

FACTORS AFFECTING RESEARCHERS PERFORMANCE IN THE INDONESIAN INSTITUTE OF SCIENCES

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Abstract: The Performance of Indonesian researchers is relatively low at the international and ASEAN levels. Moreover, LIPI (Indonesian Institute of Sciences) as one of the largest research institutions in Indonesia, its ranks on webometrics continue to decline. This study aims to prove the factors that influence the performance of LIPI researchers. This study aims to examine the effect of competence, training, organizational support, organizational climate, and researchers' characteristics on performance. With a stratified proportional sampling data collection technique, we obtained 153 researchers in research centers in LIPI. Data was collected using a questionnaire manually and online. Data were analyzed using partial least square (SEM- PLS), multiple linear regression, and descriptive statistics. The analysis concluded that research competence, training, functional position, academic qualification, and age had a significant effect on performance. But, organizational support and organizational climate had no significant effect on performance. Research competence contributes to the highest influence on performance. From this study, we recommended an increasing frequency of organizing international scientific writing training to improve researcher performance.

Keywords: Researchers Performance, Research Competence, Training, Indonesian institute of sciences.

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The development of science and technology is an important element for sustainable economic growth (Dosi & Nelson, 2013). Innovation is the basis for competitive advantage to face the era of the knowledge-based economy. So, universities, research institutions, and the industrial sector are expected to be-

come a driving force in utilizing knowledge that can improve people's welfare (WorldBank, 2012).

The quality of human resources is one of the keys to realize an advancement in innovation, science, and technology. It is hoped that researchers can improve their performance so that they are equivalent to researchers from developed countries. However, the performance of Indonesian researchers is not optimal based on research output in the form of scientific papers or research output such as patents, prototypes, designs, varieties, and so on.

Based on the ranking made by Scimago, the number of Indonesian publications is number four for the period 1996-2018 in the Southeast Asia region

(ASEAN). The number of these publications is very low, compared to Singapore, Malaysia, and Thailand.

Table 1 Ranking Of Scientific Publications of ASEAN Country in the Year 1996 – 2018

Ranking	Country	Document	Citation
1	Singapore	292.560	5.656.862
2	Malaysia	286.411	2.107.306
3	Thailand	178.133	2.043.065
4	Indonesia	110.610	600.569
5	Viet Nam	51.748	527.419
6	Filipina	32.326	468.403
7	Brunai Darussalam	4.169	35.841

Source: Scimago Journal dan Country Rank (1996-2018)

The role of institutions that can produce knowledge and human resources owned is very significant to increase a country’s research output. Universities and research institutions are the main actors of research activities which can further encourage increased knowledge. One of the largest research institutions in Indonesia is LIPI. LIPI was ranked first as a research institution in Indonesia based on the ranking issued by webometrics in 2017.

LIPI ranking on webometrics has continued to decline both in global ranks and in the Asian region due to the increase of research institutions listed on webometrics. It is shown that competition among research institutes is getting higher so that LIPI needs to improve its performance. This problem is urgent to be resolved because of the main tasks and functions of LIPI as a research institution. This means that the emphasis is on improving the performance of researchers in LIPI as human resources who have the main task and function of conducting research. So that research to examine the factors that influence the performance of researchers at LIPI and efforts to improve it needs to be done.

The research scope is broader than previous research conducted about researchers in Indonesia. The research aim tried to seek not only intrinsic factors but also extrinsic factors that influence researchers’ performance. While human resource research about researchers in Indonesia are very

limited and few previous researchers were more focused on intrinsic factor. This research was conducted at one of the largest research institutions in Indonesia so that it is expected to be able to describe the performance problems of researchers in Indonesia.

RESEARCH VARIABLES

Performance

According to Bernardin and Russel (1998) performance is the result of work done in a certain period as a result of abilities, skills, and desires achieved. According to Moeherton (2012) performance as a result of work achieved by individuals in the organization both quantitatively and qualitatively by duties and responsibilities possessed. In Indonesia assessment of researcher performance based on performance indicators established in Regulation of the Minister of Administrative Reform Number: KEP / 128 / M.PAN / 9/2004 about researchers and their credit numbers. This regulation was updated with Head of Indonesian Institute of Sciences Regulation No. 2 of 2014 about technical guidelines for the researcher’s functional position.

Competence

Spencer and Spencer (1993) defined competence as an individual attribute that causes individu-

als to have superior performance at work. Those individual attributes are skill, knowledge, and behavior. Mathis and Jackson (2010) explained that competence is an individual ability that can improve individual or team performance. The individual abilities are knowledge, skills, and characteristics. According to Stredwick (2005), competence is a basic characteristic possessed by individuals that can have an impact on superior performance. These characteristics include skills, knowledge, and ability to work in teams. Individual competence plays a crucial role in the organization because it is the foundation of the organization to achieve the specified performance.

The competency of researchers has been regulated in the regulation of Head of LIPI number 04 / E / 2009 about researcher competency standards. Based on these regulations, competence is defined as the capabilities and characteristics possessed by civil servants in the form of a combination of knowledge, skills, and behavior attitudes required in carrying out their duties so that the civil servants can carry out their duties professionally, effectively and efficiently. Based on the regulations, competence is defined as the capabilities and characteristics possessed by civil servants in the form of a combination of knowledge, skills, and behavioral attitudes required in carrying out their duties so that the civil servants can carry out their duties professionally, effectively and efficiently.

Organizational Support

Eisenberger et al (1986) define the perception of organizational support as the trust of members of the organization in terms of the extent to which organizations care about and value their contributions and well-being. The perception of organizational support is strongly influenced by the organization's treatment of organizational members, especially in the form of policies made by the organization. According to Rhoades and Eisenberrger (2002), good organizational support will build positive emotional bonds between members of the organization to their organizations because organizational members will always try to pay the organizational support they have received. One of the efforts to pay for the

support received was in the form of performance improvement. Research related to organizational support in the context of organizational support for research has been carried out by Nguyen (2015), Yang (2017), and Azzad & Seyyed (2007). Nguyen (2015) and Yang (2017) used literature sources support, supporting facilities, employee support, and financial support to measure organization support for research.

Organizational Climate

Armstrong and Taylor (2014) define organizational climate as perceptions of organizational members related to environmental characteristics that directly or indirectly affect organizational member behavior. Ehrhart et al (2014) define organizational climate as perceptions of organizational members related to share meanings in organizations resulting from experience and observation in organizations. The organizational climate in the context of research has been researched by Nguyen (2015), Yang (2017).

Training

Wilson (1999) defines training as a planned process to improve skills or knowledge to improve individual performance to meet organizational needs. Whereas Foot et al. (2016) suggested that training is a specific event designed to improve certain aspects of work to improve individual performance. Stredwick (2005) emphasizes that training is focused on improving elements of work so that individuals can carry out their work better. The specific characteristic of training is to improve specific skills or knowledge related to the work elements that will have an impact on individual performance and organizational performance. Mangkunegara (2009) suggested several indicators of effective training. Effective training must have appropriate training objectives, appropriate facilitators, appropriate material, and effective training methods.

METHOD

Population and Sample

The study was conducted at the Indonesian Institute of Sciences (LIPI) with a population of

researchers 1,715 researchers. This data is based on Pusbindiklat LIPI in January 2018. LIPI distribution researchers by rank are 459 first researcher (Peneliti Pertama), 590 junior researchers (Peneliti Muda), 410 associate researchers (Peneliti Madya), and 256 principal researchers (Peneliti Utama).

The research sample was conducted using a probability sampling method with a minimum sample of 94 researchers. The number of the respondent in this study were 153 researchers. The respondents are 37 first researcher (Peneliti Pertama), 64 junior researchers (Peneliti Muda), 36 associate researchers (Peneliti Madya), and 16 principal researchers (Peneliti Utama).

Instrument

Data collection used questionnaires that are distributed manually and online. The research questionnaire used consisted of questions and statements from the research variable indicators and had answers consisting of four choices. The measurement scale of the research questionnaire uses a Likert scale, tested using validity and reliability to obtain the validity and trustworthiness of the question items or statements submitted.

The questionnaire consisted of five items of question variables which are performance, competence, organizational support, organizational climate, training, and respondent characteristics. The performance variable is related to the question of the number of scientific papers published in five years from 2014, 2015, 2016, 2017, and 2018. This research is based on researcher performance based on performance indicators established in the Regulation of Head of the Indonesian Institute of Sciences Regulation No. 2 of 2014 about technical guidelines for the researcher's functional position. However, this study limits performance indicators only to the scientific papers. As previous research conducted by Nguyen (2015), Saimroh (2017), Lertputtarak (2018), Sax et al. (2002). As for the period of performance measurement, According to Sax et al (2002), researchers' performance measurement is recommended at least within two years. In Indonesia, researchers are given five years to fulfill their performance. Whereas Nguyen (2015)

used five years. Competency in the study uses indicators as regulated in the Head of LIPI regulation number 04 / E / 2009 concerning the competency standard of the functional position of the researcher. Indicators of competency consist of knowledge, skill, and attitude.

The organizational support variables used in this study as used by the Nguyen (2015), Yang (2017), Azzad & Seyyed (2007). Organizational support indicators used are literature sources, supporting facilities, supporting staff, and financial support. While organizational climate indicators refer to indicators used by Nguyen (2015), Azzad and Seyyed (2007), and Yang (2017). The training indicators used in this study as stated by Mangkunegara (2009). The indicators are training objectives, appropriate facilitators, appropriate material, and effective training methods. Training for the State Civil Servant has been regulated in Government Regulation Number 101 of 2000 concerning Education and training of Civil Servants. Training for civil servants is divided into functional training and technical training. This research is limited to the functional training of researchers that respondents have participated in. While the characteristics of respondents on the questionnaire related to the question of position rank, education qualifications, age, and gender.

Data Analysis

The data analysis uses Structural Equation Modelling (SEM) and descriptive statistics. While the characteristics of the researchers were analyzed using multiple linear regression. Inner Model SEM as illustrated in figure 1. The independent variable consists of competency, organizational support, organizational climate, and training. While the dependent variable is performance. Performance indicators consist of scientific papers published in international scientific journals, scientific papers published in national accredited journals, scientific papers published in proceedings of an international scientific conference, scientific papers not yet published, but delivered at scientific meetings, and unpublished scientific papers. While competency indicators consist of knowledge, skills, and work attitude. Indicators of organizational support consist of supporting

sources of literature, supporting facilities, supporting personnel, and fund support. Organizational climate indicators consist of leader commitment to research, researchers, and colleagues' commitment to research, time allocation for research, and re-

wards. Training indicators consist of training objectives, appropriate facilitators, appropriate material, and effective training methods. The Inner model of SEM as follows.

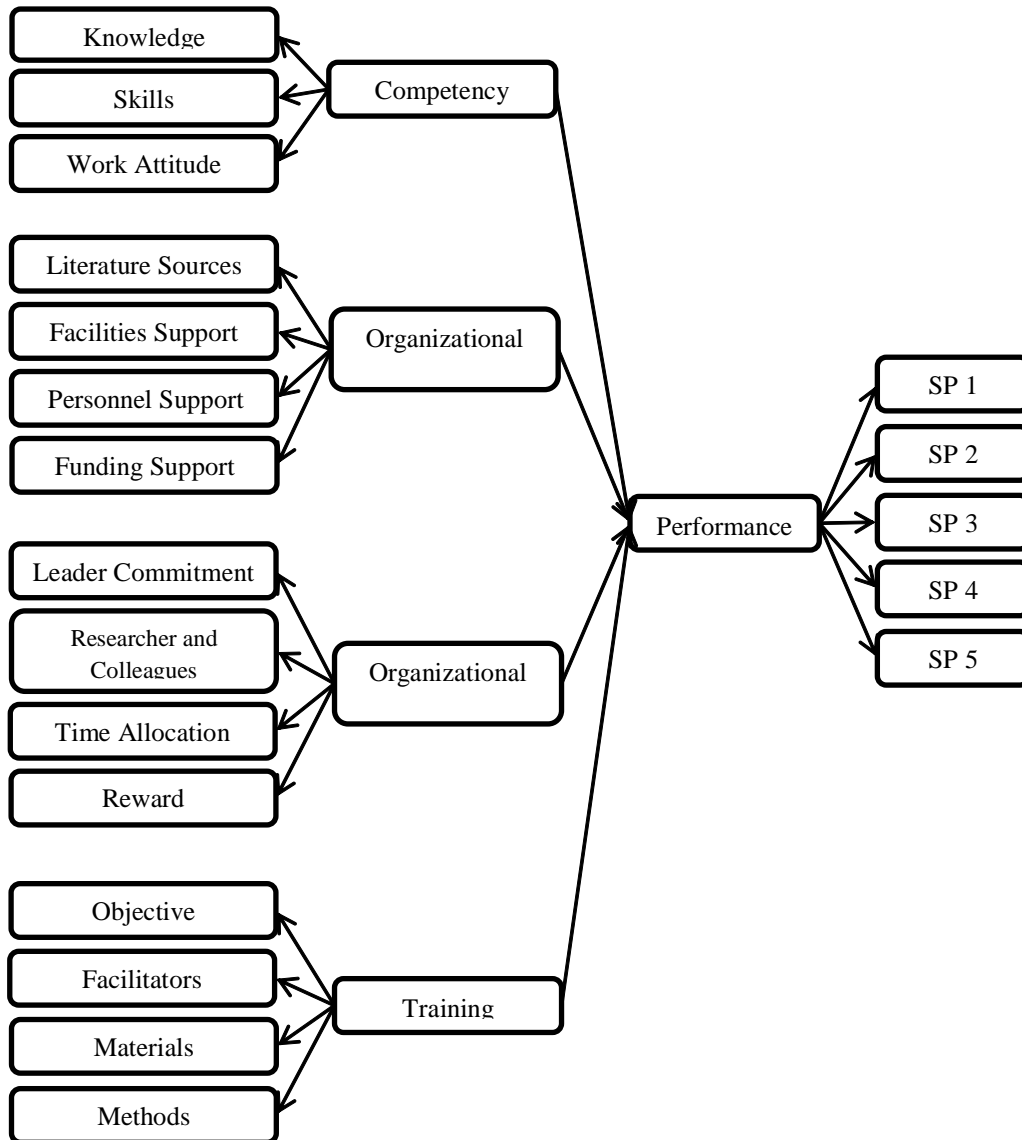


Figure 1 Path Chart of SEM

Note:

- SP 1 : Scientific papers published in international scientific journals
- SP 2 : Scientific papers published in national accredited journals
- SP 3 : Scientific papers published in proceedings of an international scientific conference
- SP 4 : Scientific papers not yet published, but delivered at scientific meetings
- SP 5 : Unpublished scientific papers

RESULTS

Respondents

The respondents of this study were 153 researchers at the Indonesian Institute of Sciences. The majority of respondents in this study were junior researchers about 64 researchers or 42% of the total respondents. The first researchers were 37 respondents, associate researchers were 36, and principal researchers were 16. In terms of educational qualifications, the majority of respondents with a master’s degree were 88 respondents or 58% of the total respondents. Doctoral degree (S3) was 49, and bachelor degrees were 16. While the gender aspect, male respondents were 82 respondents or 54% of the total respondents, and females were 71.

Performance

Performance is measured by the number of scientific papers in five years from 2014, 2015, 2016, 2017, and 2018. Then weighting is carried out by the Head of LIPI Regulation No. 2 of 2014 concerning Technical Instructions for Researchers. Scientific papers published in international scientific journals have 40 weighting points, scientific papers published in national accredited journals have 25

weighting points, scientific papers published in proceedings of the international scientific conference have 15 weighting points, scientific papers not yet published, but delivered at the scientific conference have 3 weighting points, unpublished scientific papers have 2 weighting points.

The majority of respondents fulfilled their credit points from scientific papers published in scientific journals both international and national. This is because scientific papers published in scientific journals have a high weighting point. Principal researchers and associate researchers obtain almost 83% of their credit points from scientific papers published in international scientific journals and national scientific journals. While 76% of credit point from junior researchers is also sourced from scientific papers published in international scientific journals and national scientific journals. Likewise, the first researchers produced 70% of credit point from junior researchers is also sourced from scientific papers published in international scientific journals and national scientific journals. The performance of respondents, researchers who occupy principal researchers are researchers with the highest performance. Subsequently followed by associate researchers, junior researchers, and first researchers.

Competence

Table 2 Path Coefficient Competence to Performance

Variable	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	TTable ($\alpha=0,1,n=153$)	T Statistics ((O/STDEV))	P Values
Competence → Performance	0.410	0.431	0.097	1.655	4.218	0

Based on the results of the path coefficient test, it can be interpreted that there is sufficient evidence to state that there is a significant effect of competence on performance. This means that if compe-

tence increases, it will improve performance, or the higher the competence, the higher the performance will be.

Table Original Sample Value of Competency Indicator

Competency Indicator	Original Sample (O)	Standard Deviation (STDEV)	T Statistics ((O/STDEV))
Knowledge	0.899	0.021	42.485
Skill	0.921	0.013	69.311
Work Attitude	0.877	0.022	39.623

Skill is the indicator variable that is most able to explain competence because it has the highest T statistic value. Skill is also the aspect of competency considered to be the lowest owned by respondents. This can be seen from the mean value of the skill at 3.17 which is lower than the mean competency value at 3.22. This mean value of skill is also lower than the mean value of knowledge at 3.23 and work attitude at 3.28.

Then, the ability to write abstract properly and correctly as well as the ability to operate research support equipment are aspects of skills that are considered the lowest owned by respondents. This can be seen from the mean value of each aspect at 3.10 and 3.12, while the mean of skill is 3.17. Further shown that first researchers and junior researchers held the lowest of these two aspects of skills.

Table 3 Mean Score on the Dimension of Research Competence

Competency Indicator	Mean	Category
Competency	3.22	Good
Knowledge	3.23	Good
Searching Literature Techniques	3.21	Good
Collecting Data Techniques	3.25	Good
Processing Data Techniques	3.18	Good
Scientific Writing Techniques	3.27	Good
Skill	3.17	Good
Processing and Analyzing Data	3.20	Good
Operating Research Support Equipment	3.12	Good
Writing in Indonesia Properly and Correctly	3.25	Good
Writing Abstract in English Properly and Correctly	3.10	Good
Communicate Properly	3.18	Good
Work Attitude	3.28	Excellence
Responsible	3.31	Excellence
Professional	3.31	Excellence
Motivated	3.08	Good
Honest	3.43	Excellence
Work in a team	3.33	Excellence
Discipline	3.25	Good

Organizational Support

Table 4 Path Coefficient Organizational Support to Performance

Variable	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	TTable ($\alpha=0,1,n=153$)	T Statistics ((O/STDEV))	P Values
Organizational Support → Performance	0.105	0.111	0.107	1.655	0.98	0.327

Based on the results of the path coefficient test, it can be interpreted that there is no sufficient evidence to state that there is a significant effect of

organizational support on performance. Funding support and literature source indicators have the highest T Statistics score when compared to sup-

porting facilities and supporting personnel. This means that literature source and funding support are best able to explain the organizational support.

Based on the table generally shows that respondents consider organizational support for research is inadequate. Respondents considered organiza-

Table Original Sample Value of Organizational Support

Organizational Support Indicators	Original Sample (O)	Standard Deviation (STDEV)	T Statistics ((O/STDEV)
Literature Sources	0.808	0.045	17.829
Facilities Support	0.729	0.055	13.327
Personnel Support	0.589	0.085	6.901
Funding Support	0.831	0.036	23.234

tional support was inadequate in the form of providing literature sources and funding support for research. Whereas organizational support in the form of providing research infrastructure and supporting personnel, the majority of respondents rated the organization as providing adequate. The provision of international and national journals and book facili-

ties for research was considered inadequate. Likewise, organizational support in the form of funds for research activities, funding support for publication in international journals and national journals as well as funding support for attending national and international seminars, the majority of respondents considered inadequate.

Tabel 5 Mean Score for Organizational Support

Organizational Support Indicator	Mean	Category
Organizational Support	2.44	Inadequate
Literature Sources	2.31	Inadequate
International Journal Facilities	2.31	Inadequate
National Journal Facilities	2.43	Inadequate
Book Facilities	2.20	Inadequate
Supporting Facilities	2.55	Adequate
Research Tools and Equipment	2.52	Adequate
Office Equipment and Supplies	2.59	Adequate
Supporting Personnel	2.69	Adequate
Administrative Staff to Support Research Activities	2.69	Adequate
Funding Support	2.22	Inadequate
Funding Support for Operational Research Activities	2.27	Inadequate
Funding Support for Publication in the International Journal	2.07	Inadequate
Funding Support for Publication in National Journal	2.29	Inadequate
Funding Support to Attend International Seminar	2.19	Inadequate
Funding Support to Attend National Seminar	2.30	Inadequate

Organizational Climate

Table 6 Path Coefficient Organizational Climate to Performance

Variable	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	TTable ($\alpha=0,1,n=153$)	T Statistics (O/STDEV)	P Values
Organizational Climate → Performance	-0.07	-0.06	0.099	1.655	0.714	0.476

Based on the results of the path coefficient test, it can be interpreted that there is no sufficient evidence to state that there is a significant effect of organizational climate on performance. Indicators of organizational climate used in this study are indicators of leadership commitment to research, commitment of researchers and colleagues to research,

allocation of time for research, and awards for researchers. Indicators of leadership commitment and appreciation for researchers were two indicator variables that most represent organizational climate variables because they have the highest T statistic and original sample values.

Table Original Sample Value of Organizational Climate

Organizational Climate Indicators	Original Sample (O)	Standard Deviation (STDEV)	T Statistics (O/STDEV)
Leader Commitment	0.783	0.058	13.51
Researchers and Colleague Commitment	0.603	0.162	3.713
Time Allocation for Research	0.435	0.094	4.613
Award for Researchers	0.685	0.076	9.014

Based on the table it can be seen that the majority of respondents rated that the organizational climate for research is supportive for carrying out research. The leadership in the organization is considered to have a good commitment to research activities and can provide a good example to improve the performance of researchers. Likewise, with the commitment of researchers and colleagues, researchers assess themselves and their colleagues have a good commitment to conduct research activities. Respondents often sought the advice of more experienced co-workers regarding the research activities being carried out. Respondents with co-workers also often conduct discussions and collabo-

orative research. Even though the majority of respondents agreed that the allocation of their working time generally to conduct research, researchers still carried out administrative activities so that they were felt to be disturbing. Administrative work was felt to have increased after the reorganization due to the reduced number of administrative staff. While related to the appreciation of researchers, respondents rated the organization has given a good appreciation for researchers. But respondents expect an improvement in appreciation for researchers. The respondent expected an award that is more able to encourage the motivation for researchers to improve their performance.

Table 7 Mean Score for Organizational Climate

Organizational Climate Indicator	Mean	Category
Organizational Climate	2.85	Good
Leader Commitment for Research	2.98	Good
Lead by Example to Improve Researchers Performance	2.90	Good
Strong Commitment to Research	3.02	Good
Encourage Research Collaboration	3.01	Good
Researchers and Co-Workers Commitment to Research	3.06	Good
Researchers and Co-Workers often Conduct Research Collaboration	3.08	Good
Researchers and Co-Workers Have Strong Commitment to Research	3.09	Good
Researchers and Co-Workers often Discuss Research Related Topic	3.09	Good
Researchers often Seek Advice from Experienced Co-Workers regarding research	3.09	Good
Researchers often Conduct Research Collaboration with Researchers from Other Institution	2.98	Good
Time Allocation for Research	2.73	Good
Working Hours Allocated More for Research than Other Activities	2.73	Good
Award for Researchers	2.61	Good
Organization Give Proper Appreciation to High-Performance Researchers	2.61	Good

Training

Table 8 Path Coefficient Training to performance

Variable	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	TTable ($\alpha=0,1,n=153$)	T Statistics (O/STDEV)	P Values
Training → Performance	-0.322	-0.325	0.187	1.655	1.726	0.085

Based on the results of the path coefficient test, it can be interpreted that there is sufficient evidence to state that there is a significant effect of training on performance. Training indicators consist of training objectives, appropriate facilitators, appropriate material, and effective training methods. Whereas the training intended in this research is the func-

tional training of researchers followed by researchers which is mandatory training for researchers. Training facilitator indicators and training materials are the indicators that are the most represented training variables because they have the highest statistical T and original samples.

Table Original Sample Value of Training

Training Indicators	Original Sample (O)	Standard Deviation (STDEV)	T Statistics (O/STDEV)
Objectives	0.945	0.018	52.715
Facilitators	0.975	0.010	99.008
Materials	0.957	0.014	67.162
Methods	0.955	0.017	57.325

Based on the table shows that the majority of respondents considered having received effective training. This is shown in the mean score of training objectives, training facilitators, training materials, and training methods. The objective of the training was considered effective because it is felt by the competency needed for researchers and can improve the competence of researchers so that they

can carry out better tasks. Likewise, with the facilitator, the facilitator was considered effective because it is by the training needs, the facilitator is an expert in his field and the facilitator is considered to be able to convey the material easily to be understood. The training method was also considered effective because the method used was considered according to the training needs.

Table 9 Mean Score for Training

Training Indicator	Mean	Category
Training	2.73	Effective
Objectives	2.78	Effective
Fit with Job Competency Need	2.87	Effective
Increase Knowledge and Skill in	2.90	Effective
Knowledge and Skill can be Applied in the Workplace	2.82	Effective
Able to Conduct the Job Better	2.77	Effective
Become More Motivated at Workplace	2.55	Effective
Facilitator	2.74	Effective
Fit with Training Need	2.69	Effective
Able to Encourage Participant to Participate	2.73	Effective
Able to Give An Actual Example	2.74	Effective
Expert in Their Field	2.79	Effective
Able to Convey Material Training Effectively	2.75	Effective
Able to Give Example That Easy to Understand	2.76	Effective
Material	2.68	Effective
Fit with Job Need	2.67	Effective
Training Material was Complete	2.61	Effective
Training Material Support Job Task	2.77	Effective
Methods	2.74	Effective
Fit with Training Material	2.80	Effective
The Method Used was Easy to Understand	2.77	Effective
Encourage Participant to be More Proactive	2.65	Effective

Researchers Characteristics

Test results show that the characteristics of researchers in a functional position, educational qualification, and age, there is a significant influence on performance. But gender does not significantly influence performance. Besides, the perfor-

mance of LIPI researchers is linear with the functional position, educational qualification, and age. That means, the higher the functional position, education qualification, and age, the higher the performance of researchers.

Table 10 Paired Sample T-Test for Researcher Characteristic

Variable	T Table ($\alpha=0,1,n=153$)	T Statistic	Sig.	Category
Performance - Functional Position	1.655	9.517	0.000	Significance influence
Performance - Educational Qualification	1.655	9.512	0.000	Significance influence
Performance- Age	1.655	9.525	0.000	Significance influence
Performance - Gender	1.655	1.530	0.154	No Significance influence

DISCUSSION

The results of this study indicate that research competence has a significant effect on performance which means an improvement in research competence will increase performance. The importance of research competence to increase performance also showed by previous studies as this study consistent with some previous studies conducted by Saimroh (2017), Azzad and Seyyed (2007), Blackburn et al. (1991) and Wichian et al. (2009). Saimroh (2017) in his study showed competence has a direct positive effect on performance on his research at the Ministry of Religion of the Republic of Indonesia. It was further explained that the lowest competency possessed by respondents was the aspect of research data collection and the process and analysis of quantitative data. So it was recommended to develop the competency of quantitative research methods. Azzad and Seyyed (2007) in their research also found that competence had a significant effect on the performance of researchers at universities in the Middle East. Using different indicators of competency and the broader scope of research than research conducted by Saimroh (2017), Azzad and Seyyed (2007) found that researchers felt the lowest research competency possessed were competencies to generate research grant proposals and interacting with the business community. The study was conducted at a business school accredited by the Association to Advance Collegiate Schools of Business (AACSB) in the six Gulf Corporation Council (GCC) countries. So that recommendation to improve researchers' competency to write a grant proposal and ability to generate ideas suitable for the business community were recommended.

Wichian et al. (2009) also in their research at 16 state universities in Thailand showed the importance of research competence for researchers' performance. They concluded the competence of researchers has a direct influence on the performance of researchers. Research communication skills, research skills, and techniques, and researchers' skills to get research funding were competencies that have the highest influence on performance. This study also recommended competency improvement for those three competencies. The research of Blackburn et al. (1991) also produced a similar conclusion, that individual competence has a strong influence on the performance of researchers.

Research conducted by Anisah (2015) also found the same finding with this research about researcher competence although research competence has no significant influence on performance. This research used the same competency indicator as used by Anisah (2015). Both this research and research by Anisah (2015) found that the skill to write abstract in English correctly was the lowest competency felt possessed by researchers. Especially researchers in Sumatera, Sulawesi, Bali and West Nusa Tenggara and Papua and Maluku. This finding also showed the importance of improving research competency especially the skill to write abstract in English properly and correctly. As the important role of abstract in a scientific paper to provide an overview of the content of the paper for the readers.

The other variable that has a significant effect on performance was training. This study confirmed previous research findings conducted by Anisah (2015) whereas training has a significant influence on performance. This study found that training ma-

terial has a fundamental role in organizing training so that training material must be selected effectively. This finding also concluded by Anisah (2015) that explained training material must support researchers implemented their duties. This study proved that LIPI has provided effective training for the researchers, whereas the training material, training facilitator, training methods, and training objectives were considered effective. This study finding also fits into Yang et al. (2017) study, the result showed a positive role of training for improving performance. Yang et al. (2017) study resulted that training has a significant influence on performance directly and could also be mediated by competency variable. This study finding also confirmed a study by Yulianto (2017) that proved training has a positive influence on performance directly and also mediated by employee satisfaction.

While organizational support and organizational climate have not a significant influence on researchers' performance. Perceived organizational support was rated low in form organization policy of providing literature sources for research and funding support for research. The provision of international and national journals and book facilities for research was considered inadequate by most of the respondents. LIPI has provided adequate literature sources. International journal facilities provided included science direct journals, Scopus, Springer, Proquest, and Emerald Insight. While the national journals provided included Pustaka Ristek (Library of Research and Technology Sciences). On the other hand, based on an interview, many respondents have not used the facilities provided because they were not accustomed to using the facilities provided by the organization. Many respondents preferred to use other literature resource facilities such as those provided by the respondents' Alma Mater University or direct access to literature sources without going through organizational internal services. So that, socialization of providing supporting facilities owned needs to be done more often.

Perceived organizational support in the form of funding support was also rated low by most of the respondents. Funding support for the research

project, funding support for publication in international journals and national journals, funding support for attending national and international seminars were all rated inadequate. This is because research budgets are still low in Indonesia, which has an impact on institutional budgets that have the task to conduct research and development functions including LIPI. Research budget allocation in Indonesia was lower than Malaysia and Singapore, where the ratio of R&D expenditure to gross domestic product (GDP) in Indonesia was only 0.25% (LIPI, 2018). Budget allocation for LIPI was insufficient and tends to decrease, not only for the research project, but also for the renewal of infrastructure, human resource development, and science and technology dissemination (LIPI, 2017). With this fact, LIPI encourages researchers to obtain research funding from external sources. This finding inconsistent with a previous study conducted by Wichian et al. (2009) that found data sources for research have a strong correlation to researcher performance, lack of scientific sources will result in fewer research results. The results of this study also have not confirmed the results of the study by Azzad and Seyyed (2007) that noted the important role of funding support in conducting research activities. Sulo et al. (2012) also found a positive correlation between research funds and research output that researcher could produce.

The results of this study also show the characteristics of researchers in the aspect of the academic qualification, functional position, and age, there is a positive significant influence on performance. In terms of academic qualification, the higher the academic background, the more productive the researchers. Researchers with doctorate degrees were the most productive researchers, then followed by researchers with a master's degree. This study confirms the results of Chepkrokir (2018) and Smeby and Try (2005). Chepkrokir (2018) in his research in Kenya showed that researchers with high academic qualifications will encourage higher research productivity. The higher education qualification, the more research output produced. The researcher with high academic qualifications has adequate knowl-

edge required to support their duties. Smeby and Try (2005) also found that researchers with a doctoral degree not only produced high research outputs but also have high research activities. Researchers who hold doctoral degrees usually support junior researchers, offer research mentoring and collaboration, and motivate other researchers to allocate more time for research. Researchers with high academic qualifications indicated they have high research competency obtained from formal institutions.

In terms of functional position, the higher the functional position, and the more productive the researchers. Principal researchers are the most productive then followed by associate researchers. The results of this study confirmed the research results of Nguyen (2015) and Abramo et al. (2011) that the functional position affects the performance of researchers. Nguyen (2015) showed that the higher the level of the position occupied by researchers, the higher the productivity of these researchers due to the higher research ability. The higher the rank indicated the more knowledge and research skills they accumulated. The study of Abramo et al. (2011) also found that researchers with the highest levels of positions at universities in Italy were researchers with the highest productivity compared to the levels of their lower level.

In terms of age, the older the researchers, the more productive the researchers. In this study, the most productive researchers were the researcher with age above 57 years old. Most of the researchers of this age group were researchers who hold principal researchers and doctoral degrees. This age group was researchers with the highest knowledge and research skill, and also the most experienced researchers. These findings are in line with research conducted by Subramanian and Nammalvar (2016) which found the most productive researchers were above 55 years old. The results of this study also confirmed the results of the research of Gregorutti (2008). Gregorutti's study showed that researchers' performance increased with age. The most productive age of researchers was between 41-50 years old. While in terms of

gender, this study confirmed a study conducted by Saimroh (2017) whereas there were no significant differences in the performance of male and female researchers.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Based on the analysis of SEM, it can be concluded that competence and training have a significant effect on performance. This means that increasing competence and training will improve the performance of researchers at LIPI. Research competence contributes to the highest influence on performance so that improving researcher competence will boost researcher performance. Skill is the indicator that most influences the competency. The ability to write abstract in English properly and correctly is a skill felt the lowest possessed especially by first researchers and junior researchers. So that the competency improvement program through the organization of technical training of international scientific writing should be considered. This is suitable for the needs of researchers at LIPI who prioritize fulfilling credit points from scientific papers published in international scientific journals. Whereas, the organizational support, the organizational climate has not significantly influenced the performance of researchers at LIPI.

Based on the results of the analysis of the characteristics of LIPI researchers it can be concluded that the functional position, educational background, and age significantly influence the performance of researchers at LIPI. The performance of LIPI researchers is directly linear to the level of functional position, educational background, and age. Researchers with higher functional positions, higher educational backgrounds, and more experience will have higher performance. The principal researcher has the highest performance when compared with researchers with other levels of functional position. So that the researchers with doctoral education backgrounds also have the highest performance. Then, more experienced researchers have higher performance.

Recommendations

Prioritize improving the competence of LIPI researchers through increasing the frequency of organizing technical training of international scientific writing. This is to improve the skills of LIPI researchers in writing international scientific papers. Because the skill of writing international scientific papers is a skill that is at least possessed by researchers. On the other hand LIPI researchers' preferences in fulfilling credit point through scientific papers published in international scientific journals. So that an increase in the frequency of technical training in international scientific writing can significantly improve the performance of LIPI researchers.

Increasing the competency of LIPI researchers through formal education. This is confirmed by significant differences in performance from researchers with different Education qualifications. LIPI researchers must be encouraged to continue formal education, LIPI researchers with master's academic background should be encouraged to take a doctoral degree. So, researchers with a bachelor education background should be encouraged to continue their education to master and doctoral degree

Recruitment of researchers with high academic qualifications. This is to ensure researchers' candidates already have research competencies, especially candidates of researchers with postgraduate academic qualifications. As the results of this study, academic qualifications significantly influence the performance of LIPI researchers. Researchers with postgraduate academic qualifications have higher performance than researchers with undergraduate academic qualifications.

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