

CONCENTRATION AND PERFORMANCE OF CEMENT INDUSTRY IN INDONESIA¹⁾

By

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ABSTRACT

This research aims at knowing the correlation between concentration and performance of cement industry in Indonesia. The secondary data used in this research were in the form of time series from various reports published by Central Statistics Agency (BPS), Ministry of Trade, and Ministry of Industry in the year of 1989-2010. The data were analyzed using descriptive qualitative and quantitative analysis. The analysis model used was Granger Causality. The results showed the followings: (1) the growth of concentration, efficiency, and productivity of labour fluctuated and tended to rise during the years observed, (2) the concentration and productivity of labour of cement industry in Indonesia were not correlated, while concentration and efficiency have one way correlation (concentration influenced efficiency).

Key Words:

- *Concentration*
- *Productivity of Labour*
- *Efficiency*
- *Granger Causality*

- 1) Summarized from script of Maya
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- 3) Alumni of Department of Economic Development

I. INTRODUCTION

The number of cement companies in Indonesia today is as many as nine companies belonging to the Indonesian Cement Association (ASI). The number of cement companies in Indonesia which is quite a bit causing a relatively large market share and this will affect the market structure of the cement industry. Measurement of the concentration in the cement industry can be done by measuring share of the four largest firms (CR4). CR4 is the measurement of the four largest companies focused in output compared to the total amount of output produced by the entire company.

Value-added in the cement industry can determine whether the poor performance of the industry in production. The increase in value-added will identify that the industry is moving toward the better. Addition of value-added can be assessed whether a company is operating efficiently or not. Efficiency is the ratio of the value added generated an industry with the inputs used in the form of labor, raw materials, capital, and others. The level of competition and market structure are done by looking at the development of industry's concentration. Indonesian cement industry sector is characterized by high concentrations of the several companies that control market share.

Labor productivity can measure how the standard of efficiency and effectiveness or the principles' understanding of efficiency in utilizing resources of products compared to the number of labors in the cement industry. The level of efficiency can be used as an indicator in assessing whether the use of raw materials in an efficient or inefficient and can measure the development of cement industry. After the production's process in utilizing some factors of it, in order to produce maximum production and profit and those producers will sell their products to earn revenue from the sale. This research investigated how the relationship between concentration and efficiency, and concentration and labor productivity. Based on the illustration above, the researcher will examine the "*Concentration and Performance of Cement Industry in Indonesia*".

There are some problems raised from the background of this study, such as: 1.How is the development of concentration, efficiency and labor productivity in Indonesian cement industry? 2. How is the relationship between concentration and labor productivity in Indonesian cement industry? 3. How is the relationship between concentration and efficiency in Indonesian cement industry?

II. LITERATURE REVIEW

1. Theory of Industrial Organization

Based on the micro level, industry is defined as a group of companies that produce homogeneous goods, or goods that have closed replaceable properties. However, at the macro level of understanding, industry is an economic activity that creates value-added in producing goods or services (Hasibuan, 1993: 12-13).

Industrial organization is a depiction of how the relationship between markets structure, behavior and performance. It particularly analyzes the relationship between one activity and others, the interdependence between each other in the market conditions, firm behavior and economic performance.

In the analysis of Industrial Economics, especially the industrial organization, there is a way to observe the link between structure, behavior, and performance. First, just pay attention to two aspects in depth, namely the relation between structure and performance. Second, observe the performance and behavior then link them back to the structure. Third, examine the relation of the structures of behavior and observe its performance (Hasibuan, 1993:11).

In determining the market structure on how the situation of a market, there are several criteria that should be considered, the level of concentration, the conditions of entry, the product differentiation, the scale buyers, the number of buyers, the condition of the costs, the vertical and horizontal integrations, the number of sellers, and the labor organizations. Industry performance is the result of work which is influenced by the structure and behavior. The performance of industry can be seen from the technical efficiency, equity, value -added, quality of products, employment and profitability. The behavior of industry is interpreted as a way of working or a competition in the market to achieve maximum goals. The measurement of industrial behavior is the price and industrial strategy, coercion, legal tactics of advertisement, research and innovation.

2 . Labor Productivity

Productivity is a measurement of efficiency and effectiveness, or in other words, may become the principles of efficiency in using the resources of total products produced compared

to the labor. Productivity is the result achieved per unit of labor or production factors within a certain time period. In general, the level of productivity is affected by the developments of technology, equipment and expertise of the labor (Kuncoro, in Joanna, 2011). Labor productivity is the ratio between the value of output or production industry and the total of workforce.

3. Industry Concentration

Industry concentration is the situation which shows the degree of market controlling by the companies in market industry. Each type of market structure has their own degree of concentration compared with the procurement markets with their varieties of structure.

Douglas F. Greer in 1984 describes four factors that lead to a concentration of the industry, they are : First, lucky factor ; Second, technical factors ; Third, government policy factors ; Fourth , the business needs of the factors which allow the company to take a certain decision (Hasibuan,1993).

Measurement of the concentration of industry can basically be done in three ways: first , by using the share of the company. Second, by using the Lorenz curve . Third, by using the index , Gini index, the bain index, Lerner index and the Herfindahl index (Teguh , 2010: 92).

The first technique is the measurement of the concentration of the industry by calculating the share of the observed company, both in the control output and sales, or value added. The number of companies that made sizes are different based on the applicable standard of measure, for example, the share of 3, 4, 8, or 20 largest companies (Teguh, 2010: 86).

Calculation of the classification level of market concentration in the Bird 1999 as follows :

- High Concentration : $\geq 75 \% CR4$
- Moderately Concentration : $75 \% > 50 \% \geq CR4$
- Low Concentration : $CR4 < 50 \%$

Oligopoly classification according to Joe S. Bain (1959:128-129) is the largest concentration of 3 companies dominate the market concentration of ± 87 percent and 8 largest companies dominate the market ± 99 per cent including type 1 (full oligopoly), the largest concentration of 4 companies dominate the market between 67 -75 percent, the biggest concentration of 8 companies dominate the market between 85-90 percent, a concentration of 20 largest companies control the market ± 95 per cent including type 2, the concentration of 4 largest companies dominate the market of 50-60 percent, the biggest concentration of 8

companies dominate the market between 70-85 percent, a concentration of 20 largest companies control the market \pm 90 per cent including type 3 (high moderate oligopoly), the largest concentration of 4 companies dominate the market of 35-40 percent, the largest concentration of 8 companies dominate the market 45-70 percent, a concentration of 20 largest companies dominate the market \pm 70 percent including type 4 (moderately low oligopoly), the largest concentration of 4 companies dominate the market for less than 35 percent, and the biggest concentration of 8 companies dominate the market for less than 45 percent, including oligopoly type 5 (Plunket et al , 1997).

4 . Theory of Efficiency

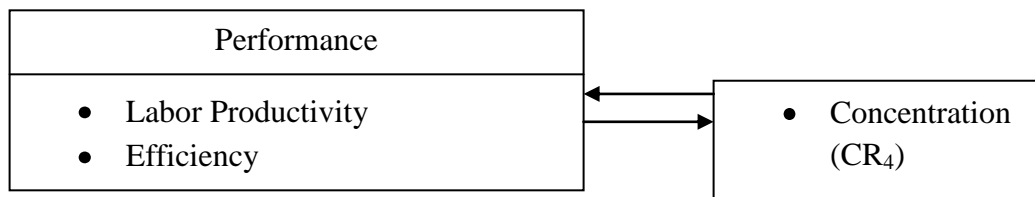
Efficiency has closed relationship with the use of resources to reach an important goal. It is an efficient production process when the result of it is the same but the use of resources is not relatively significant.

Efficiency is basically a term in modern economics that indicates the state of an economic system in utilizing all the resources for the sake of improving the welfare of an industrial economy without harming others or absence of an industrial efficiency based on the selling price of the product, because the more efficient an industry the lower the selling price will be. CE Ferguson states that the production is analyzed by combining the technology level of all kinds of input to manufacture a variety of inputs to outputs defined previously, the production can be increased by adding the input that will lower the cost of production so that it will be more efficient (Soekartwai in Novi , 2008).

To see the level of efficiency in this case is expressed by the ratio between the value - added calculation and the value of output in the same period, thus it can be used the following formulation: Value added/ intermediate cost.

Framework

The framework which is used to determine the relationship of performance in terms of labor productivity and efficiency with the concentration of the cement industry in Indonesia can be described as:



III. RESEARCH METHOD

The scope of this study is to observe the relationship between the performance and the market concentration of cement industry in Indonesia. The data used are time series data (time series) from 1989 to 2010 obtained from various sources, such as the Central Bureau of Statistics, Statistics of Large and Medium cement industry using data ISIC 5 -digit (26 411), and Indonesian Trade and Industry Department, as well as from other sources.

The size of variables used in this study (labor productivity, efficiency, and concentration) is as follows:

a) Labor Productivity

Labor Productivity: $\frac{\text{Output}}{\text{Labor}}$

b) Efficiency

Efficiency = $\frac{NT}{BM}$

Note : NT = (value added)

BM = (intermediate cost)

c.) Concentration

The level of concentration is measured with (CR4) shows the market share of the four largest firms:

$CR_4 = \sum_{i=1}^4 MS_i; MS_i = \frac{N_i}{N_t}$

Where: CR4 = ratio of concentration of the four largest companies in the industry

MS_i = share of company i-th

N_i = Rated output 4 largest companies

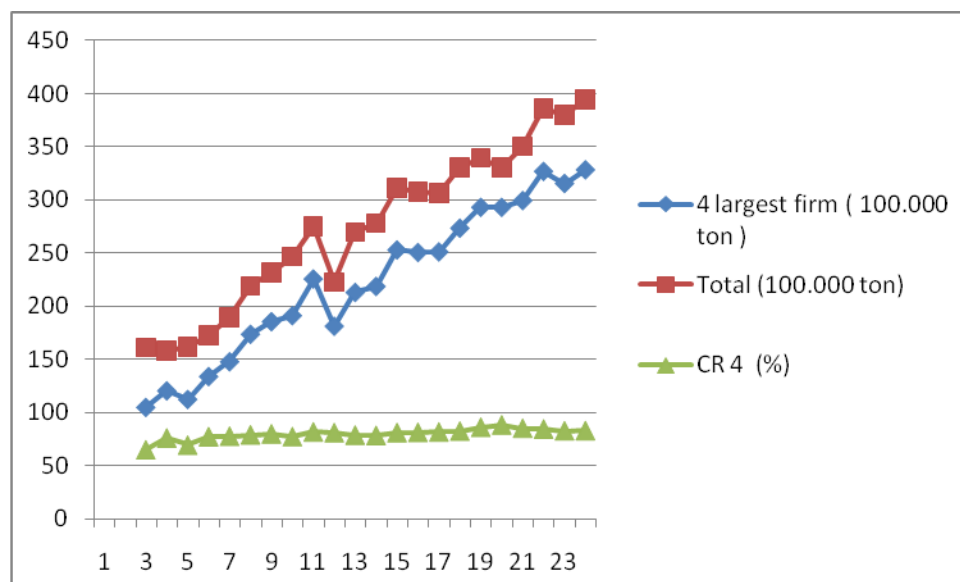
N_t = the output value of entire company in the industry

To determine the relationship between the performance of industry and the market concentration, the analysis tool used is " Granger causality test " .

IV.FINDINGS AND DISCUSSION

Concentration, Efficiency and Labor Productivity in Indonesian Cement Industry

Conditions of concentration, efficiency and labor productivity in Indonesian cement industry is shown in chart 1 and 2 and 3. From the graph one can note that the growth of the cement industry concentration fluctuates each year with the trend likely to increase during the twenty two years. Concentration fluctuations in Indonesian cement industry is due to changes in the quantity of output and the number of the four largest companies' overall output. Changes in the concentration of the cement industry can be caused by number of companies. Four firms' concentration ratio on average by 80 %, it indicates that the concentration of the cement industry in Indonesia belongs to the high concentration.

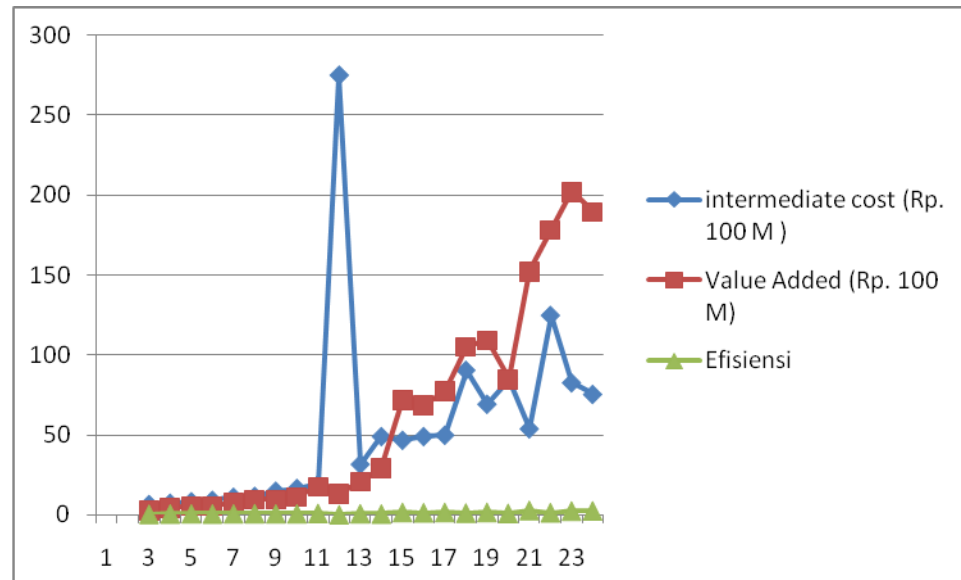


Graph 1: concentration of the cement industry

As seen from the efficiency aspect, in 1989-2000 the efficiency of the cement industry has not reached 1, this was due to the enactment of Local Code Price since 1979 and in subsequent years occurred in the field of monetary policy changes or adjustments of oil's prices in the country, so that local governments made price adjustments. In 1998 the cement industry experienced deregulation characterized by the Letter of Intern (LOI) with IMF. By the determination of the Local Code Price, so the regional oligopoly and prices lower limit were set by the Minister of Industry and Trade, thus protecting the company to be inefficient and creating supply crisis' output, but in 1998 the Local Code Price was abolished because they were not efficient (Bird, in Juwita, 2004).

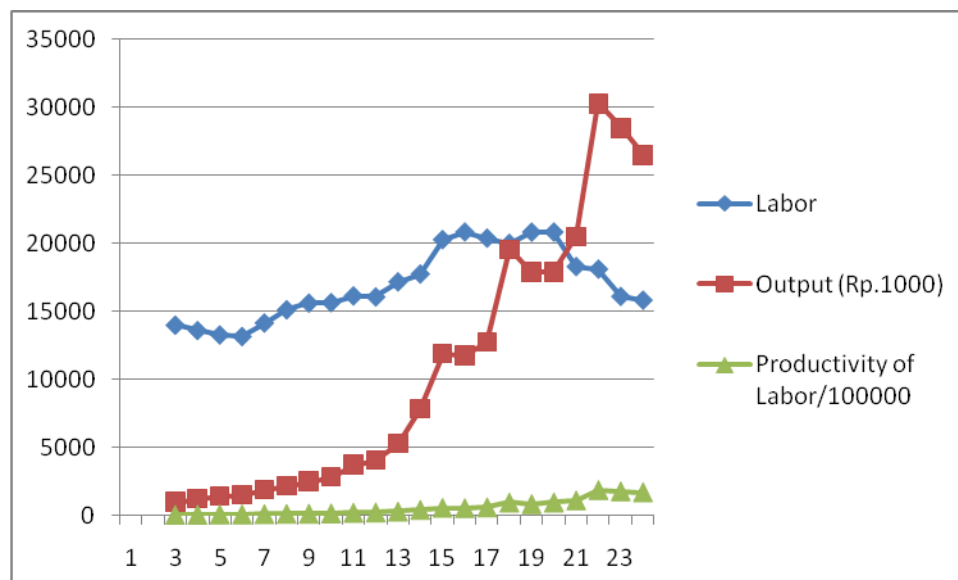
In the years of 1998-1999, a decline in the efficiency of negative growth was occurred due to the economic crisis in Indonesia. At that time the problem was so serious that the growth of the amount of output produced in 1998 less than the cost of an associate used. In 2001, an increase in the efficiency of the cement industry reached a value of more than 1, this was due to the improvement of Indonesia's economy since the crisis and the abolition of Local Price Determination.

In 2006, there was a decrease in the efficiency of the cement industry which caused by the rising of oil's price and affected the credit growth slowed to 14 percent (Mirza Adityaswara, Analyst Banking and Capital Markets). Coal prices in mid-2008 crawled up out of control and the source of high grade coal is difficult to obtain, so the current source is medium and low grade. The increase in the coal price affected the cement industry in Indonesia (prasetyo-utomo.blogspot.com/2010/12). The highest efficiency in the cement industry occurred in 2010 with an efficiency of 2:51 where the use of intermediate costs less than the previous year thereby increasing efficiency. However, the average efficiency of the cement industry in Indonesia was quite large at 1:14 with an average growth of 9.6 percent efficiency.



Graph 2: efficiency of the cement industry in Indonesia

The growth of the cement industry labor productivity fluctuates every year with the trend of increasing growth for twenty- two years. Since 1989 to 2001, the labor productivity has been increased, characterized by the positive growth. In 2002 there was a decrease in labor productivity of 3.74 percent from the bigger number of labor than in 2001 but the value of the output produced was fewer. In 2005 there was a decrease in labor productivity of 3.74 percent from the previous year. In the years 2006-2008, there was an increase in labor productivity in cement industry, but decreased again in 2009 and 2010 from the number of more workers than the previous year but produced less output value from the previous one. Fluctuations in labor productivity are influenced by the amount of cement industry, technology and capital employed in Indonesia so that is why several changes in the demand for labor and the result of output occurred.



Graph 3: Labor productivity

Results of Unit Root Test (ADF Test)

Testing the unit root / stationary Augmented Dickey Fuller performed with (ADF Test)

Null Hypothesis: D(PRODUCTIVITY) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 2 (Automatic based on SIC, MAXLAG=2)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-6.540428	0.0003
Test critical values: 1% level	-4.571559	
5% level	-3.690814	
10% level	-3.286909	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(CR4) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic based on SIC, MAXLAG=2)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-9.974301	0.0000
Test critical values: 1% level	-4.498307	
5% level	-3.658446	
10% level	-3.268973	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(EFFICIENCY) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic based on SIC, MAXLAG=2)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-11.34390	0.0000
Test critical values: 1% level	-4.498307	
5% level	-3.658446	
10% level	-3.268973	

*MacKinnon (1996) one-sided p-values.

Source: Data processing by using E - views 6.0

From the result of stationary based ADF test, the data obtained throughout the variable is not stationary, then to obtain the stationary one at first differencing the data. Based on the unit root tests using the Augmented Dickey Fuller, it can be seen that the variable concentration (CR4) stationary at first difference with the data value of the ADF test is smaller than the critical value McKinnon ($-4.498307 < -9.974301$). Stationary efficiency at first difference with the data value of the ADF test is smaller too than the critical value McKinnon ($-4.498307 < -11.34390$). The variable concentration, efficiency and labor productivity in the first difference with the ADF

test value is smaller than the critical value McKinnon ($-4.571559 < -6.540428$). Variable concentration, efficiency and productivity stationary at first difference with 99% confidence level ($\alpha = 1\%$).

Determination of Lag

Through statistical tests, and the data have been expressed stationary, then the next step is to determine the optimal lag length, results are as follows:

VAR Lag Order Selection Criteria

Endogenous variables: CR4 EFFICIENCY

PRODUCTIVITY

Exogenous variables: C

Date: 06/02/13 Time: 22:41

Sample: 1989 2010

Included observations: 20

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-355.2142	NA	7.24e+11	35.82142	35.97078	35.85057
1	-317.9393	59.63978*	4.35e+10*	32.99393*	33.59137*	33.11056*
2	-310.4633	9.718764	5.47e+10	33.14633	34.19185	33.35043

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Determination of the optimal lag is one of important procedures that must be performed in model building. The table shows that the optimal lag in lag 1 . LR value of 59.63978 and the

final value of the prediction error (FPE) $4.35e +10$, the value of the SC 33.59137 and 32.99393 is the smallest AIC value .

Granger Causality Analysis between Concentration (CR4) and Labor Productivity in Indonesian Cement Industry

To determine the relationship between the concentration (CR4) and labor productivity in Indonesian cement industry can be determined by testing granger causality. This test can identify the relationship between the concentration (CR4) and labor productivity (PRODUCTIVITY) whether there is a unidirectional relationship or bilateral causality.

Pairwise Granger Causality Tests

Date: 05/13/13 Time: 10:49

Sample: 1989 2010

Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
PRODUCTIVITY does not Granger Cause CR4	21	2.32015	0.1451
CR4 does not Granger Cause PRODUCTIVITY		1.41164	0.2502

Source: Data processing by using E - views 6.0

Based on the Granger causality test is known that Hypothesis (H0) does not Granger Cause PRODUCTIVITY CR4 received from the value of 0.1451 probability $> 0:10$ and count the value of the F - statistic is smaller than the F - table ($2.32015 < 2.61$) with $\alpha = 10$. CR4 does not Granger Cause PRODUCTIVITY received from the probability value $0.2502 > 0.1$ and the calculated value of F - statistic is smaller than the F - table value ($1.41164 < 2.61$) .

The Granger test shows that there is no relationship between labor productivity and the concentration of the cement industry. The absence of a relationship between them during the time of this study may be due to Indonesian cement industry is a capital intensive, so that an increase or decrease in the concentration is more affected by an increase in production and other factors, such as capital, energy and technology (Widayunita , 2007). The theory which can be

categorized into three distincts but interrelated branches is used. The first is a theory in which the production technology is determined by the consideration of the company's share of production technology. In this line of theory, the maximum size is the most efficient size for the company to operate, which will vary by industry. The second is the transaction cost theory which predicts the size of the company relies on a comparison between the cost of intra - company transactions and market mechanisms (Coase 1937 ; Williamson 1967) . If there is a high cost in using the market mechanism, the company will choose the larger size (Directorate of Performance Evaluation of Sectoral Development, 2010) .

Granger Causality Analysis between Concentration (CR4) and Efficiency of Indonesian Cement Industry

The relationship between the concentrations (CR4) and efficiency can be determined by testing granger causality. This test can identify the relationship between them and check whether there is a unidirectional relationship or bilateral causality.

Pairwise Granger Causality Tests

Date: 05/13/13 Time: 16:48

Sample: 1989 2010

Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
CR4 does not Granger Cause EFFICIENCY	21	3.54919	0.0758
EFFICIENCY does not Granger Cause CR4		2.09644	0.1648

Source: Data processing by using E - views 6.0

Based on the Granger test is known that the hypothesis (Ho) CR4 does not Granger EFFICIENCY rejected, this can be seen from 0.0758 probability value < 0.1 and the value of F – statistics count is greater than the value of the F – statistic tables ($3.549 > 2.61$) with $\alpha = 10\%$.

Granger test shows that there is a relationship between concentration and efficiency of the cement industry in Indonesia. It shows the concentrations affect the efficiency of Indonesian cement industry. There is a unidirectional relationship between concentration and efficiency,

which indicates the fact that concentration affects the efficiency of the cement industry in Indonesia during the years of the study. This can be caused by the increasing concentration of an industry, so the firms in the industry must be efficient to maintain the company's market share.

Efficiency has no effect on the concentration of the cement industry in the period of the study, it is possible because of government policies in the entry and exit integration of Indonesian cement. In the new governmental order, cement got many attentions from public because of the local benchmark pricing and the local government set the marketing division of the cement cartel that raised prices and marketing divisions of cement. It made cement was difficult to find in the market. In 1998, the financial crisis occurred in Indonesia and the impact went to liberalized financial markets cement. Indonesia had to borrow money from IMF which required the elimination of cement cartel, so the 1999 Constitution No. 5 about the prohibition of monopolistic practices and unfair competition was published. Since the anti-monopoly law was applied, any businesses that conduct unfair competition will be sanction to anti-monopoly law by the Commission of Business Competition. The huge potential cartel might be happened again due to the multinational companies that have a majority stake in the cement industry. The potential of this cartel is supported by the character structure of cement industry oligopoly and homogeneous goods, where there is no quality competition so there is a tendency to adjust the behavior in leading the cartels (Silalahi, 2003:3).

V. Conclusions

1. The structure of Indonesian cement is included the oligopoly market structure (High Concentration) which can be seen from the average concentration of 80%. Concentration (CR4) cement industry fluctuates with the increasing trend over the years of observation. This can be affected by the amount of output produced by the four largest companies, the total and the cement companies in Indonesia. Labor productivity in Indonesian cement industry has fluctuated with increasing trend over the years of observation too. This change can be influenced by technology, capital employed and economic crisis that hit Indonesia. The efficiency of the cement industry in Indonesia has fluctuated with increasing trend during the observation. Efficiency changes can be caused by local price determination and the rising of fuel's price.

2. The Granger Causality test on the cement industry during the years of the study showed that there was no relationship between the concentration and labor productivity due to the status of cement industry as a capital intensive industry and high technology.
3. Based on the Granger causality test during the observation between efficiency and concentration of the cement industry, there is a unidirectional relationship. Tests showed the concentration affects the efficiency of the positive impact that will be increased if the efficiency is increased too. It happens because the more concentrated the industry, the more companies will improve their efficiency in order to compete with others. Efficiency does not affect the concentration of the cement industry. This is due to local pricing and the increase of coal and fuel's price. Other factors are more influential on the concentration of capital, such as technology and innovation.

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