

Meta-Analysis of Correlational Research about the Relationship between Managerial Capabilities of Principal with Teacher Performance

Mozes Markus Wullur, Johanis Frans Senduk

Education Management
State University of Manado (UNIMA)
Minahasa, Indonesia

Alfonds Andrew Maramis

Microteaching Laboratory, Faculty of Mathematics and
Natural Sciences
State University of Manado (UNIMA)
Minahasa, Indonesia
alfondsmaramis@unima.ac.id

Abstract—Implementation of teachers' performance improvement in learning process is highly dependent on the ability of principals to manage all processes and activities related to the realization of duties and responsibilities of teachers. This study aims to analyze and synthesize a number of correlational studies that examine the relationship between principal managerial skills with teacher performance. This study uses meta-analysis techniques. Meta-analysis conducted on 13 studies about the managerial skills of principals and teacher performance. Results of this meta-analysis strengthens the evidence of the 13 studies that the managerial skills of principal has a positive relationship with teacher performance.

Keywords—meta-analysis; principal managerial skills; teacher performance

I. INTRODUCTION

Based on the Regulation of Minister of National Education No. 13 of 2007 concerning the Principal Standards [1], to be able to be appointed as the principal of a school/madrasah, a person must meet the national school principal standards. The standard covers two things, namely, qualifications and competencies. For competence, there are five dimensions of competency standards that must be possessed, namely: personality, managerial, entrepreneurship, supervision, and social. For the managerial dimension there are 16 points that must be possessed by a principal according to the regulation, the sixth point is to manage teachers and staff in order to utilize human resources optimally.

Managerial ability is a very important aspect that must be possessed by a school principal. Management is an integral component and cannot be separated from the overall educational process. The reason is that without management it is impossible for education goals to be realized optimally, effectively and efficiently. Management is needed to formulate organizational goals, determine what must be done to achieve goals, communicate to people who will do the work done to achieve goals, and determine how to measure the success of achieving these goals [2].

The significance of the principal's managerial ability to achieve the goals of school education in particular, as well as national education goals in general, is reflected in the intensity of attention of academics as stated in the form of research. Science, including education and teaching, continues to grow rapidly. One form of the development of education and teaching science is the emergence of innovative ideas which basically aim at improving the quality of education and teaching itself. The contribution of educational researchers is not small in this regard. Much research has been done by taking the topic of managerial ability.

Scientific communication through the publication of the findings of educational studies and research is so fast and easy with the existence of technological means such as the internet. Such a large contribution in which to integrate various perspectives and dimensions of education, should be addressed as a challenge that requires carefulness and wisdom of educators to assess the extent to which a phenomenon of education and teaching has developed. The challenge requires the synthesis of various dimensions and perspectives offered, in order to improve academic insight and the quality of teacher learning. Thus, the axiology of science can be directly felt.

Meta-analysis is a study of the results of similar studies. Judging from these characteristics, the meta-analysis is a documentation study. Basically, meta-analysis is a way to integrate or synthesize research findings [3]. Gall and his colleagues emphasize that meta-analysis is a statistical procedure that can be used to look for trends in the magnitude of the effect observed from a number of quantitative studies involving the same research problem or research topic [4].

Meta-analysis is not new in research world because it has been widely used since the 1970s. The meta-analysis of this era was intended as an attempt to integrate findings from a number of studies conducted using experimental designs (where there were experimental groups and control groups). This must be done because the effect size calculation is done by dividing the mean difference in the experimental group with the control group mean, with the control group's standard deviation. There is no denying that the emergence of a meta-analysis

specifically for quantitative studies is influenced by the dominance of the quantitative paradigm (scientific methods) which did prevail in this era, especially in the field of education.

From the initial documentation that has been carried out, there are quite a lot of research on the topic of the principal's managerial abilities. Research with the topic of managerial capability of principals that can be traced, generally uses a correlational approach. In general, the principal's managerial abilities are placed as independent variables, but there are also several studies that place this topic as a dependent variable. The factor that is generally correlated with the principal's managerial ability is teacher performance, but there are also several other factors. The scope of research that can be traced tends to vary, ranging from a small scope within the scope of the school to a greater scope in the demographic area. Thus, it is deemed necessary to comprehensively synthesize the results of these studies, given their impact on improving the quality of teaching in schools. With a meta-analysis approach to correlational research, especially the topic of managerial ability of principals, comprehensive empirical information will be obtained.

The objectives of this research are: 1) to provide a general description of the results of correlational research on the relationship between the principal's managerial abilities and teacher performance; 2) to analyze and synthesize a number of studies that show a significant correlation between the principal's managerial abilities and teacher performance; and 3) to provide information about other factors that are in line or not in line with the principal's managerial ability in relation to teacher performance.

II. RESEARCH METHODOLOGY

A. Research Methods

This study utilizes primary data that has been available as a result of studies conducted by various parties (especially correlational studies), to examine the relationship between managerial abilities of principals and teacher performance. From these data, a meta-analysis will be carried out or commonly understood as an analysis of the results of existing analyzes [5].

B. Meta-Analysis Procedure

Searching for research results is done through the internet using the help of google search engines. Correlational research on the relationship between the principal's managerial abilities and teacher performance is limited to studies conducted in Indonesia. The keywords used in the google search engine are correlational studies, principal's managerial abilities, and teacher performance. From the search results, the article that is most relevant to the keywords entered is selected. From the most relevant articles, are still selected again based on several criteria, such as: 1) pdf article file extensions (portable

document format, to avoid articles from unofficial blogs); 2) research articles are articles published in ISSN scientific journals; and 3) research articles documented in national data bases such as www.pdii.lipi.go.id, or in national college repositories.

After obtaining research articles according to the keywords and criteria used, then an assessment of the abstract of each article is carried out to assess the suitability of the meta-analysis. In this meta-analysis study, the independent variable is the principal's managerial ability, while the dependent variable is the teacher's performance. The results of the identification of each correlational research article include the coding of the name of the researcher, year, sample source, number of samples, type of sample, type, magnitude of the correlation coefficient, and notes about other independent variables (if any). The results of the correlational research data that were analyzed were reprocessed by summarizing and extracting the results of the study, especially the value and significance of the correlation coefficients of each study. Furthermore, the results of the data processing are reported in descriptive quantitative and qualitative [5].

III. RESULTS AND DISCUSSION

A. Meta-Analysis Calculation

1) *Research articles that are suitable for meta-analysis:* Research articles that have been obtained and deserved in accordance with the criteria for the analyzes are 13 articles. Criteria for articles according to the limits that are declared feasible to be analyzed, namely: 1) articles are the results of correlational research; and 2) analysis of research results at least contains the value of the correlation coefficient (r), the statistical test value F, or the statistical test value t. The specifications of 13 research articles are presented in Table 1.

2) *Transformation of statistical F and t to r:* Of the 13 studies, one of them produced an F value, and three of them produced a t value. Statistic value of F is the value which measures the magnitude of the difference in variance between two or several groups, and the statistic value of t is the value which measures the magnitude of the mean difference between two or several groups. For this reason, the value of F and t need to be transformed first into the value of r (correlation coefficient). The rxy values obtained directly and from the transformation results are listed in Table 2. The equation of the algebraic formula is presented as follows:

$$t = \sqrt{F} \quad (1)$$

$$r_{xy} = \frac{t}{\sqrt{t^2 + (N - 2)}} \quad (2)$$

TABLE I. SPECIFICATIONS OF RESEARCH ARTICLES THAT ARE SUITABLE FOR ANALYSIS

No.	Author	Title	Year	Scientific work	Sample characteristic
1.	Atep Yogaswara, Nanang Fattah, & Udin Saefudin Sa'ud [6]	Principal managerial contributions and personnel information systems against teacher teaching performance	2010	Journal article	SMP Teacher
2.	Basilius Redan Werang [7]	Effect of principal managerial skills and teacher's socio-economic status on teacher performance in SMA Negeri 1 Merauke Papua	2010	Journal article	SMA Teacher
3.	Bersita Ginting [8]	Relationship between school organizational culture and principal leadership with the performance of teachers of Binjai City High School	2011	Journal article	SMA Teacher
4.	Eko Djatmiko [9]	Effect of principal leadership and infrastructure on teacher performance in Semarang City Middle School	2006	Journal article	SMP Teacher
5.	Engkay Karweti [10]	Effect of principal managerial capabilities and factors affecting work motivation on the performance of SLB teachers in Subang Regency	2010	Journal article	SLB Teacher
6.	Gede Widiasta [11]	Determination of leadership behavior, principal managerial competence, and school working climate against productive teacher performance at SMK Negeri 3 Singaraja	2012	Thesis	SMK Teacher
7.	Hamzah Yunus [12]	Managerial ability of principals and work of Middle School teachers in None Bolango District, Gorontalo Province	2008	Journal article	SMP Teacher
8.	I Wayan Rija Suantara [13]	Contributions of managerial ability of principals, principal's supervision, and teachers' perceptions of their competencies against teacher performance at SMA Negeri 1 Blahbatu	2011	Journal article	SMA Teacher
9.	Nurhizrah Gistituati, & Jafridin [14]	Contributions of teacher's intellectual, emotional and spiritual intelligence and principal leadership against teachers performance in Mukomuko Regency Elementary School	2006	Journal article	SD Teacher
10.	Sri Sukiyasto [15]	Analysis of principal managerial ability in improving teacher performance in the area of Education and Culture Office, Karanganyar Regency	2005	Journal article	Principal
11.	Sudarmiani [16]	Principal manager skills, school climate and performance of MTs (Madrasah Tsanawiyah) teachers in Madiun Regency	2008	Journal article	MTs Teacher
12.	Sulistiyorini [17]	Causality model of principal managerial skills and organizational climate with performance of physical and health education teachers	2006	Journal article	Penjaskes Teacher
13.	Suprihatmi, S. W. [18]	Effect of principal managerial competence on the performance of Public Middle School teachers	2007	Journal article	SMP Teacher

3) *Analysis of sampling error correction (bare-bone meta-analysis)*: If the population correlation is assumed to be constant among several studies, then the best estimate of correlation is not a simple average of the correlation of several studies but the average weighted for each correlation is divided by the number of samples in the study [19]. The best estimate for population correlation is to follow the following equations.

a) *The mean correlation of population*: The mean correlation of the population is calculated using equation 3 below.

$$r = \frac{\sum (N_i \times r_i)}{\sum N_i} \quad (3)$$

The correlation coefficient (r_i) is the result of the correlation of variables x (principal's managerial ability) and y (teacher's performance) in study i , and N_i is the number of samples in the study i . The next step is to change the value of r or r_{xy} in each study to get the average correlation of the population, as presented in Table 3. The mean correlation of the population after being corrected by the number of samples or \bar{r} is 0.519.

TABLE II. FORMATTING SECTIONS, SUBSECTIONS AND SUBSUBSECTIONS

No.	Author	N	F	t	r _{xy}
1.	Atep Yogaswara, Nanang Fattah, & Udin Saefudin Sa'ud [6]	128			0,472
2.	Basilius Redan Werang [7]	56		5,819	0,621
3.	Bersita Ginting [8]	77			0,719
4.	Eko Djatmiko [9]	230			0,764
5.	Engkay Karweti [10]	67			0,288
6.	Gede Widiasta [11]	102			0,528
7.	Hamzah Yunus [12]	115			0,873
8.	I Wayan Rija Suantara [13]	68			0,574
9.	Nurhizrah Gistituati, & Jafridin [14]	79			0,181
10.	Sri Sukiyasto [15]	100	141,479	11,894	0,769
11.	Sudarmiani [16]	90			0,424
12.	Sulistiyorini [17]	303		3,620	0,204
13.	Suprihatmi, S. W. [18]	63			0,579

b) Variance r_{xy} ($\sigma^2 r$): Variance r_{xy} or $\sigma^2 r$ is calculated using equation 4 below.

$$\sigma^2 r = \frac{\sum [N_i x (r_i - \bar{r})^2]}{\sum N_i}$$

The results of the r_{xy} variance calculation are presented in Table 4. Based on Table 4, it is known that the r_{xy} or $\sigma^2 r$ variance is 0.056.

c) Variance of sampling error: The r_{xy} variance of 0.056 is a mixture of two things, namely variations in population correlations and variations in sample correlations produced by sampling errors. Estimation of variance in population correlations can be obtained only by correcting the r_{xy} variance observed for sampling errors [19]. The sampling error variance can be calculated using the following equation:

$$\sigma^2 e = \frac{(1 - r^2)}{(\bar{N} - 1)}$$

Based on the value of \bar{r} obtained and the average number of samples \bar{N} available, then the sampling error variance in this meta-analysis study:

$$\begin{aligned}\sigma^2 e &= (1 - 0,519^2) / (113,692 - 1) \\ &= 0,534 / 112,692 = 0,00474\end{aligned}$$

TABLE III. CORRECTION OF SAMPLING ERROR

No.	Author	N	r _{xy} (r _i)	N x r _{xy}
1.	Atep Yogaswara, Nanang Fattah, & Udin Saefudin Sa'ud [6]	128	0,472	60,416
2.	Basilius Redan Werang [7]	56	0,621	34,765
3.	Bersita Ginting [8]	77	0,719	55,363
4.	Eko Djatmiko [9]	230	0,764	175,766
5.	Engkay Karweti [10]	67	0,288	19,296
6.	Gede Widiasta [11]	102	0,528	53,829
7.	Hamzah Yunus [12]	115	0,873	100,441
8.	I Wayan Rija Suantara [13]	68	0,574	39,032
9.	Nurhizrah Gistituati, & Jafridin [14]	79	0,181	14,275
10.	Sri Sukiyasto [15]	100	0,769	76,862
11.	Sudarmiani [16]	90	0,424	38,160
12.	Sulistiyorini [17]	303	0,204	61,889
13.	Suprihatmi, S. W. [18]	63	0,579	36,477
Total		1478	6,996	766,571
Mean (\bar{r})				0,519

d) Estimation of variance correlation of population: Variance in population correlation, or true variance, is the corrected variance, ie the r_{xy} variance minus the sampling error variance. Variance in population correlation can be calculated using equation (6).

$$\sigma^2 \zeta = \sigma^2 r - \sigma^2 e \quad (6)$$

So that in this meta-analysis study can be calculated:

$$\begin{aligned}4) \quad \sigma^2 \zeta &= \sigma^2 r - \sigma^2 e \\ \sigma^2 \zeta &= 0,056 - 0,00474 = 0,05096\end{aligned}$$

e) Confidence interval: If the correlation of the population after being corrected by the number of samples (\bar{r}) has a normal distribution, then the confidence interval can be calculated by the equation (7) and (8).

$$p = \bar{r} \pm 1,96 \times \sqrt{\sigma^2 r} \quad (7)$$

So, the confidence interval can be calculated:

$$\begin{aligned}&= 0,519 \pm 1,96 \times \sqrt{0,056} \\ &= 0,519 \pm 0,464 = 0,056 < \bar{r} < 0,981\end{aligned}$$

f) Impact of sampling error: The impact of sampling error (ψ) can be known by using the equation (5)(9).

$$\psi = \frac{\sigma^2 e}{\sigma^2 r} \times 100\% \quad (8)$$

$$\psi = \frac{0,00474}{0,056} \times 100\% = 8,512\%$$

Another error factor is determined as follows:

$$\omega = (100 - \psi)\% = 91,488\%$$

TABLE IV. VARIANCE R_{xy}

No.	Author	N	$r_{xy} (r_i)$	$(r_{xy} - \bar{r})$	$(r_{xy} - \bar{r})^2$	$N(r_{xy} - \bar{r})^2$
1.	Atep Yogaswara, Nanang Fattah, & Udin Saefudin Sa'ud [6]	128	0,472	-0,047	0,002	0,283
2.	Basilius Redan Werang [7]	56	0,621	0,102	0,010	0,580
3.	Bersita Ginting [8]	77	0,719	0,200	0,040	3,080
4.	Eko Djatmiko [9]	230	0,764	0,245	0,060	13,828
5.	Engkay Karweti [10]	67	0,288	-0,231	0,053	3,575
6.	Gede Widiasta [11]	102	0,528	0,009	0,000	0,008
7.	Hamzah Yunus [12]	115	0,873	0,354	0,126	14,444
8.	I Wayan Riya Suantra [13]	68	0,574	0,055	0,003	0,206
9.	Nurhizrah Gistituati, & Jafridin [14]	79	0,181	-0,338	0,114	9,041
10.	Sri Sukiyasto [15]	100	0,769	0,250	0,062	6,231
11.	Sudarmiani [16]	90	0,424	-0,095	0,009	0,812
12.	Sulistiyorini [17]	303	0,204	-0,315	0,099	30,017
13.	Suprihatmi, S. W. [18]	63	0,579	0,060	0,004	0,227
Total		1478			Total	82,332
Mean		113,692			$\sigma^2 r$	0,056
SD		72,556			SD	8,772

g) *Analysis of measurement error correction:* After searching through Google search engines with the keywords "Principal Managerial Ability" and "Teacher Performance", obtained 32 full articles that can be downloaded. From further analysis related to the variables (F, t, r, and N) of the entire article, only 13 articles which are feasible to be analyzed using a meta-analysis. Furthermore, these 13 articles did not provide reliability coefficient data for the measurement instruments used. Artifact correction other than sampling error is correction of measurement error. In studies relating to the principal's managerial abilities and teacher performance, all are ex post facto studies which use a correlational approach. Since all articles analyzed using meta-analyses did not provide reliability coefficient values, the measurement error artifact corrections were not counted in this meta-analysis study.

B. Results

The meta-analysis in this study found that the actual population correlation after being corrected by a sampling error of 0.519, with the population correlation variance estimated at 0.05096. Referring to the 95% confidence interval with the acceptance limit between $0.056 < \bar{r} < 0.981$, this value is included in the interval boundary area to be received. Based on these results, it can be concluded that the hypothesis that there is a positive correlation between the principal's managerial abilities and teacher performance is acceptable.

Other aspects that need to be considered and studied further in a meta-analysis of managerial abilities of principals and teacher performance are errors in sampling. Based on the calculation, the results show that the sampling error variance value is 0.00474, and the population correlation variance is 0.056. From the comparison of the second value of the variance, it was found that the impact of sampling error was 8.512%, with another error factor that had not been specified at 91.488%.

C. Discussion

Basically, the purpose of conducting a meta-analysis is to examine data derived from a set of primary studies that focus

on a phenomenon of problematic. The results of this analysis are used as a basis for receiving (supporting) hypotheses or even rejecting (aborting) general hypotheses with a larger population range, and wider. The results of the meta-analysis in this study indicate that the hypothesis that there is a positive correlation between the principal's managerial abilities and teacher performance is acceptable.

The managerial ability of the principal includes various abilities in planning, organizing, mobilizing, and supervising. In planning activities, the principal must be able to estimate demands and needs, determine goals, establish methods of implementation, allocate time, and determine the resources needed. In organizing activities, the principal conducts the process of determining, grouping, and arranging staff in various activities according to their respective abilities and abilities to achieve school goals. Furthermore, the principal tried to invite all staff to be willing to work by themselves or to be full of awareness together to achieve the desired goals. Finally, supervision of the process is carried out as a form of evaluation. All of these components are an illustration and an indicator of the principal's managerial ability in carrying out their duties and responsibilities [1, 7].

The implementation of all of the management functions mentioned above is basically aimed at achieving school goals that have an impact on the quality of learning. But to achieve this, it is very much determined by the performance of the teacher in each subject that carries out the learning process directly to students. Teacher performance is a factor that greatly determines the achievement of school goals.

Teacher performance in the implementation of learning assignments includes the planning of learning programs, the implementation of teaching and learning processes, and assessment of learning outcomes. In planning learning, the teacher must be able to identify the needs of students, formulate basic competencies, and develop learning programs. In the process of implementing learning, the teacher's most important task is to condition the environment so as to support changes in behavior for students, which includes three things, namely: pre-test, competence formation, and post-test. Whereas in the assessment of learning outcomes can be done

with class assessment, basic ability tests, final assessment of education units and certification, benchmarking, and program assessment [12, 20, 21].

The implementation of improving teacher performance in the learning process is very dependent on the ability of the principal in managing all the processes and activities in carrying out the duties and responsibilities of the teacher. Between the principal's managerial abilities and the teacher's performance in the learning process has a very close relationship in the context of achieving school goals. The principal will not be able to carry out his managerial duties without receiving the full support and participation of the teacher. On the contrary, the teacher will not be able to develop and carry out his duties well without the proper and proper managerial presence of the principal [10, 12].

IV. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

From correlational studies that were further analyzed using a meta-analysis, each of these studies provided inference to each location where the research was carried out. The results of these studies seem to stand alone specifically on the place of research. With the help of a meta-analysis, studies that were previously independent and specific to the place of research, are generally inferred in a wider scope. The results of this meta-analysis provide a general conclusion that there is a positive relationship between the principal's managerial abilities and teacher performance. The higher managerial abilities possessed by a school principal will have a positive influence in the form of improving teacher performance.

B. Recommendations

Based on the results of the synthesis of this study, it can generally be recommended that the managerial abilities of principals are important to be improved in order to achieve the goals of education both at the school level and at the national level. Regarding the sustainability of this research, in the future it will provide meaningful input when compared to correlational studies from other countries. This comparison will provide a mapping, at what level is the relationship between managerial abilities of principals and teacher performance from Indonesia.

In addition, a meta-analysis needs to be carried out on the same topic but the characteristics of the sample are more specific, for example given the limitations of sample such as

Technical and Vocational Education and Training (TVET) oriented schools. The specific purpose of the existence of technical schools or vocational high schools certainly requires a special managerial touch as well. Thus, the correlation inference of managerial skills of technical school and/or vocational school principals with teacher performance can later be used as a reference for schools in taking on the role of facing the globalization era.

The researchers would like to thank the Rector of UNIMA who had the pleasure to fully finance this research.

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