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STRESS DUE TO SCIENTIFIC PUBLICATION AMONG ACADEMIC LECTURERS: INDONESIA CASE

ABSTRACT. *Recently, the Indonesia government has put forward regulations about scientific publication addressed to academia. Lecturers in Indonesia often consider that they are underpaid, the existing support systems for research is limited, and academic workloads are excessive. By considering those constraints, we anticipate that the new regulations may alleviate lecturers' stress level. Therefore, the purpose of this study is to examine the impact of the publication obligations on job stress among academic lecturers in Indonesia. We adopt the Job Demand-Control-Support (JDC-S) model that expresses the construct Job Stress and the affecting factors, namely, Job Demand, Job Control, and Job Supports. Questionnaires are used to collect the required data for those constructs from a random sample of 100 lecturers in the country. The data are analyzed by using descriptive statistics and multivariate regression analysis, and the findings follow. Those who hold doctoral degree incline to consider the publication demand is low, but for those with master degree, their opinion about the demand spread uniformly from low, average, and high. The participants find it rather hard to control aspects around the responsibility. The supports for publication are considered low, but they do not contribute much in alleviating the stress level. The stress model fits reasonably well to the issue, suggesting Job Demand and Job Control to be the most relevant factors.*

**Keywords:** Job Stress, Job Demand, Job Control, Job Support, Scientific Publication

1. **Introduction.** During the last five year, the data presented by Ref. [1] suggest that the number of scientific publications from Indonesia has increased significantly in quantity as shown in Fig. 1 and in quality as shown in Fig. 2.

The trend is a result of a set of regulation put forward by Indonesia government such as Permenristekdikti No. 20 concerning providing professional lecturers honorary allowances to improve the quality and quantity of scientific publications and Permenpan No. 17 and 46 of 2013 regarding the obligation to produce and disseminate scientific publication.

Without any doubt, the policies of increasing the academic contribution have contributed an additional but significant amount of workloads to Indonesia lecturers. How it affects the stress level among Indonesia lecturers is the subject of this research work.

Any employee concerns with the issues of job stress and job satisfaction as they strongly influence working performance. For the reason, many bodies of works have addressed the issue across various sectors of employment including health [2, 3], telecommunications [4], banking [5, 6], petrochemical industry [7], security [8], and education [9]. Those studies found the stress is influenced by various factors such as workload, professional recognition, time and resources constraints, interpersonal relationships, technology training and support, facilities, and technology literacy. Besides, Ref. [9] found that the phenomenon of the stressed lecturers in academia is rather pervasive. In the latter case, it may be influenced by student misbehavior, curriculum exposure constraints, and some academic responsibility such as publication. We should note that excessive stress may have negative association with physical health as established by Ref. [10].

Understanding the stress level induced by the new policy regarding the scientific publication in Indonesia is a crucial and novel issue.
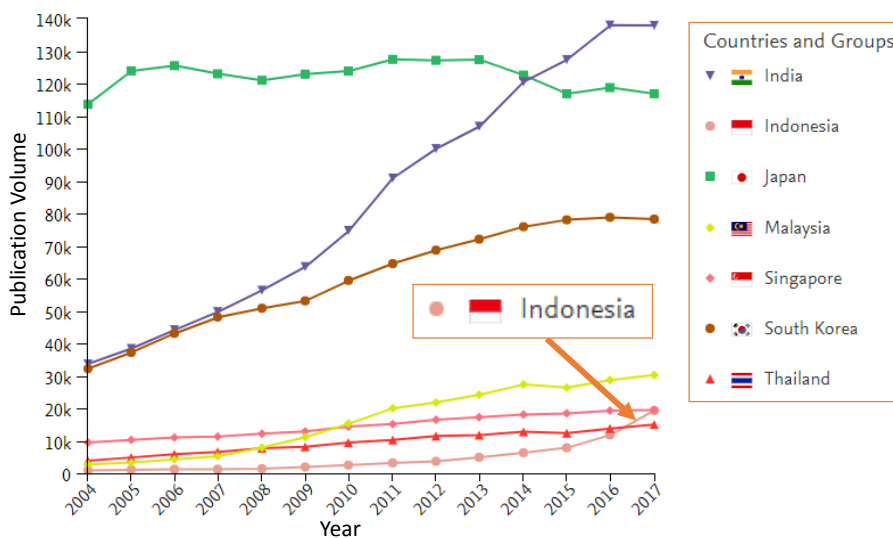
Data Source: Elsevier SciVal, Articles, Conferences, Reviews, July 2018

FIGURE 1. The number of scientific articles published by some Asian countries from 2004 until 2017.
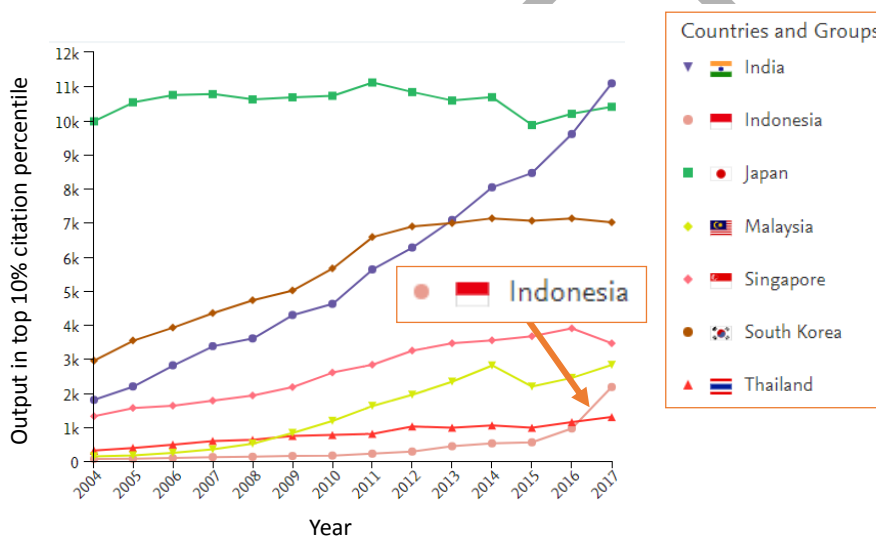
Data Source: Elsevier SciVal, Articles, Conferences, Reviews, July 2018

FIGURE 2. The number of highly cited scientific articles published by some Asian countries from 2004 until 2017.

We structure the paper as follow. Section 2, Research Method, describes the data collection and analysis methods, and also the adopted theory. Section 3, Research Results, presents the descriptive statistics of the respondents and their opinion, the results of the multivariate regression analysis, and discussion. Finally, Section 4, Conclusion, presents the most important findings in brief.

2. **Research Method.** To the best of our knowledge, five models are widely used in the study of job stress and satisfaction. They are Job Demand Resources model, Person-Environment Fit model, Job Characteristics model, Diathesis-Stress model, and Effort-Reward Imbalance model.

Those theories suggest that job stress is closely related to the environment of the workplace where complex interaction between individuals and organization occurs. The Job Demand Resouces model is also often addressed as Job Demand-Control-Support (JDC-S) model. According to the model, the level of job stress depends on demands, control, and support. The function is illustrated in Fig. 3. The job stress is higher with the higher job demand, and with lower control and support. The high-stress level may seriously affect the employee's health [11].
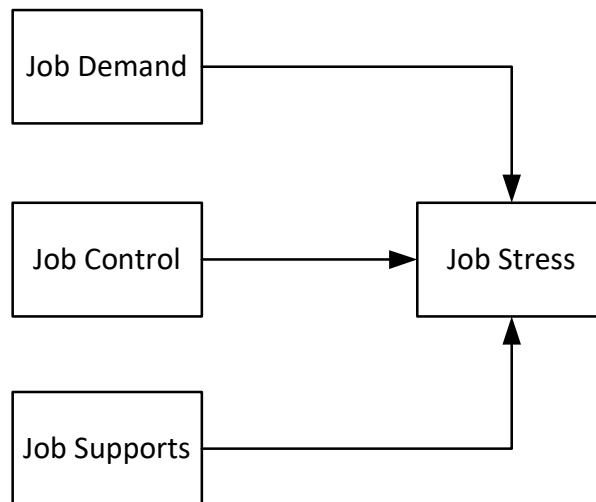
FIGURE 3. The Job Demand Control-Support (JDC-S) model adopted in this study.

Thus, the study involves four constructs, namely, Job Demand, Job Control, Job Support, and Job Stress. The definitions of the constructs strictly follow those given by Ref. [12]. They are defined as the following:

Job Demand: "one's perceived workload and further narrowed to quantitative measures of one's overloading the job. Work overload creates stress, anger, aggressive behavior, or conflicts, which is expected to negatively influence an individual's mental and physical health through increased activation of the hypothalamic-pituitary-adrenocortical system, sleep difficulties."

Job Control: "a worker's perceived freedom in how to meet their job demands and aims at reducing uncertainty in the workplace through providing exact instructions on how job tasks must be done."

Job Support: "overall levels of helpful social interaction available on the job from both coworkers and supervisors."

Thus, the following hypotheses are assessed in the current study:

$$H_1 : \text{Job Demand affects Job Stress.}$$
$$H_2 : \text{Job Control affects Job Stress.}$$
$$H_3 : \text{Job Support affects Job Stress.}$$

To statistically evaluate the relationships depicted in Fig. 3, the data of those four constructs are collected using questionnaires. The instrument is distributed to academic lecturers residing in Indonesia within the time frame of May 2019 until June 2019. Some sources suggest that the number of the total Indonesia lecturers is 237 837 individuals. With ten percent precision, the required sample size is about 100, according to Ref. [13]. The sample is selected randomly. Then, the questionnaires are distributed to those individuals online.

The questionnaires consist of five sections. We note that the questionnaires are administered in Indonesia language to the respondents. Section A contains basic information from respondents such as age, gender, education, teaching experience, and marital status.

The remain sections contain questions addressing Job Demand, Job Control, Job Supports, and Job Stress. For each of those questions, participants are provided with five options, from which one answer must be selected. Those options are Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree.

Section B contains four statements to access Job Demand in the individual current position. Those statements are:

- I am overwhelmed in pursuing the targets of scientific publications.
- I usually work overtime in completing scientific publications.
- I am disturbed by the obligation of scientific publications.
- I pay attention to SINTA ranking as an appreciation and self-proof.

A lower score in Job Demand indicates a lower demand.

SINTA is a site established by the Ministry of Research, Technology, and Higher Education of the Republic of Indonesia for aggregating scientific outcomes and ranking among lecturers. A typical SINTA page can be seen in Fig. 4.

Section C contains four statements to measure the level of Job Control. Those statements are:
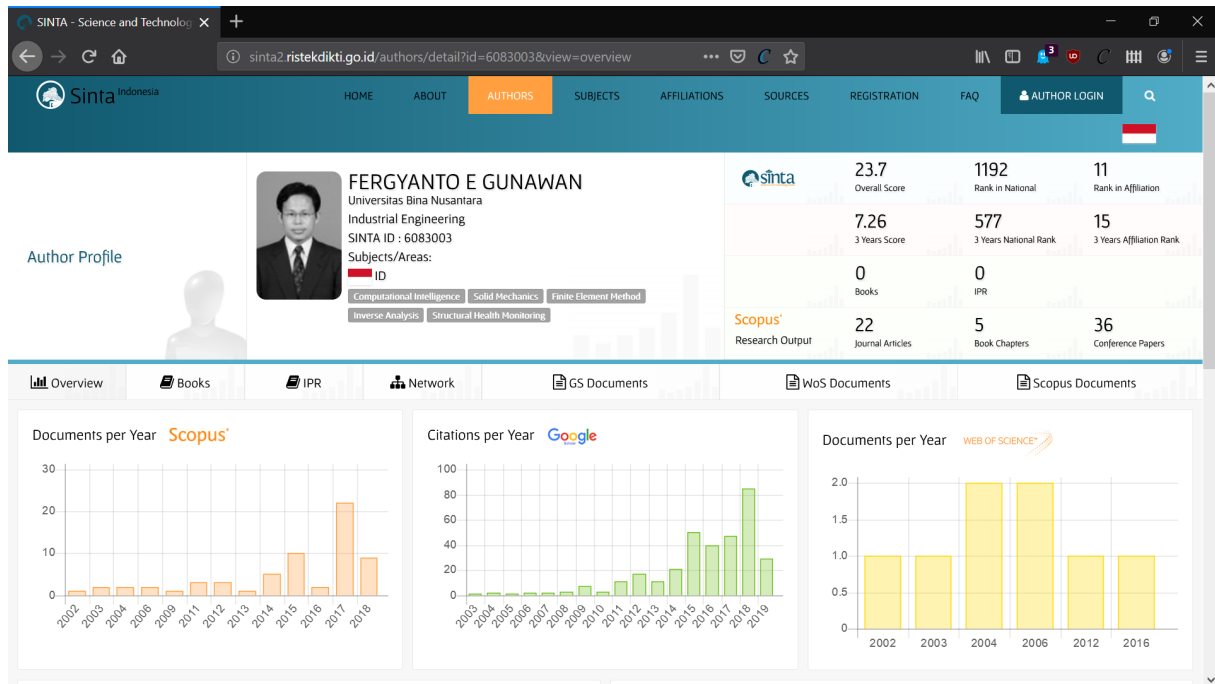
FIGURE 4. A typical SINTA page. SINTA provides some information of scientific outcomes. SINTA is established by the Ministry of Research, Technology, and Higher Education of the Republic of Indonesia.

- I can manage the obligations of scientific publications.
- My working environment is suitable for the writing of scientific publications.
- I can manage the time for composing scientific articles.
- I have the freedom to determine the research topic for publication both in national journals or international journals

A lower score in Job Control denotes the condition of less control on the jobs at hand.

Section D contains four statements to assess Job Supports. Those statements are:

- I am assisted by institution in financing scientific publications.
- I am supported by colleagues in writing scientific publications.
- I am awarded by institution for publishing scientific articles.
- Institution has supporting facilities for scientific publications.
- Institution provides training for writing scientific publications.

A lower score in Job Support indicates less support.

Finally, section E contains a statement to assess Job Stress. The question is: "How high is your stress level due to the obligation of scientific publication?". A lower score on Job Stress indicates a lower stress level.

The conformity of the three hypotheses to the collected empirical data is evaluated statistically by multivariate regression analysis. For the purpose, we establish a linear model of:

$$\text{Job Stress} = \beta_0 + \beta_1 \cdot \text{Job Demand} + \beta_2 \cdot \text{Job Control} + \beta_3 \cdot \text{Job Support.} \tag{1}$$

The three hypotheses are accepted on the condition that the t statistics associated with β_1, β_2, and β_3 are sufficiently large, exceeding the critical limit of $t_{(\alpha/2,n-d-1)}$, where α denotes the significance level and is usually taken as 0.05. Prior to the computation of the t statistics, we perform the ANOVA test to determine the importance of Model (1) globally. In this case, we compute and evaluate the F statistic. In addition, we also evaluate the model fitness to the data by using the coefficient of determination or R^2. Finally, we evaluate the residual data, which represent the gap between the model prediction and the actual data, to understand the suitability of the model with the basic assumptions from which the model is established.

3. **Research Results.**

3.1. **Descriptive Statistics.** First, we start the discussion with a general description regarding the respondent's responses to the four constructs. The relevant statistics, the means and standard deviations, are presented in Table 1. These data suggest that on the average, the demand for publication is considered

TABLE 1. The descriptive statistics of the responses to each question. The measures scales are Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4), and Strongly Agree (5).

Constructs and Statements	Mean	Std.
Job Demand		
I am overwhelmed in pursuing the targets of scientific publications.	2.93	1.008
I usually work overtime in completing scientific publications.	3.02	0.995
I am disturbed by the obligation of scientific publications.	2.60	0.947
I pay attention to SINTA ranking as an appreciation and self-proof.	3.34	0.956
Job Control		
I can manage the obligations of scientific publications.	2.26	0.676
My working environment is suitable for the writing of scientific publications.	2.49	0.990
I can manage the time for composing scientific articles.	2.44	0.833
I have the freedom to determine the research topic for publication both in national journals or international journals.	2.23	0.790
Job Supports		
I am assisted by institution in financing scientific publications.	2.55	0.999
I am supported by colleagues in writing scientific publications.	2.27	0.737
I am awarded by institution for publishing scientific articles.	2.78	1.001
Institution has supporting facilities for scientific publications.	2.45	0.925
Institution provides training for writing scientific publications.	2.24	0.842
Job Stress		
How high is your stress level due to the obligation of scientific publication?	2.94	0.874

to be moderate by Indonesia lecturers. The participants incline to consider the demand for publication to be disturbing.

As for the second construct, Job Control, the participants' opinion tends to be negative, suggesting an inclination to the condition of lack of control. They tend to disagree with the statement "I can manage the obligations of scientific publication". A similar tendency is also visible on the statement "I have the freedom to determine research topics".

As for the third construct, Job Support, the participants' opinion also tends to disagree. They tend to disagree to the statement "Institution conduct training for writing scientific publications" and "I am supported by colleagues in writing scientific publication". Generally speaking, they incline to disagree with receiving support from their institution and colleagues.

Finally, they do not consider that the obligation of scientific publication leads to high stress.

3.2. **Reliability of Participants' Responses.** We use Cronbach's alpha to evaluate the internal consistency of responses for each construct. Responses are assumed reliable if the associated alpha is higher than 0.7. For the current research, the computed Cronbach's alphas are presented in Table 2, and all values are higher than the threshold. Thus, we consider the participants' responses to be reliable.

TABLE 2. The computed Cronbach's alpha for each construct to evaluate the internal consistency of the participants' responses.

Constructs	Number of Items	Coefficient of Reliability	Reliability Status
Job Demand	4	0.70	Reliable
Job Control	4	0.74	Reliable
Job Supports	5	0.82	Reliable

3.3. **Multivariate Regression Analysis.** We begin the multivariate analysis by observing the fitness between the data and the assumed model, Model (1). Statistically, the fitness is described by the coefficient of determination or R^2. The result is $R^2 = 0.532$, suggesting that the model reasonably fits the data.

The second statistical analysis is the F test to evaluate the significance of the coefficients β_1, β_2, and β_3 in Eq.(1) as a whole. The null hypothesis for the test is $\beta_1 = \beta_2 = \beta_3 = 0$, and the alternative hypothesis is: at least, a coefficient is non zero. As for this test, the results are presented in Table 3 where the computed F-stat equals to 36.433 at the p-value of 0.000, suggesting the alternative hypothesis prevails.

TABLE 3. The result of the F test where the independent variables are: Job Demand, Job Control, and Job Supports, and the dependent variable is Job Stress.

Model	Sum of Squares	df	Mean Squares	F-stat	p-value
Regression	40.270	3	13.423	36.433	0.000
Residual	35.370	96	0.368		
Total	75.640	99			

The third step in the multivariate analysis is the t test for the three coefficients, namely, β_1, β_2, and β_3. The results are depicted in Table 4. The results suggest that the first two coefficients, i.e., $\beta_1 = 0.672$ and $\beta_2 = -0.389$, are to be statistically significance. Meanwhile, the third coefficient, i.e., $\beta_3 = -0.082$, is statistically insignificant.

TABLE 4. The result of the t tests where the independent variables are: Job Demand, Job Control, and Job Supports, and the dependent variable is Job Stress. See Model (1).

Model	Unstandardized Coefficients		Std. Coef.	t-stats	p-values
	B	Std. Error	Beta		
(Constant)	2.650	0.680		3.896	0.000
Job Demand	0.672	0.105	0.528	6.369	0.000
Job Control	-0.389	0.131	-0.268	-2.965	0.004
Job Supports	-0.082	0.104	-0.061	-0.792	0.431

We have the confidence with these results as we look into the Pearson's correlation coefficients. Respectively, the values are 0.683, -0.578, -0.268 for the correlations of Job Stress-Job Demand, Job Stress-Job Control, and Job Stress-Job Supports. Those statistics are significant at the confidence level of 0.01 with two tails. High stress is associated with high demand, low control, and low support. However, a strong association only exists in Job Stress-Job Demand and Job Stress-Job Control. As for Job Stress-Job Supports, the association is rather mild.

From the results in Table 4, we obtain the regression model relating Job Demand, Job Control, and Job Supports to Job Stress of the following:

$$\text{Job Stress} = 2.650 + 0.672 \cdot \text{Job Demand} - 0.389 \cdot \text{Job Control} - 0.082 \cdot \text{Job Supports}. \qquad (2)$$

We should state a few notes regarding the model. The lower score of Job Stress, Job Demand, Job Control, and Job Support respectively indicate a lower stress level, a lower demand level, a lower control on the tasks, and more deficient support from the institutions and colleagues. We also note that the effect of the Job Support to Job Stress is statistically insignificant.

The model seems to be intuitive. A lecturer may undergo high stress on the conditions of high demand, poor control, and inadequate support. In the other side, the stress is low when the demand is low, and when the control and supports are high.

As for the final part of the regression analysis is to evaluate the correctness of the assumptions from which the regression model is derived. For the purpose, we evaluate the normality and randomness of the residual data, which represents the difference between the model predictions on the stress level and the participants' responses. The results are presented in Fig. 5. These results indicate that the assumption is satisfied, and it concludes our multivariate regression analysis.

3.4. **Discussion.** In this work, we study the stress among Indonesia lecturers due to the governing regulations regarding scientific publication. We look at the problem from JDC-S theory. The empirical data and the theory fits at $R^2 = 0.532$. Strong correlations are found for Job Stress-Job Demand and Job Stress-Job Control. However, we also identify a weak correlation between Job Stress-Job Supports. For the latter relationship, the computed t statistic is too small to ensure that it does not happen by chance. Despite this fact, in general, JDC-S theory explains the problem sufficiently well.

On this basis, to better understand the problem, we look into the detail of the respondents' responses to the four constructs. We summarize the respondents' opinion in Fig. 6. It reveals some interesting phenomena.

Firstly, we look into the distribution of opinion in the aspect of Job Demand. The data suggest the respondents tend to concentrate in two blocks: those who consider the demand is slightly high and those who consider it is slightly low. We speculate that this phenomenon may be explained by the education
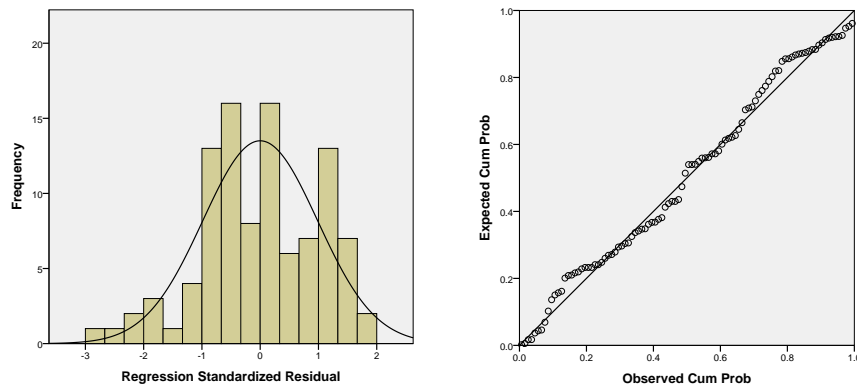
FIGURE 5. The distribution of the residual data in the form of a probability-probability plot.
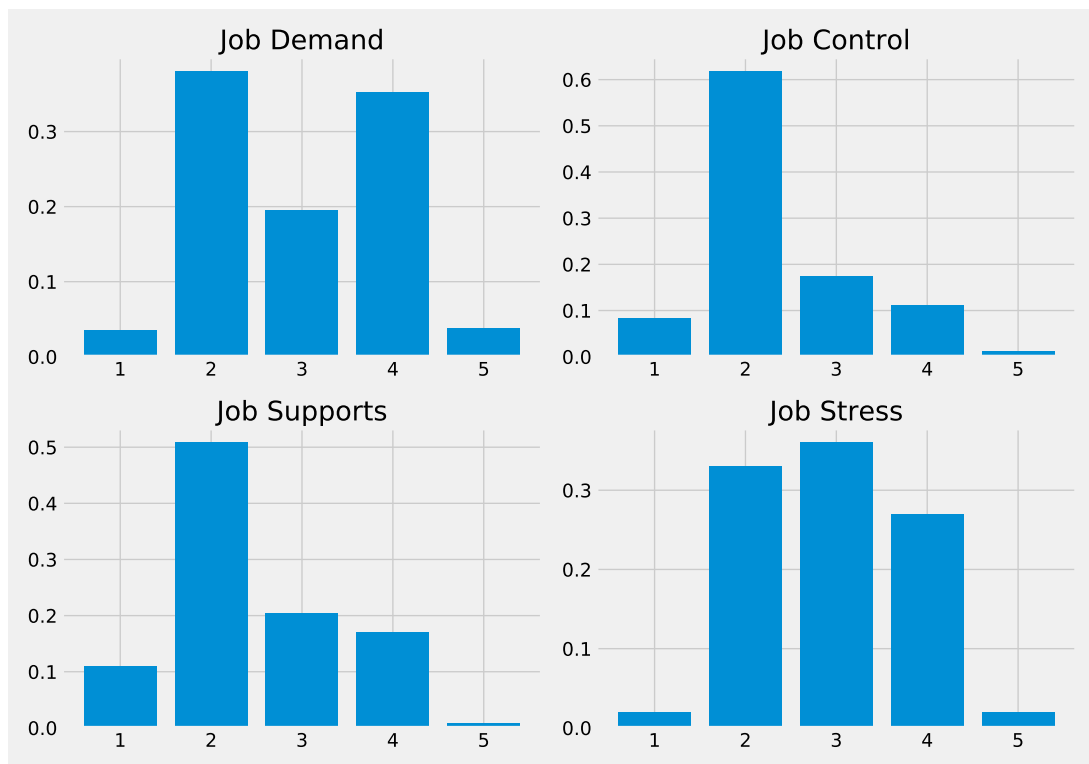

FIGURE 6. The distribution of the participants's responses to the questionnaires. Lower value denotes lower demand, lower control on the job, lower amount of existing supports, and lower stress level.

level of the lecturers. We note that in Indonesia, the law stipulates that the minimum degree to be a lecturer in bachelor programs is master degree. Meanwhile, usually, only those who have a doctoral degree possess sufficient skillsets for writing research papers. On this basis, we speculate the pressure of scientific publication may bring forth higher stress to one with a master degree than to one with a doctoral degree. To support this conjecture, we cross-tabulate the data of Job Stress and academic degree, see Table 5. It shows the majority of lecturers with doctoral degree believe their stress level is low. Meanwhile, those who have a master degree, their opinions about this issue spread rather uniformly from low to high. Thus, the stress induced by the publication obligation depends on the academic degree.

For the cases of Job Control and Job Supports, the majority of the participants agree that both factors are rather low. Job Stress is rather normally distributed. Interesting to see that the lack of Job Supports does not influence Job Stress, but the lack of Job Control affects Job Stress.

4. **Conclusion.** We begin this research with interest to understand the relationship between the obligation for scientific publication and the stress level among Indonesia lecturers. The stress level distribution, according to the data, tends to follow the normal distribution. For most participants, the stress level is

TABLE 5. The relationship between the stress level and the lecturer academic degree.

		The Level of Stress due to Publication					
		Very Low	Low	Neutral	High	Very High	Total
Education	Bachelor Degree			1			1
	Master Degree		23	28	25	1	77
	Doctoral Degree	2	10	6	2	1	21
	Unknown			1			1
	Total	2	33	36	27	2	100

at an acceptable level. From the perspective of JDC-S theory, the stress is mainly affected by the aspects of demand and control related to the job, rather than by the job supports. Many consider the demand is rather high, as much as those who consider the demand is rather low. In detail, those who hold doctoral degree incline to consider the publication demand is low, but those who hold master degree, their opinion about the demand spread uniformly from low, standard, and high. Many consider the supports for research in Indonesia is rather low. However, the lack of support does not lead to or affects their stress level in a statistically significant manner. The lecturers seem to accept the fact rather well.

For future research, it may be useful to view the problem by using different theories such as Person-Environment Fit model to reveals other aspects affecting the job stress.

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