
Effect of Empowerment, Work Environment and Fatigue on Silver Craft Productivity

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ABSTRACT

The survival and growth of a company are not only determined by the strength of capital or money, but also determined by its success in managing human resources. The productivity of human resources is influenced by several factors. This study aims to examine the effect of empowerment, work environment and fatigue which are partially and simultaneously significant on the productivity of silver craftsmen. Respondents in this study consisted of 40 silver craftsmen in Pulo Village, Lumajang Regency. By using the analysis of multiple linear regression, the results obtained that empowerment does not have a significant effect, while the work environment and fatigue have a significant effect on productivity. The limitation of this study is limited to respondent which is only examines silver craftsmen in Pulo Village, Lumajang Regency. Hopefully, the limitation of this study can be examined in the further studies.

Keywords: Empowerment, Environment, Fatigue, Productivity



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INTRODUCTION

Today's business environment is growing and developing dynamically, very requires an effective and efficient management system and it means that it can easily change or adapt and it can accommodate every changes that are and has occurred quickly, precise and directed with a low cost. Organizations are no longer seen as closed systems, but they are open systems that must be able to respond and accommodate various external changes quickly and efficiently. The economic crisis that impacts the sluggish of world's business climate has led many companies to downsize or another internal consolidation as financial savings to be able to survive and achieve growth through an effective and efficient performance.

The survival and growth of a company are not only determined from successful financial management based on the strength of capital or money, but also determined from the success in managing human resources. Human resource management means that the company must be able to unify many perceptions or perspectives of employees and company leaders in order to achieve company goals through the formation of a good working mentality with a high dedication and

loyalty towards their job, providing job motivation, good direction and coordination in working by a leader to his/her subordinates. Empowerment is a means that can be done as a stimulus to increase work productivity. The labors will bring out all of their potential through empowerment so it will affect worker productivity. Empowerment is a duty for the owner of the company to maintain the continuity of the company by increasing their productivity. Empowerment can be include by giving responsibility and authority so it will create a sense of responsibility and work spirit which can give a desire to work and provide the best for their job. Achieving the goals of the company depends not only from the modern equipment, complete facilities and infrastructure, but rather on people who carry out the job. The success of an organization is greatly affected by individual performance of its employees. Every organization and company will always try to improve their employee performance, in the hope that what the company's goals will be achieved. Empowerment, work environment and fatigue because of work can also affect an employee's performance or productivity.

According to Goetsch & Davis (2006, 230), empowerment does not mean only involving the employees, but involving them by giving them an actual voice. Involving employees in making some decisions that relating their job is a fundamental principle of good management. With Total Quality Management (TQM), this principle takes precedence. Employees does not only involved for making some decisions, but also involved in the process of thinking creative that initiates for making decisions. According to Semito in Sunyoto (2015: 38), work environment is everything around the workers which can affect the workers in carrying out assigned duties, such as cleanliness, music, lighting, and so on. According to Tarwaka, et al (2004: 93), "*Fatigue is a protective mechanism to avoid further damage, so there is recovery after rest. Fatigue is a subjective feeling. Work fatigue is a condition which accompanied by decreased efficiency and a need for work.*" (Budiono, 2003:82). Siagian (2002) in Sutirno (2012: 99) explained that work productivity is a mental attitude which is always looking for the good of what already exists. A belief that a person can do a better job today than yesterday and tomorrow is better than today.

Some of empirical studies prove it, such as Kurniati and Iswara (2013), on their study entitled The Effect of Work Stress, Work Environment and Organizational Culture on Lecturer Performance, providing the results that work environment, work stress and organizational culture are simultaneously influential and significant on lecturer performance. Suryani & Wulandari (2009) on their study entitled Relationship Between Workload, Work Stress and Conflict Level with Nurse's Work Fatigue at Yogyakarta Pdhi Islamic Hospital, Yogyakarta City. The results of this study showed that there was a significant relationship between Workload, Work Stress, and the Level of Conflict with Work Fatigue. Sofyan (2013), in her study entitled The Effect of Work Environment on Work Performance of BAPPEDA Employees. The results of this study showed that there was a significant influence between the work environment on the working performance of BAPPEDA employees at X Regency, so it is clear that work productivity is strongly affected by the work environment.

In Lumajang Regency, there is the silver craft industry center which almost all of the residents work as silver craftsman that quite enough to controlling the market in Bali. Making handmade traditional silver craft requires a high skill and concentration for the craftsman. Empowerment, environment and work fatigue can affect the quality of the silver craft. This one encourages an interest in studying the effect of empowerment, work environment and fatigue on silver craftsmen on their productivity. This continuous study of empowerment, work environment, fatigue and productivity raises some questions that will be sought for the solutions, namely: a) Does empowerment has a significant effect on the silver craftsmen productivity at Silver Craft Industry Center in Lumajang Regency ? b) Does work environment has a significant effect on the silver craftsmen productivity at Silver Craft Industry Center in Lumajang Regency ? c) Does fatigue has a significant effect on the silver craftsmen productivity at Silver Craft Industry Center in Lumajang Regency ? d) Does empowerment, work environment and fatigue has a significant

effect simultaneously on the silver craftsmen productivity at Silver Craft Industry Center in Lumajang Regency ?

METHODS

This type of study is a survey research that does not make changes or does not have a special treatment towards the learned variables (non-experimental). The purpose of this study is explanatory research which is a type of study that explains the causal relationship between one variable and the others by hypothetical testing. Based on its nature, this study is exploratory because another further testing of a study is required, so this study is exploratory.

This study was conducted on the Lumajang society which is also a silver craftsman in the silver industry center in Lumajang. The reason for choosing this object because by choosing a silver craftsman, hopefully the data or responses to be obtained from this study could have an accurate results on the factors that affecting their productivity. The data used in this study is primary data. Primary data is collected by researcher to answer a research question. Primary data used in this study is the results of the questionnaire's filling by respondents which is craftsman at silver craft industry center in Lumajang Regency. This type of data is internal data which obtained from craftsman at the silver craft industry center in Lumajang Regency.

The population in this study was filled by every craftsman at silver craft industry center in Lumajang. The method of determining the sample size used in this study is the method developed by Roscoe in his book entitled *Research Methods For Business* (1982: 253) as quoted in (Sugiyono, 2009: 129), if the study will do a multivariate analysis, so the number of sample will be at least 10 (ten) times the number of variables studied, including the number of independent and dependent variables. The analysis used in this study is a multivariate analysis, which is a linear regression analysis and path analysis that consisted of 4 (four) variables. Researcher will takes a large number of samples to catch respondents' opinions that for each variable is represented by 10×4 variables = 40 samples. The data collection technique used in this study is a questionnaire that sent to the respondents, which are the craftsmen in silver craft industry center in Lumajang. The aim is to catch respondents' opinions about empowerment, work environment and fatigue, and also their impact on work productivity. The data measurements are done by giving a score on each answer from the question of the questionnaire.

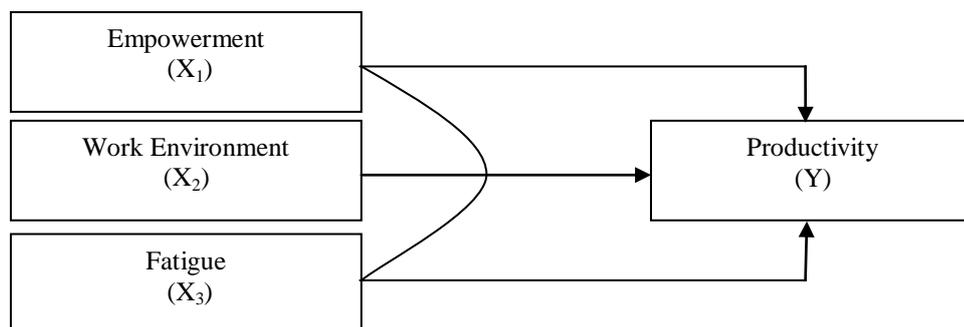


Figure 1. Research Model

The data analysis technique in this study will be done using multiple linear regression analysis model with IBM SPSS 24 application. Previously, the research instrument will be tested because the research instrument used in this study is a questionnaire which must be tested first for the validity and reliability. After conducting the test for research instrument, then the classical assumption test is carried out, which are the data normality test, multicollinearity test and

heteroscedasticity test. After conducting the analysis of multiple linear regression, then the hypothesis will be tested which used to determine whether there is an influence and how much the independent variable can affect both of partial and simultaneous variables. By doing T test for the partial test and F test for the simultaneous test and the determination coefficient.

RESULTS AND DISCUSSION

Pulo Village is a gold and silver craft center in Lumajang Regency. The status as a silver and gold center is well-known. Most of the population work as gold and silver craftsman, both as an entrepreneurs and laborers. To be proud of, from the Pulo Village came the great craftsmen of gold and silver. This skill is hereditary. Their skill as a craftsman has made the gold or silver craftsmen from Pulo Village respected by similar craftsmen from another area. Generally, craftsman in Pulo Village being a craftsman since elementary school. The gold or silver craftsmen in Pulo Village were divided to groups of craftsmen. In Pulo Village, there are 4 groups of craftsmen, which are consists of 14 craftsmen. Every craftsman employs at least three employees.

Pulo Village's gold and silver craft products were not only marketed in Lumajang, but also marketed outside Lumajang, even abroad. Mostly to Bali. When the monetary crisis occurred at the end of the 1990's, craftsmen in Pulo Village were successfully victorious because they had a large stock with their old prices while the price of gold in the market soared. But not long afterward, when the bomb of Bali I happened which followed by the bomb of Bali II, the market in Bali immediately free fall. Many of them went out of business. But gradually, as the national economy rebounded, they rose again. Slowly, the gold and silver craftsmen in Pulo Village have grown again until now. Pulo Village's gold or silver craft products have a variety of shapes, start from rings, bracelets, earrings and necklaces, for adults and children. The motives are various. Almost every craftsmen have their own unique motif, and most of them ordered by gold shops. As for silver, besides making their own motives, it is also based on the orders. The respondents in this study were silver craftsmen at silver craft industry center in Pulo Village, Lumajang Regency. The number of respondents who were being a sample in this study consisted as many as 40 people. Following are the data that will be presented relating to the general description of the respondents:

Table 1. Description of Respondents According to Gender

No.	Gender	Quantity	%
1.	Male	36	90,00%
2.	Female	4	10,00%
	Total	40	100%

Data source : Results of The Questionnaire Research, 2020

The data above shows that from 40 selected respondents, it shows that the silver craftsmen of Pulo Village in Lumajang are dominated by male respondents around 90%.

Table 2. Decription of Respondents According to Age

No.	Age	Quantity	%
1.	17 - 25	5	12,5%
2.	26 - 33	11	27,5%
3.	34 - 41	10	25,0%
4.	42 - 49	11	27,5%
5.	> 50	3	7,5%
	Total	40	100%

Data source : Results of The Questionnaire Research, 2020

The data above shows that from 200 selected respondents, it shows that the consumers of Agung Banan Chips in Lumajang are dominated by respondents around 17-25 years old and 42 to 49 years old, respectively around 27,5%.

Table 3. Description of Respondents According to Education

No.	Education	Quantity	%
1.	Elementary School	11	36,67%
2.	Junior High School	19	30,0%
3.	High School	10	33,33%
4.	Bachelor	0	0%
	Total	40	100%

Data Source : Results of The Questionnaire Research, 2020

The data above shows that from 40 selected respondents, it shows that the silver craftsmen of Pulo Village in Lumajang are dominated by respondents with an elementary education level around 36,67%.

Table 4. Description of Respondents According to Status

No.	Status	Quantity	%
1.	Married	32	80,00%
2.	Single	8	20,00%
	Total	40	100%

Data Source : Results of The Questionnaire Research, 2020

The data above shows that from 40 selected respondents, it shows that the silver craftsmen of Pulo Village in Lumajang are dominated by respondents with a married status around 80%.

The results of the validity test on the empowerment variables (X1), there are 4 (four) invalid statements, those are X1.1, X1.2, X1.4 and X1.5. The results of the validity test on the environmental variables (X2), there is 1 (one) invalid statement, that is X2.4. While the results of the validity test on the fatigue variables (X3), there are 2 (two) invalid statements, those are X3.4 and X3.5. Therefore, invalid statements will be issued and the data will be tested for the validity again. The results of the validity test on the questionnaire towards 4 (four) variables in this study show that all statements on each variable have r count $> 0,3$ with a significant level below 5%, so it can be concluded that all questionnaires used to extract the data are valid, so it can digging up the data or information needed. The results of the questionnaire reliability test of 4 (four) variables in this study show that all statements on each variable have a Cronbach's Alpha value as listed in table 5.11. So, it can be concluded that all the concepts in measuring each variable from the questionnaire used in this study are reliable questionnaires.

A good regression model must be free from the problem of deviating towards classical or basic assumptions. The following are the results of the classical assumptions test in the regression model. The results of the data normality test show that there is a normal graphic pattern in the model where the dots are not far from the diagonal line, and it means that the two regression models have normally distributed. The results of the test show that all the variables used as predictors of the regression model show a quite small VIF value, where all of them are below 10 and the tolerance value is more than 0,1. It means that the independent variables used in this study do not show any multicollinearity symptoms, and it means that all independent variables in this study are mutually independent variables. The results of the heteroscedasticity test show that there is no clear pattern from these points. It shows that the regression model has no heteroscedasticity symptoms, which means that there is no significant disturbance in this regression model.

The multiple linear regression test between empowerment (X_1), environment (X_2) and fatigue (X_3) on productivity (Y) provides the following regression equation: $Y = 26,745 - 0,041 X_1 + 0,115 X_2 - 0,116 X_3$.

Hypothesis Test 1 : There is a significant empowerment effect on the productivity of silver craftsman at the Silver Craft Industry Center in Lumajang Regency. First, find the t_{table} value, where the t_{table} value with $\alpha = 5\%$, $df (n-2)$ is obtained $t_{table} (\alpha/2 ; 40-2) = (0,025 ; 38) = \pm 2,02439$. Criteria Testing: The hypothesis is accepted if $t_{count} > t_{table}$ or $t_{count} < t_{table}$. The hypothesis is rejected if $t_{table} \leq t_{count} \leq t_{table}$. The test is obtained t_{count} value about $-0,235$ with a significant level of $0,816$, it means that $t_{count} (-0,235)$ lies between $-t_{table} (-2,02439)$ and $t_{table} (2,02439)$ and $sig (0,816) > \alpha (0,05)$, so the hypothesis is rejected and it is concluded that empowerment (X_1) has no significant effect on productivity (Y).

Hypothesis Test 2 : There is a significant environment effect on the productivity of silver craftsman at the Silver Craft Industry Center in Lumajang Regency. First, find the t_{table} value, where the t_{table} value with $\alpha = 5\%$, $df (n-2)$ is obtained $t_{table} (\alpha/2 ; 40-2) = (0,025 ; 38) = \pm 2,02439$. Criteria Testing : The hypothesis is accepted if $t_{count} > t_{table}$ or $t_{count} < t_{table}$. The hypothesis is rejected if $t_{table} \leq t_{count} \leq t_{table}$. The test is obtained t_{count} value about $2,673$ with a significant level of $0,005$, it means that $t_{count} (2,673) < t_{table} (2,02439)$ and $sig (0,005) < \alpha (0,05)$, so the hypothesis is accepted and it is concluded that environment (X_2) has a significant effect on productivity (Y).

Hypothesis Test 3 : There is a significant fatigue effect on the productivity of silver craftsman at the Silver Craft Industry Center in Lumajang Regency. First, find the t_{table} value, where the t_{table} value with $\alpha = 5\%$, $df (n-2)$ is obtained $t_{table} (\alpha/2 ; 40-2) = (0,025 ; 38) = \pm 2,02439$. Criteria Testing: The hypothesis is accepted if $t_{count} > t_{table}$ or $t_{count} < t_{table}$. The hypothesis is rejected if $t_{table} \leq t_{count} \leq t_{table}$. The test is obtained t_{count} value about $-3,015$ with a significant level of $0,017$, it means that $t_{count} (-3,015) < -t_{table} (-2,02439)$ and $sig (0,017) < \alpha (0,05)$, so the hypothesis is accepted and it is concluded that fatigue (X_3) has a significant effect on productivity (Y).

Hypothesis Test 4 : There is a simultaneous significant effect of empowerment, environment and fatigue on the productivity of silver craftsman at the Silver Craft Industry Center in Lumajang Regency. First, find the F_{table} value, where the F_{table} with $(\alpha);(df1);(df2) = (\alpha 0,05);(df1=3);(df2=40-2-1=37)$ and it is obtained $F_{table} = 2,86$. Criteria Testing: The hypothesis is accepted if $t_{count} > t_{table}$. The hypothesis is rejected if $t_{count} < t_{table}$. The test is obtained F_{count} value about $8,344$ with a significant level of $0,004$, it means that $F_{count} (8,344) > F_{table} (2,86)$ and $sig (0,004) < \alpha (0,05)$, so the hypothesis is accepted and it is concluded that empowerment, environment and fatigue has a simultaneous significant effect on productivity. The coefficient of determination (R Square) obtained at $0,428$. It means that $42,8\%$ of the silver craftsman productivity at Silver Craft Industry Center in Lumajang Regency can be explained by the empowerment, environment and fatigue variables, while the remaining about $57,2\%$ of performances were affected by other variables which are not examined in this study.

First discussion is about the results of the first hypothesis which said that there is an effect of empowerment on the silver craftsman productivity at Silver Craft Industry Center in Pulo Village, Lumajang. The result shows that empowerment has no significant effect on the productivity. The result of this test contradict with the results of Pramayani & Andyani's research (2018), Prabawa & Suparta (2018) whose their research results show that empowerment has an effect in increasing the work productivity. Empowerment does not only involving employees, but involving them by giving an actual voice. Involving employees in making some decisions which relate to their work is a fundamental principle of a good management. With Total Quality Management (TQM), this principle takes precedence. Employees does not only making decisions, but also involved in the process of thinking creative that initiates for making decisions. In this study, empowerment has no effect on the productivity, it is explained that silver craftsmen who were respondents in this study

generally acted as an owner as well as craftsman and did not have employees because everything was done by themselves with their respective skill, so that is why empowerment did not occur in here. There are several questions about empowerment which relate to colleagues, in this case the craftsman's colleagues are still their own families, usually husband, wife or their own children, so their relationship is still kinship which is quite close at work. However, in the future this empowerment needs to be an important thing in order to increase the silver craftsman's productivity in producing some crafts. Empowerment must be done to make an environment which supports the empowerment program, including the following steps: (a). Making an open communication work team with the employees, (b). Training is an important thing to improve job skills, (c). Measuring the effectiveness of the program by providing a success standard measure as a means of controlling work towards employee performance, (d). Giving support to motivate craftsman, (e). Giving authority and responsibility for the job to determine the actions needed to completing the various assigned tasks, (f). Creating the more flexible rules and systems. By this acts, it will facilitate In making decisions and support organizations that so easy to adapt to environmental changes that happen, so that the organization is more competitive than its competitors.

Second discussion is relate with the results on the second hypothesis which show that work environment has an effect on the silver craftsman productivity in Silver Crafts Industry Center at Pulo Village, Lumajang. The results shows that work environment has a significant effect on the productivity. This results are relate with the research of Suryani & Wulandari (2013), Diana Khairani (2013), which the results show that work environment has an effect on the work productivity. It can be explained that if we want to make silver craft in a very small size is definitely requires a comfortable environment, such as lighting and room conditions that support the attractive and qualified production of silver product. Don't forget to mention about the work environment which is needed a sense of security around it so the craftsman can feel such a calmness in doing their work. A good and conducive working environment was expected to achieve more effective results. So, the effectiveness in the organization can be increased by creating a situations with job characteristics that are so consistent with the developer's character of the job. It is suggested that there are several strategies for developing a work environment which can leads the goals, such as: (a) job selection and placement, (b) education and development, (c). an explicit design or assignment program and (d). appraisal and remuneration or achievement. Together, these activities can give a large contribution to the improvement of the work environment which organizational effectiveness is ultimately determined.

Third discussion is relate to the results on the third hypothesis which show that there is an effect of fatigue on the silver craftsmen productivity in Silver Craft Industry Center at Pulo Village, Lumajang. The results show that fatigue has a significant effect on the productivity. This results are relate with the research of Kondangen P, et al (2016), Maulid Sidiq (2019), which the results show that fatigue has an effect on the work productivity. Making silver craft needs a high concentration remember that the the products which produced must be attractive and unique and have a quite small shape. A high concentration will cause a fatigue for the craftsman. Work fatigue will be able to decrease the work capacity and work endurance which are characterized by a sensation of fatigue, decreased motivation, decreased activity. In the end, this one going to result a decreased productivity or the results of the product will less than optimal. Work fatigue can also happen due to work pressure which in the end affects the health of the craftsman. Therefore, in addition to needing an enough nutrition, the craftsman should maintain their motivation, because a decreased motivation can also result their feeling of tired at work. It is proven that the research results show a negative relationship between work fatigue and productivity, it means that the more higher the fatigue which experienced by craftsman, the more productivity will decrease and conversely, the more lower the fatigue which experienced by craftsman, the more productivity will increase.

Fourth discussion is relate to the results on the fourth hypothesis which show that there is a simultaneous significant effect of empowerment, work environment and fatigue on the silver craftsmen productivity in Silver Craft Industry Center at Pulo Village, Lumajang. The combination of empowerment, work environment and fatigue will create an effect on productivity. Based on the principle, because working on this silver craft is a job that needs a high concentration, high skills and high motivation, it is very necessary for always maintain empowerment, work environment and avoid work fatigue if you want craftsman capable to produce a high productivity. Support from owner and government is also expected to look after this. Not only from external, the craftsmen themselves also must be able to create their own good empowerment, a conducive work environment and avoid work fatigue. Cause there an actions that come from the craftsmen's initiative, they will be more motivated and capable to create a good working environment, avoiding fatigue by always look after the nutrition and working hours. So in the end, their productivity will be increased too.

CONCLUSION

Based on the results of this study and discussion which described above, several conclusions can be drawn as follows: (a). Empowerment does not have a significant effect on silver craftsman productivity in the Silver Craft Industry Center at Pulo Village, Lumajang Regency, (b). Work environment has a significant effect on silver craftsman productivity in the Silver Craft Industry Center at Pulo Village, Lumajang Regency, (c). Fatigue has a significant effect on silver craftsman productivity in the Silver Craft Industry Center at Pulo Village, Lumajang Regency, (d). Empowerment, Work environment and fatigue has a simultaneous significant effect on silver craftsman productivity in the Silver Craft Industry Center at Pulo Village, Lumajang Regency.

Straight to the results of this study and discussion above, suggestions were given for several parties as follows: (a). For silver craftsmen in Lumajang, a contribution of scientific thought to silver craftsmen in Lumajang, in order to create a conducive working atmosphere and always looking after against work fatigue which can make a productivity decreased. Although empowerment has no effect, it is needed for an efforts to increase craftsman's empowerment in order to make them motivated for creating a quality craft, (b). For further research, all of the limitation in this study is about the sample which is limited only on silver craftsmen at Silver Craft Industry Center in Pulo Village, Lumajang, whereas other excellent crafts in Lumajang do exist apart from silver craft, Batik as an example. Therefore, it is highly recommended for further researchers to collect a wider research object. Considering the fact that the sample of respondents studied in a research had different characters, it would be very interesting if the further researchs were carried out on another superior crafts besides silver craft.

REFERENCES

- Elia, K. P. (2016). Hubungan antara kelelahan kerja dan masa kerja dengan produktivitas kerja pada tenaga kerja bongkar muat di Pelabuhan Bitung tahun 2015. *PHARMACON*, 5(2).
- Kurniati, M., & Iswara, P.W. (2016). Pengaruh Stres Kerja, :ingkungan Kerja dan Budaya Organisasi terhadap Kinerja Dosen. *Jurnal Jurusan Manajemen Bisnis*.
- Prabawa, I. M. A., & Supartha, I. W. G. (2018). Meningkatkan produktivitas karyawan melalui Pemberdayaan, kerja sama tim dan pelatihan Di perusahaan jasa. *E-Jurnal Manajemen Universitas Udayana*, 7(1).
- Pramayani, A. S. D. I., & Adnyani, I. G. A. D. (2018). Pengaruh Pemberdayaan, Perilaku Inovatif, Dan Motivasi Kerja Terhadap Produktivitas Kerja Karyawan Bumbu Bali Restoran Tanjung Bena Badung, Bali. *INOBIS: Jurnal Inovasi Bisnis dan Manajemen Indonesia*, 2(1), 1-15.

- Sidiq, M. (2019). Pengaruh kelelahan kerja dan hubungan atasan dan bawahan terhadap produktifitas karyawan PT. PC batu bara. *PSIKOBORNEO*,2019, 7(2): 365-378
- Suryani, D., & Wulandari, Y. (2009). Hubungan antara Beban Kerja, Stres Kerja dan Tingkat Konflik Dengan Kelelahan Kerja perawat di RS Islam Yogyakarta di kota Yogyakarta. *Jurnal Fakultas Kesehatan Masyarakat Universitas Ahmad Dahlan*.
- Tandjung, J.W. (2004). *Marketing Management Pendekatan Pada Nilai-Nilai Pelanggan*. Bayumedia Publishing: Malang.
- Tarwaka, Bakhri, Sudioyeng. (2004). *Ergonomi ntuk Kesehatan Kerja Dan Produktifitas*. nika Pres. Surakarta.
- Widyasari, J. K. (2010). *Hubungan Antara Kelelahan Kerja Dengan Stress kerja Pada Perawat di Rumah Sakit Islam Yarsis Surakarta*. Other thesis, Universitas Sebelas Maret.