The Internal Determinants of Korea Maritime University Students' Professional Consciousness on Marine Officers by the Use of Factor Analysis

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Ⅰ. Introduction

A ship's organization today is changing drastically in accordance with the changes in geo-politics, economics, technology, employment mode and manpower administration all of which can be regarded as external factors inducing the changes. P.T.Quinn[1] listed the different types and levels of forces operating on the shipping industry today as the followings ;

(1) Geo-political factor ; the rise of nationalism, national fleets, new maritime nations, and the demise of empires and their associated trading patterns.

(2) Economic factor ; the recession, fuel costs, oversupply of ships for available cargo, international competition for scarce resources, higher capital unit costs, fluctuating

1) P.T. Quinn, "People and change in the shipping industry", ERGOSEA 81, p. 92.

currency rates, bank and government controls or lack of them.

(3) Techonology ; more automation, the advent of the micro chip, computerasation, more sophiscated machinery, more sophiscated means of tracking, information processing, communication and control.

(4) Employment factor ; continuing reduction in numbers of jobs available, increasing numbers of redundancies, ever-narrowing scope for life-time careers.

(5) Turnaround ; faster turnaround, shorter port leaves, dock locations away from cities

(6) Manpower ; fewer people employed, smaller sized crews, continuing loss of skilled people training investments, and wastage of human resources.

(7) Ownership ; fewer family owned companies, companies becoming part of larger conglomerates and non-shipping concerns.

However, a ship's organization adapts itself to those changes very slowly, espcially in the respects of manpower, and organizational developments. Such phenomena result from tradition-oriented and conservative characteristics of shipping industries as compared to other industries.[2)]

Therefore, effective administration of human resources and early adaptation to changes of the shipping environment is an important task to shipping industry. In Korea and other developed shipping countries, many studies which which deal with the improvement of productivity of a ship's organization and seafarer's behavior have been conducted vigorously in various fields. They are mainly the studies on the personality and perception, motivation and behavior of each member of a ship's organization, on the communication, group relation, role analysis and leadership of small groups within the organization and on the environmental changes and organizational development of the entire organization.

As Korea Maritime University aims particularly to educate students to have the proper qualities and specific characteristics of marine officers and engineers through on

2) J. Reggema, M.H. Smith, "On the process of organizational change in shipping", ERGOSEA 81, P. 71.

-board training and participation in group life style, it is very important that these theories of organizational behaviors should be applied to real problems. In this respect, it is very important for us educators to grasp perception determinants which indicate how they recognize their life aboard ship and work as marine officers and engineers.

Therefore, the purpose of this study is to extract important internal determinants through factor analysis which will analyze important factors on which students who will in the future take a key role in shipping industries feel about life and work aboard ship.

Through these analyses it is also possible to make a comparative study on the important internal determinants through which students recognize their life and work aboard ship according to group by group. It is believed that this study offer important implications for the improvement of quality of on-board training education and of efficiency of participation in a group life style.

II. Methodology

1. Factor Analysis

Factor analysis refers to a variety of statistical techniques whose common objective is to represent a set of variables in terms of a smaller number of hypothetical variables.[3] Therefore Factor Analysis is frequently employed in all kinds of research for the purpose of exploring the unknown domain by reducing complex interrelationship to a resulting simple linear expression and is useful in assessing the internal statistical structure of this type of instrument.[4] Consequently four functions factor analysis can perform are specified as follows[5] ; 1) Identify a set of dimensions that are latent(not easily observed) in a large set of variables ; 2) Devise a method of combining or condensing large

3) Jae-On, Kim, Charles W. Muller, "Introduction to Factor Analysis", a SAGE University Paper, 1978, p. 9.

4) Kerlinger, Fred N, "Foundations of Behavior Research", Holt, Rinehart and Winston, 1973.

5) Joseph F. Hair, Jr, "Multivariate Data Analysis" Petroleum Publishing Company, 1979, p. 218.

numbers of people into distinctly different groups within a larger population 3) Identify appropriate variables for subsequent regression, correlation or discriminant analysis from a much larger set of variables. 4) Create an entirely new set of a smaller number of variables to partially or completely replace the orginal set of variables for inclusion in subsequent regression, correlation or discriminant analysis.

In implementing factor analysis, the following statistical approaches were used to generate unbiased, conservative results. Firstly, Bartlett's test of significance of correlational matrix was employed to determine at the outset whether there exists any relationship among variables.

$$H_0 ; R = I, \quad II_1 ; R \neq I, \quad \chi^2 = (n-1-\frac{2V+5}{6} 1n \mid R \mid, \quad \text{Degree of freedom} = \frac{V(V-1)}{2}$$

where, n=mumber of observations, v=number of variables used, and

R=determinants of the correlational matrix

Secondly, screetest and Harris procedure were employed to extract the exact number of factors. In screetest, all the characteristic roots are plotted with the value of the root along the ordinate and the root's factors number as the abscissa. The point where the factors curve above the straight line formed by the smaller roots gives the number of factors. The basic idea is that when the roots drops dramatically in size, an additional factor would and relatively little to the information already extracted.

In this study, scree test is used as a prelimiary step to subsequently execute the Harris procedure since it tends to generate less conservative results than the Harris procedure. In the Harris procedure. a number of different factor solutions are employed to examine the patterns of factor loadings across the different factor solutions employed.

The number of factors is determined when the patterns of factor loadings are most consistent across different factor solutions employed. In this study, Minres factor analysis, Truncated factor analysis(Backdoor Image), Image factor analysis, and Alpha factor analysis were employed for the Harris procedure. Among the different four factor solutions, the Minres factor analysis is chosen as the most representative solution due to the consistency of the factor loadings of raw data(1. the junior group, 2. the freshmen

group-the mumber of responses ; 354)

2. Sources of Data

The survey was made possible with the data provided by Korea Maritime University Students consisting of the Junior group and Freshmen group. Using the simple random sampling procedure, 420 KMU students belonging to Navigational dept. and Engineering dept. were randomly selected from the predefined population. Survey questionnaire were distributed to randomly selected 420 KMU students. Of the 420 questionnaire distributed, all of them were returned. Of the 420 questionnaire distributed, 15 responses were deleted for the reasions specificed in table 1. This generated a net total of 405 usable responses. Of these 405 responses, 51 responses were not pertinent to the interest of the study. Finally, 354 responses were selected to be used in this study. Accoringly these 354 responses consisted of 243 responses from Junior group and 111 responses from Freshmen group.

Table 1. Summary Responses of the Distributed Questionnaire Survey

1. Total Distributing		420
2. Total 1Number of the Questionnaire Returned		420
* Unusable Responses	-15	
3. Total Responses Deleted	-15	
4. Net total of Usable Responses		405
* Responses not pertinent to the interest of the study	-51	
5. Net Total of the Responses used in this study		354

3. Sample Size

The factors presented in Table2 were considered in estimating the sample size and total number of questionnaire to be distributed. Of the four factors in Table 2, factor 1

and factor 2 are more relevant to estimating the sample size whereas factor 3 and 4 are to estimating the total number of questionnaires to be distributed. Factor analysis dictates that sample size should be at least five times the number of predictor variables in the analysis.[6)]

Table 2. Factors considered for the Sample Size and the Total Number of Questionnaires to be Distributed

1. Factor Analysis
N=5P, where, P=Number of predictor variables, N=Sample size
2. Split Sample Test*
3. Estimated Number of Responses to be screened out
4. Expected Survey Responses Ration**

* Total number of Responses(n=354) was not large enough to execute this procedure.

** In this study, this ratio was 100%.

III. Results

The 354 responses to the questionnaire items in Table 3 were factor analyzed.

These 354 responses were divided into 4 groups(2 x 2 cells) according to their characteristic variables representing grades, perception on life aboard ship and image on work aboard ship as shown in Table 3.

Table 3. List of variables entered factor analysis

variables	Labels
B9	Having a lot of chances to visit interesting foreign ports
B10	Having a lot of chances to apply nautical skills practically

6) Joseph. F. Hair, op. cit., p. 219.

B11 Being an expert on ship's operation

B12 Being a real man in nautical skills as well as in character building

B13 Having a lot of chances to exercise authorities and leadership

B14 Having a lot of chances to serve to one's nation

B15 A disciplined work life seems to be a good aspect in seafaring

B16 Living conditions aboard ship seems to be a good aspect in seafaring

B17 Comaraderie with fellow officers and good human relations with shipboard men seems to be good aspects in seafaring

B18 To be highly respected from friends and peers

B19 Seafaring seems to be a different kind of job

B20 Being away from family seems to be a disadvantageous aspect in seafaring

B21 Long period aboard ship seems to be disadvantageous aspect in seafaring

B22 Seafaring seems to provide enough wage for one's service

B23 Employment opportunities are good prospective in the future

B24 Seafaring is not likely to provide enough employment opportunities

B25 Seafaring seems to provide permanent employment

B26 Employment to foreign flaged vessel is likely to be easy in the future

B27 Seafaring seems to serve one's national economic development

B28 Seafaring seems to be a good job for the men

B29 Seafaring seems to be a valuable job

B30 Seafaring seems to be a dangerous and painful job

B31 Seafaring seems to be a comfortable and interesting job

B32 Seafaring seems to be a good job to the liberal minded person

B33 Seafaring doesn't have advantages in transferring to the shore job

B34 Having expected chances to find a job ashore

B35 Specialized knowledge on ship to be of value ashore

Table 4. The classified groups for factor analyzing

Related vaviables / classified group	Perception on life aboard ship	Image on work aboard ship
	Variables(B9-B21)	Variables(B22-B35)
A group of junior	I cell	II cell
A group of freshmen	III cell	IV cell

Before factor analyzing the data relating to the specified four(4) subgroups, Bartlett's test of the significance of the crrelation matrix was carried out to determine whether there exists any relationship among the items.

1. Factor Analyzing on I cell(Junior group vs variables B9-B21)

The scree test presented in figure I indicated that three or four factors are the logical number of factors to be extracted for the analysis ; the plots of the eigenvalues provided by Minres and Backdoor Image suggest that three factors, whereas Image and Alpha suggest four factors. Based on these findings, Harris procedure(Table 6) was carried out across the four different factor solutions(Alpha, BI, Image, and Minres) using two factors as the minimum trial number of factors and five factors as the maxium with 0.3 as the criterion loading point. Of the four alternative number of factors, three factors yielded the most consistent factor loadings across the four different factor solutions, as shown in Table 5.

Table 5. Factor loadings of the variables

VARIMAX ROTATED FACTOR MATRIX/MINRES FACTOR SOULTION

	FACTOR 1	FACTOR 2	FACTOR 3	COMMUNALITY
B9	.21567	.39573	-.01904	.18846
B10	.10612	.59524	-.02733	.26598

B11	.11521	.70728	-.12349	.33540
B12	.49567	.29267	-.22753	.35321
B13	.43185	.31872	-.05854	.32598
B14	.36771	.43016	.11332	35401
B15	.58225	.14126	-.16966	.35022
B16	.42897	-.04118	-.29316	.22684
B17	.63116	.19275	.05097	.37203
B18	.65134	.22136	-.03386	.37927
B19	.33106	.22936	-.30471	.24084
B20	-.09697	-.04664	.71905	.28194
B21	-.03251	-.01044	.51864	.18302

Eigenvalue	3.72759	1.57822	1.24461
・% of common variance	56.9%	24.1%	18.9%
・% of total variance	28.7%	12.1%	9.6%

・% of the total variance

af all the variables explained by 3 factors; 50. 4%

Figure 1. Scree-test(perception on life aboard ship)

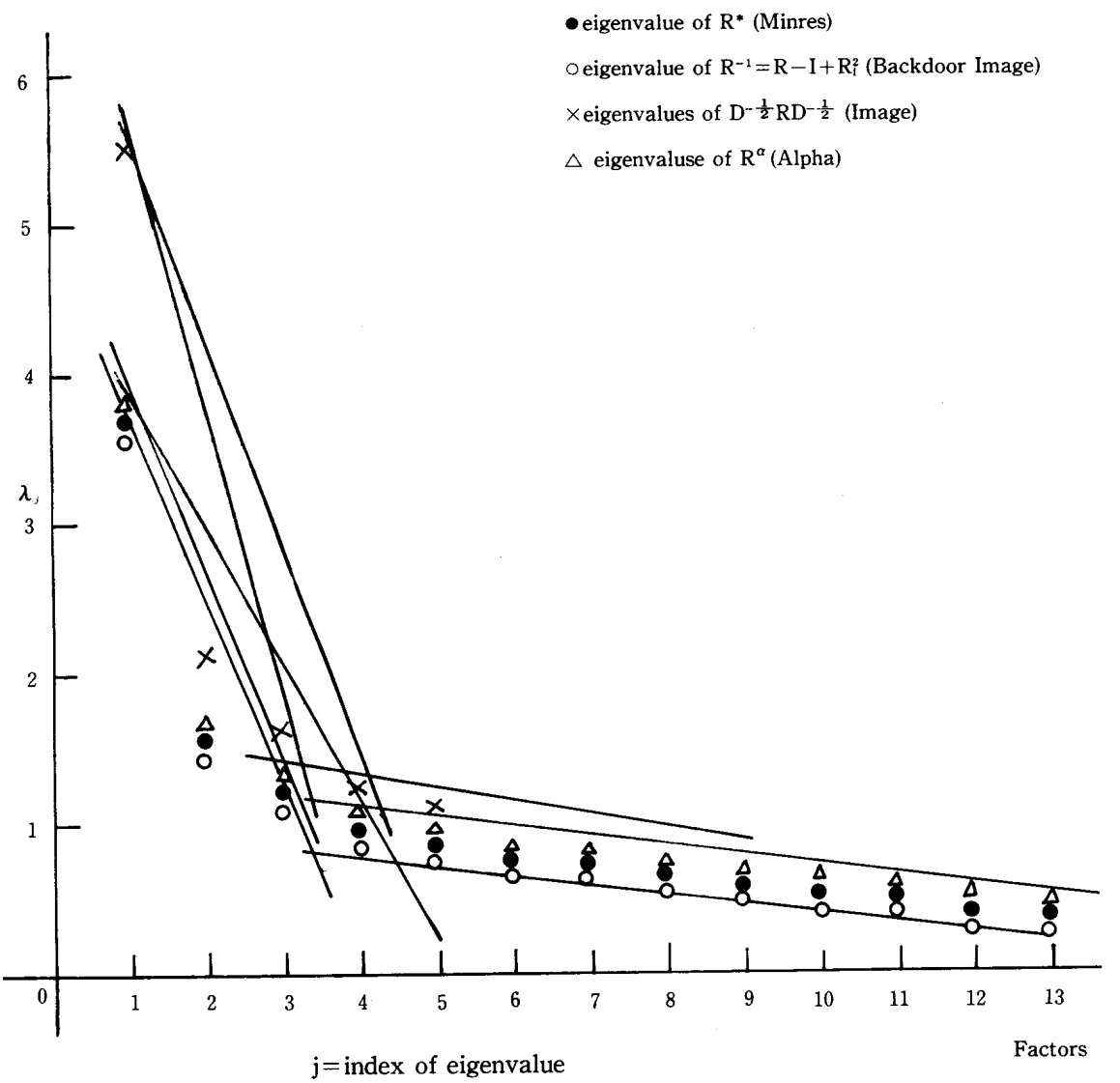

Table 6. Determination of the Number of Factors by Harris Procedure

VARIMAX ROTATED FACTOR MATRIX

	ALPHA	BI	IMAGE	MINRES
	FACTOR 1	FACTOR 1	FACTOR 1	FACTOR 1
B9	.19778	.18367	.18125	.21567
B10	.10371	.05442	.11268	.10612
B11	.12975	.10414	.14400	.11521
B12	.46991	.55821	.40386	.49567
B13	.42400	.50487	.35601	.43185
B14	.37065	.42853	.30604	.36771
B15	.56927	.69350	.46957	.58225
B16	.41126	.56430	.34835	.42897
B17	.61309	.71811	.49955	.63116
B18	.61659	.72343	.50614	.65134
B19	.29844	.34868	.27294	.33106
B20	-.07951	-.08979	-.10169	-.09697
B21	-.00746	.02072	-.03605	-.03251

VARIMAX ROTATED FACTOR MATRIX

	ALPHA	BI	IMAGE	MINRES
	FACTOR 2	FACTOR 2	FACTOR 2	FACTOR 2
B9	.40956	.56189	.34323	.39573
B10	.56323	.75183	.45217	.59524
B11	.63547	.77080	.49663	.70728
B12	.34432	.28853	.30746	.29267
B13	.35739	.35673	.34363	.31872
B14	.42830	.49072	.41631	.43016
B15	.18345	.08133	.21088	.14126

B16	.01828	-.18407	.03690	-.04118
B17	.19724	.15448	.25139	.19275
B18	.24916	.19694	.28366	.22136
B19	.30488	.27395	.24118	.22936
B20	-.16143	-.04864	-.05951	-.04664
B21	-.10102	-.01079	-.01330	-.01044

VARIMAX ROTATED FACTOR MATRIX

	ALPHA	BI	IMAGE	MINRES
	FACTOR3	FACTOR3	FACTOR3	FACTOR 3
B9	.03322	-.01784	.05183	-.01904
B10	.06361	-.04260	.04487	-.02733
B11	-.01417	-.15026	.11143	-.12349
B12	-.21458	-.26503	.22908	-.22753
B13	-.00519	-.02026	.07806	-.05854
B14	.19945	.20138	-.05937	.11332
B15	-.16353	-.14950	.17279	-.16966
B16	-.32714	-.36488	.25905	-.29316
B17	.03890	.08688	.03316	.05097
B18	-.02952	-.00291	.08997	-.03386
B19	-.28305	-.40677	.26441	-.30471
B20	.58363	.79393	-.44346	.71905
B21	.49922	.76316	-.37562	.51864

Table 7. Salient Loadings on Extracted Factors

Variables	Factor 1	2	3
B 1 2	.50		
B 1 3	.43		
B 1 5	.58		
B 1 6	.43		
B 1 7	.63		
B 1 8	.65		
B 9		.40	
B 1 0		.60	
B 1 1		.70	
B 1 4		.43	
B 1 9			−.30
B 2 0			.72
B 2 1			.52

Table 5 presents the Varimax rotated factor matrix based on Minres factor solution using three factors. As in the previous Harris procedure, 0.3 is used as the criterion loading.

Factor 1 is significantly correlated with the variables B12, B13, B15, B16, B17 and B18 and explains 28.7% of variation of the total variables. Factor 2 is correlated with the variables B9, B10, B11, and B14 and explains 12.1% of variation of the total variables. Factor 3 is significantly correlated with the variables B19, B20 and B21 and explains 9. 6% of variation of the total variables. The total proportion of variation of the total variables that can be explained by the three factors amount to 50.4% As shown in table

5, factor 1 explains 56.9% of that proportion, factor 2 24.1%, and factor 3 18.9%. Thus factor 1 can explain the largest percentage of the variation that can be explained by the three factors.

Evaluating communallity for each variable, these three factors can best explain the variance of the vakriables B13 ; 37.9% of variation of this variable can be explained by three factors. Looking at the cluster and nature of those variables that are significantly correlated with each factor, factor 1 appears to represent the possibility of self-actualization on life aboard ship, factor 2 the specialization of ship operation skill, and factor 3 psychological conflict due to being away from family. As shown in table 7, factor 1 has salient loadings by variables B12, B13, B15, B16, B17 and B18. All these 6 variables are related to the measure of the possibility of self-actualization on life aboard ship. Factor 2 has salient loadings by variables B9, B10, B11 and B14. All these variables are related to the measures of the specialization of ship operation skill. Factor 3 has salient loadings by variables B19, B20, and B21. All these variables are related to the measures of psychological conflict due to being away from family. These findings suggest that a group of juniors has greatly considered these factors to be the most important factors in their perception on life aboard ship in the importance order.

2. Factor Analyzing on II cell(Junior group vs variables B22-B35)

The scree test presented in figure 2 indicated that three or four factors are the logical number of factors to be extracted for the analysis ; the plots of the eigenvalues provided by Minres and Backdoor Image suggest that three factors, whereas Image and Alpha suggest four factors. Based on these findings, Harris procedure(Table 9) was carried out across the four different factor solutions(Alpha, B1, Image, and Minres) using two factors as the minim in trial number of factors and five factors as the maxium with 0.3 as the criterion loading point. Of the four alternative number of factors, three factors yielded the most consistent factor loadings across the four different factor solutions, as shown in Table 8.

Table 8. Factor loadings of the variables

VARIMAX ROTATED FACTOR MATRIX/MINRES FACTOR SOULTION				
	FACTOR 1	FACTOR2	FACTOR3	COMMUNALITY
B22	.28867	-.22088	-.15269	.17862
B23	.53003	-.29133	.13360	.39909
B24	-.39347	.32284	-.12814	.32835
B25	.28437	-.20294	-.00432	.15750
B26	.32817	-.29964	.27167	.19244
B27	.13945	.64526	.23539	.29239
B28	.44901	.44647	.30132	.34317
B29	.61533	.24401	.13819	.37688
B30	-.18795	.19451	.12654	.17622
B31	.29982	-.32409	.02315	.21259
B32	.15039	-.09948	.27792	.15752
B33	-.38466	-.08810	.36023	.19501
B34	.51798	-.00939	-.24664	.28030
B35	.45643	.39506	-.38752	.31557
Eigenvalue	2.73582	1.96549	1.41357	
· % of common variance	44.7%	32.1%	23.1%	
% of total variance	19.5%	14.9%	10.1%	

· % of total variance of all the variables explained by 3 factors ; 43.6%

Figure 2. Scree-test(Image on work aboard ship)

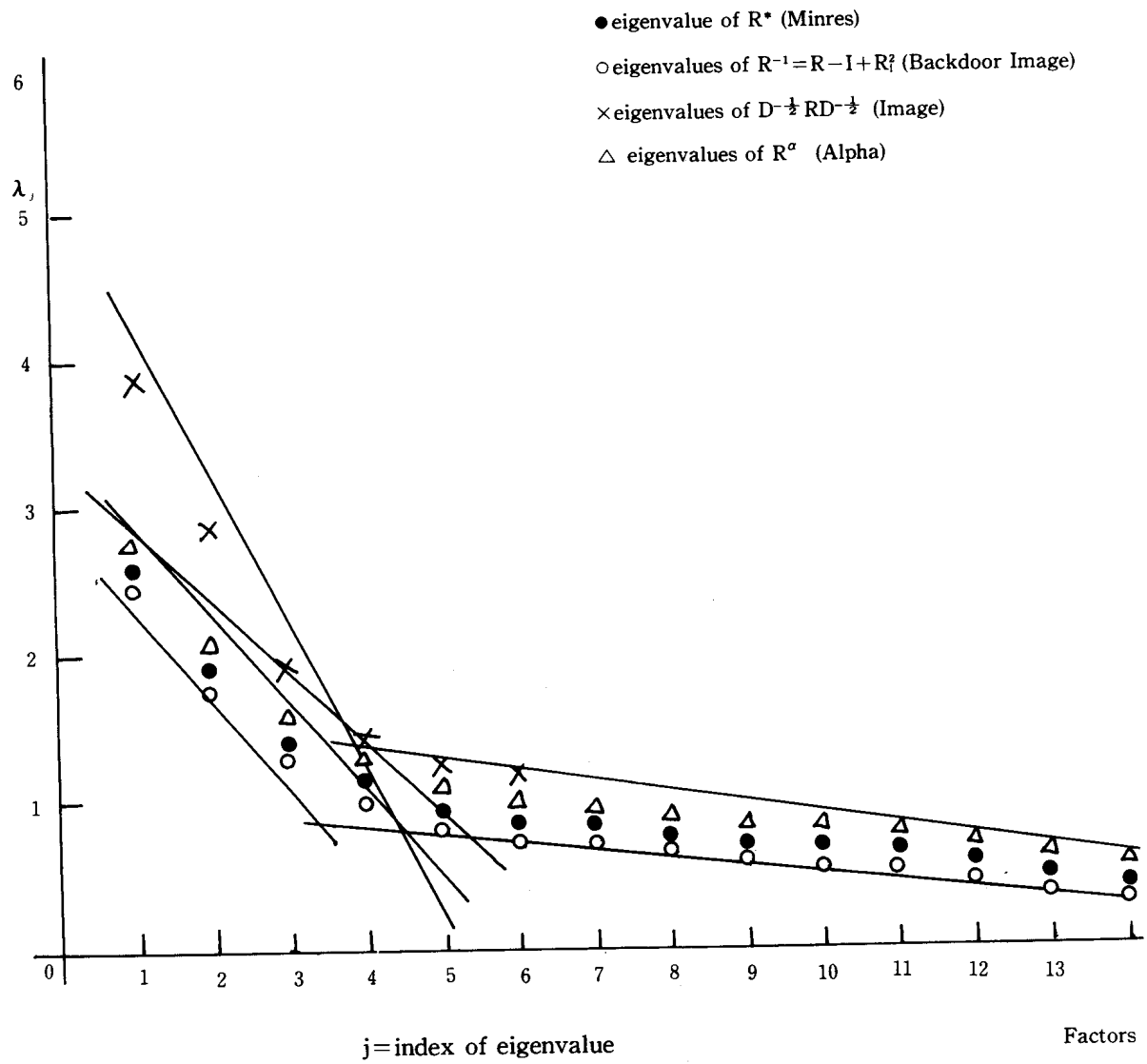

Table 9. Determination of the Number of Factors by Harris Procedure

VARIMAX ROTATED FACTOR MATRIX

	ALPHA	BI	IMAGE	MINRES
	FACTOR 1	FACTOR 1	FACTOR 1	FACTOR 1
B22	.38868	.30935	.25316	.28867
B23	.62040	.56018	.47849	.53003
B24	-.49417	-.43086	-.36765	-.39347
B25	.38848	.30502	.24745	.28437
B26	.42008	.34002	.28652	.32817
B27	.08078	.08859	.11474	.13945
B28	.42967	.39526	.37295	.44901
B29	.63791	.58098	.51702	.61533
B30	-.26837	-.21061	-.16450	-.18795
B31	.41067	.32853	.26017	.29982
B32	.20786	.16321	.13270	.15039
B33	-.44050	-.36394	-.31640	-.38466
B34	.59887	.50943	.42904	.51798
B35	.44004	.39166	.35039	.45643

VARIMAX ROTATED FACTOR MATRIX

	ALPHA	BI	IMAGE	MINRES
	FACTOR 2	FACTOR 2	FACTOR 2	FACTOR 2
B22	-.24546	-.19619	-.17427	-.22088
B23	-.24822	-.24847	-.23546	-.29133
B24	.33605	.30595	.27939	.32284
B25	-.23719	-.17848	-.14898	-.20294
B26	-.33880	-.26361	-.22698	-.29964
B27	.73248	.58697	.46648	.64526

B28	.56113	.45269	.34263	.44647
B29	.37256	.29825	.21618	.24401
B30	.25298	.19306	.15922	.19451
B31	-.40271	-.30788	-.24734	-.32409
B32	-.13718	-.09326	-.06725	-.09948
B33	-.20679	-.12808	-.07611	-.08810
B34	.08740	.04653	.01588	-.00939
B35	.52350	.40414	.30004	.39506

VARIMAX ROTATED FACTOR MATRIX

	ALPHA	BI	IMAGE	MINRES
	FACTOR 3	FACTOR 3	FACTOR 3	FACTOR 3
B22	-.28126	-.17979	-.12540	-.15269
B23	.09959	.12586	.10123	.13360
B24	-.10882	-.12897	-.10459	-.12814
B25	.05649	-.00718	-.03545	-.00432
B26	.39688	.25527	.16463	.27167
B27	.30604	.20538	.13323	.23539
B28	.32755	.25634	.17153	.30132
B29	.18639	.12544	.06516	.13819
B30	.30891	.17867	.12228	.12654
B31	.04140	.00184	-.02618	.02315
B32	.59336	.31407	.17718	.27792
B33	.52919	.34169	.22915	.36023
B34	-.24516	-.23269	-.19105	-.24664
B35	-.35630	-.30331	-.21712	-.38752

Table 10. Salient Loadings on Extracted Factors

Variables	Factor 1	2	3
B 2 2	.29		
B 2 3	.53		
B 2 4	−.39		
B 2 5	.28		
B 2 6	−.33		
B 2 9	.62		
B 3 4	.52		
B 3 5	.46		
B 2 7		.65	
B 2 8		.45	
B 3 1		−.32	
B 3 0			.31
B 3 2			.28
B 3 3			.36

Table 8 presents the Varimax rotated factor matrix based on Minres factor solution using three factors. As in the previous Harris procedure, 0.3 is also used as the criterion loading. Factor 1 is significantly correlated with the variables B22, B23, B24, B25, B26, B29, B34, and B35 and explains 19.5% of the total variables. Factor 2 is correlated with the variables B27, B28, and B31 and explains 14.0% of variation of the total variables. Factor 3 is significantly correlated with the variables B30, B32, and B33, and explains 10. 1% of theveriance of the total variables. The total proportion of variation of the toatl variables that can be explained by the three factors amount to 43.6%. As shown in table

8, factor 1 explains 44.7% of that proportion, factor 2 32.1%, and factor 3 23.1%. Thus factor 1 can explain the largest percentage of the variation that can be explained by the three factors.

Evaluating communality for each variable, these three factors can best explain the variance of the variable B23 ; 39.9% of variation of this variable can be explained by three factors. Looking at the cluster and nature of those variables that are significantly correlated with each factor, factor 1 appears to represent employment opportunity, factor 2 job satisfaction as a marine officer, and factor 3 occupational transferability. As shown in table 10, factor 1 has salient loadings by variables B22, B23, B24, B25, B26, B29, B34, and B35. All these variables are related to the measures of employment opportunity. Factor 2 has salient loadings by variables B27, B28, and B31. All these variables are related to the measures of job satisfaction as a marine officer. Factor 3 has salinet loadings by variables B30, B32, and B33. All these variables are related to the measures of occupational transferability. Thus these findings suggest that a group of juniors has greatly considered these three factors to be the most important factors in their perception on work aboard ship(image on being a marine officer) in the importance order.

3. Factor Analyzing on III cell(a group of freshmen vs variables B9-B21)

The scree test presented in figure 3 indicated that three or four factors are the logical number of factors to be extracted for the analysis ; the plots of the eigenvalues provided by Minres and Backdoor Image suggest that three factors, whereas Image and Alpha suggest four factors. Based on these findings, Harris procedure(Table 12) was carried out across the four different factor solutions(Alpha, BI, Image, and Minres) using two factors as the minim a trial number of factors and five factors as the maxium with 0. 3 as the criterion loading point. Of the four alternative number of factors, three factors yielded the most consistent factor loadings across the four different factor solutions, as shown in table 11.

Table 11. Factor loadings of the variables

VARIMAX ROTATED FACTOR MATRIX/MINRES FACTOR SOULTION				
	FACTOR 1	FACTOR 2	FACTOR 3	COMMUNALITY
B9	.46919	.18721	-.00469	.25369
B10	.65807	.12005	-.01574	.45938
B11	.69118	.47677	-.19517	.58058
B12	.57476	-.14015	.02080	.36810
B13	.64770	.10735	-.15712	.50953
B14	.60799	.30196	.07193	.51274
B15	.56769	-.15855	-.05640	.36794
B16	.50296	-.33220	.27016	.35098
B17	.49428	-.11316	.23385	.32046
B18	.64184	-.23521	.39168	.43919
B19	.48886	-.09531	-.24710	.40814
B20	-.25935	.45182	.42080	.21874
B21	-.15656	.26305	.30259	.20303
Eigenvalue	4.35971	1.44248	1.23283	
· % of common variance	61.9%	20.5%	17.5%	
· % of total variance	33.5%	11.1%	9.5%	

· % of the total variance

variance of all the variables explained by 3 factors ; 54.1%

Figure 3. Scree-test(Perception on life aboard ship)

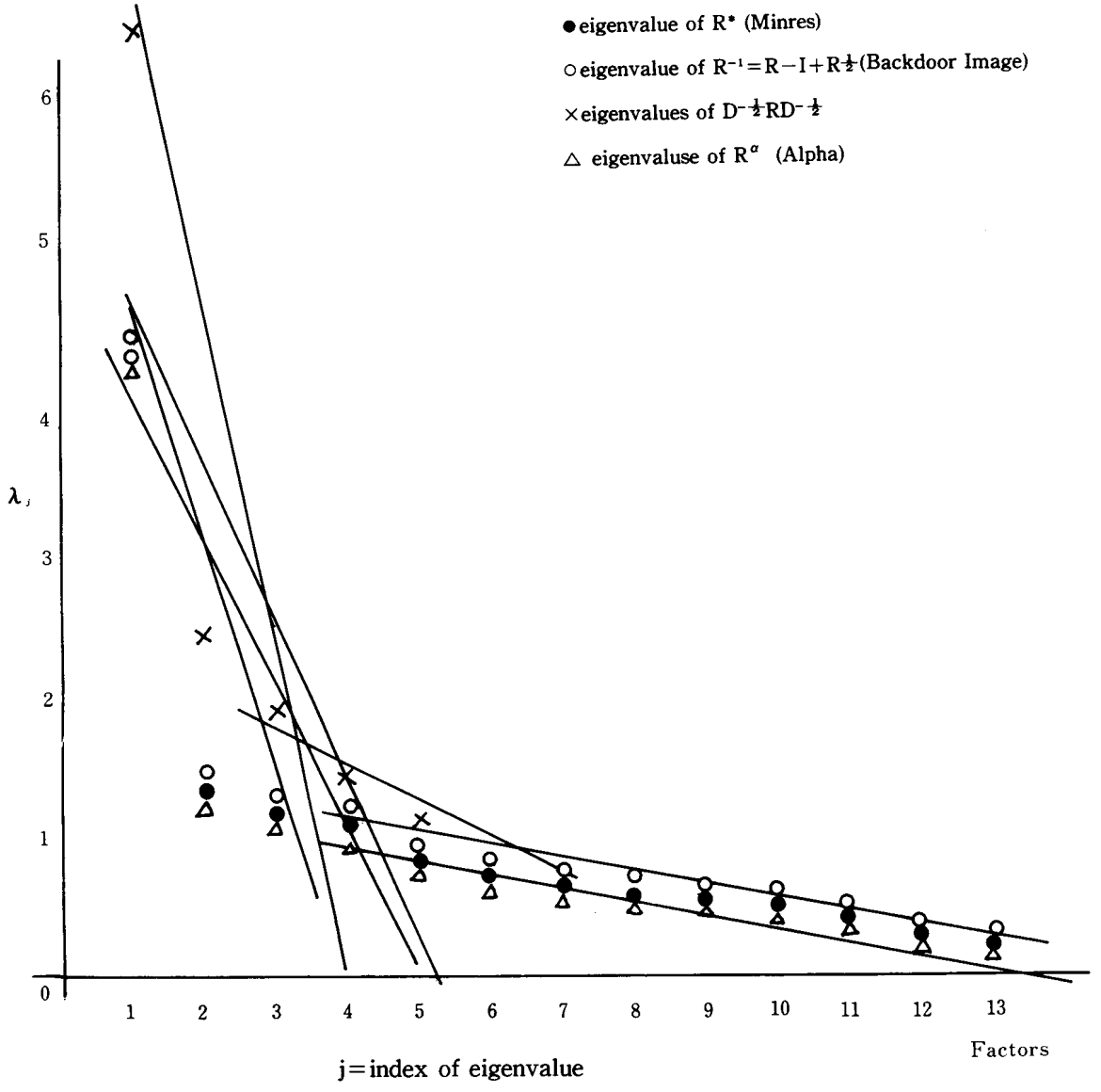

Table 12. Determination of the Number of Factors by Harris Procedure

	VARIMAX ROTATED FACTOR MATRIX			
	ALPHA FACTOR1	BI FACTOR1	IMAGE FACTOR1	MINRES FACTOR1
B9	.52713	.47072	.45039	.46919
B10	.70244	.66138	.62352	.65807
B11	.68300	.66603	.64306	.69118
B12	.63224	.57915	.53279	.57476
B13	.69150	.66074	.62848	.64770
B14	.64476	.61864	.60089	.60799
B15	.62385	.57183	.52756	.56769
B16	.54309	.49264	.43317	.50296
B17	.54963	.49611	.44903	.49428
B18	.65820	.61308	.55220	.64184
B19	.54309	.50224	.46295	.48886
B20	-.28192	-.24525	-.20923	-.25935
B21	-.18555	-.15958	-.13002	-.15656

	VARIMAX ROTATED FACTOR MATRIX			
	ALPHA FACTOR2	BI FACTOR2	IMAGE FACTOR 2	MINRES FACTOR 2
B9	.30144	.18454	.11168	.18721
B10	.16573	.11993	.05542	.12005
B11	.38000	.40107	.27838	.47677
B12	-.17355	-.15532	-.14027	-.14015
B13	.08232	.12933	.09754	.10735
B14	.38698	.34008	.20710	.30196
B15	-.21544	-.17068	-.14366	-.15855

B16	-.22983	-.31137	-.31771	-.33220
B17	-.02039	-.12883	-.17022	-.11316
B18	-.05005	-.19417	-.24137	-.23521
B19	-.22495	-.13167	-.06170	-.09531
B20	.68331	.37694	.23701	.45182
B21	.61109	.29252	.16184	.26305

VARIMAX ROTATED FACTOR MATRIX

	ALPHA FACTOR3	BI FACTOR3	IMAGE FACTOR3	MINRES FACTOR 3
B9	-.14105	-.00591	-.02104	-.00469
B10	-.08282	-.00245	-.00646	-.01574
B11	-.35089	-.16639	-.07826	-.19517
B12	-.10447	.03812	.04110	.02080
B13	-.29037	-.17856	-.03434	-.15712
B14	-.12067	.07093	.14726	.07193
B15	-.00593	-.05368	-.03086	-.05640
B16	.54041	.26885	.10524	.27016
B17	.43306	.25626	.11926	.23385
B18	.49795	.33764	.17092	.39168
B19	-.25500	-.28357	-.27314	-.24710
B20	.23759	.31054	-.27984	.42080
B21	.35229	.31365	.21516	.30259

Table 13. Salient Loadings on Extracted Factors

Variables	Factor 1	2	3
B 9	.47		
B 1 0	.66		
B 1 1	.69		
B 1 2	.57		
B 1 3	.65		
B 1 5	.57		
B 1 7	.49		
B 1 8	.64		
B 1 9	.49		
B 1 4		.30	
B 1 6		−.33	
B 2 0			.42
B 2 1			.30

Table 11 presents the Varimax rotated factor matrix bssed on Minres factor solution using three factors. As in the previous Harris procedure, 0.3 is also used as the criterion loading. Factor 1 is significantly correlated with the variables B9, B10, B11, B12, B13, B15, B17, B18 and B19 and explains 33.5% of variation of the total variables. Factor 2 is correlated with the variables B14 and B16 and explains 11.1% of variation of the total

variables. Factor 3 is significantly correlated with the variables B20, B21 and explains 9.5% of variation of the total variables. Accordingly the total proportion of variation of the total variables that can be explained by the three factors amount to 54.1%. As shown in table 11, factor 1 explains 61.9% of that proportion, factor 2 20.5% and factor 3 17.5%. Thus factor 1 can explain the largest percentage of the variation that can be explained by the three factors.

Evaluating communality for each variable, three three factors can best explain the variance of the variable B11 ; 58.1% of variation of this variable can be explained by three factors. Looking at the cluster and nature of those variables that are significantly correlated with each factor, factor 1 appears to represent the possibility of self-development on life aboard ship, factor 2 the good housing environment of life aboard ship, and factor 3 a sense of psychological distance. As shown in table 13, Factor 1 has salient loadings by variables B9, B10, B11, B12, B13, B15, B17, B18, and B19. All these 9 variables are related to the measures of the possibility of self-development on life aboard ship. Factor 2 has salient loadings by variables B14, B16. All these variables are related to the measures of environmental aspects of life aboard ship. Factor 3 has salient loadings by variables B20, B21. All these variables are related to the measures of a sense of psychological distance. Thus these findings suggest that a group of freshmen has greatly considered these three factors to be the most important factors in their perception on life aboard ship in the importance order.

4. Factor Analyzing on I cell(a group of freshmen vs variables B22-B35)

The scree test presented in figure 4 indicates that three or four factors are the logical number of factors to be extracted for the analysis ; the plots of the eigenvalues provided by Minres and Backdoor Jmage suggest that three factors, whereas Image and Alpha suggest four factors. Pased on these findings, Harris procedure(Table 15) was carried out across the four different factor solutions(Alpha, Bl, lmage, and Minres) using two factors as the minim trial number of factors and five factors as the maxium with 0.3 as the criterion loading point. Of the four alternative number of factors, three factors yielded

the most consistent factor loadings across the four different factor solutions, as shown in table 14.

Table 14. Factor loadings of the variables

VARIMAX ROTATED FACTOR MATRIX/MINRES FACTOR SOULTION				
	FACTOR1	FACTOR2	FACTOR3	COMMUNALITY
B22	.43108	-.00837	-.13884	.26293
B23	.52765	.10705	-.35265	.33602
B24	-.17367	-.11815	.27939	.20738
B25	.42212	.18850	-.11329	.20739
B26	.29256	.26084	-.11798	.18084
B27	.56338	-.46566	.02586	.44349
B28	.72398	-.36095	-.02466	.55078
B29	.63164	-.23080	.08472	.42735
B30	-.34788	-.29855	.19022	.21026
B31	.19652	.43891	-.13290	.23018
B32	.11313	.27286	.05524	.19157
B33	-.54962	.00468	-.00364	.38127
B34	.46565	.41984	.54127	.33308
B35	.49131	.05345	.32272	.33134
· Eigenvalue	3.50885	1. 60484	1.28746	
· % of common variance	54.1%	26.1%	19.8%	
· % of total variance	25.1%	12.1%	9.2%	

· % of the total variance af all the variables explained by 3 factors ; 46.4%

Figure 4. Scree-test(Image on Marine Officer)

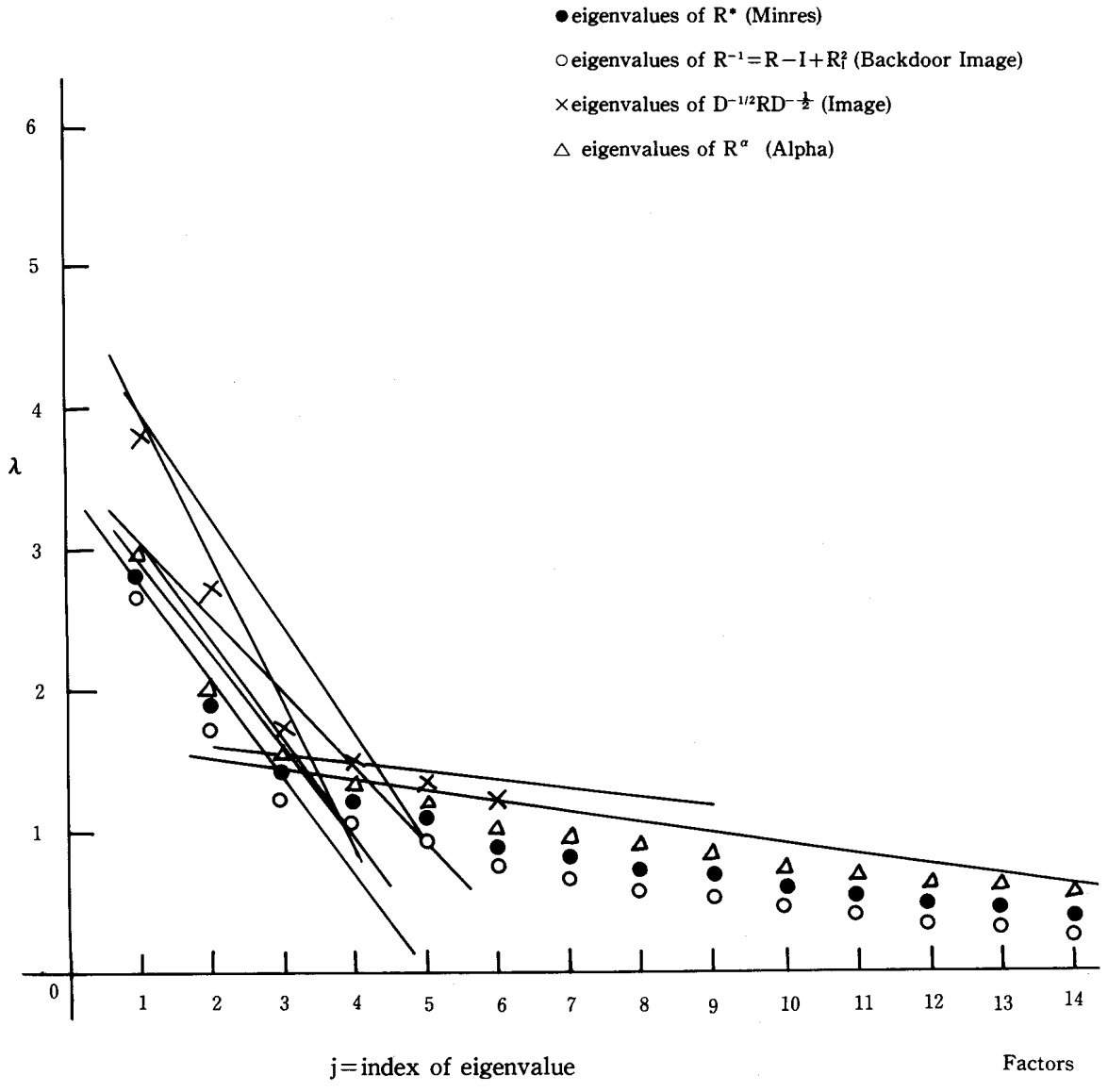

Table 15. Determination of the Number of Factors by Harris Procedure

	VARIMAX ROTATED FACTOR MATRIX			
	ALPHA	BI	IMAGE	MINRES
	FACTOR 1	FACTOR 1	FACTOR 1	FACTOR 1
B22	.44673	.51215	.40033	.43108
B23	.52262	.58924	.45090	.52765
B24	-.18342	-.22034	-.14695	-.17367
B25	.42385	.50166	.36452	.42212
B26	.29544	.35791	.23848	.29256
B27	.55067	.57801	.55037	.56338
B28	.70511	.72268	.66989	.72398
B29	.62972	.67210	.60153	.63164
B30	-.34854	-.41722	-.28208	-.34788
B31	.19635	.24109	.13573	.19652
B32	.11661	.14659	.07631	.11313
B33	-.57016	-.62671	-.50755	-.54962
B34	.41230	.46737	.34529	.46565
B35	.48896	.54607	.43828	.49131

	VARIMAX ROTATED FACTOR MATRIX			
	ALPHA	BI	IMAGE	MINRES
	FACTOR 2	FACTOR 2	FACTOR 2	FACTOR 2
B22	.00580	-.05074	.05517	-.00837
B23	.14178	.12361	.15629	.10705
B24	-.17915	-.24612	-.14469	-.11815
B25	.21002	.26625	.18611	.18850
B26	.28149	.38789	.23193	.26084
B27	-.43155	-.52317	-.29466	-.46566

B28	-.32292	-.37385	-.20073	-.36095
B29	-.23411	-.31318	-.13352	-.23080
B30	-.32408	-.43223	-.26832	-.29855
B31	.45890	.63315	.35186	.43891
B32	.31218	.45961	.23186	.27286
B33	.02735	.12352	-.06843	.00468
B34	.25190	.25621	.25231	.41984
B35	.00677	-.06067	.07389	.05345

VARIMAX ROTATED FACTOR MATRIX

	ALPHA FACTOR 3	BI FACTOR 3	IMAGE FACTOR 3	MINRES FACTOR 3
B22	-.13513	-.16414	-.10241	-.13884
B23	-.32223	-.45592	-.21487	-.35265
B24	.31320	.54745	.21513	.27939
B25	-.04132	-.06162	-.03561	-.11329
B26	-.08984	-.17815	-.06390	-.11798
B27	-.02492	-.02552	-.01238	.02586
B28	-.03868	-.03102	-.02368	-.02466
B29	.08680	.10959	.05815	.08472
B30	.07112	.04988	.07121	.19022
B31	-.01821	.02065	-.03344	-.13290
B32	.19045	.36075	.11763	.05524
B33	.03987	.06723	.01912	-.00364
B34	.40498	.55703	.26757	.54127
B35	.36511	.50590	.24449	.32272

Table 16. Salient Loadings on Extracted Factors

Variables	Factor 1	2	3
B 2 2	.43		
B 2 3	.53		
B 2 5	.42		
B 2 7	.56		
B 2 8	.72		
B 2 9	.63		
B 3 0	−.35		
B 3 3	−.55		
B 3 4	.47		
B 3 5	.49		
B 3 1		.44	
B 2 4			.54
B 3 2			.36

Table 14 presents the Varimax Rotated Factor Matrix based on Minres factor solution using three factors. As in the previous Harris procedure, 0.3 is used as the criterion loading. Factor 1 is significantly correlated with the variables B22, B23, B25, B27, B28, B29, B30, B33, B34 and B35 and explains 25.1% of variation of the total variables. Factor 2 is correlated with the variables B31 and explains 12.1% of variation of the total variables. Factor 3 is significantly correlated with the variables B24, B32 and explains 12. 1% of variation of the total variables. The total proportion of variation of the total

variables that can be explained by the three factors amount to 46.4%. As shown in table 14, factor 1 explains 54.1% of that proportion, factor 2 26.1% and factor 3 19.8%. Thus factor 1 can explain the largest percentage of the variation that can be explained by the three factors.

Evaluating communality for each variable, these three factors can best explain the variance of the variable B28 ; 55.1% of variation of this variable can be explained by three factors. Looking at the cluster and nature of those variables that are significantly correlated with each factor, factor 1 appears to represent the specialization of a being marine officer, factor 2 emotional perception of marine officers, and factor 3 few opportunities to be employed as a marine officer. As shown in table 16, factor 1 has salient loadings by variables B22, B23, B25, B27, B28, B29, B30, B33, B34, and B35. All these 10 variables are related with the measures of the specialization of a being marine officer. Factor 2 has salient loadings by variables B31. Thus this variable is related to the measure of emotional perception of marine officers. Factor 3 has salient loadings by variables B24, B32. All these variables are related to the measures of few opportunities to be employed as a marine officer. Thus these findings suggest that a group of freshmen has greatly considered these three factors to be the most important factors in their perception on work aboard ship(image on being a marine officer) in the importance order.

IV. Summary

In this study, the internal perception determinants through which students of Korea Maritime University perceive their life and work aboard ship according to the significance and importance order were extracted by the use of factor analysis.

Considering that on-board training greatly influence the students' perception regarding their life and work aboard ship, ther required sample were selected from three different kinds of populations- a group of juniors on-board training, a group of juniors finished on-board training, and a group of freshmen for a comparison one-by the use of

simple random sampling method.

The main results of this study are summarized as follows ;

1. A group of juniors

1) Major perception determinants regarding life aboard ship.
   a) The possibility of self-actualization of life aboard ship.
   b) The specialization of ship operation skill.
   c) Psychological conflict due to being away from family.
2) Major perception determinants regarding work aboard ship.
   a) Employment opportunity.
   b) Job satisfaction as a marine officer.
   c) Occupational transferability.

2. A group of freshmen.

1) Major perception determinants regarding life aboard ship.
   a) The possibility of self-development on life aboard ship.
   b) The good housing environment of life aboard ship.
   c) a sense of psychological distance.
2) Major perception determinants regarding work aboard ship.
   a) The specialization of a being marine officers.
   b) Emotional perception of marine officers as a vocation.
   c) Few opportunities to be employed as a marine officer.

These findings suggest that there are not significant differencies between each groups as far as on the perception of internal determinants regarding life aboard ship. In comparison, the group of juniors perceived the specialization of ship operation skill as the second important factor, whereas the group of freshmen perceived the good housing environment of life aboard ship as the second important factor.

Considering the major perception determinants regarding work aboard ship, the groups of juniors perceived 1) employment opportunity, 2) job satisfaction as a marine officer, 3) occupational transferability, whereas the group of freshmen perceived 1) the specialization of being a marine officer, 2) emotional perception of marine officers, 3) few opportunity to be employed as a marine officer. Thess findings indicate that the group of juniors perceived their future job more practically than the group of freshmen does, whereas the group of freshmen perceived their future job more emotionally than the group of juniors does.

References

1. Au, Taik Sup, "Quantitative Analysis of Social Sciences Data", Nanam Publishing Co., 1984.
2. Bedaux, L.G.M., Groeneveld, J.P., "Organizational Change in Shipping", ERGOSEA, 1981.
3. Dillion, William R., Goldstein Matthew, "Multivariate Analysis", John Wiley and Sons, 1984.
4. Kerlinger, Fred N., "Foundations of Behavioral Research", 2nd ed., Holt, Rinehart and Winston, Inc., 1973.
5. Kim, Kwang Woong, "Research Methods in Social Science", Park-youg-sa, 1981.
6. Kim, Jae-On, Mueller, Charles W, "Introduction to Dactor Analysis", s SAGE University Paper, 1978.
7. _____, _____, "Factor Analysis, Statistical Method and Practical Issues", a SAGE University Paber, 1978.
8. Lee, Hak-Jong, "Personnel Administration", Se-Kyung-Sa, 1985.
9. _____, "Organizational Behavior", Se-Kyung-Sa, 1985.
10. Moreby, D.H., "The Human Element in Shipping", a Seatrade Publication, England, 1975.

11. _____, "Personnel Management in Merchant Ship", Pergamon Press, 1968.
12. Norman, H. Nie, Statistical Package for the Social Sciences", McGraw-Hill Book Company, 1975.
C, Hadlai Hull
Jean G. Jenkins
Karin, Stein Brenner
Dale, H, Bent
13. Park, Sang Gap "The Exploratory Research on the KMU Student's Professional Consciousness on Shin, Han Won Merchant Marine Officers", The Journal of Korea Maritime University, 1986.
Kim, Hwan Soo
14. P.T.Quinn, "People and Change in the Shipping Industry", ERGOSEA, 1981.
15. Rosengren, William R., "The Social Organization of Nautical Education", Lexington Books, 1976. Bassis, Michael S.
16. Roggema, J., "On the Progress of Organizational Change in Shipping", ERGOSEA, 1981.
17. Swanda, John, "Organizational Behavior", Alfred Publishing Co., 1979.
18. Takashi, Kuroda, "The Self-Image of Training Ship Cadets", The Japanese Journal of Navigation, 1984.