An analysis of lecturers' demographic factors affecting research performance in Indonesia

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ABSTRACT

This study aims to determine the demographic factors that affect lecturer publication performances in Indonesia. This study employs data from 658 lecturers in the faculties of economics and business from 7 universities in Indonesia. Data of lecturer profile consisting of academic rank, administrative position, highest education, the country where lecturers received their degrees (overseas or regional), age, work years, and gender was collected from the Ministry of Research online database. To find out the relationship of these factors on the performance of lecturers' publications, multivariate regression analysis with a 95% confidence level was carried out and followed by the Tukey test. Academic rank, highest education, and the university where the lecturer received their degree had a significant influence (p -value < 0.05) on the 3-years and overall publication performance. Gender and administrative positions only have a significant effect on the 3-years publication performance, while age and work years did not significantly influence publication performance. The results of this study can be used by lecturer management policymakers in developing countries to make appropriate strategies in developing lecturer resources. Due to the limitations of the factors tested, the results of this study have not been able to fully explain the performance of publications lecturers in Indonesia. Regression equation r -squared value of 3-year version 1, version 2, overall version 1, and version 2 are 18,15%, 21,73%, 24,54%, and 23,51% respectively. Subsequent research needs to be done with a more comprehensive analysis of factors so that it can be identified factors that are almost the performance of lecturer publications in Indonesia.

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Introduction

The function of Higher Education in Indonesia is *Tridharma* that means the institution must provide education, research, and community service (OECD, 2015). Based on Indonesian Law No. 14 of 2005 concerning Teachers and Lecturers, Lecturers are professional educators and scientists with the main task of transforming, developing, and disseminating science, technology, and art through education, research, and community service. Lecturers must conduct research to provide solutions to existing problems with the field of science they master. Although research is one of the obligations of lecturers, the number of research publications per number of lecturers in Indonesia is still not equal. Currently, from a total of 294.820 lecturers (MoRTHE, 2018) and 9.669 researchers (LIPI, 2020), Indonesia only produces 266.106 documents in Google Scholar and only 33.438 documents are Scopus indexed in 2019 (SJR - International Science Ranking, 2020). This inequal productivity of research requires policymakers to practice developing human resources to increase the output of lecturers' research performance. One of the first steps in developing human resources is to practice human resources analytics.

Human resources analytics practice is the use of information technology that uses descriptive, visual and statistical data analysis related to the human resources process and organizational performance to enable data-driven decision making (Armstrong & Taylor, 2020). Academia implements human resources management with a specific practice that differs from the industry sector (Gao & Haworth, 2019) due to different orientations. Successful human resources management implementation must pay attention to understand an employee (Mierlo, Bondarouk, & Sanders, 2018) in this case is a lecturer. One of the practices of human resources analytics in higher education is to analyze the factors that influence the performance of academic staff. Many factors affect the

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performance of the publications of lecturers where have been studied by previous researchers. Puuska (2010) found that academic grade, highest education, and gender influenced the performance of public research lecturers at Finnish University. Puuska (2010) states that Professors are the most productive where PhDs publish more than non-PhDs. In terms of gender, Puuska said that male performs better than women in research.

Indonesia has a unique lecturer composition where lecturers in Indonesia are dominated by master graduates of 190,993, while doctoral graduates are only 39,687 (MoRTHE, 2018). The number of professors in Indonesia is also still small of 5,961 or around 2% of the total number of lecturers in Indonesia (MoRTHE, 2018). The Indonesian government is currently also providing various scholarships abroad for lecturers with a greater cost than a domestic university to increase Indonesia's international publications. Countries where lecturers get their degrees are considered to influence the performance of publications because of differences in the quality of education of each country. Elfindri, Rustad, Nizam, & Dahrulsyah (2015) found that the international publications' productivity of lecturers who graduated from overseas universities was four to five much higher compared to the productivity of lecturers who graduated from domestic universities. One of the things that are complained by lecturers is the administrative burden that disturbs the focus of the lecturer in conducting research. Administrative positions are considered to have an impact on the productivity of publications where Lovakov (2014) states that administrative positions significantly affect affective commitment, but on the other hand causes role conflict.

Some of the demographic conditions of lecturers in Indonesia that have been mentioned are interesting to be studied this impact on publication performance. This study will analyze the factors that influence the performance of lecturer publications. Indonesia developed a national online database system called SINTA to asses publication performances of lecturers in Indonesia. This study will employ the score of the lecturer from this online database system. Overall, this research will examine several factors, namely Academic ranking, Administrative positions, Highest education, Overseas studies or Regional Studies, Age, Work years, and Gender on publication scores in SINTA. Understanding this factor is an important thing to consider in determining the best lecturers policy and management in Indonesia to improve the productivity and quality of research in Indonesia.

Literature Review

Conceptual Background

Human Resources Analytics

The practice of Human Resources Analytics provides a basis for decision making related to human management. This practice consist of the process of identifying variables, collecting data variables, and analyzing variable data relating to the organization in order to determine what must be maintained and what should be developed in organization (Armstrong & Taylor, 2020). Practice of human resources analytics in the tertiary education is the analysis of factors that influence the performance of human resources, namely lecturers. The research performance of lecturers in Indonesia can now be accessed through a system that has been designed to assess the productivity and quality of research called SINTA. This system uses a variety of benchmarks for lecturers' research performance in terms of quantity, quality (journal quartile), and the number of citations. Furthermore, Armstrong stated that the purpose of Human Resources analytics is to evaluate the effectiveness of recruitment, learning, and human resource development. The first process of human resources analytics is the analyzing and interpreting raw data to get the meaning called information. Information was processed for productive purposes called knowledge.

Factor Influencing Lecturer Research Performances

Academic ranking is related to salary and also obligations. Salaries from lecturers who have higher academic rankings are generally higher than salaries of lecturers with lower academic ranks. Bakotic (2016) states that Salary and position in the company affect job satisfaction. Monthly income affects job satisfaction (Shrestha, 2019) and Job satisfaction determines organizational performance. On the other hand, lecturers who have academic ranking professors and associate professors have dependents to produce scientific work. Puuska (2010) and Elfindri, Rustad, Nizam,& Dahrulsyah (2015) states that the productivity of professors is higher than in other positions.

Administrative positions have 2 opposite effects. Lovakov (2014) mentioned that administrative positions significantly affect affective commitment, but on the other hand causes role conflict. Administrative task of lecturers reduce lecturer time to conduct research. Administrative positions are considered to have negative impact on the publications productivity of lecturer. Lecturers with higher degrees tend to have better publication performance because doctoral education provides scientific skills and ability. Puuska (2010) shows that PhDs produce more publications than non-PhDs. Hemmings & Kay (2010), Gray & Helliard (1994) also find the same thing that a PhD has a significant effect on performance research. PhD education also offers deeper research skills compared to master's education. The researcher's qualification has a positive effect on research output (Sulo, Kendagor, Kosgei, Tuitok, & Chelangat, 2012).

Elfindri, Rustad, Nizam,& Dahrulsyah (2015) state that the productivity of international publications of lecturers who graduated from foreign universities is four to five much higher compared to the productivity of lecturers who graduated from domestic universities. Lecturers who study abroad tend to have higher confidence in international scientific publications. Gray & Helliard (1994) state that age has no significant effect on publication activities. Paul & Phua (2011) state that the relationship between age and job satisfaction

is U-shaped. This means that younger and older lecturers tend to have higher job satisfaction. Lecturers who have high teaching time tend to have more experience. This experience will make lecturers better in terms of research compared to new lecturers. Gray & Helliard (1994) which states that Gender has no significant effect on publication activity. Paul & Phua (2011) also stated that Gender had no significant effect on job satisfaction lecturers.

Conditions of Higher Education in Indonesia

According to MoRTHE (2018), the number of tertiary education institutions in Indonesia reached 4670, with 27.779 Study Programs, 1.732.308 New Entrants, 8.043.480 Enrolled Students, 1.247.116 Graduates, and 294.820 Lecturers. Gross Enrollment Ratios (the proportion of students to the population in the age group 19-23-years) in 2018 reach 34,58%. The number of lecturers with academic rank professors is 5.961, while lecturers without positions are 120.545. Lecturers in Indonesia are dominated by master graduates of 190.993, while doctoral graduates are only 39.687. Lecturers in Indonesia are dominated by the 26-35 year age group of 86.915, 36-45 years old at 84.624, and 46-55 years old as many as 71.408.

Lecturers in Indonesia have 3 main obligations called *Tridharma* of Higher Education, namely teaching, research, and social services. Lecturer positions in Indonesia consist of 4 positions namely lecturer (referred to as *asisten ahli*), senior lecturer (*lektor*), associate professor (called *lektor kepala*), and professor.

Research and Methodology

This study employs data of 658 lecturers in the faculties of economics and business from 7 public universities in Indonesia. Data of lecturer profile consisting of academic ranking, highest education, graduates from regional/overseas universities, gender, age, and working years are obtained from a lecturer database from Indonesia's ministry of higher education (MoRTHE). The administrative position of lecturer information is obtained from the university's official website. Each factor description is represented by the numbers shown in Table 1.

Table 1: Description of Factors tested

Factor	Description
Administrative Position	0 = no position, 1 = position in laboratory/staff, 2 = position in Department, 3 = position in Faculty, 4 = position in University
Gender	1 = male, 2 = female
Academic Grade	0 = no grade, 1 = lecturer, 2 = senior lecturer, 3 = associate professor, 4 = professor
Education	2 = Master, 3 = Doctor
Foreign Study	0 = non-foreign, 1 = foreign
Age	1 = <31, 2 = 31-40, 3 = 41-50, 4 = 51-60, 5 = >60
Teaching years	1 = 0-5, 2 = 6-15, 3 = 16-25, 4 = 26-35, 5 = >35

Indonesia developed a new national online database system called SINTA to assess publication performances of lecturers in Indonesia. This study will employ research scores from lecturers from this online database system. The calculation components and formulas of publication Score are shown in Table 2 (Version 1) and Table 3 (Version 2). The period used in this scoring consists of the 3-years score and overall score.

Table 2: SINTA Score Component and Formula version 1

Component of Assessment	Rating Weight (W)
Number of Journal Article Documents in Scopus (A)	40
Number of Non-Journal Documents in Scopus (B)	15
Number of citations in Scopus (C)	4
Number of Citation on Google Scholar (D)	1

$$\text{Formula Sinta Score: } ((Ax40) + (Bx15) + (Cx4) + (Dx1)) / \text{Divisor}$$

The divisor is a number resulting from a statistical calculation that takes into account the highest SINTA Personal Score / Highest Lecturer / Researcher.

Table 3: SINTA Score Component and Formula version 2

Component of Assessment	Rating Weight (W)
Number of Journal Article Documents in Scopus (A)	Q1 = 40 Q2 = 40 Q3 = 35 Q4 = 30 Non-Q = 30
Number of Non-Journal Documents in Scopus (B)	15
Number of citations in Scopus (C)	4
Number of Citation on Google Scholar (D)	0.5
Number of articles in the SINTA Journal (E)	S1 = 25 (non Scopus) S2 = 25 S3 = 20 S4 = 20 S5 = 15 S6 = 15

Formula Sinta Score: $WA * A + WB * B + WC * C + WD * D + WE * E$

Data Analysis Technique

The data obtained will be tested using the multivariate regression analysis at a 95% confidence level. Each of these factors will be tested by one-way ANOVA and followed by the Tukey test with a 95% confidence level. All statistical operations in this study use the Minitab® application.

Result and Discussion

The results of the regression analysis (Table 4) show that several factors significantly influence the performance of the publication.

Table 4: Results of Regression Test

Factor	Version 1 (18,15%)	3 years	Version 1 (24,54%)	Overall	Version 2 (21,73%)	3 years	Version 2 (23,51%)	Overall
	Coef	P-value	Coef	P-value	Coef	P-value	Coef	P-value
Constant	-0,239	0,306	-2,260*	0,013	-60,7*	0,021	-147,0*	0,037
Academic ranking	0,2048*	0,000	1,503*	0,000	35,70*	0,000	126,9*	0,000
Highest education	0,4026*	0,000	1,157*	0,001	45,6*	0,000	74,3*	0,007
Country where lecturer get degree	0,2383*	0,004	1,635*	0,000	19,99*	0,033	115,1*	0,000
Gender	-0,2442*	0,001	-0,527	0,065	-19,00*	0,022	-34,2	0,122
Administrative position	0,1687*	0,000	0,272	0,110	14,33*	0,004	22,1	0,094
Age	-0,0766	0,284	0,025	0,927	-7,71	0,338	-10,4	0,630
Work years	-0,0790	0,216	-0,449	0,071	-7,13	0,321	-31,9	0,098

*Significant at confidence level 95%

The value in parentheses () is the r-square of the regression equation

To find out the differences in the average SINTA score of each group, the Tukey test was carried out for a significant factor (Table 5). The Tukey test provides a letter index to distinguish significantly different values. Average values that have different letter indices have significantly different values. *Tukey test : Means that do not share a letter are significantly different.*

Table 5: Average and Tukey Test Results

Factor	Total	3 years performances		Overall performances	
		Version 1	Version 2	Version 1	Version 2
Academic Grade	Professor	59	1,383 (a)	192,7 (a)	7,66 (a)
	Assoc. Professor	131	0,5805 (b)	90,69 (b)	3,005 (b)
	Senior Lecturer	219	0,4452 (bc)	52,67 (c)	1,801 (c)
	Lecturer	240	0,2644 (c)	28,16 (c)	0,923 (c)
	No Grade	9	0,01333 (bc)	0,0556 (bc)	0,193 (bc)
Administrative Position	University	10	2,039 (a)	202,9 (a)	
	Faculty	30	1,252 (a)	140,0 (ab)	
	Department	102	0,6067 (b)	89,7 (b)	
	Staff and Laboratory	56	0,2616 (b)	34,4 (c)	
	No position	460	0,4004 (b)	52,69 (c)	
Highest Education	Doctor	318	0,8097 (a)	107,08 (a)	3,757 (a)
	Master	340	0,1800 (b)	22,03 (b)	0,7908 (b)
Graduate from	Overseas	169	0,7532 (a)	89,94 (a)	3,810 (a)
	Regional	489	0,3914 (b)	53,87 (b)	1,676 (b)
Gender	Male	327	0,6865 (a)	84,18 (a)	
	Female	331	0,2846 (b)	42,34 (b)	

The academic ranking factor coefficient is positive, which means the higher the academic ranking, the higher the performance of the publication. Regression test results show that an increase in 1 academic ranking can increase the value of publication performance by 0,2048 (version 1 3-years), 1,503 (version 1 overall), 35,70 (version 2 3-years), and 126,9 (version 2 overall). This is probably caused by several factors, the first is salary. According to Indonesia Government Regulation No. 15/2019, lecturers' salaries vary according to their academic ranking, the higher the academic ranking, the higher the base salary. Furthermore, Tukey's test results show that professors and associate professors have significantly higher publicity performance scores than other academic rankings (indicated by letters a and b). Professors and associates professors also receive an honorary salary. Bakotic (2016) states that Salary and position in the company affect job satisfaction. Monthly income affects job satisfaction (Shrestha, 2019) and job satisfaction determines organizational performance. Another factor that causes these results is the obligation to get the certification salary. Ministry of Research and Technology Regulation No. 20/2017 stated that to get a certification salary, the associate professor must make 3 national or 1 international scientific works, while professors must make 3 international journals or 1 accredited international journal. External factors that influence lecturers to conduct research are the desire to promote academic ranking (Chinamasa, 2012). This result is slightly different from Cadez, Dimovski & Groff (2013) which found that professors reduce the quality of teaching since young lecturers have new technology and focus on administration. However, many other studies show the same results as this study. Puuska (2010) and Elfindri, Rustad, Nizam, & Dahrulsyah (2015) states that the productivity of professors is higher than in other positions. Besides, new lecturers usually have a higher teaching burden compared to senior lecturers. Teaching load significantly reduces research productivity. The number of teaching hours may reduce research output, whereas the increase in the number of grants held per year may increase output per year in Australian academic economists (Fox & Milbourne, 1999). If the teaching load is small, the lecturer has more free time for research. Research time has a positive effect on publication scores (Hemmings & Kay, 2010). This result can be a consideration for the government to increase the number of professors but still strengthen the regulation on the obligation of lecturers to produce scientific paper. The small amount of Indonesian international research is also caused by the low of self-confidence about of the quality of the articles they produced, the writing of articles in English that takes a lot of time, and the lack of appreciation of lecturers who have successfully published in reputable international journals (Arsyad, Purwo, Sukanto, & Adnan, 2019).

Highest education has a significant effect on the performance of 3-year publications and overall with a positive coefficient. Regression test results indicate that an increase of 1 degree (meaning if the master lecturer increases his degrees to become a doctor) will increase the value of publication performance by 0,4026 (v1 3-years), 1,157 (v1 overall), 45,6 (v2 3-years), and 74,3 (v2 overall). Tukey's test results showed a significant difference between lecturers with PhDs and lecturers with Masters degrees. Puuska (2010) shows that PhDs produce more publications than non-PhDs. Academics with high qualifications tend to produce a lot of scientific work (Hemmings & Kay, 2010). Hemmings & Kay (2010), Gray & Helliard (1994) also find the same thing that a PhD has a significant effect on performance research. PhD education also offers deeper research skills compared to master's education. The researcher's qualification has a positive effect on research output (Sulo, Kendagor, Kosgei, Tuitoek, & Chelangat, 2012). There is a positive correlation between work engagement and human resource management practices, such as learning and developing (Veth, Korzilius, Van der Heijden, Emans, & De Lange, 2019). The government must encourage lecturer resources in Indonesia to increase its degree. The policy of the Indonesian government to offer PhD scholarships for lecturers are the right thing and needs to be improved considering that the PhD has a significant influence on the performance of publications.

The university where the lecturer got his degree also had a significant influence on the score of the publication. The positive coefficient reflected that the SINTA score of overseas university graduate lecturers is significantly higher than domestic graduate lecturers. Regression test results indicate that lecturers who get their degrees from overseas universities have added scores of 0.2383 (v1 3-years), 1.635 (v1 overall), 19.99 (v2 3-years), and 115.1 (v2 overall) compared to lecturers who get their degrees from universities in Indonesia. This is in line with the findings from Elfindri, Rustad, Nizam, & Dahrulsyah (2015) that the productivity of international publications of lecturers who graduated from foreign universities is four to five much higher compared to the productivity of lecturers graduated from domestic universities. This is possible because studying abroad can add to international collaboration. International collaboration can increase the productivity of scientific publications, especially international publications (He, Geng, & Campbell-Hunt, 2009). These results indicate that studying abroad has a positive impact on the quality of lecturers, but on the other hand, studying abroad requires a large cost. Conducting overseas scholarships for lecturers is important, one of them is conducting educational cooperation with other countries, but subsequent research can focus on which country that produce graduates with the highest scientific productivity and also consider the cost of study in the country. However, the Indonesian government must also improve the quality of master and doctoral education in domestic university.

Regression test results show that gender has a significant influence on the lecturer publication performance in the last 3-years. The negative coefficient of this factor shows that men have a higher publicity performance than women (because in this regression test, men are replaced by number 1, and women are replaced by number 2). The regression equation indicates that female lecturers have reduced scores by 0,2442 (v1 3-years) and 19,00 (v2 3-years). Tukey's test results showed a significant difference between the scores of male and female lecturer publications. This result is different from the findings from Gray and Helliard (1994) which states that Gender has no significant effect on publication activity. Paul & Phua (2011) also stated that Gender had no significant effect on job satisfaction lecturers. However, Puuska (2010) found that male is better than female in scientific publications. Female research output was generally low. Female academics made contributions that are more significant to teaching than research (Ogbogu, 2009). These results indicate an increase in the performance of male lecturer publications over the past 3-years compared to female lecturers. This

result could be due to the obligations of women in Indonesia who have household obligations that are likely to reduce research time. Besides, men have more energy to do research than women. The results of these factors can be taken into consideration for policymakers to increase the productivity and quality of research in Indonesia.

Regression test results show that the administrative position has a significant effect on the performance of publications in the last 3-years. The regression equation indicates that each addition of 1 administrative position will provide an increase of 0,1687 (v1 3-years) and 14,33 (v2 3-years). Lovakov (2014) mentioned that administrative positions significantly affect affective commitment, but on the other hand causes role conflict. The coefficient of this factor is positive, meaning that the higher the administrative position, the higher the public performance. This can happen because the holder of an administrative position often has access to a larger amount of extra university income, such as funds from contract research, as a result of the power generated by the position (Clark & Oey-Gardiner, 1991). Paul & Phua (2011) also state that managers have significantly higher values than senior lecturers and lecturers. Tukey's test results show that lecturers who have positions at the university and faculty levels are significantly higher than those without a position. Administrative position holders usually are more senior lecturers who have a high academic rank. This also confirms that the administrative position of the lecturer does not reduce the performance of publications and does not interfere with the research activities of lecturers.

To find out the effect of age and work year fairly on a publication score is to look at a 3-year performance because when viewed from an overall score it will be unfair. Regression test results showed that there was no significant effect of age and work years on the performance of lecturers' publications both the last 3-years and overall ($p\text{-value} > 0.05$). These results are in line with research from Gray & Helliar (1994) which states that age has no significant effect on publication activities. But Paul & Phua (2011) state that the relationship between age and job satisfaction is U-shaped. This can occur because young lecturers are given more teaching load compared to more senior lecturers.

Overall, regression equation r-squared value of 3-year version 1, version 2, overall version 1, and version 2 are 18,15%, 21,73%, 24,54%, and 23,51% respectively. This means that the factors mentioned earlier are able to explain only around 25% publicity performance of lecturers in Indonesia. The next research needs to be carried out a deeper and more comprehensive analysis to find out other factors that influence the performance of publications so that the management of lecturer resources can find the right decision.

The results of this study contribute to increasing understanding of the aspects of human resources analytics in higher education, especially in developing countries.

Conclusions

Regression test results show that the factors of academic ranking, highest education, and country university where lecturers get their degree have a significant effect ($p\text{-value} < 0.05$) on the performance of scientific publications both 3-year performance and overall performance. Gender and administrative position factors only have a significant effect on the performance of publications in the past 3-years. While the age and duration of teaching did not significantly influence publication performance. The results of this study provide direction for policy makers to improve factors Academic ranking, highest education, and country university where lecturers get their degree by increasing the qualifications of master lecturers to become doctors, improving the quality of postgraduate education, and reviewing regulations related to academic ranking. Due to the limitations of the factors tested, the results of this study have not been able to fully explain the performance of publications lecturers in Indonesia. Regression equation r-squared value of 3-year version 1, version 2, overall version 1, and version 2 are 18,15%, 21,73%, 24,54%, and 23,51% respectively. Subsequent research needs to be done with a more comprehensive analysis of factors so that it can be identified factors that are almost the performance of lecturer publications in Indonesia.

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