Factor Analysis of the Companies Demands to the Polytechnic Graduates in Indonesia

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Factor Analysis of the Companies Demands to the Polytechnic Graduates in Indonesia

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The study focused on what factors are demanded by companies to polytechnic graduate. The aim of the research is to identify the dominant factors of the hard skill and soft skill aspects of the polytechnic graduate considered by the companies. Theoretically it can be explained that the employee's success is determined 18% by hard skills and the remaining 82% by soft skill. The research was conducted in POLMAN Bandung with sampling and data were collected through questionnaire. The questionnaires were arranged in the form of Likert Scale and the data were analyzed using factor analysis. The results showed that the most dominant factors considered by companies to polytechnic graduates are Relationship Building, Communication Skill, Lifelong Learning, Motivation and Commitment. The findings of this study reinforce other studies that claim that the companies demands on graduates more on softskill than hardskill.

Keywords: Factor Analysis, Companies Demands, Polytechnic Graduates.

1. INTRODUCTION

Polytechnic students of Diploma 3 and 4 programs are prospective workers who are educated and professional needed by workplace. In gaining prospective workers, the workplace party requires a candidate who has the ability in accordance with the field of work as a support in performing the duties of the organization.

In the workplace, the ability is called skill. Skill traditionally often refers to the technical skills of a prospective worker such as the ability to use a tool, process data, operate a computer, or know certain knowledge. Such capabilities are called hard skills or technical skills[1]. In this study, hard skills i.e. foreign language mastery, having knowledge of expertise possessed, operating IT tools, designing products and processes, designing systems, ability to implement areas of expertise possessed, and implementing work control. In addition to hard skills, companies need employees who have soft skills. Soft skills are intrapersonal skills such as the ability to self-manage and interpersonal skills such as how individuals interact with others[1]. Based on compiling a combination of Sharma, SCS-SAQ Polman, IQF and The Workplace, and then

corrected by the soft skills competencies contained in LOMA's Competency Dictionary, obtained by compiling conclusions soft skills as much as 12 soft skills[2]. List of 12 soft skills are : commitment, communication skill, detail orientation, entrepreuner skill, flexibility, integrity, leadership, lifelong learning, motivation, relationship building, self confidence, and thinking skills.

Each year there are many polytechnic graduates who compete to find employment, but the number of jobs is not as large as the number of graduates available.

With the more fierce competition to the workplace that requires these employees, it is better that students as candidates must equip themselves with skills including hard skills and soft skills[3]. Almost all companies today require an appropriate combination of hard skills and soft skills, regardless of employee position.

The workplace believes that superior human resources are those who not only have the skills of hard skills but also skilled in the aspects of soft skills. Study from Employment Research Institute in 2005 revealed, employee success is only determined 18% by hard skill and the remaining 82% by soft skills[4].

Case study of this research was conducted in Politeknik Manufaktur Negeri Bandung (POLMAN Bandung). POLMAN Bandung as a vocational higher education that

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has a commitment to provide high quality education and produce competitive graduates, always strives to measure the level of graduates user satisfaction by company[4]. This is to determine whether POLMAN Bandung has been able to meet the requirements expected by companies.

Indonesian Qualification Framework (IQF) is a framework that integrates competence stages and qualifications between the education and training fields of employment and work experience for granting recognition of the competence of work in various sectors[6]. In IQF, mastery learning outcomes hereinafter called qualifications obtained through the internalization of knowledge, attitudes, skills, competencies, and the accumulation of work experience. IQF consists of 9 levels of qualification, starting from level 1 as the lowest level up to level 9 as the highest level. Level qualified for a diploma III equivalent to the lowest level of 5, and a graduate of Bachelor of Applied Diploma IV or equivalent with a minimum level of 6. Description qualification levels 5 and 6 contains the values of Attitude, Skills General and Specialized Skills and Knowledge Mastery.

The problem is the company demand assessment to the attributes of hard skills and soft skills aspect of graduates. Thus, the purpose of this research is to obtain and know the representative picture of the graduate users tendency on the aspects of hard skills and soft skills owned by graduates which become dominant / important for companies.

2. RESEARCH METHOD

1. Population and Sample
   The target population is the graduates user which the are workplaces. Because of the limited time given the large population of research objects and the study was taken 22 samples, which are graduates users who follow the industry presentation program (recruitment program / job expo) on campus in 2017. Limitations of graduate users are the manager / HRD in the industry where graduates work, which is assumed to be very understanding about the factors studied.

2. Research Variabel
   Graduate attributes perceived by graduate users are grouped into specific factors analyzed. The factors are as follows :
   1) Hard Skill. Derived from the requirement of hard skills competency required at IQF (Indonesia Qualification Framework) level 5 and 6 according to the competence of diploma 3[6], covering the following factors:
      a) Foreign language mastery,
      b) Having knowledge of expertise possessed,
      c) Operating IT Tools,
      d) Designing products and processes,
      e) Designing systems,
      f) Ability to implement areas of expertise possessed, and
      g) Implementing work control.
   2) Soft Skill. In the soft skills component adopted dimension which is used in soft competency scale is measuring instrument developed by internal researcher of POLMAN Bandung to measure soft

skill index of polytechnic students that have been valid and reliable. It covers the following factors:
   a) Commitment: Able to Understand the recent knowledge and commitment to quality
   b) Communication Skill: Able to communicate in writing and able to employ the non-verbal communication
   c) Detail Orientation: Able to focus on any important matters
   d) Entrepreuner Skill: Able to run creativity and innovation
   e) Flexibility: Able to adapt to the environment
   f) Integrity: Acting consistent, having a commitment and showing honesty
   g) Leadership: Able to act as leader
   h) Lifelong Learning: Having a desire to learn
   i) Motivation: Having the energy and drive to work hard
   j) Relationship Building: Able to work individually or in teams
   k) Self Confidence: Being confident in doing work tasks, and
   l) Thinking Skill: Able to solve problems and make decisions

3. Data Collection Procedure
   The data taken are primary data and done by questionnaire technique, that is, the question of about the attitude of the graduate to the variables that are explored by using the scale of the model assessment of Linkert, with the range of assessment from 1 for unimportant to 5 for very important. Type of questionnaire used is self administrated questionnaire which is a questionnaire that is filled by the subject of research ie the company. Questions in questionnaires are derived from the needs of hard skills competencies required at *IQF* level 5 and 6 according to the competence requirements of diploma 3[6]. For questions on the components of soft skills, adopt dimensions used in soft competency scale is a measuring tool developed by internal researchers of POLMAN Bandung to measure the soft skills index of polytechnic students which have been tested valid and reliable.

4. Technical Data Analysis
   1) Factor Analysis
      Factor Analysis is a multivariate statistical technique used to reduce and summarize of all dependent and interdependent variables. The corresponding relationship between one variable with another is to be tested to identify its dimensions or factors. Riduwan[7], explained that factor analysis is useful to know which factors are superior or dominant from some variables to be selected. Can also distinguish priority variables that are ranked based on the results of the analysis
   2) Factor Analysis Procedure[8]
      a) **Formulate the Problem**. Identify objectives / goals of factor analysis and measurement of variables on the basis of Likert / interval scale.
      b) **Construct the Correlation Matrix**. Data are arranged in correlation matrix, analytic process is based on correlation of matrix between

variables. If inter variables are mutually correlated then factor analysis is appropriate to use, and if the correlation is small then factor analysis is not appropriate to use. Bartlett's test of sphericity can be used to test the accuracy of factor models. Kaiser-Meyer-Olkin (KMO) is useful for the measurement of sample feasibility.

c) **Determine the Number of Factors**. The procedure used to determine the number of factors is **Determination Based on Eigenvalues**, approach with eigenvalue greater than 1.

d) **Rotate Factors**. The method used for rotation is the varimax procedure, which minimizes the number of variables with high loading on factors, thus improving the ability to interpret the factors that exist.

e) **Interpret Factors**. Interpretation is accelerated through variables that have greater loading on the same factor which can then be interpreted in terms of high loading variables.

f) Select Surrogate Variables. Selecting a replacement variable so that the researcher can carry out the next analysis and interpret the results within the original variable constraint rather than the factor score by testing the factor matrix and selecting each variable factor that has the highest loading on the factor.

g) Determine Model Fit. The final step in factor analysis is the determination of model precision. The difference between the observed correlation (contained in the correlation matrix input) and the re-generated correlation (as estimated on the factor matrix) can be tested through the model itself, called the residual. If there are many large residuals, then the model factor is less precise and the model needs to be reconsidered.

3. EXPERIMENTAL RESULT

a. Assessing decent variable

From the output of SPSS program for 19 variables data answered by 22 respondents in the questionnaire, the results are as follows:

1) Three tests were performed to extract variables with MSA (Measure of Sampling Adequacy) which are below 0.5. The criteria for MSA numbers is above 0.5, which means that variables can still be predicted for further analysis[7]. From **anti image correlation** data, the extraction variable is *Having_knowledge_of_expertise possessed* (0.474), *Designing_systems* (0.422), and *Ability_to_implement_areas_of_expertise possessed* (0.459). This means that these variables do not follow the next process.

2) **KMO and Bartlett's test**. After extracting 3 variables, it is obtained the following results: The output (Table 1) shows the KMO and Bartlett's test is 0.713 which is above 0.5 with significance 0.000

that is below 0.05. So, the variables and samples are eligible for further analysis.

Table.1.

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,713
Bartlett's Test of Sphericity	Approx. Chi-Square	240,416
	df	120
	Sig.	,000

Source : Output Program SPSS

b. Factoring and Rotation

1) **Analisis communalities**. Communalities are essentially the number of variance (can be in percentage) of an initial variable that can be explained by the existing factor[7]. In Table 2, for example, *foreign_language_mastery$_{H1}$*, the number 0.730 means that 73% of the variance of *foreign_language_mastery$_{H1}$* can be explained by the factor formed, as are the other variables. The greater the communalities the closer the relationship of the corresponding variable to the factors formed.

Table.2.

Communalities

	initial	extraction
foreign language mastery-H1	1,000	,730
operating IT tools-H3	1,000	,812
designing product & process-H4	1,000	,742
implement work control-H7	1,000	,676
commitment-S1	1,000	,784
communication skill-S2	1,000	,869
detail orientation-S3	1,000	,870
entrepreneur skill-S4	1,000	,710
flexibility-S5	1,000	,786
integrity-S6	1,000	,801
leadership-S7	1,000	,726
lifelong learning-S8	1,000	,833
motivation-S9	1,000	,734
relationship building-S10	1,000	,874
self confidence-S11	1,000	,801
thinking skill-S12	1,000	,378

Extraction Method : Principal Component Analysis
Source : Output Program SPSS

2) **Total variance explained**. In Table 3 Total Variance Explained, the 16 variables analyzed can be grouped into 4 factors, is eigenvalues that indicate a number greater than one. Thus there are 4 factors that are formed. Factor loadings is the amount of correlation between each variable with Factor 1, Factor 2, Factor 3, and Factor 4. Determination of the incoming variable of each factor is done by comparing the correlation amount on each line. Score below 0.5 correlation indicate a weak correlation, while above 0.5 indicates strong correlation.

Table.3.

Total Variance Explained

component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	7,492	46,822	46,822
2	2,295	14,344	61,167
3	1,278	7,988	69,154
4	1,073	6,708	75,862
5	,956	5,977	81,839
6	,701	4,383	86,223
7	,597	3,729	89,952
8	,369	2,308	92,260
9	,314	1,961	94,220
10	,266	1,660	95,880
11	,244	1,527	97,407
12	,180	1,127	98,533
13	,091	,566	99,099
14	,080	,500	99,599
15	,039	,241	99,840
16	,026	,160	100,000

component	Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %
1	7,492	46,822	46,822
2	2,295	14,344	61,167
3	1,278	7,988	69,154
4	1,073	6,708	75,862

component	Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %
1	4,479	27,992	27,992
2	3,871	24,197	52,189
3	2,228	13,922	66,111
4	1,560	9,751	75,862

Extration Method: Pricipal Componen Analyis

Source : Output Program SPSS

Table.4.

Rotated Component Matrix[a]

	Component			
	1	2	3	4
foreign language mastery-H1	-,012	,103	,842	,100
operating IT tools-H3	,448	,654	,418	,093
designing product & process-H4	,321	,117	,694	,379
implement work control-H7	,424	,448	,363	,405
commitment-S1	,763	,319	,207	-,239
communication skill-S2	,858	,181	,050	-,329
detail orientation-S3	,117	,735	,523	-,207
entrepreneur skill-S4	,115	,625	,450	,321
flexibility-S5	,121	,872	,045	,093
integrity-S6	,467	,666	-,186	,324
leadership-S7	,440	,728	-,006	,048
lifelong learning-S8	,830	,277	-,002	,260
motivation-S9	,804	,231	,027	,183
relationship building-S10	,893	,160	,223	,046
self confidence-S11	-,095	,174	,281	,826
thinking skill-S12	,288	,481	,208	,143

Extrction Method: Pricipal Componen Analysis.

Rotation Method: Variax with Kaiser Normalization

a. Rotation converged in 6 literations

Source : Output Program SPSS

Table.5.

Component Transformation Matrix

Component	1	2	3	4
1	,669	,638	,333	,184
2	-,644	,254	,551	,467
3	,340	-,710	,599	,148
4	,149	-,153	-,477	,852

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Source : Output Program SPSS

3) **Rotated component matrix.** Although of the 16 variables, factors have been formed, but it needs to be rotated to clarify which variables go into each factor. The rotation results are presented in Table 4 as follows:

- Factor 1 : *commitment$_{S1}$, communicatio skill$_{S2}$, lifelong_learning$_{S8}$, motivation$_{S9}$, and relationship_building$_{S10}$.*
- Factor 2 : *operating_IT_tools$_{H3}$, implement_work_control$_{H7}$, detail_orientation$_{S3}$, entrepreneur_skill$_{S4}$, flexibility$_{S5}$, integrity$_{S6}$, leaderhsip$_{S7}$, and thinking_skill$_{S12}$.*
- Factor 3 : *foreign_language_mastery$_{H1}$* and *designing_product&process$_{H4}$.*
- Factor 4 : *self_confidence$_{S11}$.*

c. Component Transformation Matrix

From table 5 it can be explained that the diagonal factors 1, 3 and 4 are above 0.5 (0.669, 0.599, and 0.852), proving that the three components (components) formed have a high correlation. Diagonal component 2 shows a number below 0.5 indicating that there is another component on each factor that has a high enough correlation. In the 2nd component, the diagonal

shows the number 0.254. Factor 2 has a low correlation so there is still a correlation with other factors. Component 2 on factors 1, 3 and 4 shows larger numbers, especially in Factor 1 (component 2) showing the numbers - 0.644.

d. Determining the Factor Labels

The new label name which is representative for the variables that enter in each of the factors are : 1st dominant (46.82%), 2nd Dominant (14.34%), 3rd Dominant (7.99%), and 4th Dominant (6.71%). The amount of variance mentioned above is less than 100% (75.86%), indicating that there is still interest stimuli as other factors that have not been revealed yet.

e. Model Fit

Testing the accuracy of the model used SPSS program output by looking at the difference between the observed correlation (on correlation matrix) with reproduced correlation. Obtained a residual value of 49 (40.0%) having an absolute value of more than 0.05. With the above residual conditions, the model can be declared eligible to use.

f. Interpretation of Factors.

1) All the variables that come in each factor have a positive correlation. It means that the larger loading of the relevant variable increases the selected tendency as the importance factor of the graduates by the graduate users.

2) Dominant factors

From Figure 1 and Figure 2, The Dominant & Ranking Factors are:
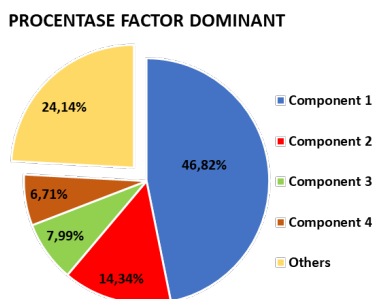
Source : Output Program Excel
Fig.1. Procentase Dominant Factor

C.3 : COMPONENT 3; C.4 : COMPONENT 4
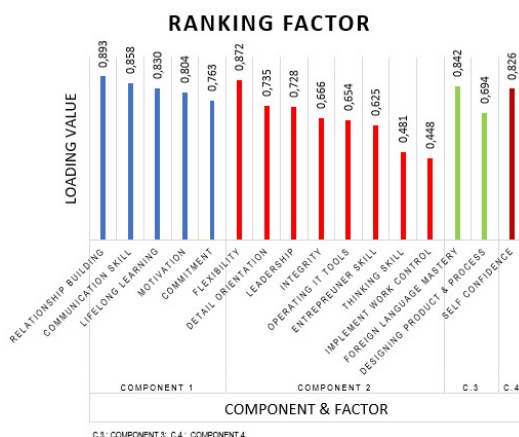
Source : Output Program Excel
Fig.2. Ranking Factor

a) Component 1 are the most dominant factor with variance of 46.82%. Ranking factors are: Relationship Building, Communication Skill, Lifelong Learning, Motivation and Commitment,
b) Component 2 are the second dominant factors with a variance of 14.34%. Ranking factors are: Flexibility, Detail Orientation, Leadership, Integrity, Operational IT Tools, Entrepreneur Skill, Thinking Skill, and Implementation Work Control,
c) Component 3 are the third dominant factors with a variance of 7.99%. Ranking factors are: foreign language mastery and designing product & process,
d) Component 4 is the fourth dominant factor with a variance of 6.71%. Factor is self confidence,
e) Others with a variance of 24.14% are factors other than those studied

4. CONCLUSIONS

The predominant factors from graduate demands by companies can be grouped in 4 levels, they are:

- 1st dominant (the most dominant), 46.82%, there are five factors consisting of: Relationship Building, Communication Skills, Lifelong Learning, Motivation and Commitment,
- 2nd dominant, 14.34%, there are 8 factors consisting of: flexibility, detail orientation, leadership,

integrity, operating IT tools, entrepreneur skill, tinking skill, and implementation work control,
- 3rd dominant, 7.99%, there are 2 factors consisting of: foreign language mastery and designing product & process,
- 4th dominant, 6.71%, there is 1 factor which is self confidence.

The most dominant factor is dominated by factors of soft skills category. It becomes a proof that the companies demands to polytechnic graduates who will be candidates for employment are more likely concerned with aspects of soft skills.

It is hoped that this research can still be developed / improved, so that the results of this research can be utilized by educational managers to prepare graduates of politechnic in order to compete in the worksplace and meet companies demands.

The findings of this study reinforce other studies that claim that the companies demands on graduates more on softskill than hardskill.

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