The impact of job stress on employee productivity during Covid-19 pandemic at the aviation industry

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Abstract. The aviation industry is significantly affected by the Covid-19 issue due to the travel ban policy to avoid any uncontrolled Covid-19 outbreak. This condition certainly produces stress that affects employee productivity. In this study, observations were made of the effect of Job stress and the stress on the impact of the Covid-19 pandemic to the productivity of aviation engineering employees. The 65-person questionnaires were distributed to collect the data samples. The relationship of Job stress to Covid-19 stress issue to the employee productivity was analyzed using multivariate regression analysis. A series of statistical tests on the reliability of respondents' responses, $R^2$ test, F-test, and t-test are conducted to strengthening research hypothesis analysis. The results showed that Job stress and Covid-19 stress parameters had a simultaneous effect on employee productivity. The Covid-19 parameter was more significant than Job stress to affect the productivity. The linear regression model showed $R^2 = 68.1\%$ which meant the model reasonably fit the data. The analysis had also proof that the model met the regression, normality, and random requirements. For further research, it was required to formulate mitigation activities to minimize any risk of job and Covid-19 issue stress that significantly affected the employee productivity.

Keywords: Aviation industry, Covid-19, Job stress, Multivariate regression analysis, Productivity

1. Introduction
The Covid-19 outbreak is currently a world concern in preventing its impact. The impact of Covid-19 pandemic has greatly affected many aspects of human life throughout the country, especially in the aviation industry. According to Lau et al. [1] that the number of flight routes and the total volume of passengers is very relevant to the risk factors of the current spread of Covid-19 so that a global flight ban policy is imposed. As seen in figure 1 [2] shows the number of global commercial flights during the month affected by Covid-19, after March, which decreased from the maximum number of flights. In the first quarter of 2020, the impact of aviation losses could negatively reduce the World Gross Domestic Product (GDP) by 0.02% to 0.12% according to observed data and in the worst-case scenario. Further, it is forecasted that by the end of 2020 the losses could be as high as 1.41to 1.67% and job losses can reach a value of 25 up to 30 million.
Figure 1. The number of global commercial flights from February to August 2020

Figure 2. The number of commercial flights at several airports in Asia from February to August 2020

Figure 2 shows total number of commercial flight at several airports in Asia that has been impact by Covid-19 pandemic on the aviation industry could be access at Opensky Network site [3]. Furthermore, the number of decrease flights from the maximum flight capacity. Armstrong et al.[4] mentioned that the possible direct impact of the flight ban due to Covid-19 involve the overall economic activity, the creation of jobs that directly serve passengers in airlines, airports, and air navigation service providers. It also includes jobs related to the manufacturing sector (companies that manufacture aircraft, machinery, and other vital technologies) also Maintenance, Repair, and Overhaul (MRO). Therefore, it cannot be denied issue creates problems for the aviation industry, there are stress and the impact on worker productivity. Job stress is understood as a dangerous physical and emotional response that occurs when job requirements do not match the abilities, resources, or worker’s needs. Job stress is a reaction to dealing with pressure in workers [5]. Every worker understands that Job stress has a huge impact on productivity, and it should be maintained well.

Research on stress in aviation workers has been reviewed by MacDonald et al.[6] who evaluated the existence of chronic Job stress in flight attendants by studying the relationship between the causes of Job stress (stressors) and job dissatisfaction. The independent variable is the cause of Job stress measured based on role ambiguity, role conflict, superiors’ support, coworkers support, and task control. Sun K et al. [7] found analyzed the relationship of stress and work performance using Structural Equation Modeling (SEM) and proposed a model and policies to improve human resource management for the aviation industry. In other research, Cahill et al. [8] developed a tool to improve pilot work-related stress and suggested that aviation industry should support psychological and positive activities in contributing employee wellbeing.

Research on job stress on employee performance during Covid-19 has also been carried out by the research of Prasad K and Vaidya R W[9] in agriculture. The Covid-19 parameters studied consisted of
five factors, namely the effect of workplace isolation, reducing communication with colleagues, reducing interactions with friends, reducing interactions with family, and excessive work. Furthermore, Job stress causes job delays, inappropriate job roles, job role problems, social support, career, job control, and finally affects the worker's performance factors. In other research, according to [10] found that the level of Job stress in the organization is low. Authors collected 80 respondents (10% of the total population) data using stratified random sampling technique. One important finding that stress is also associated with lower productivity, absenteeism, and increased rates of work accidents.

In other studies, the effect of stress was also observed contributed to decreasing employee productivity. Hoboubiet al. [11], interviewed 125 petrochemical company employees as respondents. The study determined the level of Job stress, the job descriptive index to test job satisfaction, and Hersey and Goldsmith questionnaires used to investigate the productivity in this study. The analysis showed that the Job stress levels was at the medium-high levels while productivity was moderate.

Based on a literature study, there are many effects of Job stress on employee productivity and it possible to be worsen during the Covid-19 pandemic. This research is conducted to determine the effect of Job stress and Covid-19 stress parameters on employee productivity in aviation industry. It is very important to evaluate the industry performance and avoid any worse risk that disturbing the business.

Given above this present study was carried out to investigate the impact of Job stress on employee productivity during Covid-19 pandemic at the Aviation industry. Thereby, evaluating and exploring the causal relationships cause of Job stress during Covid-19 pandemic in impact to employee productivity.

2. Methods

2.1. Research framework
This research follows the theoretical framework which was proposed by the research of Prasad K and Vaidya R W [9]. In this research, Job stress factors and Covid-19 are supposed to be independent variables that affect productivity. Productivity as the dependent variable is measured using five factors adopted from the research of Indhu G and Thirumakkar [10]. The research framework is illustrated at Figure 3.
Based on the framework as, this study involves three variables which are defined as follows. Job stress is a pressure on employees caused by work-related factors [9]. Covid-19 parameters is a factor to examining the emergence of stress in workers during the Covid-19 pandemic refer to the research of Prasad and Vaidya [9] and Productivity is a measure of the efficiency of a person, machine, factory, the system in converting inputs into useful outputs [12]. Thus, the proposed hypothesis in this study are $H_1$ (Job stress affects productivity) and $H_2$ (Covid-19 stress parameters affect productivity).

2.2. Data collection and acquisition

The data were collected through a questionnaire to evaluate the statistical model and achieve hypothesis test. The questionnaire was distributed to technicians in each production unit in the component department of aviation industry. The questionnaires were distributed during August 2020 period on working day.

Based on the data from Human Resource Department PT X, the total number of the production crew is 187 people as shown at figure 4. It is referred to the 10% precision level rule, the data sample taken is at least 64 employees [13]. In this study, 65 employees of component department data samples were taken. The distribution of the respondents is tabulated in table 1.

The questionnaire consists of 4 parts. Part 1 consists of general information such as gender, marital status, number of children, age, education, work schedule system (shift or normal), working hours, and salary. In this part also contains of questions which are focused on the indicators of Job stress, Covid-19 Stress Parameters, and Productivity. Each indicator has several questions related to stress and productivity parameters. Respondents are required to provide five Likert-scale possible answer, namely Strongly Agree (5), Agree (4), Neutral (3), Disagree (2), and Strongly Disagree (1).
Part 2 of the questionnaire consists of the composition of 4 parameter questions on the production employee Job stress indicator. For example, for the workload parameter statement for the Job stress indicator is illustrated by these statements: “I feel bored with the work I do”, “I feel the current workload is high”, “I feel the workload makes the time I allocate to work unbalanced with my personal life” and “I feel that by working at home my workload is increasing”. A high score level indicates a high level of stress on the job currently.

Part 3 of the questionnaire consists of a composition of the four parameter questions on the Covid-19 indicator which affect the stress parameters for production employees. For example, the workplace isolation parameter statement for the Covid-19 indicator stress parameter is shown at these statement: “I feel that work activities are limited by the isolation policy during the pandemic”, “I feel burdened by the current isolation policy”, “I feel that physical distancing is not applied to my office” and “I felt that self-isolation during the Covid-19 epidemic at home gave stress to my job”. A high score level indicates the level of stress caused by the current high Covid-19 pandemic conditions.

Part 4 of the questionnaire consists of for parameter questions to measure the level of the employee productivity indicator. As an example of the work performance parameter statement for the productivity indicator are “I feel that the implementation of work from home causes a loss of work productivity”, “I feel that my productivity has decreased because my workload has also decreased during this pandemic”, “I have experienced a decline in performance due to the current condition of the company” and “I feel that the inhibiting factors of working at home are reducing my job performance”. A low score level indicates the current level of employee productivity is low.

2.3. Data analysis

The suitability of the two hypotheses which are analyzed regarding to the collected empirical data using multivariate regression analysis. At the end, a linear model will be developed as follows:


\[ \text{Productivity} = \beta_0 + \beta_1 \cdot \text{Job Stress} + \beta_2 \cdot \text{Covid19 Stress Parameter} \] (1)

In this study, two hypotheses were accepted with the condition that the t statistical value associated with the coefficients \( \beta_1 \) and \( \beta_2 \) had quite a large difference, exceeding the critical limit, \( t(\alpha/2, n-(k-1)) \), where \( \alpha \) was a significant level, namely equal to 0.05. Suppose that \( n \) as the number of data samples and \( k \) is the number of independent variables. The t test is performed by ANOVA analysis to determine the \( F \) statistical value to use in the global test on the two independent variables (job stress and Covid-19 stress parameters) and the dependent variable (productivity). In this stage, a conclusion is achieved, it is rejecting or support the hypothesis.

Previously at the beginning of the process, a response reliability test was evaluated using Cronbach's alpha. Further, a value of \( R \)-squared (\( R^2 \)) to show the model ability to fit the data availability. In the final section, the residual data is discussed, which represents the comparison of the prediction model and the actual data to provide a proper understanding of model.

3. Result and discussion

3.1. Descriptive statistics

Descriptive analysis in this study discusses an overview of the respondent’s responses to the three variables. The statistical description of respondent’s responses is presented in table 2. The average data at the first construct namely Job stress is considered moderate by aviation engineering employees. Respondents tend to find Job stress bothersome. As for the second construct, namely Covid-19 Parameters, respondent's opinions also tend to be moderate, indicate that respondents also tend to experience Job stress caused by Covid-19. The third construct is productivity, respondents tend to disagree with the statement "I always try to improve the quality of my work". The tendency of disagree responses can be seen in the other three productivity statements. It is indicating that the productivity of aviation engineering employees is low.

| Table 2. The descriptive statistics of the respondent’s responses |
|---------------------------------------------------------------|
| **Constructs and Statements**                                | **Mean** | **Std.** |
| **Job stress**                                               |          |          |
| I feel bored with the work that I do                         | 2.78     | 1.192    |
| I feel the current workload is high                          | 2.71     | 1.182    |
| I feel the workload makes the time that I allocate to work out of balance with my personal life | 2.89     | 1.106    |
| I feel that by working at home my workload is increasing     | 2.63     | 1.084    |
| **Covid - 19 Parameters**                                    |          |          |
| I feel that work activities are limited by the isolation policy during the Covid-19 pandemic | 2.92     | 1.108    |
| I feel overwhelmed by the current isolation policy           | 2.55     | 0.969    |
| I feel that physical distancing is not applied to my office  | 3.06     | 1.059    |
| I feel that self-isolation during the Covid-19 pandemic at home give stress to my work | 2.68     | 1.017    |
| **Productivity**                                             |          |          |
| I always try to improve the quality of my work               | 1.46     | 0.792    |
| I have really good skills for doing my tasks                 | 1.54     | 0.686    |
| I experience a decrease for my performance because of the current condition in the company | 1.68     | 0.77     |
| I feel that working at home is the factor that make my work performance decrease | 1.48     | 0.615    |
Table 3. The computed Cronbach’s Alpha for each construct to evaluate

| Constructs   | Number of items | Coefficient of reliability | Reliability status |
|--------------|-----------------|-----------------------------|--------------------|
| Job stress   | 24              | 0.945                       | Reliable           |
| Covid-19 Parameters | 20        | 0.886                       | Reliable           |
| Productivity | 20              | 0.789                       | Reliable           |

Table 4. The results of statistical $R^2$ calculations

| Model | R   | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-----|----------|-------------------|-----------------------------|
| 1     | 0.825 | 0.681    | 0.671             | 3.78212                     |

a. Predictors: (Constant), Covid-19, Job stress  
b. Dependent Variable: Productivity

3.2. Reliability of respondent’s responses
Reliability serves to evaluate the questionnaire instrument whether it consistently produces the same results every time the measurement is made. In this study, the reliability was analyzed using Cronbach Alpha [14]. Respondent's responses are assumed reliable if the calculated alpha value is higher than 0.7. The computed Cronbach’s alphas are presented in Table 3. All calculated alpha values were higher than the threshold. Therefore, the values in Table 3 indicate that the respondent's responses are reliable.

3.3. Multi-variate regression analysis
The multivariate regression method serves to predict a relationship between productivity as the dependent variable on Job stress and Covid-19 as the independent variable. In this study, a multivariate regression begins by discussing the coefficient of determination of the model ($R^2$). The coefficient of determination explains percent (%) impact of Job stress and Covid-19 variables on the productivity variable simultaneously. The result of statistical $R^2$ test is presented in Table 4. Based on Table 4, the result show that statistical $R^2$ value is 0.681 which means that Job stress and Covid-19 simultaneously affect productivity by 68.1%. This suggests that model (1) reasonably fits the data.

The second statistical analysis is F-test which serves to evaluate the significance of the coefficients $\beta_1$ and $\beta_2$ in equation (1) as a whole. The null hypothesis for this test $\beta_1 = \beta_2 = 0$ while the alternative hypothesis is that at least, a coefficient is non-zero. The results of the F-test are presented in Table 5. The computed F statistical (F-stat) indicates to reject the null hypothesis.

The F-test also aims to determine the effect between independent variables (Job stress and Covid-19) on the dependent variable (productivity) simultaneously. This test decides whether the dependent and independent variables have any relationship if the Sig value is smaller than 0.05. Results show that Sig. value is 0.000 which is less than 0.05 indicates that Job stress and Covid-19 simultaneously have an effect to the productivity performance.

The t-test is evaluated on three independent variable coefficients $\beta_0, \beta_1$ and $\beta_2$ to determine the level of significant influence on productivity. The t-test explains that the coefficient $\beta_2 = 0.303$ which statistically indicate it more significant than the coefficient $\beta_1 = 0.108$. The result of t-test is showed at Table 6.

Further, this paper conducted an analysis based on Pearson's correlation coefficients. This study applies t-test significance at level 0.05 Two-Tailed Test. Since the significance level index of t-test 0.05 Two-Tailed Test is 1.999, the t-test value is accepted or considered significant if it exceeds the value. In the two independent variables, the t-test value has exceeded the significant criteria. The value of the Job stress and Covid-19 are 2.379 and 4.555, respectively. This result declared that these variables are significant to determine the employee productivity. Furthermore, at the t-test, there is a significant value or p-value which aims to proof the influence of each variable on productivity with conditions less than 0.05 p-value. Therefore, it indicates that Covid-19 Stress Parameters are more influential than Job stress on productivity.
Based on the structural tests as aforementioned, the multi-variate linear regression model for this case is showed as follow.

\[ \text{Productivity} = 7.117 + 0.108 \cdot \text{Job Stress} + 0.303 \cdot \text{Covid19 Stress Parameter} \]  

(2)

| Model     | Sum of Squares | df  | Mean Square | F       | Sig.  |
|-----------|----------------|-----|-------------|---------|-------|
| 1 Regression          | 1895.064       | 2   | 947.532     | 66.240  | 0.000 |
| Residual              | 886.874        | 62  | 14.304      |         |       |
| Total                 | 2781.938       | 64  |             |         |       |

Table 5. The result of the F-test

| Model     | Unstandardized B | Coefficients Std. Error | Standardized Coefficients Beta | t       | Sig.  |
|-----------|------------------|-------------------------|-------------------------------|---------|-------|
| 1 (Constant)| 7.117             | 2.255                    |                                | 3.156   | 0.000 |
| Job stress | 0.108             | 0.046                    | 0.296                         | 2.379   | 0.020 |
| Covid-19   | 0.303             | 0.066                    | 0.566                         | 4.555   | 0.000 |

Table 6. The result of the t-test

Two independent variables are Job stress and Covid-19 Stress parameters have a significant effect on the productivity. The effect of the two independent variables is interpreted as a negative influence on the productivity of aviation industry employee. Therefore, if any stress caused by the Covid-19 issues is increase, it is possible to decreasing the employee productivity at the Aviation industry. Job stress also has the same effect, which has a negative effect on productivity however it has lower significance level than Covid-19 Stress Parameters.

This research also provides the normality and random requirements on the residual data as showed at figure 5. Based on the probability plot and histogram display, the multivariate regression analysis model in this study has met the basic valid requirements.

An analysis is also carried out to show the heteroscedasticity of the independent variables in the regression model as presented at figure 6. The scatterplot display shows the absence of heteroscedasticity indication and the residual data plot shows the random distribution of positive and negative values. These illustrations proof that independent relationship of independent variables meets the linear requirements. It also indicates that we accept \( H_1 \) and \( H_2 \), moreover reject for \( H_0 \).
Figure 5. Distribution of residual data on probability plots

Figure 6. Distribution of random residual data on a scatterplot

4. Conclusion and future work

This study is conducted to evaluate the effect of Job stress and Covid-19 issue on the employee productivity for the aviation industry. The statistical tests indicate to accept the hypothesis 1 and 2 which is concluded that the job stress and Covid-19 issues simultaneously affect the productivity of engineering employees in the aviation industry. The relations of the Job stress and Covid-19 issue to the employee’s productivity tends to negative. It indicates that the higher value of the Job stress and Covid-19 will affect the productivity of employee. Based on the results of research during this pandemic, it was found that the Covid-19 stress parameter is more significant than the job stress factor to affect the decreasing of employee productivity in aviation industry.

This paper has been proofed that job stress and Covid-19 pandemic affect the employee productivity at the aviation industry. This condition has to be maintained well to improve the industry performance. Therefore, for further research, it is possible to formulate the managerial implication to mitigating to minimize the job stress and Covid-19 risk at the aviation industry.
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