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Analysis of The Effect of Market Concentration Level on The Efficiency of Large and Medium Processing Industry in East Java

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A B S T R A C T

This study aims to investigate the effect of market concentration on industrial efficiency. Large and medium processing industry data in East Java and the Stochastic Frontier Analysis (SFA) approach were used to investigate the impact of market concentration on the efficiency of the industry. The results of the study indicate that market concentration in the processing industry in East Java leads to oligopoly. The variable of firm size (FSize) and the level of market concentration (CR4) have a negative effect on the level of technical efficiency of large and medium industries in East Java.

Keywords: *Efficiency; Market Concentration; Firm Size; manufacture industry; Stochastic Frontier Analysis*
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INTRODUCTION

Industry is predicted to have a vital role to drive the domestic economy. In order to be able to carry out the intended function optimally in the current era of the technology industry, Indonesian companies must strive to increase their competitiveness by improving product quality and product efficiency (Suyudi Mangunwihardjo, 1997).

Manufacturing is a very vital sector that drives economic development. Countries that own and rely on the industrial sector will grow their economy. In addition, improving the quality of the manufacturing industry can encourage economic growth, because manufacturing has better effectiveness and efficiency than other sectors. According to (Chenery, 1975), the process of transformation of the economic structure will appear in its development where manufacturing becomes the driving force of economic growth and begins to leave dependence on traditional agricultural commodities (Kuncoro, 1997: 57-58).

The industrial sector is the leading sector and contributes greatly to the formation of GRDP in East Java. Based on data on the distribution of the percentage of GRDP contribution according to business fields in 2011-2015, it shows that the industrial sector in several years seems to dominate with an average share of above 28 percent. This value is far above the agricultural sector and wholesale and retail trade; car and motorcycle repair.

The level of competition from the manufacturing industry is determined by the productivity, level of production and the efficiency of industrial technology. (Porter, 2004) suggests that productivity is the most fundamental factor of competitiveness at the individual, company or industry level. Total Productivity Factor (TFP) is defined as an indicator of the development of industrial productivity performance. TFP will describe the impact that capital and labor can work together to create maximum output.

Market structure is one of the factors that play a vital role in analyzing industry behavior and performance. There are three main components in the market structure, namely market share, concentration and barriers of entry, and. While market share is the target of an industry or company, and its contribution or role is a tool to bring profit for the company. Meanwhile, concentration is defined as a combination of market shares of oligopolistic industries that are interdependent between these industries. The combination of market shares from various companies or industries forms a concentration in the market (Wihana Kirana, 2001).

A high level of concentration will give rise to indications of uncompetitiveness in the market. Not only that, barriers to entry can also affect the level of competition in the market. Bird (1999) explains that barriers to entry can be caused by government policies that have a greater impact on the level of competition than concentration. This happens because when a company's leading price is higher than the market price, other companies will join it, causing price stability to return to its original level. The difficulty of a company to enter an industry is sometimes caused by a barrier to entry.

Market structure and performance are not always related. According to Demsetz (1973 in Bird, 1999) explains that the level of competitive market concentration from companies that are efficient and grow faster than other companies that are less efficient will certainly provide more profit margins. (Carlton and Perloff, 2000) added that the relationship between structure and performance does not make price and concentration more competitive. Another explanation states that larger companies (increased concentration) can produce more efficiently. In industrial sector research, there is a tendency to find that between concentration and barriers to entry prices there is almost no relationship,

especially in recent years (Carlton and Perloff, 2000).

According to (Amalia and Nasution, 2007), three opinions about market concentration and share are part of the market structure, among others: First, traditional assumptions. This opinion describes concentration as a proxy for market power. Increased market concentration leads to greater market power and less access to collusion, and allows firms to earn extraordinary profits. Then when the market concentration increases, the profitability will also increase. Second, the differentiation hypothesis. This opinion reveals that market share is a proxy for the results of different products. By making a differentiation in the product, its market share will increase and this increase will be followed again by product differentiation and so on, thus producers can freely set prices far from competitive prices. In this case, high profits or profits are obtained from low costs even by setting prices above market prices. Then the increase in market share will also increase profitability. Third, efficient structure. This opinion assumes that the level of concentration and market share is not considered as a proxy for market power but rather as a company efficiency. The more efficient a company is, the more concentrated its market structure will be so as to increase profits.

In the empirical study of the influence of market competition, various indices including the n-firm concentration ratio, Herfindahl index have been used to determine the level of market competition. In the context of India, (Goldar, 1986 b) applied the concentration ratio to analyze its effect on productivity, but found no statistically significant effect. However, in studies for other countries, a positive impact of product market competition on productivity has been reported. For example, based on UK company data, [Nickell (1996); Nickell and Wall (1992); and Nickell et al., (1997)] show that various types of product market competition indices increase productivity, while research (Nickell et al., 1992) shows that an increase in a firm's market share reduces its productivity growth. (Nickell et al., 1997) found that the average increase in the average price of value added tends to decrease productivity growth. (Green and Mayes, 1991) claim that the level of competition is one of the important variables that significantly explains the difference in efficiency.

This study is intended to determine the classification of market concentration categories based on the ISIC classification. Besides that, the researcher also wants to test and analyze the impact of market concentration and company size on the efficiency of large and medium processing industries in East Java.

The theories related to and supporting the research were put forward including: production theory, SCP paradigm (structure, conduct, performance), efficiency theory, market structure theory and market concentration. Production is all kinds of resources that are used or utilized to convert one raw material into a different processed or finished material, no matter what, where, or when the commodity is distributed and in what ways consumers can use the commodity (Miller and Meiners, 2000). Therefore, production includes the manufacture of raw materials, storage processes, retail, repackaging, transportation and distribution. While Pindyck and Rubinfeld (1995) believe that production is a transition from two or more inputs (resources) to one or more outputs (products). As far as industry is concerned, production is at the core of the economy. To be able to produce, large enough inputs such as capital, technology and labor are needed. Therefore, there is a relationship between production and input, in the form of the maximum output produced by certain inputs or what is called the production function.

According to Sadono Sukirno

(2003) the production function is a link between the factors of production and the level of production. Factors of production are called inputs, and the volume of production is called output. Lincoln Arsyad (2003), revealed that inputs and outputs will later be connected to the production function. Later it will be known whether by utilizing a certain input the maximum output will be obtained, or vice versa. One of the determinants of the production function is the availability of technology from the company. Therefore, the output and input functions of the production system are the accumulation of capital, labor, technology, equipment, materials and others. After that the production function is denoted by the two input one output model.

In order to facilitate the analysis, Faried (1991) states that only labor can affect the factors of production, and other factors of production are considered constant, so that it will be clearly known the influence of production factors on the quantity of production. That is, the number of workers in the production process will greatly affect the quantity of production. Factors of production whose value does not change, then the amount is also constant is usually called a constant factor of production. Meanwhile, the factors of production where the quantity is dynamic as long as the production takes place is defined as the production of variable production. Production factors that are dynamic or constant will appear in the production process which has a short-term period. While the production factors are static and will appear in the production process which has a long-term period.

The basis of the structure conduct performance (SCP) paradigm itself was coined by Edward S. Mason, a lecturer at the University of Harvard in 1939, who argued that the structure of an industry will determine how industry players behave (conduct) which ultimately determines diversity or performance (performance) of the industry. Structure is usually measured by the concentration ratio. Behavior, among others, is seen from the level of competition or collusion between producers. The diversity or performance of an industry is measured, among others, by the degree of innovation, efficiency and profitability.

METHODOLOGY

This study uses a quantitative approach using statistical procedures. Neuman (2003) explains that there are usually three types of quantitative research, including: surveys, experiments, and content analysis. In this study, the type of research used is experimental. The type of experimental method is a method that aims to explain the causal relationship (caseality) between one variable and another (variable x and variable y).

The data used in this study is secondary data obtained from the 2008-2014 Large and Medium Industry survey conducted by the Central Statistics Agency (BPS). In order to measure efficiency in this study, the SFA approach (stochastic frontier analysis) can be carried out through an output-oriented approach for measuring technical efficiency, and an input-oriented approach for measuring cost efficiency. Technical efficiency is measured based on the production frontier, while cost efficiency is measured based on the cost frontier (Kumbhakar, 2000).

In this study there is a statistical description of the variables used. This summary is obtained from the results of processing unbalanced panel data, so that the number of observations each year is different. Table 1 presents a summary of the statistics of the variables used in the study. These variables are divided into production functions and technical efficiency. The production function contains input variables used in the production process, while the company performance function contains independent variables that affect the technical efficiency of

manufacturing companies in East Java.

Technical efficiency in industries in East Java can also be influenced by company size (FSize) and concentration ratio (CR4). The FSize variable is the ratio between the output produced by the company to the total output in the same industry. FSize value close to zero indicates a small company size ratio and vice versa. Furthermore, CR4 shows market concentration in the manufacturing industry in East Java. A CR4 value close to zero indicates a lower concentration of output sales in the industry and the market will be more competitive, while a CR4 value close to one indicates that the market is controlled by a dominant party or a monopoly occurs.

There are two functions used in this research, namely the production function and the efficiency function which are denoted as follows:

$$y_{it} = \alpha_0 + \sum_{k=1}^{K} \beta_k x_{kit} + \frac{1}{2}\sum_{k=1}^{K}\sum_{l=1}^{L} \beta_{kl} x_{kit} x_{lit}$$

$$+ \sum_{k=1}^{K} \beta_{kl} x_{kit} t + \beta_t t + \frac{1}{2}\beta_{tt} t^2 + v_{it} + u_{it}$$

Where is the y_{it} function as a production function which consists of the variables of capital (l), labor (l), raw materials (m), and energy (e). Meanwhile, the u_{it} function as an efficiency function consists of company size (size) variables and the Concentration Ratio (CR4) index.

The main variables used in the frontier production model consist of output and input variables. The output variable is a proxy for the total output as a whole. This variable refers to the total output value produced by the company in a certain year. The input variable in the form of capital is measured by calculating the value of fixed assets, such as: land and buildings, company machines, and assets in the form of vehicles. While the input variable in the form of labor is measured by calculating the number of workers used. The input variable in the form of material is the total cost of local and imported raw materials used during the production process. Meanwhile, the input variable in the form of energy is measured based on the company's total expenditure on the use of fuel oil, gas and electricity.

Market concentration is the collection of buyers and sellers, indicating the level of potential capacity in the market. The degree of concentration can indicate a certain type of industrial structure. According to Hasibuan's (1994) research, the degree of oligopoly structure is usually measured by concentration. Because oligopoly is formed from a mixture of perfect competition and monopoly. in some cases oligopoly can produce differentiated goods. In other cases, oligopoly companies (usually tight oligopolies) tend to become monopolies because there is no competition for similar goods. Then there are other characteristics where the company conducts coordinated

Table 1.
Variable Units and Number of Observations

Variable	Unit	Obs
q	Million Rupiah	31362
k	Million Rupiah	31362
l	Million Rupiah	31362
m	Million Rupiah	31362
e	Million Rupiah	31362
FSize	Rasio	31362
CR4	Rasio	31362

behavior (collusion), and makes the monopoly structure coordinated collusive.

Besides that, there are other variables, namely the concentration level variable that can be calculated and measured, including the Concentration Ratio (CR), Hirsch-Herfindahl Index (IHH), and Gini Ratio Index. According to Hasibuan, this measurement is usually used on the degree of oligopoly structure. The oligopoly structure is important to understand because the average market structure in Indonesia is like that. Calculation of CR4 as follows:

$$CR_4 = \frac{MS1 + MS2 + MS3 + MS4}{MS_i}$$

Where MS1 is the first largest company's market share, MS2 is the second largest company's market share, MS3 is the third largest company's market share, MS4 is the fourth largest company's market share and MS_i is total market share available.

The calculation of the classification of market concentration levels according to Bird (1999) is as follows:

High Concentration: CR4 ≥ 75%
ModeratelyConcentration:75%>CR4≥50%
Low Concentration : CR4 < 50%

RESULT AND DISCUSSION

The data used in this study were sourced from the Annual Survey of Large and Medium Enterprises conducted by the Indonesian Central Statistics Agency (BPS). The data used in this study focuses on industries in East Java. From the results of data filtering, it is obtained the number of different observation units in each year and industrial classification using 2-digit ISIC. From these results, there are a total of 24 processing industries that carry out the production process in East Java. The industries operating in East Java are the food industry; drink; tobacco processing; textiles; apparel; curing articles of leather and footwear; wood, articles of wood and cork and wickerwork of bamboo, rattan, and the like; paper and paper goods; printing and reproduction of recording media; products from coal and petroleum refining; chemicals and goods made from chemicals; pharmaceuticals, medicinal and herbal products; rubber, articles of rubber and plastics; non-metallic minerals; base metal; metal goods, except machinery and equipment; computers, electronics and optics; electrical equipment; machinery and equipment ytdl; motor vehicles, trailers and semi-trailers; other means of transportation; furniture; other processing; and repair and ordering services for machinery and equipment.

The output of this study is in the form of total goods produced and there are two variables that affect the production function, namely input and output. While the input variables consist of capital, labor, materials and energy. Meanwhile, in the technical efficiency function, the dependent variable consists of technical inefficiency and the influencing factors, namely firm size and CR4.

To find out the classification of the CR4 index based on the ISIC classification, CR4 is classified into three, namely when the CR4 value is more than 75 percent, it will be classified as High Concentration. When the CR4 value is in the range of more than 50 percent and less than 75 percent, it is in the Moderately Concentration category, and when the CR4 value is less than 50 percent, it is in the Low Concentration category. By using the 2-digit ISIC, the CR4 index value shows an average of 0.711, with this result indicating that the majority of processing industries in East Java are in the Moderately Concentration category. If seen in table 2, the highest CR4 value is found in the repair and installation of machinery and equipment service industry, while the lowest CR4 is in the furniture industry, which is 0.442 or is in the Low Concentration classification.

Table 2.
Market Competition Level

ISIC 2 Digit	Industry	CR4					
		2010	2011	2012	2013	2014	Rata-rata
10	Food	0.726	0.694	0.687	0.721	0.710	0.707
11	Drink	0.764	0.742	0.719	0.729	0.675	0.726
12	Tobacco Processing	0.814	0.788	0.748	0.690	0.695	0.747
13	Textile	0.648	0.693	0.638	0.607	0.551	0.627
14	Apparel	0.542	0.548	0.607	0.532	0.591	0.564
15	Leather, Leather Goods and Footwear	0.713	0.743	0.736	0.754	0.694	0.728
16	Wood, Wood and Cork Products (Not Included Furniture) and Woven Items from Bamboo, Rattan and the Like	0.550	0.574	0.578	0.594	0.566	0.573
17	Paper and Paper Goods	0.668	0.688	0.700	0.679	0.736	0.694
18	Printing and Reproduction of Recorded Media	0.714	0.637	0.715	0.738	0.706	0.702
19	Products from Coal and Petroleum Refining	0.871	0.866	0.860	0.832	0.771	0.840
20	Chemicals and Goods from Chemicals	0.759	0.756	0.764	0.818	0.757	0.771
21	Pharmaceuticals, Medicinal Products and Herbs	0.827	0.834	0.722	0.736	0.706	0.765
22	Rubber, Rubber and Plastic Goods	0.612	0.612	0.518	0.554	0.492	0.557
23	Non-Metal Minerals	0.720	0.717	0.702	0.703	0.707	0.710
24	Base Metal	0.768	0.761	0.725	0.742	0.715	0.742
25	Metal Goods, except Machinery and Equipment	0.687	0.709	0.669	0.706	0.685	0.691
26	Computers, Electronic and Optical Goods	0.821	0.828	0.821	0.842	0.827	0.828
27	Electrical equipment	0.823	0.806	0.808	0.817	0.786	0.808
28	Machinery and Equipment ytdl	0.801	0.840	0.828	0.826	0.826	0.824
29	Motor Vehicles, Trailers and Semi Trailers	0.610	0.531	0.542	0.549	0.512	0.549
30	Other Transport Equipment	0.771	0.781	0.759	0.808	0.796	0.783
31	Furniture	0.422	0.583	0.364	0.436	0.405	0.442
32	Other Processing	0.769	0.818	0.752	0.786	0.806	0.786
33	Repair and Installation Services for Machinery and Equipment	0.955	0.871	0.883	0.885	0.907	0.900
Number of Industry		6005	6228	6370	6226	6473	6260

Table 3.
Market Competition Level Classification

High Concentration				*Moderately Concentration*				*Low Concentration*			
ISIC 2 digit	CR4	Obs	Total Observasi	ISIC 2 digit	CR4	Obs	Total Observasi	ISIC 2 digit	CR4	`Obs	Total Observasi
12	0.747	2196		10	0.707	8253		31	0.442	2063	
19	0.840	80		11	0.726	409					
20	0.771	1329		13	0.627	2455					
21	0.765	363		14	0.564	1854					
26	0.828	204		15	0.728	1169					
27	0.808	397		16	0.573	1570					
28	0.824	403	6426	17	0.694	775	22869				2063
30	0.783	363		18	0.702	636					
32	0.786	890		22	0.557	2038					
33	0.900	201		23	0.710	1753					
				24	0.742	419					
				25	0.691	1130					
				29	0.549	408					

After the results of the concentration ratio (CR4) are known, then in table 3 below has shown the classification of industrial concentrations in different industrial classifications. High moderation concentrations tend to be found in sub-sectors with fewer observations. So that the CR4 value close to one indicates that the market is controlled by the dominant party or a monopoly occurs. According to (Shepherd, 1999), this can trigger potential anti-competitive practices in the market that need to be watched out for.

In addition, the value of CR4 on Low Concentration in the furniture industry shows that the industry has a low oligopoly market structure or the market leads to perfect competition. This shows that the furniture industry is not only controlled by several companies in it, but business actors can easily enter the furniture industry.

Furthermore, to determine the effect of Company Size (FSize) and Concentration Ratio (CR4) on the technical inefficiency of the processing industry in East Java, the first step is to test the production

Table 4.
Stochastic Frontier Production Function Selection Test Results

Model	H0	l	x2	Kesimpulan
Hick Neutral	$\beta_{kt} = 0$	-12675.233	13.277	Menolak Ho
No Tec Progress	$\beta_t = \beta_{tt} = \beta_{kt} = 0$	-12675.233	16.812	Menolak Ho
Cobb-Douglas	$\beta_{kl} = \beta_t = \beta_{tt} = \beta_{kt} = 0$	-12675.233	23.209	Menolak Ho
No inefficiency	δ_0=δ_n=0	161.988	20.972	Menolak Ho

Source: Author's calculations of the log-likelihood function. The critical limit value is based on the Chi-squared distribution (X2). For the null hypothesis of the no-inefficiency effect function, the critical limit value is based on the mixed-chi squared distribution provided by Kodde and Palm (1986).

Table 5.
Estimated Results

Variables	*Parameters*	*Model 1*		*Model 2*		*Model 3*		*Model 4*	
Constant	b_0	2.604	*	2.613	*	2.601	*	2.372	*
		(0.032)		(0.089)		(0.014)		(0.016)	
k	b_k	0.208	*	0.145	*	0.140	*	0.098	*
		(0.010)		(0.008)		(0.006)		(0.001)	
l	b_l	0.264	*	0.285	*	0.324	*	0.153	*
		(0.008)		(0.024)		(0.011)		(0.002)	
m	b_m	0.011		0.015		0.050	*	0.526	*
		(0.010)		(0.026)		(0.006)		(0.002)	
e	b_e	0.629	*	0.647	*	0.608	*	0.257	*
		(0.005)		(0.029)		(0.006)		(0.002)	
k^2	b_{kk}	-0.009	*	-0.026	*	-0.028	*		
		(0.001)		(0.002)		(0.001)			
l^2	b_{ll}	0.025	*	0.026	*	0.020	*		
		(0.003)		(0.004)		(0.003)			
m^2	b_{mm}	0.198	*	0.202	*	0.195	*		
		(0.003)		(0.004)		(0.001)			
e^2	b_{ee}	0.109	*	0.123	*	0.112	*		
		(0.005)		(0.006)		(0.004)			
kl	b_{kl}	0.005	*	0.008	*	0.008	*		
		(0.002)		(0.002)		(0.001)			
km	b_{km}	-0.030	*	-0.012	*	-0.013	*		
		(0.002)		(0.002)		(0.002)			
ke	b_{ke}	0.040	*	0.032	*	0.034	*		
		(0.002)		(0.002)		(0.002)			
lm	b_{lm}	-0.031	*	-0.043	*	-0.047	*		
		(0.001)		(0.006)		(0.002)			
le	b_{le}	-0.002		0.008		0.013	*		
		(0.001)		(0.006)		(0.002)			
me	b_{me}	-0.148	*	-0.159	*	-0.150	*		
		(0.003)		(0.005)		(0.002)			
t	b_t	-0.073	*	-0.025	*				
		(0.002)		(0.001)					
t^2	b_{tt}	-0.034	*						
		(0.001)							
kt	b_{kt}	-0.015	*						
		(0.001)							
lt	b_{lt}	-0.002	**						
		(0.001)							
mt	b_{mt}	0.023	*						
		(0.001)							
et	b_{et}	-0.012	*						
		(0.002)							
Fungsi Inefiisiensi Teknis									
Variables	***Parameters***	***Model 1***		***Model 2***		***Model 3***		***Model 4***	
Constant	d_0	0.093	*	0.108	*	0.2224	*	0.400	*
		(0.002)		(0.010)		(0.0129)		(0.013)	
Firmshare	d_{Fshare}	-0.373	*	-0.609	*	-0.5671	*	-1.140	*
		(0.075)		(0.168)		(0.0294)		(0.063)	
CR4	d_{cr4}	-0.106	*	-0.036	*	-0.0570	*	-0.061	*
		(0.032)		(0.027)		(0.0052)		(0.008)	
Sigma-squared	s^2	0.089	*	0.094	*	0.0916	*	0.108	*
		(0.000)		(0.001)		(0.0006)		(0.001)	
Gamma	*g*	0.025	*	0.046	*	0.0154	*	0.088	*
		(0.008)		(0.022)		(0.0017)		(0.010)	
Log likelihood function		-6337.617		-6897.758		-7060.148		-9548.645	
LR test of the one-sided error		161.988		226.354		418.517		638.566	

Notes: * significant at 1% level; ** significant at the 5% level, and *** significant at the 10% level

function by looking at the Likelihood Ratio value. If the appropriate production function has been obtained, the next step is to test whether there is an inefficiency effect in the production function model using the LR test of one-side error method. By comparing H0 the Log-Likelihood value of the translog sub-model, while H1 shows the Log-Likelihood of the translog production function.

Overall, the model shows that the value of Log-Likelihood is greater than X2, which means that it rejects H0. So the selected model is translog. Table 4.4 presents the LR value of the one-sided error test on the translog production function in model 1, with a critical value of df = 7 with a one percent confidence value in the table of 17.75, which means that all model 1 rejects the null hypothesis. So it can be concluded that there is an efficiency effect in the translog model or there is an influence of environmental factors on the company's efficiency level.

To ensure that the estimation results of the variable coefficients in the study are accurate, it is necessary to ensure that the stochastic production function is selected correctly. Table 4.4 describes the test results of the production function submodel, where there are four sub-models that are tested on the translog stochastic production function. Based on the results of the generalized likelihood test, the null hypothesis of the four translog sub-models in the two tables is rejected, which means that the sub-model does not meet the requirements to represent the data. Therefore, the estimation results obtained from the translog stochastic production function will be used to interpret the effect of FSize and CR4 on technical efficiency.

By using the translog model, the focus of the discussion is on model 1 which shows the effect of FSize and CR4 on technical efficiency. The FSize variable has a negative sign and is significant at = 1 percent of the textual inefficiency. This shows that when FSize increases, it will decrease technical inefficiency or the company will be more efficient. Likewise, the variable CR4 has a negative sign and is significant at = 1 percent of the textual inefficiency. This shows that when CR4 increases, it will decrease technical inefficiency or the company will be more efficient. So that using model 1 can answer the second problem formulation where FSize and CR4 affect technical inefficiency at = 1 percent.

The FSize variable in model 1 shows a negative and significant sign of technical inefficiency. In other words, the larger the company, the higher the company's performance, this is in line with the positive relationship between company scale and company performance (Chapelle and Plane, 2005; Charoenrat et al., 2013; Tingum and Ofeh, 2017).

This is contrary to research which states that companies with larger production scales are not easy to remain consistently efficient compared to companies with small production scales (Biggs et al., 1996; Aggrev et al., 2010). Companies that have small scale companies have a more flexible and practical company structure, making it easier to make policies, and have greater flexibility in adjusting the inputs used in the production process. Companies with small production scales are considered able to adapt to the business environment and are able to establish good cooperation with other partners so that they are considered more efficient (Charoenrat & Harvie, 2014). And the CR4 variable shows a negative and significant sign of technical inefficiency. Hicks (1935) and argues that firms with higher concentration will reduce competition among firms, thereby reducing the benefits of obtaining technical efficiency. Competitive pressures positively affect the technical efficiency of the firm, while inefficiency arises due to the imperfection of managerial activities in determining the production function, thereby creating more wasteful spending.

To maintain their monopoly power. On the other hand, a high level of market concentration can also be the result of static competition that can protect less productive companies. This means that increased production capabilities can be stimulated in a more competitive environment (Ahn, 2002).

CONCLUSION

The results of this study indicate that in general the CR4 index is classified into three namely High Concentration, Moderately Concentration, and Low Concentration. By using the 2-digit ISIC, the CR4 index value shows an average value of 0.711, this result shows the average processing industry in East Java in the Moderately Concentration category. Based on the CR4 calculation, the industry in East Java leads to an oligopoly market. Besides that, all the factors in this study affect the level of technical efficiency. Firm size variable (FSize) and market concentration level (CR4) have a negative effect on the level of technical efficiency of large and medium industries in East Java.

The evidence from this study has implications for the government, including market concentration in East Java which leads to oligopoly, which must remain under government supervision. In this case, the Business Competition Supervisory Commission (KPPU) intensively supervises and evaluates business activities that lead to unfair business competition in accordance with their duties and authorities. In terms of the fulfillment and supply of raw materials for manufacturing companies, the local government, in this case the Cooperatives and UMKM Service, takes an inventory of the raw material needs and seeks to provide HR training for the surrounding community so that they are able to meet the raw material needs according to company standards.

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