Factors that Influence Employee Performance Department of Education Bone District based on Factor Analysis

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Abstract—**This research was conducted at the Department of Education in Bone regency with the purpose of knowing the factors that influence the performance of civil servant Department of Education of Bone Regency. Factor analysis is used to summarize a number of variables into several factors and their naming as factors. Therefore, in this research, the researchers used factor analysis to reduce the variable into a factor. The population in this research was the Civil Servant Department of Education of Bone Regency, while the sample was all the officials in the Department of Education in Bone regency that consisting of 37 people. Sample selection in this research used a purposive sampling method. Based on the results of data analysis through factor analysis, there was obtained results from 15 variables analyzed, 4 variables of it did not match for further analysis so that only 11 variables left. From the 11 variables, 4 factors are formed that was the service factor which includes the variable of age, income, length of work / dedication, improvement factors covering career, bonus / rewards and leadership style, supporting factors including the number of family members, employee motivation, infrastructure, and internal factors of office including the variables of working hours and work environment. Each variable on the formed factor generated a positive correlation except the variable of the number of family members on factor 3. It showed that the better factor, the better performance of the employees resulted.**

Keywords—*factor analysis, factors influencing employee performance, Department of Education*

I. INTRODUCTION

Bone regency is one of the regency in South Sulawesi province and has a large area and numbers of people. In line with local government programs, the improvement of education is one of the programs implemented to educate the people of Bone. Accordingly, the flow of education should be supported by an institute that is able to distribute educational programs of the government to all stakeholders. Department of Education in Bone regency is the institution that plays an important role in government programs educational.

In these terms, an institution, whether government institutions or private institutions, is judged to be good if each of its work programs can run well and succeed. Success to implement a work program cannot be separated from the factors that can affect the performance level of an institution employee. Such constraints often come and are one of the problems in an institution.

According to Saeed et al. [1] factors that affect the performance of employees that are, work motivation, the ability of employees, work environment, work discipline, leadership, and simultaneous personality or jointly have a significant effect on employee performance.

One of the statistical analysis techniques that can be used to determine the influencing factors in multivariate analysis, especially for factor analysis. According to Chatfield [2], Multivariate analysis is an analysis technique used to analyze a set of data that uses many variables as the object to be measured. Factor analysis is used to reduce many factors into a few factors that are assumed to be indicators of a particular latent variable.

The aim of this research is the determination of the most dominant factors that influence the employee performance of the Department of Education in Bone regency.

II. LITERATURE REVIEW

A. Factor Analysis

According to Chatfield [2] factor analysis is an analytical technique used to provide an understanding that underlies the dimensions or regularity of a symptom. According to Green [3] factor analysis is a technique to assist researchers in identifying constructs that are not directly measurable.

According to Khattree & Naik [4] factor analysis consists of two exploratory analysis and confirmatory analysis. Exploratory factor analysis is an analysis that seeks a number of indicators to form a general factor without any prior theory foundation, while confirmatory factor analysis is an analysis that seeks a number of indicators that form a general factor based on the existing theoretical basis.

B. Purpose of Factor Analysis

According to Khattree & Naik [4], the purpose of factor analysis is to look for a minimum of factors with the principle of simplicity or parsimony that can generate correlations among observed indicators.

C. Model of Factor Analysis

According to Kline [5], the observed random variable X with component p has an average vector with a covariance matrix Σ. The factor model is formed in order x to be linear

and dependent on some unobserved random variable $F_1, F_2, \ldots, F_m$ the so-called general factors and p sources of diversity or sources of additional variation of $\varepsilon_1, \varepsilon_2, \ldots, \varepsilon_p$ called errors or specific factors (special factors). Generally, the factor analysis model is:

$$X_1 - \mu_1 = l_{11}F_1 + l_{12}F_2 + L + l_{1m}F_m + \varepsilon_1$$
$$X_2 - \mu_2 = l_{21}F_1 + l_{22}F_2 + L + l_{2m}F_m + \varepsilon_2$$
$$M$$
$$X_p - \mu_p = l_{p1}F_1 + l_{p2}F_2 + L + l_{pm}F_m + \varepsilon_p$$
$$X - \mu = L \quad F + \varepsilon$$
$$\underset{(p \times 1)}{} = \underset{(p \times m)(m \times 1)}{} \underset{(p \times 1)}{}$$

According to Khattree & Naik [4] to perform factor analysis, there are two assumptions that must be met are:

1. The error term ei has independent properties with each other, E(ei) = 0 and Var(ei) = σ^2

2. The Factors that cannot be directly observed (Fi) have independent properties with each other.

D. *The procedure of Factor Analysis*

1) Calculates the correlation matrix to determine the adequacy requirements for the data in the factor analysis. In calculating the correlation matrix can be used in the following formulation:

   a) Bartlett's Test of Sphericity

   This test is a statistical test for the overall significance of all correlations within the correlation matrix. The Bartlett test statistics are as follows

   $$X^2 = -\left[(N-1) - \frac{2p+5}{6}\right]\ln|R| \qquad (2)$$

   With degree of independent *df = [p(p-1)]/2*

   b) Kaiser - Meyer Olkin (KMO)

   KMO is used to look at the data adequacy requirements for factor analysis and to measure the homogeneity of the indicator.

   $$KMO = \frac{\sum\sum r_{ij}^2}{\sum\sum r_{ij}^2 + \sum\sum a_{ij}^2} \qquad (3)$$

   Where, r_{ij}^2 = correlation coefficient, a_{ij}^2 = partial coefficient

   Factor analysis is precise when the value of KMO lies between 0 , 5 - 1.0. If the values generated by the Bartlett and KMO tests are met, then the indicator or the reference variable can be analyzed further.

   c) A measure of Adequacy Sampling

   MSA is an index of comparison between partial correlation coefficients for each variable. MSA is used to measure adequacy sample

   $$MSA = \frac{\sum\sum r_{ij}^2}{\sum\sum r_{ij}^2 + \sum\sum a_{ij}^2} \qquad (4)$$

   The value of the MSA is a value that requires an appropriate indicator for factor analysis. The procedure is if the value of MSA _ 0,5 then the indicator is feasible for use

in the factor analysis but if the value of MSA < 0,5 then the indicator is not feasible.

2) Extraction factors are used to reduce data from several indicators in producing fewer factors that are able to explain the correlation between observed indicators.
3) This factor rotation is necessary if factor extraction has not yet produced a clear key factor component.
4) Naming factors have been obtained.

III. RESEARCH METHODS

A. *Types of Research*

In order to support the discussion, the type of data needed is the primary data that is data obtained directly from the Civil Servants Bone Regency Department of Education through a filled questionnaire.

B. *Location of Research*

The location of this research is the Department of Education of Bone Regency. The data obtained then will be analyzed using factor analysis.

C. *Focus of Research*

Population in this research is the Civil Servants Department of Education of Bone Regency. This research uses *purposive sampling* method. The sample in this research is employees of Bone Regency Department of Education.

Data collection is obtained through questionnaires distributed to the employees who filled in accordance with the questions that have been prepared. In addition, the type of questionnaire used is a direct questionnaire with some questions that have been available.

To obtain an illustration of the variables, then the data is scoped as follows:

1. Age (year) is the age of employee (at the time of research)
2. Income (IDR) is the salary earned for a month by employees both basic salary and additional salary.
3. Education (year) is the last education.
4. Working placement is the suitability of job ability.
5. Working period /service (year) is the period employee work began to be accepted into employees until this research conducted.
6. A number of families are the number of family members covered.
7. Career path is the employee work gait.
8. Bonus (award) is the award given by the leader to the employee.
9. Leadership style is the leadership model in the lead.
10. Employee motivation is encouragement for employee morale.
11. Facilities and infrastructure is the equipment provided.
12. Working hours are the time of employees to work.
13. Distance from home to office
14. The working environment is the state of the workplace environment
15. Office facilities are provided a facility to support employee performance.

D. Implementation Procedure of Research

To achieve the objectives of the research in accordance with the focus of the research, then the steps taken are as follows:

1. Making a questionnaire that contains the question-questions where each point in the question is a variable of the research.

2. Distributing questionnaire to the respondent that are employees Department of Education of Bone Regency. Once filled, the questionnaire is taken back to be used as data.

3. The result of the questionnaire is saved as Microsoft Office Excel 2007 format.

4. Analyzing the data that has been obtained by using SPSS for Windows 10. This data analysis uses factor analysis.

5. Summarizing the results.

IV. RESULTS AND DISCUSSION

Here are some analyzed variables such as age, income, education, working placement, working service period, number of families, career path, bonus / reward, leadership style, employee motivation, facilities and infrastructure, working hours, home distance to the office, work environment, and office facilities.

The first step that must be performed is to determine the value of KMO and Bartlett's Test and Anti-Image Matrices data to know the data are possible to be elaborated into a number of factors or analyzed data can be used in further factor analysis with the record value of KMO and Bartlett's Test and the value of MSE on Anti - Image Matrices should be more than 0.5. If the value in Anti-Image Matrices is less than 0.5, then the variable will be issued at the analysis phase until no more variable with the value is less than 0.5 is found. The implementation of this analysis is repeatedly performed until it gets the value of the corresponding variable. From the analysis of 15 analyzed variables, there are 4 variables that do not qualify, so that further analysis is only performed on 11 variables. Here are the results of KMO and Bartlett's Test and MSE values on 11 variables as follows

TABLE I.   KMO'S VALUE AND BARTLETT'S TEST

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.651
Bartlett's Test of Sphericity	Approx. Chi-Square	141.484
	df	55
	Sig.	0.000

In KMO and Bartlett's Test table, the value on KMO Measure of Sampling Adequacy is 0.651. The number indicates that the partial correlation value obtained is at a good level.

TABLE II.   ANTI – IMAGE MATRICES

No	Variable	MSA
1	Age	0.571
2	Income	0.709
3	Number of families	0.608
4	Career	0.717
5	Bonus	0.626
6	Leadership style	0.771
7	Employee motivation	0.539
8	Infrastructure	0.713
9	Working hours	0.702
10	Working period	0.613
11	Working environment	0.617

From the Anti - Image Matrices table, each variable obtains an MSA value above 0.5 and meets for further tests. The value of the MSA shows the percentage of variable variance to a factor that will be formed.

The next step is determining the number of factors formed by looking at the value of the eigenvalue and the screen plot of the 11 analyzed variables.

TABLE III.   TOTAL VARIANCE EXPLAINED

Comp.	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.143	28.573	28.573	3.143	28.573	28.573
2	2.515	22.861	51.435	2.515	22.861	51.435
3	1.265	11.499	62.934	1.265	11.499	62.934
4	1.021	9.282	72.216	1.021	9.282	72.216
5	0.756	6.870	79.085			
6	0.673	6.114	85.199			
7	0.548	4.983	90.183			
8	0.373	3.388	93.571			
9	0.322	2.924	96.495			
10	0.258	2.349	98.844			
11	0.127	1.156	100			

The eigenvalue value indicates the significance of each factor in calculating the variance of the four formed factors. The order of eigenvalue is always sorted from the largest to the smallest with the criteria that the eigenvalue below 1 is not used in calculating the number of formed factors.
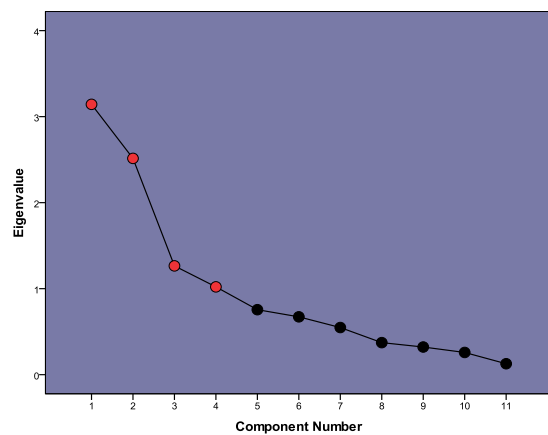

Fig. 1.   Scree Plot

Figure 1 shown the basic of the obtained number of factors with the graph. It can be seen that the eigenvalue of 1 factor up to 4 line factor decreases sharply and the eigenvalue value of 1 factor to 4 factors is above the number

1 while for the 5 to 11 the eigenvalue is already below 1. It shows that the number of formed factors is 4 factors.

The table above shows the result of the rotation of matrix component which shows the distribution of variables on a factor. The result of factor analysis of 11 analyzed variables is finally reduced to 4 factors, among others, as follows

Factor 1 consists of variable age, income, and a working service period that can be named as dedication factor. Correlation of variable is a positive value which means that the better the dedication, the better the performance of employees.

TABLE IV.   ROTATE COMPONENT MATRIX

Variable	Component			
	1	*2*	*3*	*4*
Age	**.881**	-.035	-.009	.150
Income	**.776**	.181	-.087	-.157
Number of families	.329	-.046	**-.671**	.210
Career	.043	**.837**	.132	.191
Bonus	-.087	**.888**	.078	.005
Leadership style	.173	**.782**	.100	.221
Employee motivation	-.049	.070	**.858**	.227
Infrastructure	.343	.356	**.628**	.063
Working hours	.313	.084	-.004	**.765**
Working period	**.888**	-.028	-.032	.155
Working environment	-.178	.330	.102	**.721**

Factor 2 consists of career, bonus / reward, and leadership style that can be named as an improvement factor. Correlation of these variables is positive which means that the better the improvement factor, the better the performance of employees.

Factor 3 consists of the variable number of family members, employee motivation, and facilities and infrastructure that can be named as supporting factors. The correlation of the variable is positive except for the number

of family members. It shows that the better the supporting factor, the better the performance of employees.

Factor 4 consists of a working hour and working environment which can be named as internal office factor. Correlation of these variables is a positive value which means that the better the internal factors of the office the better the performance of employees.

Based on these 4 factors can be mentioned that the factors that influence employee performance include several factors such as service factor, improvement factors, supporting factors, and internal office factors.

V. CONCLUSIONS

Based on the results of data analysis has been done then it can be concluded that of the overall variables analyzed that is 15 variables, there are only 11 variables that meet for further analysis. From the 11 variables, four factors are formed which consist of service factor with variable of age, income, and working length, improvement factor consist of career ladder, bonus, and leadership style, supporting factor consist of variable of family member, employee motivation, and infrastructure, internal factors of the office consist of work hours and internal office variables.

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