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Lean Six Sigma Model for Pharmacy Manufacturing: Yesterday, Today and Tomorrow

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ABSTRACT

The purpose of this research is to create a model and analyze the effect of the application of Six Sigma on the performance of the pharmaceutical industry, the application of the six sigma model through DMIC, namely Determine, Measure, Improve and Control.The method used in this research is quantitative method. Data collection is by circulating electronic questionnaires online to the pharmacy management industry. The instrument used to measure Six Sigma is DMIC, namely Determine, Measure, Improve and Control. Respondents in this research were 300 managers from 15 industries pharmacy which has implemented Six Sigma for 5 years. Based on the results of this study, it is concluded that the application of six sigma has a significant effect on the performance of the pharmaceutical industry. The application of six sigma through the DMIC steps, namely determine, measure, improve and control will encourage increased performance of the pharmacy industry

Keywords: Six Sigma, DMIC, Company Performance, Pharmacy Industries

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INTRODUCTION

In the industrial era 4.0, the pharmacy industry competition became tighter along with the many pjarmacy industry companies offering products with new innovations and competing to attract consumer interest. Quality is an important factor that is used as a reference for consumer satisfaction in determining the goods and services to be consumed. An effective product quality assurance program can result in increased market penetration with higher productivity and lower costs of producing goods and services. The pharmacy manufacturing industry is growing experienced an increase along with the increase in world energy demand. This increasing need will trigger competition among producers to convince every consumer of the quality and capability of the company. Important factors in maintaining a position in market competition include continuously improving or optimizing the effectiveness and cost efficiency of the production line. Competition among producers is getting tighter, so companies try to use all available resources efficiently and effectively. Production activities that are running must have quality results and high capabilities must be owned by the company. An important factor that is done to maintain a competitive position in the market is trying to continue to improve or optimize the effectiveness and cost efficiency of the production line.

According to Gasperz (2005: 322-330), the stages of implementing quality improvement with Six Sigma consist of five stages, namely using the DMAIC method or Define, Measure, Analyze, Improve, and Control. DMAIC is a process for continuous improvement towards Six sigma targets. Define is the goal setting of Six sigma quality improvement activities. This step is to define action plans (action plans) that must be carried out to carry out the improvement of each stage of the key business processes (Gaspersz, 2005: 322). In the define stage, what will be done is to determine the problems that have been identified in the production process from beginning to end into products. According to Pande (2003) three main activities related to defining core processes and customers areDefining the major core processes of the business, Defining the key outputs of those core processes, and the key customers they serve Create a high-level map of the core process or strategic process. Measure is the second operational step in the Six Sigma quality improvement program. In the measure stage, what will be done is to validate or filter the problem and start researching the root of the problem in the process. Measure is a logical follow-up to the define step and is a bridge to the next step. Measurements taken can be in the form of measuring process stability, calculating the chance of defects, measuring the proportion of defects and so on (Pete Pande, 2005).

According to Pande (2005: 48) measure steps have two main objectives, namely obtaining data to validate and qualify problems and opportunities. Usually this is critical information for improving and completing the budget for the first project. Get started with touching facts and figures that provide clues about the root of the problem. Then in the measure stage, there are three main things that must be done, namely: (Pande, 2005: 48) Choosing or determining key quality characteristics (Critical to Quality). The determination of key Critical to Quality must be accompanied by measurements that can be quantified in numbers. This is intended so as not to cause perceptions and interpretations that can be wrong for everyone in a Six Sigma project and cause difficulties in measuring the quality characteristics of reliability. In measuring the characteristics of quality, it is necessary to pay attention to internal aspects (level of product defects, costs due to poor quality, etc.) and external aspects of the organization (customer satisfaction, market share, etc.). Develop a data collection plan. Measurement of the baseline performance at the output level. Analyze is the third operational step in the Six Sigma quality improvement program. In the Analyze stage, it is to analyze the root causes of processes and problems, and to identify the root of the problem (Gaspersz, 2011). The purpose of this stage is to find out

how well the process is taking place and to identify root causes that may cause variations in the process (Juran, 1993). According to Pande (2000), the purpose of this stage is to identify what steps are needed to be implemented in improving a process and reducing the main sources of variation.Improve is the fourth operational step in the Six Sigma quality improvement program. This stage is an implementation of improvement activities based on the results of the analysis in the previous stage. Control is the last operational stage in an effort to improve Six Sigma quality. At this stage, control of the process is carried out continuously to increase capabilities, besides ensuring that improvements to the process once applied will be maintained. This stage is a plan for repairs to unwanted processes and the benefits of continuous improvement must be obtained. In this section, a control plan is carried out for the process (Dewi S. K., 2012).

Jirasukprasert et. al (2012) has conducted a case study of defect reduction in glove companies in Thailand. By applying the principles of Lean Six Sigma DMAIC, the result is a reduction in defects per million opportunities from 195,095 to 83,750. In addition, there was an increase in the Sigma level from 2.4 to 2.9. Dennis Sun (2014) results that the Lean Six Sigma approach results in increased efficiency beyond the target, namely 60% reduction in idle time and waste and a 40% reduction target *al*ong with reducing business process variations and shows an increase in stakeholder satisfaction without sacrificing the technical accuracy of manufacturing configuration control. Astari (2014) states that defective products can be reduced if the company is able to reduce the number of defects that occur in the product. With the decrease in the number of defects, it is expected that the number of defective products will also decrease. The method used is Six Sigma DMAIC to reduce paint bucket defects in. The results of this study are the DPMO and the sigma quality level of plain buckets are 7591.88 and 3.93, respectively. The purpose of this study is to analyze and calculate the effect of Determine (D) of Six Sigma have positive and significant effect on pharmacy industry performance, influence measure (M) of Six Sigma on pharmacy industry performance, influence of Improve (I) of six sigma on pharmacy industry performance and influence of control (C) of Six Sigma on pharmacy industry performance.

METHODS

The method used in this research is quantitative method. Data collection is by circulating electronic questionnaires online to the pharmacy management industry. The instrument used to measure Six Sigma is DMIC, namely Determine, Measure, Improve and Control. Each closed question / statement item is given five answer options, namely: strongly agree (SS) score 5, agree (S) score 4, neutral / doubt -Doubt (N) score 3, disagree (TS) score 2, and strongly disagree (STS) score 1. The method for processing data is by using PLS and using SmartPLS software version 3. Respondents in this research were 300 managers from 15 industries pharmacy which has implemented Six Sigma for 5 years.

Table 1. Respondent Descriptive Information

Criteria		Total
Age	< 30 Years	125
	30 - 40 Years	85
	> 40 Years	90
Work Experiencs	< 5 Years	155
	5-10 Years	65
	> 10 Years	80
Gender	Male	180
	Female	120

Based on the respondent's profile data from the questionnaire, it was obtained that age under 30 years, a total of 125 respondents, age 30 - 40 years, a total of 85 respondents and age above 40 years were 90 respondents. The work experiences under 5 years are 155 respondents, 5-10 years as much as 65 respondents and over 10 years are 80 respondents, for male gender total 180 and female 120.

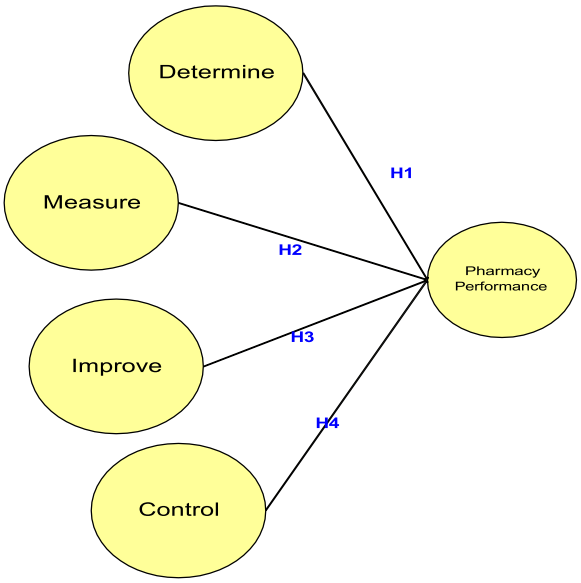

Fig 1. Research Framework

Based on literature review and previous research, the following hypothesis was obtained:

- H1: Determine (D) of Six Sigma has a positive and significant effect on Pharmacy Industry Performance
- H2: Measure (M) of Six Sigma has a positive and significant effect on Pharmacy Industry Performance
- H3: Improve (I) of Six Sigma have positive and significant effect on Pharmacy Industry Performance
- H4: Control (C) of Six Sigma has positive and significant effect on Pharmacy Industry Performance

RESULTS AND DISCUSSION

Test the Validity and Reliability of Research Indicators

The sequence of model testing includes convergent validity, discriminant validity. To test construct reliability,

cronbach's alpha and composite reliability values were used. The results of the PLS analysis can be used to test the research hypothesis if all indicators in the PLS model have met the requirements of convergent validity, discriminant validity and reliability testing. Convergent validity test is done by looking at the loading factor value of each indicator against the construct. In most references, a factor weight of 0.5 or more is considered to have sufficiently strong validation to explain latent constructs (Chin, 1998; Ghozali, 2014; Hair et al., 2010). In this study, the minimum limit for the accepted loading factor is 0.5, provided that the AVE value of each construct is> 0.5 (Ghozali, 2014). After going through SmartPLS 3.0 processing, there are several indicators or items that need to be removed from the model, namely: WP4 and WP6. Furthermore, after that, all indicators have a loading factor value above 0.5 or provided that the AVE value is above 0.5. So thus, the convergent validity of this research model has met the requirements. Loadings value, cronbach's alpha, composite reliability and AVE for each construct.

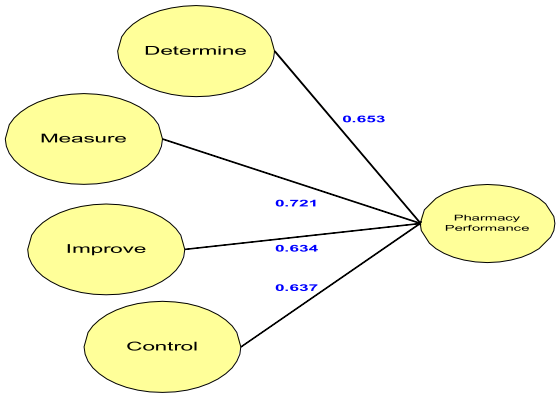

Fig 2. Research Framework Result

Construct Reliability Testing

The reliability of the six-sigma construct is determined from the Cronbach's alpha value and the composite reliability of each six-sigma construct. The required composite reliability and cronbach's alpha value is more than 0.7 (Ghozali, 2014).

Table 2A. Indicator Loadings, Cronbach's Alpha, Composite Reliability, and Average Variance Extracted (AVE) for Yesterday Periode

Varables	Items	Loadings	Cronbach's Alpha	Composite Reliability	AVE
Determine (D)	DA11	0.764	0.731	0.827	0.715
	DA12	0.721			
	DA13	0.641			
Measure (M)	MA11	0.612	0.824	0.803	0.689
	MA22	0.521			
	MA33	0.642			
Improve (I)	IA11	0.721	0.813	0.904	0.708
	IA22	0.731			
	IA33	0.621			
Control (C)	CA11	0.812	0.715	0.906	0.704
	CA22	0.714			
	CA33	0.628			

The results of reliability calculations in table 2A above on yesterday period show that all six sigma constructs on yesterday period have a composite reliability value and cronbach's alpha is greater than 0.7 (> 0.7). And it can be concluded that all six sigma constructs on yesterday period have met reliability.

Table 2B. Indicator Loadings, Cronbach's Alpha, Composite Reliability, and Average Variance Extracted (AVE) for Today Periode

Varables	Items	Loadings	Cronbach's Alpha	Composite Reliability	AVE
Determine (D)	DB11	0.643	0.873	0.897	0.763
	DB12	0.731			
	DB13	0.631			
Measure (M)	MB11	0.712	0.714	0.871	0.533
	MB22	0.613			
	MB33	0.709			
Improve (I)	IB11	0.672	0.798	0.825	0.524
	IB22	0.621			
	IB33	0.721			
Control (C)	CB11	0.721	0.812	0.713	0.752
	CB22	0.634			
	CB33	0.709			

The results of calculating the six-sigma reliability in table 2b above on the today period show that all six sigma constructs in the today period have a composite reliability value and Cronbach's alpha is greater than 0.7 (> 0.7). And it can be concluded that all six sigma constructs in today period have fulfilled reliability.

Table 2C. Indicator Loadings, Cronbach's Alpha, Composite Reliability, and Average Variance Extracted (AVE) for Tomorrow Periode

Varables	Items	Loadings	Cronbach's Alpha	Composite Reliability	AVE
Determine (D)	DC11	0.543	0.863	0.921	0.652
	DC12	0.652			
	DC13	0.732			
Measure (M)	MC11	0.612	0.823	0.914	0.875
	MC22	0.723			
	MC33	0.673			
Improve (I)	IC11	0.734	0.832	0.834	0.812
	IC22	0.721			
	IC33	0.654			
Control (C)	CC11	0.624	0.832	0.914	0.712
	CC22	0.723			
	CC33	0.543			

The results of the calculation of the six sigma reliability in table 2c above in the tomorrow period show that all six sigma constructs in the today period have a composite reliability value and Cronbach's alpha is greater than 0.7 (> 0.7). And it can be concluded that all six sigma constructs in the tomorrow period have met reliability.

Testing the Validity of Six Sigma Desriminants

Discriminant validity is done to ensure that each latent variable is different from other latent variables. The model has good discriminant validity if the AVE square value of each exogenous construct exceeds the correlation between this construct and other constructs (Ghozali, 2014). The results of discriminant validity testing are by using the AVE square value, namely by looking at the Fornell-Larcker Criterion Value obtained as shown in Table 3.

Table 3A. Sig Sigma Discriminant Validity Yesterday Periode

Variables	D	M	I	C	P
Determine (D)	0.821				
Measure (M)	0.790	0.808			
Improve (I)	0.506	0.543	0.902		
Control (C)	0.512	0.532	0.521	0.901	
Performance (P)	0.526	0.356	0.341	0.431	0.892

The results of discriminant validity testing on yesterday period in table 3A above show that all constructs from yesterday period have a square root value of AVE above the correlation value with other latent constructs (through the Fornell-Larcker criteria). The cross-loading value of all items from an indicator yesterday period is greater than other indicator items so it can be concluded that the model has met discriminant validity (Fornell & Larcker, 1981)

Table 3B. Six Sigma Discriminant Validity Today Periode

Variables	D	M	I	C	P
Determine (D)	0.824				
Measure (M)	0.562	0.891			
Improve (I)	0.671	0.531	0.872		
Control (C)	0.512	0.545	0.621	0.891	
Performance (P)	0.513	0.652	0.432	0.621	0.821

The results of the discriminant validity test on the today period in table 3B above show that all constructs of today period have a square root value of AVE above the correlation value with other latent constructs (through the Fornell-Larcker criteria). The cross-loading value of all items from an indicator today period is greater than other indicator items so that it can be concluded that the model has met discriminant validity (Fornell & Larcker, 1981)

Collinearity Testing

Furthermore, the collinearity test is carried out to determine whether there is collinearity in the model. To find collinearity, it is necessary to calculate the VIF of each construct. If the VIF score is higher than 5, then the model has collinearity (Hair et al., 2014).

Tabel 4A. Six Sigma Collinearity Statistics (VIF) Yesterday Periode

Variables	Performance(P)
Determine (D)	1.252
Measure (M)	2.123
Improve (I)	1.211
Control '(C)	1.221

Based on the test results in Table 4A, all VIF scores of all Six Sigma variables on yesterday period were smaller than 5, meaning that this model does not have collinearity problems.

Tabel 4B. Six Sigma Collinearity Statistics (VIF) Today Periode

Variables	Performance(P)
Determine (D)	1.213
Measure (M)	2.341
Improve (I)	1.452
Control '(C)	3.234

Based on the test results in Table 4B, all VIF scores of all Six Sigma variables on the Today period are less than 5, meaning that this model does not have collinearity problems.

Tabel 4C. Six Sigma Collinearity Statistics (VIF) Tomorrow Periode

Variables	Performance(P)
Determine (D)	2.231
Measure (M)	1.231
Improve (I)	3.213
Control '(C)	2.123

Based on the test results in Table 4C, all VIF scores of all Six Sigma variables in the Tomorrow period are less than 5, meaning that this model does not have collinearity problems.

Hypothesis testing in PLS includes the direct effect significance test. To determine the effect of the application of six sigma on performance in yesterday, today and tomorrow. The effect test was carried out using the t-statistic test in the partial least squared (PLS) analysis model using the SmartPLS 3.0 software. With the boothstrapping technique, the R Square value and the significance test value were obtained as shown in the Table below:

Table 5A. R Square Velue yesterday periode

	R Square	R Square Adjusted
Performance (P)	0.781	0.651

Based on Table 5A above, the value of R Square Performance (P) on yesterday period was 0.781 which means that variable performance (P) can be explained by variables to determine, measure, improve and control by 78.1% on yesterday period, while the remaining 21.9% was explained by other variables not discussed in this study.

Table 5B. R Square Velue today periode

	R Square	R Square Adjusted
Performance (P)	0.782	0.621

Based on Table 5B above, the value of R Square Performance (P) on the today period is 0.782, which means that variable performance (P) can be explained by variables to determine, measure, improve and control by 78.2% in the today period, while the remaining 21.8% is explained by other variables not discussed in this study.

Table 5C. R Square Velue tomorrow periode

	R Square	R Square Adjusted
Performance (P)	0.785	0.631

Based on Table 5C above, the value of R Square Performance (P) on the today period is 0.785, which means that variable performance (P) can be explained by variables to determine, measure, improve and control by 78.5% in the tomorrow period, while the remaining 21.5% is explained by other variables not discussed in this study.

Six Sigma Hypothesis Testing

Table 6 displays t-statistics and p-values which show the influence between variables to determine, measure, improve and control with variable performance.

Tabel 6A. Six Sigma Hypotheses Testing for Yesterday Periode

Hypotheses	Relationship	Beta	SE	T Statistics	P-Values	Decision
H1	Determine ->P	0.234	0.012	3.212	0.001	*Supported*
H2	Measure ->P	0.652	0.021	5.321	0.000	*Supported*
H3	Improve->P	0.621	0.025	3.212	0.001	*Supported*
H4	Control ->P	0.421	0.081	2.098	0.002	*Supported*

Based on the statistical calculations summarized in Table 6A above, it is concluded that all sig sigma variables on yesterday period positively and significantly affect performance. Evidenced by the value of t-statistics greater than 1.96 and a p-value of less than 0.05. meaning that all hypotheses are accepted.

Tabel 6B. Six Sigma Hypotheses Testing for Today Periode

Hypotheses	Relationship	Beta	SE	T Statistics	P-Values	Decision
H1	Determine ->P	0.213	0.012	2.141	0.001	*Supported*
H2	Measure ->P	0.521	0.014	5.123	0.001	*Supported*
H3	Improve->P	0.313	0.015	4.145	0.000	*Supported*
H4	Control ->P	0.234	0.012	1.321	0.002	*Supported*

Based on the statistical calculations summarized in Table 6B above, it is concluded that all sig sigma variables in the today period positively and significantly affect performance. Evidenced by the value of t-statistics greater than 1.96 and a p-value of less than 0.05. meaning that all hypotheses are accepted.

Tabel 6C. Six Sigma Hypotheses Testing for Tomorrow Periode

Hypotheses	Relationship	Beta	SE	T Statistics	P-Values	Decision
H1	Determine ->P	0.121	0.015	3.212	0.000	*Supported*
H2	Measure ->P	0.141	0.021	4.215	0.002	*Supported*
H3	Improve->P	0.321	0.031	3.216	0.001	*Supported*
H4	Control ->P	0.231	0.013	2.312	0.002	*Supported*

Based on the statistical calculations summarized in Table 6B above, it is concluded that all sig sigma variables in the today period positively and significantly affect performance. Evidenced by the value of t-statistics greater than 1.96 and a p-value of less than 0.05. meaning that all hypotheses are accepted.

Discussion

Effect of Determine (D) Six Sigma on Performance

Based on the statistical calculations summarized in Tables 6A, B, C above, it is concluded that determine (D) significantly affects performance. On yesterday's table period 6A, the t-statistics value of 3.212 was greater than 1.96 and the p-value was 0.001 less than 0.05. That is, the hypothesis is accepted. In the today period table 6B, the t-statistics value of 2.141 is greater than 1.96 and a p-value of 0.001 is smaller than 0.05. That is, the hypothesis is accepted. In the tomorrow table period 6C, the t-statistics value of 3.212 is greater than 1.96 and a p-value of 0.001 is smaller than 0.05. That is, the hypothesis is accepted. These findings are in line with and in accordance with the results of previous studies (Asbari, 2019; Fayzhall, et al., 2020; Purwanto, 2020; Asbari, Purwanto, et al., 2019; Asbari, Santoso, et al., 2019; Fayzhall, Asbari , Purwanto, Basuki, et al., 2020; Fayzhall, Asbari, Purwanto, Goestjahjanti, et al., 2020) which states that six sigma, improvement has a significant effect on performance, meaning that the application of six sigma will encourage increased performance of the company.

Effect of Measure (M) Six Sigma on Performance

Based on the statistical calculations summarized in Tables 6A, B, C above, it is concluded that Measure (M) significantly affects performance. On yesterday's table period 6A, the t-statistics value of 5.321 was greater than 1.96 and the p-value of 0.000 was smaller than 0.05. That is, the hypothesis is accepted. In the today period table 6B, the t-statistics value of 5.123 is greater than 1.96 and a p-value of 0.001 is smaller than 0.05. That is, the hypothesis is accepted. In the tomorrow table period 6C, the t-statistics value of 4.122 is greater than 1.96 and a p-value of 0.001 is smaller than 0.05. That is, the hypothesis is accepted. These findings are in line with and in accordance with the results of previous studies (Asbari, 2019; Fayzhall, et al., 2020; Purwanto, 2020; Asbari, Purwanto, et al., 2019; Asbari, Santoso, et al., 2019; Fayzhall, Asbari , Purwanto, Basuki, et al., 2020; Fayzhall, Asbari, Purwanto, Goestjahjanti, et al., 2020) which states that six sigma, improvement has a significant effect on performance, meaning that the application of six sigma will encourage increased performance of the company.

Effect of Improve (I) Six Sigma on Performance

Based on the statistical calculations summarized in Tables 6A, B, C above, it is concluded that Measure (M) significantly affects performance. On yesterday's table period 6A, the t-statistics value of 3.212 was greater than 1.96 and the p-value was 0.001 less than 0.05. That is, the hypothesis is accepted. In the today period table 6B, the t-statistics value of 4.145 is greater than 1.96 and a p-value of 0.000 is smaller than 0.05. That is, the hypothesis is accepted. In the tomorrow table 6C period, the t-statistics value of 3.216 is greater than 1.96 and a p-value of 0.001 is smaller than 0.05. That is, the hypothesis is accepted. These findings are in line with and in accordance with the results of previous studies (Asbari, 2019; Fayzhall, et al., 2020; Purwanto, 2020; Asbari, Purwanto, et al., 2019; Asbari, Santoso, et al., 2019; Fayzhall, Asbari , Purwanto, Basuki, et al., 2020; Fayzhall, Asbari, Purwanto, Goestjahjanti, et al., 2020) which states that six sigma, improvement has a significant effect on performance, meaning that the application of six sigma will encourage increased performance of the company.

Effect of Control (C) Six Sigma on Performance

Based on the statistical calculations summarized in Tables 6A, B, C above, it is concluded that control (C) significantly affects performance. On yesterday's table period 6A, it was obtained that the t-statistics value of 2.098 was greater than 1.96 and the p-value of 0.002 was smaller than 0.05. That is, the hypothesis is accepted. In the today period table 6B, the t-statistics value of 1.321 is greater than 1.96 and a p-value of 0.002 is smaller than 0.05. That is, the hypothesis is accepted. In the tomorrow table 6C period, it is obtained that the t-statistics value of

2.312 is greater than 1.96 and the p-value is 0.001 less than 0.05. That is, the hypothesis is accepted. These findings are in line with and in accordance with the results of previous studies (Asbari, 2019; Fayzhall, et al., 2020; Purwanto, 2020; Asbari, Purwanto, et al., 2019; Asbari, Santoso, et al., 2019; Fayzhall, Asbari , Purwanto, Basuki, et al., 2020; Fayzhall, Asbari, Purwanto, Goestjahjanti, et al., 2020) which states that six sigma, improvement has a significant effect on performance, meaning that the application of six sigma will encourage increased performance of the company.

CONCLUSION

Based on the results of this study, it is concluded that the application of six sigma has a significant effect on the performance of the pharmaceutical industry. The application of six sigma through the DMIC steps, namely determine, measure, improve and control will encourage increased performance of the pharmacy industry. Highly recommend finding, explore, and analyze it in future studies. Second, this research is conducted in the pharmaceutical industry and may not be generalized to other industries. Therefore, it is highly recommended to carry out further research on this topic in other industries. May be added to the entire region, or in another country.

REFERENCES

1. Agistiawati, E., Asbari, M., Basuki, S., Yuwono, T., & Chidir, G. (2020). Exploring the Impact of Knowledge Sharing and Organizational Culture on Teacher Innovation Capability. *International Journal of Science and Management Studies (IJSMS)*, *3*(3), 62–77. http://www.ijsmsjournal.org/volume3-issue3.html
2. Armstrong, M., & Taylor, S. (2014). *Human Resource Management Practice*. Ashford Colour Press Ltd.
3. Asbari, M., Purwanto, A., Fayzhall, M., Winanti, Purnamasari, D., & Firdaus, R. A. (2020). Hard skills or soft skills: Which are more important for Indonesian teachers innovation. *Test Engineering and Management*, *83*(2836), 2836–2854. http://www.testmagzine.biz/index.php/testmagzine/article/view/4087
4. Asbari, M., Purwanto, A., Maesaroh, S., Hutagalung, D., Mustikasiwi, A., Ong, F., & Andriyani, Y. (2020). Impact of Hard Skills, Soft Skills and Organizational Culture : Lecturer Innovation Competencies As Mediating. *EduPsyCouns: Journal of Education, Psychology and Counseling*, *2*(1), 142–155. https://ummaspul.ejournal.id/Edupsycouns/article/view/419
5. Asbari, M., Purwanto, A., & Santoso, P. B. (2019). Influence of Leadership, Motivation, Competence, Commitment and Culture on ISO 9001:2015 Performance in Packaging Industry. *Scholars Journal of Economics, Business and Management*, *6*(12), 577–582.
6. Asbari, M., Wijayanti, L., Hyun, C. C., Purwanto, A., & Santoso, P. B. (2020). How to build innovation capability in the RAC industry to face industrial revolution 4.0? *International Journal of Psychosocial Rehabilitation*, *24*(6), 2008–2027. https://doi.org/10.37200/IJPR/V24I6/PR260192
7. Asbari, M., Wijayanti, L. M., Hyun, C. C., Purwanto, A., Santoso, B., & Article, H. (2019). Effect of Tacit and Explicit Knowledge Sharing on Teacher Innovation Capability. *Dinamika Pendidikan*, *14*(2), 227–243. https://doi.org/10.15294/dp.v14i2.22732
8. Astuti, E., & Khoirunnisa, R. M. (2018). Pengaruh Employee Engagement, Komitmen Organisasi, Dan Kepemimpinan Transformasional Terhadap Kesiapan Untuk Berubah (Readiness For Change) Pada Karyawan Universitas Ahmad Dahlan. *JURNAL FOKUS*, *8*(1), 47–66.
9. Babin, B. J., & Boles, J. S. (1998). Employee behavior in a service environment: A model and test of potential differences between men and women. *Journal of Marketing*, *62*(2), 77–91. https://doi.org/10.2307/1252162
10. Banjongprasert, J. (2017). An Assessment of Change-Readiness Capabilities and Service Innovation Readiness and Innovation Performance : Empirical Evidence from MICE Venues. *IJEM International Journal of Economics and Management*, *11*, 1–17.
11. Bass, B., & Avolio, B. (2000). *Technical Report,Leader form, rater form, and Scoring Key of MLQ From 5x-Short*. Mind Garden, Inc.
12. Bernardin, H., & Russel, J. (1993). *Human Resource Management: An Experimental Approach*. Mc Graw Hill Companies.
13. Bernarto, I., Bachtiar, D., Sudibjo, N., Suryawan, I. N., Purwanto, A., & Asbari, M. (2020). Effect of transformational leadership, perceived organizational support, job satisfaction toward life satisfaction: Evidences from indonesian teachers. *International Journal of Advanced Science and Technology*, *29*(3), 5495–5503. http://sersc.org/journals/index.php/IJAST/article/view/6057
14. Bogler, R. (2001). The influence of leadership style on teacher job satisfaction. *Educational Administration Quarterly*, *37*(5), 662–683. https://doi.org/10.1177/00131610121969460
15. Burn, J. (1978). *Leadership*. Harper.
16. Chin, W. (1998). *The Partial Least Squares Approach to Structural Equation Modeling* (E. Modern Methods for Business Research, In: G. A. Marcoulides (ed.)). Lawrence Erlbaum Associates Publisher.
17. David, S., Armanu, & Afnan, T. E. (2017). The Effects of Transformational Leadership and Personality on Employee Performance in Nissan Malang Mediated by Organizational Commitment. *RJOAS*, *3*(19), 197–210. https://doi.org/https://doi.org/10.18551/rjoas.2017-01.21
18. Eliyana, A., Ma'arif, S., & Muzakki. (2019). Job satisfaction and organizational commitment effect in the transformational leadership towards employee performance. *European Research on Management and Business Economics*, *25*(3), 144–150. https://doi.org/10.1016/j.iedeen.2019.05.001
19. Fayzhall, M., Asbari, M., Purwanto, A., Basuki, S., Hutagalung, D., Maesaroh, S., Chidir, G., Goestjahjanti, F. S., & Andriyani, Y. (2020). Pengaruh Gaya Kepemimpinan Terhadap Kapabilitas Inovasi Guru Dalam Perspektif Organizational Learning. *EduPsyCouns: Journal of Education, Psychology and Counseling*, *2*(1), 64–91. https://ummaspul.e-journal.id/Edupsycouns/article/view/413

20. Fayzhall, M., Asbari, M., Purwanto, A., Goestjahjanti, F. S., Yuwono, T., Radita, F. R., Yulia, Y., Cahyono, Y., & Suryani, P. (2020). Transformational versus Transactional Leadership: Manakah yang Mempengaruhi Kepuasan Kerja Guru? *EduPsyCouns: Journal of Education, Psychology and Counseling*, *2*(1), 256–275. https://ummaspul.e-journal.id/Edupsycouns/article/view/463
21. Fikri, M. A. A., Asbari, M., Purwanto, A., Nugroho, Y. A., Waruwu, H., Fauji, A., Shobihi, A. W., Singgih, E., Sudiyono, R. N., Agistiawati, E., & Dewi, W. R. (2020). A Mediation Role of Organizational Learning on Relationship of Hard Skills, Soft Skills, Innovation and Performance: Evidence at Islamic School. *EduPsyCouns: Journal of Education, Psychology and Counseling*, *2*(1), 398–423. https://ummaspul.e-journal.id/Edupsycouns/article/view/498
22. Fitriana, R., & Sugiyono. (2019). Kesiapan berubah pada sekretariat jenderal kementerian kelautan dan perikanan republik indonesia. *IKRAITH EKONOMIKA VOL*, *2*(2), 42–51.
23. Fornell, C., & Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research*, *18*(1), 39. https://doi.org/10.2307/3151312
24. Ghozali, I. (2014). *Structural Equation Modeling, Metode Alternatif dengan Partial Least Square (PLS)* (4th ed.). Badan Penerbit Universitas Diponegoro.
25. Hadiyani, S. (2014). Peranan Komitmen Organisasi dan Employee Engagement terhadap Kesiapan Karyawan untuk Berubah. *JURNAL PSIKOLOGI*, *41*(1), 17–33.
26. Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate Data Analysis* (7th ed.). Pearson Prentice Hall.
27. Hair, J. F., Hult, G. T., Ringle, C. M., & Sarstedt, M. (2014). *A primer partial least squaresstructural equation modeling (PLS-SEM)*. SAGE Publications.
28. Holt, D. T., Armenakis, A. A., Feild, H. S., & Harris, S. G. (2007). Readiness for Organizational Change: The Systematic Development of a Scale. *The Journal of Applied Behavioral Science*, *43*(2), 232–255. https://doi.org/10.1177/0021886306295295
29. Hutagalung, D., Asbari, M., Fayzhall, M., Ariyanto, E., Agistiawati, E., Sudiyono, R. N., Waruwu, H., Goestjahjanti, F. S., Winanti, & Yuwono, T. (2020). Peran Religiusitas, Kepemimpinan Transformasional, Kepuasan Kerja dan Mediasi Organizational Citizenship Behavior terhadap Kinerja Guru. *EduPsyCouns: Journal of Education, Psychology and Counseling*, *2*(1), 311–326. https://ummaspul.e-journal.id/Edupsycouns/article/view/483
30. Jumiran, Novitasari, D., Nugroho, Y. A., Sutardi, D., Sasono, I., & Asbari, M. (2020). Pengaruh Dimensi Kepemimpinan Transformasional terhadap Kepuasan Kerja dan Komitmen Organisasional: Studi Kasus pada Dosen Perguruan Tinggi Swasta. *EduPsyCouns: Journal of Education, Psychology and Counseling*, *2*(1), 600–621. https://ummaspul.e-journal.id/Edupsycouns/article/view/555
31. Kamar, K., Asbari, M., Purwanto, A., Nurhayati, W., Agistiawati, E., & Sudiyono, R. (2020). Membangun Karakter Siswa Sekolah Dasar melalui Praktek Pola Asuh Orang Tua Berdasarkan Genetic Personality. *JINoP (Jurnal Inovasi Pembelajaran)*, *6*(1). https://doi.org/doi:https://doi.org/10.22219/jinop.v6i1.10196
32. Katsaros, K. K., Tsirikas, A. N., & Kosta, G. C. (2020). The impact of leadership on firm financial performance: the mediating role of employees' readiness to change. *Leadership & Organization Development Journal*, *41*(3), 333–347. https://doi.org/https://doi.org/10.1108/LODJ-02-2019-0088
33. Khalifa Elgelal, K. S., & Noermijati, N. (2014). The Influences of Transformational Leaderships on Employees Performance (A Study of the Economics and Business Faculty Employee at University of Muhammadiyah Malang). *Asia Pacific Management and Business Application*, *3*(1), 48–66. https://doi.org/10.21776/ub.apmba.2014.003.01.4
34. Luthans, F. (2005). *Perilaku Organisasi* (11th ed.). Penerbit ANDI.
35. Maesaroh, S., Asbari, M., Hutagalung, D., Agistiawati, E., Basuki, S., Radita, F. R., Nurasiah, Yulia, Y., Singgih, E., & Chidir, G. (2020). Pengaruh Religiusitas dan Kepemimpinan Transformasional terhadap Kinerja Guru melalui Mediasi Organizational Citizenship Behavior. *EduPsyCouns: Journal of Education, Psychology and Counseling*, *2*(1), 276–290. https://ummaspul.ejournal.id/Edupsycouns/article/view/473
36. Mahessa, N. F., & NRH, F. (2016). Gaya Kepemimpinan Melayani dan Kesiapan untuk Berubah pada Karyawan BPJS Ketenagakerjaan. *Jurnal Empati*, *5*(1), 113–116.
37. Makena, J. E. (2017). Pengaruh Kepemimpinan Transformasional Terhadap Kinerja Organisasi Melalui Pembelajaran Organisasi dan Inovasi Pada Hotel Prama Sanur Beach Bali. *JAGADHITA:Jurnal Ekonomi & Bisnis*, *4*(2), 76–88. https://doi.org/10.22225/jj.4.2.135.76-88
38. Mathis, & Jackson. (2002). *Manajemen Sumber Daya Manusia* (Pertama). Salemba Empat.
39. Monoyasa, M. W., Sularso, R. A., & Prihatini, D. (2017). Pengaruh Gaya Kepemimpinan Transformasional Kepala Sekolah Terhadap Kinerja Guru Sekolah Dasardengan Motivasidan Inovasi Guru Sebagai Variabel Intervening Dieks Kota Administratif. *JURNAL RELASI STIE MANDALA JEMBER*, *13*(2), 315–335. http://jurnal.stie-mandala.ac.id/index.php/relasi/article/download/120/107
40. Mujiburrahman, Asmony, T., & Husnan, H. (2017). Pengaruh Kepemimpinan Transformasional Dan Iklim Psikologis Terhadap Kesiapan Untuk Berubah Karyawan Puskesmas Kabupaten Lombok Barat Dalam Rangka Akreditasi Dan Komitmen Afektif Sebagai Variabel Intervening. *JURNAL MAGISTER MANAJEMEN*, *6*(2), 1–19. https://doi.org/JURNAL MAGISTER MANAJEMEN
41. Novitasari, D., Asbari, M., Sutardi, D., GazalI, & Silitonga, N. (2020). Mempertahankan Kinerja Karyawan di Masa Pandemi Covid-19: Analisis Kesiapan untuk Berubah dan Efektivitas Kepemimpinan Transformasional. *Value: Jurnal Manajemen Dan Akuntansi*, *15*(2), 22–37. https://doi.org/https://doi.org/10.32534/jv.v15i2.1152
42. Novitasari, D., Asbari, M., Wijaya, M. R., & Yuwono, T. (2020). Effect of Organizational Justice on Organizational Commitment: Mediating Role of Intrinsic and Extrinsic Satisfaction. *International Journal of Science and Management Studies (IJSMS)*, *3*(3), 96–112.

http://www.ijsmsjournal.org/volume3-issue3.html
43. Novitasari, D., Sasono, I., Santoso, J., Sudiyono, R. N., & Asbari, M. (2020). Pengaruh Kesiapan untuk Berubah pada Karyawan Manufaktur: Analisis Praktik Kepemimpinan di Masa Pandemi Covid-19. *JUMBO (Jurnal Manajemen , Bisnis Dan Organisasi)*, *4*(1), 175–188. https://doi.org/http://dx.doi.org/10.33772/jumbo.v4i1.13260
44. Nugroho, Y. A., Asbari, M., Purwanto, A., Basuki, S., Sudiyono, R. N., Fikri, M. A. A., Hulu, P., Mustofa, Chidir, G., Suroso, & Xavir, Y. (2020). Transformational Leadership and Employees' Performance: the Mediating Role of Motivation and Work Environment. *EduPsyCouns: Journal of Education, Psychology and Counseling*, *2*(1), 438–460. https://ummaspul.e-journal.id/Edupsycouns/article/view/507
45. Nuryanti, Y., Novitasari, D., Nugroho, Y. A., Fauji, A., Gazali, & Asbari, M. (2020). Meningkatkan Komitmen Organisasional Dosen: Analisis Pengaruh Kepemimpinan Perguruan Tinggi dan Kepuasan Intrinsik & Ekstrinsik Dosen. *EduPsyCouns: Journal of Education, Psychology and Counseling*, *2*(1), 561–581. https://ummaspul.ejournal.id/Edupsycouns/article/view/551
46. Pramadani, A. B. (2012). Hubungan antara Komitmen Organisasi dengan Kesiapan untuk Berubah pada Karyawan Divisi Enterprise Service (DES) Telkom Ketintang Surabaya. *Jurnal Psikologi Industri Dan Organisasi*, *1*(03), 112–119.
47. Purwanto, A., & Asbari, M. (2020). Model Pengaruh Gaya Kepemimpinan Authentic, Authoritarian ,Tansformational, Transactional Berpengaruh Terhadap Kinerja: Studi Pada Kinerja Dosen Perguruan Tinggi di Jawa Tengah. *EduPsyCouns: Journal of Education, Psychology and Counseling*, *2*(1), 227–245. https://ummaspul.e-journal.id/Edupsycouns/article/view/441/257
48. Purwanto, A., Asbari, M., Budi Santoso, P., Mayesti Wijayanti, L., Chi Hyun, C., Berman Sihite, O., & Prameswari Saifuddin, M. (2020a). Pengaruh Gaya Kepemimpinan Partisipatif dan Otokratis Terhadap Kinerja Sistem Jaminan Halal HAS 23000 Pada Industri Makanan Kemasan. *Edumaspul - Jurnal Pendidikan*, *4*(1). https://www.researchgate.net/publication/339470652_Pengaruh_Gaya_Kepemimpinan_Partisipatif_dan_Otokratis_Terhadap_Kinerja_Sistem_Jaminan_Halal_HAS_23000_Pada_Industri_Makanan_Kemasan
49. Purwanto, A., Asbari, M., Fahlevi, M., Mufid, A., Agistiawati, E., Cahyono, Y., & Suryani, P. (2020b). Impact of Work From Home (WFH) on Indonesian Teachers Performance During the Covid-19 Pandemic : An Exploratory Study. *International Journal of Advanced Science and Technology*, *29*(5), 6235–6244. http://sersc.org/journals/index.php/IJAST/article/view/15627
50. Purwanto, A., Asbari, M., & Hadi, A. H. (2020a). Gaya Kepemimpinan Perguruan Tinggi Kesehatan: Authentic, Tansformational, Authoritarian atau Transactional. *Surya Medika Jurnal Ilmiah Ilmu Keperawatan Dan Ilmu Kesehatan Masyarakat*, *15*(1), 8–18. https://doi.org/10.32504/sm.v15i1.163
51. Purwanto, A., Asbari, M., & Hadi, A. H. (2020b). Pengaruh Gaya Kepemimpinan Tansformational, Authentic, Authoritarian, Transactional Terhadap Kinerja Guru Pesantren di Tangerang. *Dirasah*, *3*(1). https://ejournal.laifa.ac.id/index.php/dirasah
52. Purwanto, A., Asbari, M., Prameswari, M., & Ramdan, M. (2020c). Gaya Kepemimpinan Di Madrasah Aliyah: Authentic, Tansformational, Authoritarian Atau Transactional? *Nidhomul Haq*, *5*, 15–31. https://doi.org/10.31538/ndh.v5i1.544
53. Purwanto, A., Asbari, M., Prameswari, M., Ramdan, M., & Setiawan, S. (2020d). Dampak Kepemimpinan, Budaya Organisasi dan Perilaku Kerja Inovatif Terhadap Kinerja Pegawai Puskesmas. *Jurnal Ilmu Kesehatan Masyarakat*, *9*(01), 19–27. https://doi.org/10.33221/jikm.v9i01.473
54. Purwanto, A., Asbari, M., & Santoso, P. B. (2019). Influence of Transformational and Transactional Leadership Style toward Food Safety Management System ISO 22000:2018 Performance of Food Industry in Pati Central Java. *Inovbiz: Jurnal Inovasi Bisnis*, *7*(2), 180–185. https://doi.org/10.35314/inovbiz.v7i2.1213
55. Purwanto, A., Bernarto, I., Asbari, M., Mayesti Wijayanti, L., & Chi Hyun, C. (2020). Effect of Transformational and Transactional Leadership Style on Public Health Centre Performance. *Journal of Reseacrh in Business, Economics, and Education*, *2*(1), 304–314. http://e-journal.stie-kusumanegara.ac.id
56. Purwanto, A., Mayesti Wijayanti, L., Chi Hyun, C., & Asbari, M. (2019). the Effect of Tansformational, Transactional, Authentic and Authoritarian Leadership Style Toward Lecture Performance of Private University in Tangerang. *DIJDBM*, *1*(1), 29–42. https://doi.org/10.31933/DIJDBM
57. Purwanto, A., Wijayanti, L. M., Choi, C. H., & Asbari, M. (2019). the Effect of Tansformational, Transactional, Authentic and Authoritarian Leadership Style Toward Lecture Performance of Private University in Tangerang. *DIJDBM*, *1*(1), 29–42. https://doi.org/10.31933/DIJDBM
58. Putri, M. D., & Soedarsono, D. K. (2017). Pengaruh Kepemimpinan Transformasional Dan Employee Engagement Terhadap Kinerja Karyawan Direktorat Solution Operation Telkomsigma. *E-Proceeding of Management :*, *4*(3), 2541–2546.
59. Robbins, S. P. (2001). *Organizational Behavior: Concept, Controversies, Aplications* (8th Editio). Indeks Kelompok Gramedia.
60. Sari, P. O. (2018). Pengaruh Gaya Kepemimpinan Transformasional, Komitmen Afektif, Komitmen Kontinuans dan Komitmen Normatif terhadap Kesiapan Berubah (Studi Pada Bank BRI Kantor Wilayah Yogyakarta). *EXERO : Journal of Research in Business and Economics*, *1*(1), 68–89. https://doi.org/10.24071/exero.2018.010104
61. Setyowati Putri, R., Purwanto, A., Pramono, R., Asbari, M., Mayesti Wijayanti, L., & Chi Hyun, C. (2020). Impact of the COVID-19 Pandemic on Online Home Learning: An Explorative Study of Primary Schools in Indonesia. *International Journal of Advanced Science and Technology*, *29*(5), 4809–4818. http://sersc.org/journals/index.php/IJAST/article/view/13867
62. Siswatiningsih, I., Raharjo, K., & Prasetya, A. (2019). Pengaruh Kepemimpinan Transformasional Dan Transaksional Terhadap Budaya Organisasi, Motivasi Kerja, Komitmen Oganisasional Dan Kinerja Karyawan. *Jurnal Bisnis Dan Manajemen*, *5*(2), 146–157. https://doi.org/10.26905/jbm.v5i2.2388
63. Sopa, A., Asbari, M., Purwanto, A., Budi Santoso, P., Mustofa, Hutagalung, D., Maesaroh, S., Ramdan, M., &

Primahendra, R. (2020a). Hard skills versus soft skills: Which are more important for indonesian employees innovation capability. *International Journal of Control and Automation*, *13*(2), 156–175. http://sersc.org/journals/index.php/IJCA/article/view/7626

64. Sopa, A., Asbari, M., Purwanto, A., Budi Santoso, P., Mustofa, Hutagalung, D., Maesaroh, S., Ramdan, M., & Primahendra, R. (2020b). Hard skills versus soft skills: Which are more important for indonesian employees innovation capability. *International Journal of Advanced Science and Technology*, *29*(3), 6431–6453. http://sersc.org/journals/index.php/IJAST/article/view/7233
65. Sudiyono, R. N., Fikri, M. A. A., Asbari, M., Suroso, Nugroho, Y. A., & Singgih, E. (2020). The Role of Employee Engagement in the Relationship between Authentic Leadership , Talent Management and Job Satisfaction. *International Journal of Advanced Science and Technology*, *29*(5), 11809–11836. http://sersc.org/journals/index.php/IJAST/article/view/25377
66. Sudiyono, R. N., Goestjahjanti, F. S., Asbari, M., Fayzhall, M., Yani, A., Winanti, Yuwono, T., Nurasiah, Yulia, Y., Singgih, E., & Chidir, G. (2020). Meningkatkan Komitmen dan Kinerja Dosen : Apa Peran Manajemen Perguruan Tinggi ? *EduPsyCouns: Journal of Education, Psychology and Counseling*, *2*(1), 337–352. https://ummaspul.ejournal.id/Edupsycouns/article/view/489/283
67. Susyanto, H. (2019). Pengaruh Kepemimpinan, Keterlibatan Karyawan dan Kepuasan Kerja terhadap Kesiapan untuk Berubah dalam Menghadapi Perubahan Organisasi. *Jurnal Ekonomi, Bisnis, Dan Akuntansi (JEBA)*, *21*(1), 1–20.
68. Waruwu, H., Asbari, M., Purwanto, A., Nugroho, Y. A., Fikri, M. A. A., Fauji, A., Shobihi, A. W. I., Hulu, P., Sudiyono, R. N., Agistiawati, E., & Dewi, W. R. (2020). The Role of Transformational Leadership, Organizational Learning and Structure on Innovation Capacity: Evidence from Indonesian Private Schools. *EduPsyCouns: Journal of Education, Psychology and Counseling*, *2*(1), 378–397. https://ummaspul.e-journal.id/Edupsycouns/article/view/499
69. Yanthy, E., Purwanto, A., Pramono, R., Cahyono, Y., & Asbari, M. (2020). Pengaruh Gaya Kepemimpinan Transformasional dan Tranksaksional Terhadap Kinerja Sistem Jaminan Halal HAS 23000. *Jurnal Bisnis Dan Manajemen Islam*, *8*(1), 131–153. https://doi.org/http://dx.doi.org/10.21043/bisnis.v8i1.7045
70. Yuwono, T., Novitasari, D., Hutagalung, D., Sasono, I., Silitonga, N., & Asbari, M. (2020). Peran Organizational Justice terhadap Komitmen Organisasional: Analisis Mediasi Kepuasan Kerja Dosen Perguruan Tinggi Swasta. *EduPsyCouns: Journal of Education, Psychology and Counseling*, *2*(1), 582–599. https://ummaspul.e-journal.id/Edupsycouns/article/view/550
71. Yuwono, T., Wiyono, N., Asbari, M., Novitasari, D., & Silitonga, N. (2020). Analisis Pengaruh Efektivitas Kepemimpinan Transformasional dan Kesiapan untuk Berubah terhadap Kinerja Karyawan Wanita di Masa Pandemi Covid-19. *Jurnal Ilmiah Mahasiswa Ekonomi Manajemen*, *5*(3), 615–632. http://www.jim.unsyiah.ac.id/EKM/article/view/15502