be examined in this paper.

Hypothesis I:

> The socioeconomic properties in the regional societies will also be summarized into a few specific synthetic social indicators in the second and third term research, and they will be, regardless of the time, stably represented as the three principal components; urbanization, saturation, and pettiness.

Hypothesis II:

> In the data of the second and third research, too, the advertising cost of each prefecture will show a significant correlation with synthetic social indicators and moreover, the regression equation which explains the amount of advertising cost by such social indicators are stable in the second and third research; that is, regarding the changes in each prefecture's advertising cost, urbanization contributes four times more than saturation, and two times more than pettiness.

If these initial hypotheses can be confirmed in the subsequent researches three years and 20 years later, we can explain the changes in the socioeconomic properties in Japan's prefectures, and the results will help us develop a model on the relation between socioeconomic properties and advertising, suggesting a new approach for social indicator analysis.

II. A Reappraisal of Synthetic Social Indicators

The purpose of this section is to reexamine the first hypothesis mentioned above. As in the first research, therefore, we picked up fifty individual social variables based on a conceptual framework of social indicators system that represents various properties in the society. The framework is as shown in Chart 1.[3] The numbering of

[1] Takeshi Shimizu, "Advertising and Social Indicators", *Keio Business Review*, No. 17, 1980.
[2] "Minryoku", statistical book edited by Asahi Newspaper Co.

variables in the framework corresponds to those in Chart 2 and 3.

After we prepared the fifty social variables for each prefecture, we conducted a principal component analysis as we did in the first research. The principal components obtained through the analysis were considered as a summary of the fifty individual social variables, and as synthetic social indicators representing the basic dimension of society.

Chart 2 shows the results of principal component analysis in the first research, together with a summary of the same analysis based on the second and third research, where only figures with high factor loading were extracted. The full output of the factor loadings in the principal component analysis is shown in Chart 3.

Based on the summary in Chart 2, we will begin by comparing the results of the first and second term.[4] As regards to the cumulative proportion of variance, about 56% to 57% of the total variance of the fifty indicators are summarized into three principal components, and the overall variance explained is the same in the first and second research. As to the proportion of total variance explained, component one shows the biggest contribution summarizing about 33% of the total variance of the fifty variables, followed by the second and third components.

As regards to the factor loading pattern, it can be said that components 1, 2 and 3 shows a very similar and stable factor pattern in both terms. To be more precise, on principal component 1, all the 21 variables that had a factor loading over 0.6 in the first term also had the same loadings of over 0.6, and had the same plus or minus signs. In the first research, individual social variables such as minus ratio of primary industry employee, plus ratio of population density, rate of college application, department store sales, number of overseas travelers and frequency of transport facility utilization showed a particularly high absolute value of factor loadings; and thus, this component was interpreted to be a factor of urbanization. The same results were obtained in the second research. As regards to component 1, there was a high correlation of factor loadings for the fifty variables between the first and second research, showing a component correlation coefficient of 0.98. This confirms the stability of results in term 1 and 2.

As to component 2, there were 8 variables with factor loadings of an absolute value of above 0.5 in the first study, while in the second study, the number of such variables were 10. Their loadings and the plus or minus signs generally matched, except for the ratio of department store sales. In study 1, the factor loadings were high with rate of population outflow, number of hospital beds, number of advertising agencies, minus population growth rate and ratio of supermarket sales. Based on these results, this component was considered as a factor of saturation. The loading for these variables remained high in study 2, confirming the validity of the naming. This is also proved with a component correlation coefficient of as high as 0.93 between the two studies.

As to principal component 3, the component correlation coefficient drops to 0.86, but there is still a high correlation between the two studies. The number of variables

[3]This framework for social indicators were made by the writer in 1977 in a project of The Japan Advertising Academy, where he took part as an organizer.

[4]For comparative research between the first and second term, refer to the following: Takeshi Shimizu, "Kohkoku to Shakaishihyo no Saiginmi", *Mita Shogaku Kenkyu,* vol. 24, no. 3, 1981.

with a factor loading of an absolute value of above 0.5 was 4 in study 1 and 5 in study 2. Only two variables matched at a loading of above 0.5 between both studies, but the unmatched variables also showed a loading of close to 0.5, and the signs are the same for variables with loading above 0.5. Therefore, looking at unemployment rate, number of dwellers per room, ratio of petty retail shops, minus annual sales per supermarket, component 3 was considered as a factor of pettiness in study 1. In study 2, minus disposable income and consumption expenditure were added to this, thereby reinforcing the above consideration.

In this way, we came to the conclusion that the factor pattern consisting of principal components 1 to 3 proved to be stable in both studies, and that the social properties could be represented in three dimensions; urbanization, saturation and pettiness.

However, the basic social structure has a long-term characteristic and thus, may not show any significant changes in three years. Therefore, it became necessary to compare these results with the analysis results of study 3, conducted 20 years later. Considering the results of principal component analysis in study 1 and 3, the cumulative proportion of variance explained by the three components was 56% in study 1 and 55% in study 3, showing minimal difference. This means that these 3 synthetic social indicators can summarize nearly 60% of all the prefectural social properties even 20 years later. As to the proportion of total variance explained by each component, the figures in the two studies show the same pattern; 34% and 32% for principal component 1, 13% and 13% for principal component 2, and 9% and 10% for principal component 3 in study 1 and 3 respectively. Moreover, the principal component correlation coefficient of factor loadings between study 1 and study 3 were 0.86 for component 1, 0.58 for component 2, and 0.55 for component 3. The figures are lower than those in study 1 and 2, but we can still say that the fundamental factors constructing society basically haven't changed 20 years later.

Next, we will observe the contents and characteristics of the three principal components in study 3. In component 1, considered as a factor of urbanization in study 1, the main individual social factors, except for a significant drop in annual department sales, not only show a high loading with the same signs, but also includes other urbanization factors such as minus number of retail shops, and plus annual retail shop sales. This means that the major dimension representing society is urbanization, serving as the basic synthetic social indicator 20 years later, too.

As to principal component 2, variables considered as factors of saturation have similar figures in study 3 for plus number of hospital beds and minus population growth rate, while demonstrating a considerable difference in other variables. It includes new variables such as minus ratio of secondary industry employees, number of dwellers per room, and plus ratio of tertiary industry employees. By this, we can conclude that while saturation remains to be a characteristic factor in the regional society, there are some changes in its characteristics, that it is developing into a more mature stage of saturation, with population shifts towards service industries.

As to principal component 3, it can be considered, as in study 1, as a factor of pettiness in study 3. Here also, some changes were observed. While variables representing pettiness lowered their factor loadings or correlation coefficient, other variables such as number of libraries, number of advertising agencies, balance of deposits per capita, and monthly disposable income increased their minus correlation. By this, it can

be said that the pettiness factor is taking on a financial, information-oriented characteristic.

In this way, it could be said that study 3, based on data gathered 20 years later, leads us to the conclusion as in study 1, that is, properties forming regional society, while some changing in its characteristics, can be represented by the three synthetic social indicators of urbanization, saturation and pettiness.

III. A Reappraisal of the Relation between Advertising and Synthetic Social Indicators

The purpose of this section is to test the second hypothesis mentioned above using new data; that is, whether prefectural advertising cost[5] maintains a statistically significant correlation in the data of study 2 and 3, and whether the regression equation in study 1 proves to be significant and stable with new data. In essence, it is to examine if the results obtained in study 1 can be replicated in the data of study 2 and 3; that is, whether prefectural advertising cost can be significantly explained by urbanization, saturation and pettiness, the three synthetic social indicators representing social properties, and whether urbanization has an explanatory power four times that of saturation, and twice that of pettiness.

The term "advertising cost" in this study means the total advertising cost of the four media, TV, radio, newspaper and magazine. Japan's total advertising cost in 1976 was 1 trillion 114 billion, which, in 1979 rose to 1 trillion 624.2 billion, showing a 146% growth in 3 years. About two decades later in 1997, it rose to 3 trillion 935.7 billion, making the growth rate 353%. The per capita change for the three terms were ¥9,900 for term 1, ¥14,100 for term 2 and ¥31,826 for term 3, showing a considerable increase.

Our aim in this section is to examine if the changes of the regional society can explain this big advertising cost increase between term 1 and 3, as it did for term 1. To review our analysis results in study 1, the regression equation obtained through regression analysis was:

$$Y=0.814X1+0.208X2-0.391X3 \quad \cdots\cdots(1)$$

subject to, Y : prefectural per capita advertising cost by the four media
X1 : urbanization X2 : saturation X3 : pettiness

The adjusted determination coefficient in this equation was as high as 0.867 and proved to be significant at 0.1% level. The t-value of the partial correlation coefficient was also significant at least at 0.1%. As to the signs of the correlation coefficients, urbanization X1 is plus and pettiness X3 is minus, directions of effects as was presumed. Contrastively saturation X2 shows a minus result of offsetting.

In this way, the three synthetic social indicators from component 1 to 3 offers a statistically significant explanation for the advertising cost. These independent variables are mutually non-correlative as they were the components obtained by principal component analysis, thereby eliminating the problem of multicollinearity. Also, since each variable was standardized, their relative importance was evaluated by the absolute value of partial correlation coefficient, their ratio being 4 : 1 : 2.

[5]The estimates for prefectural advertising cost were made based on the formula used in the above-mentioned project.

To test whether this equation based on the first term data was also valid for data in term 2 and 3, we examined its predictive power; we introduced new data, to the 3 independent variables obtained by the regression equation in term 1, estimated the advertising costs, and then compared the estimates to the actual advertising costs. As a result, the determination coefficients, showing the overall statistics of the predictive power, was 0.81 in term 1, 0.75 in term 3, and the results of F test were significant at levels of 1% and 5%.

Meanwhile, the U statistics of H.Tyle, the index used for an overall evaluation on the inconsistency between estimates and the actual results, was 0.22 in term 2 and 0. 28 in term 3. This is not close enough to zero, but the precision in the predictive power still proved to be high for this type of analysis.

Next, we tested validity of the regression equation based on the term 1 data in contrast to the regression equations most fitting the data in term 2 and 3.
The quations for term 2 and 3 were:

$$Y=0.817X1+0.161X2-0.363X3 \quad \cdots\cdots(2)$$
$$Y=0.738X1+0.152X2-0.413X3 \quad \cdots\cdots(3)$$

As a result, F-test on the difference between the equations of term 1 and 2 was insignificant at 5% level. As to the equations of term 1 and 3, again the F-test was insignificant at 7% level. By this, it was clear that there was not a significant difference between equations (2) and (3), based on data in term 2 and 3, and equation (1) in term 1.

By these results, it was concluded that the term 1 equation proved to be valid not only in term 2, 3 years later, but also in term 3, about 20 years later, and that it could survive without being replace by a new equation. This confirmed hypothesis 2. In other words, Japan's prefectural advertising cost maintained a steady relation with synthetic social indicators representing regional societies, thereby confirming a stable validity in the term 1 equation.

IV. Area Developmental Stages Model and Japan's Total Advertising Cost

According to these analysis results, it became apparent that prefectural socio-economic properties could be represented by 3 synthetic social indicators of urbanization, saturation and pettiness, urbanization being the fundamental factor among all. This suggests a possibility to regard developments in regional societies as an urbanization process, assuming that each regional society will develop from pettiness to urbanization stage, and eventually reach a saturation stage.

In handling such area developmental stages, we can trace each prefectural developmental variance by examining the changes of factor scores obtained by principal component analysis. In the past two decades, for instance, Aomori, Iwate, and Hokkaido have begun to move towards the urbanization stage, though still in the pettiness stage for the time being, while Saitama, Hyogo, Chiba and Ehime have already reached the urbanization stage. Kanagawa, Fukuoka, and Aichi have reached the typical stage of urbanization, and Tokyo, Osaka and Kyoto have passed the urbanization stage, going into the matured saturation stage.

If we combine these area developmental stages with advertising, the area's relative influence in relation to the advertising cost, as confirmed previously, develops into a ratio of 1 : 4 : 2, as the area develops through its pettiness, urbanization and saturation stages. This can be considered as a model for area developmental stages regarding advertising.

This means that in Japan, there are areas shifting from pettiness to urbanization stage, with an increase in advertising cost, while there are other areas shifting from urbanization stage to saturation stage, with a decrease in advertising cost, and that the mapping of these areas can predict the total advertising cost of this country. In other words, we can infer that if there is an increase in areas shifting from pettiness to urbanization stage, the country's total advertising cost will increase, and if that stage develops further and matures into saturation stage, it will decrease.

V. Application of Social Indicator Analysis to Marketing in General

The aim of this study was to recomfirm the results of social indicator analysis, obtained 20 years ago, with new data. By this, we attempted to trace the variance of socioeconomic properties of regional societies over time, according to the area's developmental stages, thereby developing an area developmental stages model for advertising. In that sense, this was part of a macro research on advertising, trying to clarify the external relation between society and advertising.

The application of this social indicator analysis, however, is not limited to advertising and can be extended to marketing in general. Incidentally, the writer once conducted a similar analysis on retail labor productivity (retail sales per employee), a typical problem in retail distribution. The results of multiple regression analysis on the relation of social indicators and retail labor productivity in term 2 showed that the contribution of urbanization was about 3 times more than that of saturation, and two times more than that of pettiness. That hypothesis was tested on the data in term 3, in order to develop an area developmental stages model for retail labor productivity.

In the second study on this retail labor productivity, a hypothesis had been set regarding the signs of partial correlation coefficient. That is, urbanization was assumed to show a plus correlation with retail labor productivity on initial salary of college graduate, balance of deposits per capita, population growth rate, and annual sales for various stores, while saturation was assumed to show a minus correlation, based on such characteristics as low rate in population growth, population outflow, as well as low rates in the ratio of departmen stores and supermarkets. Likewise, it was assumed that pettiness would have a minus correlation, based on such characteristics as high unemployment rate, high ratio of petty retail shops, small number of supermarkets. The results of multiple regression analysis in term 2, 1979, with retail labor productivity as the dependent variable was:

$$Y=0.75X1-0.26X2-0.37X3 \quad \cdots\cdots(4)$$

In the equation, the partial correlation coefficients were all significant at level of 1%, and the all signs matched the prediction. The determination coefficient was satisfactory at a level of 0.75, confirming that urbanization contributed three times more than saturation, and two times more than pettiness, the hypothesis mentioned

above.

In order to examine its validity and stability in the third term, we first tested its predictive power in term 3. The determination coefficient was 0.71, and U statistics was 2.5. Meanwhile, we obtained a regression equation most fitting term 3, and then checked for the difference between those of term 2 and term 3. The relation between retail labor productivity and social indicators in term 3 was:

$$Y=0.64X1-0.27X2-0.39X3 \quad \cdots\cdots(5)$$

All partial correlation coefficients were significant at a level of 1%, with all signs matching prediction and the determination coefficient was 0.63. Meanwhile the result of F-test for checking the difference between equation (4) and (5) proved to be insignificant at a level of 5%. By these results, it was confirmed that despite the great variance in retail labor productivity over time, the validity of the equation in term 2 was supported as being stable over time, thus with no need for a replacement.

As seen in the advertising−area developmental stages model, we can assume such area developmental stages as an area's urbanization process through the three stages of pettiness, urbanization and saturation over time. Likewise, we could develop a retail−area developmental stages model by including the relation between retail labor productivity and regional societies as shown above. As we have seen, the relation between social indicators and retail labor productivity is still supported as being valid today. The results in the second term concerning this retail labor productivity maintained a steady significance 18 years later in term 3, its relative contribution by the area developmental stages showing a pattern of -3 : 6 : -2.

In other words, the pettiness stage with low income and balance of deposits lowered retail labor productivity, while the urbanization stage with high population density and consumption level boosted it, and the saturation stage with a high population outflow again lowered it.

From this it can be said that a continuously low GNP in Japan will block the urbanization process in areas at the pettiness stage, thereby lowering the retail labor productivity. Likewise, we could assume that a ready environment for area urbanization will boost retail labor productivity. How much it increases will depend on the combination with other areas at the saturation stage, with a declining productivity.

This new type of social indicators analysis can be summarized into the following steps:

1. Develop framework of social indicators system that suits the research goal. In this research, the framework consisted of dimension 1 (social goals, goaling activities, basic social conditions), dimension 2 (structure and environment of life) and dimension 3 (consciousness and behavior of life)

2. Select and process various individual social variables representing social properties (50 variables in this study). Standardize the value of variables in the form of per capita, per household and ratio, in order to examine the regional qualities, then position them into their corresponding fields in the framework of social indicators system.

3. Summarize the individual social variables into a few synthetic social indicators by some statistical method (urbanization, saturation and pettiness by principal

component analysis in this study).

4. Examine the stability of synthetic social indicators over time (3 and 21 years for advertising cost in this study).

5. Assume an area developmental stages as an urbanization process and examine changes in each area over time.

6. Determine marketing factors for the research purpose, and prepare data (in this study, mainly the four media's total advertising cost in relation to society)

7. Set up a test hypothesis and a sign hypothesis on the relation between marketing factors to be analyzed and synthetic social indicators.

8. Execute statistical analysis to clarify this relation (multiple regression analysis in this study).

9. Conduct a statistical examination on the analysis results. This consists of an examination of the test hypothesis and sign hypothesis, an evaluation on the stability over time, evaluation and judgement based on knowledge and experience.

10. Develop a model for area developmental stages, based on the analysis results on the relation between marketing factors to be examined and synthetic social indicators, which in turn can be utilized as a basis to infer logically new research hypotheses.

This new type of social indicators analysis differs from existing analysis in that it does not explain properties themselves in regional society by a simply adding up individual social variables. Rather, this type of analysis aims first to statistically summarize such properties into a few representative social indicators, and then examines their stable relation to a given marketing subject, relating this to the area developmental stages thereby developing some marketing-area developmental stages model to finally draw a logical inference about the research subject.

In this way, it can be said that this type of social indicators analysis can be an effective method not only for subjects like advertising cost or retail labor productivity, but also for marketing in general, especially macro marketing problems.

Chart 1 Social Indicators System (50 variables)

		Fundamental structure and environment of life	Consciousness and behavior of life
Social goals	Welfare	1. Number of social welfare facilities 2. Number of hospital beds 3. Number of dwellers per room	32. Participants of consumer organizations 33. Number of ill deaths
	Education-culture	4. Number of primary-middle school teachers 5. Number of libraries	34. Rate of college application 35. Rate of election voting
	Peace-security	6. Number of criminal cases 7. Number of traffic accidents	36. Value of life insurance 37. Do of fire insurance
	Income-consumption	8. Monthly disposable income 9. Initial salary	38. Consumption expenditure 39. Ratio of food expenditure 40. Ratio of miscellaneous expenses
Goaling activities	Production-distribution	10. Ratio of primary industry employees 11. Do of secondary industry 12. Do of tertiary industry 13. Unemployment rate 14. Ratio of petty retail shops 15. Number of cosmetic shops 16. Do of retail shops 17. Do of supermarkets 18. Annual sales per wholesaler, and retail shop 19. Do per supermarket 20. Do per department store 21. Ratio of department store sales 22. Do of supermarkets 23. Numer of advertising agencies 24. Number of employees per establishment 25. Annual factory shipment	41. Deposit balance per capita 42. Ratio of 4-wheeler ownership 43. Department store sales per capita 44. Supermarket sales per capita 45. Cosmetic shops sales per capita
	Transportation-communication	26. Number of telephone subscription 27. Road pavement ratio	46. Number of overseas travelers 47. Frequency of transport facility utilization 48. Number of mail per capita
Basic social conditions	Population	28. Males-females ratio 29. Population growth rate 30. Population density 31. Persons per household	49. Intra-prefecture population moves 50. Rate of population outflow

Chart 2 Factor Loadings (Summary)

	I			II			III			Communality		
No.	1998	1980	1977	1998	1980	1977	1998	1980	1977	1998	1980	1977
1	-0.73	-0.61	-0.61							0.61	0.54	0.61
2				0.55	0.51	0.61				0.69	0.78	0.82
3							0.36	0.54	0.55	0.28	0.69	0.73
4	-0.69	-0.76	-0.74							0.55	0.78	0.79
5							-0.59	-0.42	-0.29	0.49	0.36	0.40
6	0.72	0.68	0.68							0.52	0.68	0.66
7										0.26	0.40	0.50
8							-0.46	-0.61	(-0.37)	0.47	0.72	0.73
9	0.72	0.79	0.79							0.74	0.79	0.78
10	-0.82	-0.70	-0.87							0.72	0.78	0.87
11				-0.83	-0.34	-0.18				0.84	0.83	0.91
12	0.53	0.63	0.65	0.69	0.40	0.22				0.81	0.71	0.82
13				0.56	0.52	(0.25)	0.40	0.73	0.74	0.56	0.87	0.88
14							-0.13	0.48	0.54	0.43	0.77	0.77
15				0.40	0.54	(0.44)				0.54	0.82	0.90
16	-0.80	-0.63	(-0.58)	0.30	0.60	0.52				0.85	0.87	0.88
17							-0.13	-0.52	(-0.48)	0.26	0.73	0.54
18	0.91	0.74	0.78							0.84	0.88	0.92
19										0.54	0.64	0.45
20	0.39	0.77	0.79							0.19	0.68	0.78
21	0.80	0.80	(0.21)	0.26	0.03	-0.58				0.71	0.80	0.77
22				-0.29	-0.57	-0.61				0.37	0.78	0.75
23				0.35	0.56	0.61	-0.69	-0.32	(-0.15)	0.63	0.75	0.82
24				-0.09	-0.70	(-0.39)				0.63	0.84	0.35
25										0.28	0.43	0.47
26	0.61	0.65	0.73							0.75	0.73	0.78
27										0.32	0.66	0.69
28	0.52	0.71	0.76							0.43	0.82	0.86
29				-0.45	-0.69	-0.68				0.66	0.80	0.81
30	0.79	0.84	0.84							0.78	0.84	0.85
31	-0.21	-0.60	-0.61	-0.76	-0.37	-0.30				0.63	0.82	0.87
32							-0.49	-0.15	(-0.40)	0.34	0.30	0.53
33	-0.78	-0.75	-0.77							0.76	0.88	0.86
34	0.71	0.74	0.81							0.67	0.84	0.87
35	-0.69	-0.82	-0.76							0.56	0.72	0.64
36										0.08	0.47	0.43
37				-0.54	-0.13	-0.30				0.38	0.68	0.71
38							-0.38	-0.60	(-0.35)	0.35	0.79	0.73
39										0.27	0.51	0.64
40										0.32	0.52	0.55
41	0.32	0.65	0.76				-0.77	-0.40	(-0.25)	0.62	0.83	0.90
42				-0.52	-0.26	-0.04				0.36	0.42	0.69
43	0.83	0.85	0.86							0.84	0.84	0.88
44							0.09	-0.48	-0.67	0.28	0.78	0.79
45	0.35	0.66	0.65							0.26	0.68	0.77
46	0.92	0.88	0.89							0.90	0.83	0.87
47	0.86	0.90	0.90							0.88	0.92	0.93
48	0.61	0.69	0.69	0.34	0.50	0.55	-0.47	-0.36	(-0.15)	0.71	0.92	0.90
49										0.60	0.66	0.55
50				0.34	0.66	0.68				0.54	0.64	0.66
E.V.	15.88	16.50	16.81	6.37	6.94	6.59	5.12	5.06	4.41			
P.V.	31.8	33.0	33.6	12.7	13.9	13.2	10.2	10.1	8.8			
C.V.	31.8	33.0	33.6	44.5	46.9	46.8	54.7	57.0	55.6			
C.C.	0.86	0.98		0.58	0.93		0.55	0.86				

E.V. : Eigenvalue P.V.: Proportion of Total Variance C.V. : Cumulative Proportion of Variance
C.C. : Component Correlation Coefficient with 1977

Chart 3 Factor Loadings (Full Output)

	I			II			III			Communality		
No.	1998	1980	1977	1998	1980	1977	1998	1980	1977	1998	1980	1977
1	-0.73	-0.61	-0.61	0.22	0.25	0.38	-0.16	-0.28	-0.26	0.61	0.54	0.61
2	-0.61	-0.41	-0.38	0.55	0.51	0.61	-0.11	-0.25	-0.07	0.69	0.78	0.82
3	0.39	0.53	0.45	0.04	-0.09	-0.33	0.36	0.54	0.55	0.28	0.69	0.73
4	-0.69	-0.76	-0.74	0.22	0.31	0.40	-0.17	-0.16	-0.00	0.55	0.78	0.79
5	-0.36	-0.29	-0.30	-0.09	0.29	0.46	-0.59	-0.42	-0.29	0.49	0.36	0.40
6	0.72	0.68	0.68	0.18	0.43	0.24	0.04	0.12	0.24	0.52	0.68	0.66
7	0.27	-0.02	-0.01	-0.32	0.09	0.22	-0.29	-0.23	-0.31	0.26	0.40	0.50
8	-0.05	-0.11	-0.12	-0.51	-0.23	-0.17	-0.46	-0.61	-0.37	0.47	0.72	0.73
9	0.72	0.79	0.79	-0.42	-0.31	-0.12	-0.22	-0.17	-0.07	0.74	0.79	0.78
10	-0.82	-0.70	-0.87	0.13	-0.13	0.00	0.18	0.04	0.13	0.72	0.78	0.87
11	0.10	0.51	0.57	-0.83	-0.34	-0.18	-0.38	-0.35	-0.49	0.84	0.83	0.91
12	0.53	0.63	0.65	0.69	0.40	0.22	0.22	0.36	0.44	0.81	0.71	0.82
13	0.30	-0.02	-0.06	0.56	0.52	0.25	0.40	0.73	0.74	0.56	0.87	0.88
14	-0.42	-0.50	-0.51	0.49	0.36	0.16	-0.13	0.48	0.54	0.43	0.77	0.77
15	-0.53	0.04	0.26	0.40	0.54	0.44	-0.32	0.17	0.25	0.54	0.82	0.90
16	-0.80	-0.63	-0.58	0.30	0.60	0.52	-0.34	0.10	0.25	0.85	0.87	0.88
17	-0.45	-0.24	-0.24	-0.20	0.04	0.29	-0.13	-0.52	-0.48	0.26	0.73	0.54
18	0.91	0.74	0.78	-0.10	0.40	0.45	0.02	-0.23	-0.05	0.84	0.88	0.92
19	0.73	0.58	0.49	-0.02	-0.33	-0.36	0.10	0.03	-0.21	0.54	0.64	0.45
20	0.39	0.77	0.79	-0.16	0.19	0.30	-0.13	0.00	0.01	0.19	0.68	0.78
21	0.80	0.80	0.21	0.26	0.03	-0.58	-0.02	0.02	-0.05	0.71	0.80	0.77
22	0.28	0.31	-0.15	-0.29	-0.57	-0.61	0.45	-0.31	-0.30	0.37	0.78	0.75
23	0.19	0.52	0.58	0.35	0.56	0.61	-0.69	-0.32	-0.15	0.63	0.75	0.82
24	0.78	0.56	0.27	-0.09	-0.70	-0.39	-0.12	0.01	-0.28	0.63	0.84	0.35
25	0.35	0.36	0.35	-0.36	-0.38	-0.43	0.16	0.12	-0.14	0.28	0.43	0.47
26	0.61	0.65	0.73	0.48	0.28	0.23	-0.39	-0.44	-0.40	0.75	0.73	0.78
27	0.16	0.38	0.51	0.35	0.46	0.43	-0.42	-0.08	-0.05	0.32	0.66	0.69
28	0.52	0.71	0.76	-0.39	-0.41	-0.44	0.05	0.21	0.03	0.43	0.82	0.86
29	0.49	0.39	0.54	-0.45	-0.69	-0.68	0.47	0.37	0.02	0.66	0.80	0.81
30	0.79	0.84	0.84	0.30	0.28	0.22	-0.26	-0.05	0.02	0.78	0.84	0.85
31	-0.21	-0.60	-0.61	-0.76	-0.37	-0.30	0.11	0.07	0.04	0.63	0.82	0.87
32	-0.32	-0.19	-0.28	-0.01	0.22	0.41	-0.49	-0.15	-0.40	0.34	0.30	0.53
33	-0.78	-0.75	-0.77	0.14	0.26	0.35	-0.37	-0.42	-0.23	0.76	0.88	0.86
34	0.71	0.74	0.81	-0.05	0.14	0.15	-0.40	-0.18	-0.10	0.67	0.84	0.87
35	-0.69	-0.82	-0.76	-0.16	0.18	0.08	-0.24	-0.03	-0.16	0.56	0.72	0.64
36	0.19	-0.04	0.24	-0.06	0.16	0.09	-0.21	0.42	0.44	0.08	0.47	0.43
37	0.30	0.40	0.47	-0.54	-0.13	-0.30	-0.04	0.33	0.10	0.38	0.68	0.71
38	0.13	0.08	0.23	-0.43	-0.26	-0.08	-0.38	-0.60	-0.35	0.35	0.79	0.73
39	0.41	0.48	0.50	0.25	0.00	-0.13	0.20	0.31	0.16	0.27	0.51	0.64
40	-0.12	-0.39	-0.38	-0.36	-0.13	-0.03	-0.42	-0.40	-0.16	0.32	0.52	0.55
41	0.32	0.65	0.76	-0.16	0.46	0.47	-0.77	-0.40	-0.25	0.62	0.83	0.90
42	-0.38	-0.28	-0.36	-0.52	-0.26	-0.04	-0.30	-0.12	-0.38	0.36	0.42	0.69
43	0.83	0.85	0.86	0.29	0.18	0.24	-0.25	-0.11	-0.06	0.84	0.84	0.88
44	0.41	0.50	0.40	-0.32	-0.39	-0.18	0.09	-0.48	-0.67	0.28	0.78	0.79
45	0.35	0.66	0.65	0.11	0.30	0.34	-0.36	-0.22	0.03	0.26	0.68	0.77
46	0.92	0.88	0.89	-0.06	0.08	0.05	-0.23	0.04	0.05	0.90	0.83	0.87
47	0.86	0.90	0.90	0.28	0.22	0.15	-0.25	-0.07	-0.04	0.88	0.92	0.93
48	0.61	0.69	0.69	0.34	0.50	0.55	-0.47	-0.36	-0.15	0.72	0.92	0.90
49	0.75	0.53	0.50	0.18	0.32	0.24	0.03	0.34	0.39	0.60	0.66	0.55
50	0.65	-0.13	-0.20	0.34	0.66	0.68	-0.04	-0.11	-0.11	0.54	0.64	0.66
E.V.	15.88	16.50	16.81	6.37	6.94	6.59	5.12	5.06	4.41			
P.V.	31.8	33.0	33.6	12.7	13.9	13.2	10.2	10.1	8.8			
C.V.	31.8	33.0	33.6	44.5	46.9	46.8	54.7	57.0	55.6			