AN ANALYSIS OF MANUFACTURING MARKET STRUCTURE IN NORTH SUMATRA PROVINCE

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Abstract

This study aims to analyze market structure and manufacturing industry performance on the economy of North Sumatra. The analysis uses two approaches, namely SCP analysis and econometric model. The data used is the Survey of Large Medium 2005-2009. The result shows that the structure of the industry is more dominant, including tight oligopoly, only small parts which belong to loose oligopoly and oligopoly markets. Some industries which have important roles for the economy are the palm oil industry, food and beverage industry, rubber industry and rubber products, and iron and steel basic industries, and basic non-ferrous metals.

Keywords: market structure, industry performance, manufacturing industry, local economy
JEL classification numbers: L10, L20, L60

Abstrak

Penelitian ini bertujuan untuk menganalisis struktur dan kinerja industri pengolahan dan pengaruhnya terhadap perekonomian Propinsi Sumatera Utara. Penelitian menggunakan dua pendekatan, yaitu analisis structure, conduct and performance (SCP) dan model ekonometrik data panel. Data yang digunakan adalah data base Industri Besar dan Sedang tahun 2005-2009. Hasil penelitian menunjukkan bahwa struktur industri didominasi oleh struktur pasar oligopoli yang ketat. Sebagian kecil lainnya adalah oligopoli ringan dan monopoli. Beberapa industri yang memiliki peran penting bagi perekonomian Sumatera Utara adalah industri minyak sawit, industri makanan dan minuman, industri karet dan produk karet, dan besi dan logam dasar, dan industri logam dasar bukan besi.

Kata kunci: struktur pasar, kinerja industri, industri manufaktur, perekonomian lokal
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INTRODUCTION

Industry development is an integral part of national development. It is one of the important sectors in the development of national economy. According to Dumairy (1996) industrial sector is believed to be a sector that can pilot other sectors for economic development. Industrial products have high term of trade or more profitable and create a greater added value than the products of other sectors.

The role of the industrial sector in a country or region can be observed from the definition of industrial economics. According to Jaya (2001), the scope of industrial economic is a study of structure, conduct and performance of market and firms. Two important aspects covered in the industrial economics are: firstly, a set of concepts and

analysis of competition and monopoly with a wide range of markets in between, and secondly, the one which is closely related to the real market which is enlivened by the presence of competition among the firms.

The theory of industriale conomic is part of the economics which is primarily based on microeconomic theory. Therefore, it is not surprising that both theories study the economic behaviour. The theory of industrial economics particularly analyzes the relationship between one activity to another activity, the interdependence between each other in the market and the links between market conditions, corporate conduct and economic performance (Naylah, 2008).

The manufacture industry in North Sumatra Province has a very important role. It can be seen through its significant contribution to the formation of demand and supply, consumption, government expenditure, investment, exports and imports, gross added value and sectoral output. The manufacture has strong sectoral linkages so this sector can stimulate the development of upstream and downstream sectors (Bangun, and Hutagaol, 2008).

In 2009 the current price PDRB of North Sumatra Province was Rp 234.47 trillion. The industrial sector was still the main contributor which reached 23.29 percent of the PDRB. Then, it was followed by agriculture (23.03 percent) and trade, hotels and restaurants (19.01 percent). Meanwhile, other sectors give a total contribution by 34.67 percent to the economy in North Sumatra (BPS of North Sumatra, 2010). The economic growth of North Sumatra from 2008 to 2010 tended to increase. However, the contribution of industrial sector declined from 24.14% to 23.29% and 22.9%, respectively. This paper analyzes the development of industrial sector in North Sumatera which cannot be separately by the structure of industrial market.

According to Prasetyo (2007), the market structure is an important key of market conduct and market performance. Market structure which is not concentrated in the form of oligopoly and or monopoly can still be used for the application of behavioral pattern model of product policy strategy through the creation of various product innovations rather than only the implementation of pricing strategies that destroy each other. Muslim et.al (2008) show that there is a dominant behavior from some big companies in the pricing of cooking palm oil as consequences of olygopolystic market structure. It is explained by the CR4 which is greater than 0.4.

METHODS

This study uses three approaches namely Structure, Conduct, and Performance (SCP) Analysis. The SCP Analysis is used to determine the structure, conduct and performance of an industry. A structure analysis is usually measured by the concentration ratio. The concentration ratio is the percentage of the total industry output or sales revenue. To measure the barriers to entry into the market it uses the minimum efficient scale. As for measuring the performance of the industry, it uses pool data econometric model of *random effects*. The data sources from Medium and Large Industry Database of BPS.

Analysis of Industrial Structure

To see the structure of an industry was firstly performed by Mason (1939). Mason argued that the structure of an industry will determine how the firms conduct that finally determines the industryperformance .

Many studies have shown that there can be a strong relationship between structure-conduct-performance (SCP) of the firm and market power (Bos and Djalil, 2006). The structure is usually measured by the ratio of the concentration while the conduct of the companies can be seen from the level of competition or collusion between manufacturers. The performance of an industry is measured by its degree of innovation, efficiency, and profitability.

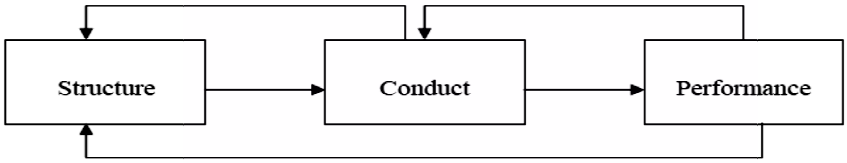

Figure 1: Structure, Conduct, Performance (SCP) Approach

Each company has a market share ranging from 0 to 100 percent of the total sales of the entire market. The market share of the company can describe the profit of firm's sales. Broadly speaking, the market share of a company is written by equation (1), to obtain the value of MS_i.

$$MS_i = \frac{S_i}{S_{tot}} \; x \; 100 \qquad (1)$$

Note:
MS_i is the ith company's market share (%)
Si is the ith company's sales (rupiah)
S_{tot} is total sales of all companies (rupiah)

The level of concentration can be calculated through the Concentration Ratio (CR). Concentration ratio is the percentage of the total industry output or sales revenue (Equation 2). The ratio of a number of firms (m) determine the relative market share of total industry output.

$$CR_m = \sum_{i=1}^{m} MS_i \qquad (2)$$

The greater the percentage rate is (approaching 100) the greater the industrial concentration of the product. If the concentration ratio of an industry reaches 100 percent means the market structure is a monopoly. In many studies it can use CR1, CR2, CR3 and CR4. However this study uses CR4 as an indicator in determining the type of an industrial market structure in North Sumatra.

Market entry barriers can be seen through the number of competitors that have sprung up to compete in achieving the desired profit target and capturing the market share. One way that is used to look at the market entry barriers is by measuring the economics of scale approached through the output of firms. The output value is then divided by the value of the industry total output. This calculation is called the Minimum Efficiency Scale (MES). According Md. Nor, et.al (2000), MES is defined as the minimum firm size at which all of the advantages of scale are attained. Various methods (with corresponding drawbacks) have been used to derive the MES. One of them is explained by Equation 3.

$$MES = \frac{\text{The Biggest Company Output}}{\text{Total Output}} \qquad (3)$$

Simply, this formula can be understood that if the concentration ratio of an industry is relatively large, the barrier to entry into the market is relatively complicated. On the other hand, if it is smaller then the entry into the market will be much easier. It is because the control output is not concentrated in one particular company.

Conduct Analysis and Industry Performance

Industry conduct is analyzed descriptively in order to obtain information about the conduct of the firms in the manufacturing industry. Industry conduct analyzes the behaviour along with the application of the strategies used by the firms in an industry to capture market share and beat the competitors. This analysis is done deliberately because the variables that reflect the conduct are qualitative in nature.

Industry performance analysis is done by using the profit approach. Profit is

used to analyze the relationship of the market structures on the firm performance. Endogenous variable used is a proxy of industry profit, while the exogenous variable is the number of companies, the number of workers, supporting expenses for raw materials and expenses for fuel and lubricants.

$$\begin{aligned} \Pr ofit_{it} &= \beta_1 + \beta_2 QLBOR_{it} + \beta_3 VBP_{it} \\ &\quad + \beta_4 VBBM_{it} + \varepsilon_{it} \end{aligned} \tag{4}$$

Note:
$Profit_i$ is industry profits at the industrial unit i and year t (%).
$QLBOR_{it}$ is total labor (person) in industry i in year t.
VBP_{it} is spending on supporting raw materials (Rp 000) for industry i in year t.
$VBBM_{it}$ is spending on fuels and lubricants (Rp 000) for industry i in year t.
β_0-βi is intercept and coefficient parameters
ε_{it} is error terms.

The estimation technique uses random effect, in the form of double log estimation so that the coefficient parameters obtained from the estimation equation (4) is the value of elasticity. Greene (2012) states random effect model is formulated as follows:

$$Y_{it} = (\beta_1 + \varepsilon_i) + \beta_2 X_{2it} + \beta_3 X_{3it} + \mu_{it} \tag{5}$$

Where *i* is 1, 2, 3… *k* and *t* is 1, 2, 3. . . *n*

Equation (5) shows the intercept of the model consisting of the fixed coefficient at β_1 added with ε_i which states there is random for each observation in describing the characteristics of the observations, where ε_i has mean and σ_ε^2. So the equation (5) becomes $\varepsilon_i + \mu_{it}$. Thus equation (5) can be rewritten into:

$$Y_{it} = \beta_1 + \beta_2 X_{2it} + \beta_3 X_{3it} + \varphi_{it} \tag{6}$$

Where $\varphi_{it} = \varepsilon_i + \mu_{it}$.

Error component of φ_{it} has two components, namely faults error cross-section (ε_i) or specific individual errors and observation combination errors and period of time series, μ_{it}. Random effect model is often referred to as Error Components Model - ECM, with the following assumptions:

1. $\varepsilon \sim N(0, \sigma_\varepsilon^2)$
2. $\mu_{it} \sim N(0, \sigma_\varepsilon^2)$
3. $E(\varepsilon_i \mu_{it}) = 0; \quad E(\varepsilon_i \varepsilon_j) = 0 \quad (i \neq j)$
4. $E(\mu_{it}\mu_{is}) = E(\mu_{it}\mu_{ij}) = E(\mu_{it}\mu_{js}) = 0 (i \neq j; t \neq s)$

Those assumptions above bear equation, where:

$$E(\varphi_{it}) = 0 \text{ and } Var(\varphi_{it}) = \sigma_\varepsilon^2 + \sigma_\mu^2 \tag{7}$$

If the value $\sigma_\varepsilon^2 = 0$ then the equation (7) above will be exactly the same with the equation (4) which states that the model is a pooled model. The equation (7) also states the existence of homoschedastic variance, which is shown by φ_{it} and φ_{is} $(t \neq s)$ correlation so that the fault of a certain cross-section unit at two different times is correlated (Johnston and John, 1997).
The correlation between the two is shown by the equation:

$$\rho = corr(\varphi_{it}, \varphi_{is}) = \frac{\sigma_\varepsilon^2}{\sigma_\varepsilon^2 + \sigma_\mu^2}; \quad t \neq s \tag{8}$$

For every cross-section unit ρ remains the same and regardless of the distance of the two times, and the second ρ remains the same for all the cross-section units. The estimator of the efficient REM must use the General Least Squares Method or generalized least square (Gujarati, 2011). The data used is Medium and Large Scale Industries with the period of 2005 to 2009 where the observation is the all ISIC 2 industries of North Sumatra.

Some researchers use Price Cost Margin (PCM) variable as a proxy of profit. It carried out by Winsih (2007) and Su-

cianti (2011). The PCM is one of the performance indicators used as a rough estimation of industry profits. In this study, PCM is peroxide by added value. This means that the higher the added value, the more efficient is the industry performance in terms of the cost minimization so that the profit of the industry is greater. PCM can be formulated as follows:

$$PCM = \frac{\text{Added Value - Total Output}}{\text{Output Value}} \quad (9)$$

Efficiency and productivity as an independent variable that affects the PCM are based on research by Puspasari (2006). These variables are included because the high performance can be caused by the efficiency and the number of output produced. Efficiency shows a comparison between the added value and the input value, which can be written as follows:

$$\text{Industry Eficiency} = \frac{\text{Added Value}}{\text{Input Value}} \quad (10)$$

Productivity indicates the company's ability to produce output at a period of time. Productivity can be written in the following equation:

$$\text{P}roductivity = \frac{\text{Output Value}}{\text{Input Value of Labor}} \quad (11)$$

From the formula above, it can be seen that the productivity of a worker is measured by the value of the product. The term is also often equated with labor per effective output (Romer, 1996). The equation is used to determine how much the role of labor in producing products of the company.

RESULTS

Market Structure Analysis

Market structure analysis in the manufacturing industry can be determined by looking at the market share from the sales of each industry, the concentration ratio of the four largest companies or CR4, and the magnitude of market entry barriers which is described by the Minimum Efficiency Scale (MES). The discussion begins from analyzing the structure of the industry, the efficiency of industry and explaining about industry performance.

Market Share

The concentration ratio is a measure of the market share of an industry which is oligopolistic in nature. Big companies realize the interdependence among companies. Concentration ratio measurement is conducted on the four largest companies in the industry (CR4) manufacturing in North Sumatra. Grouping of the four companies is based on the output value produced by each company. Concentration ratio is obtained by measuring the contribution of the output generated by the four largest firms to total industry output. The value of the concentration ratio of the four largest firms (CR4) in the manufacturing industry from 2005 to 2009 is shown in the Table 1.

The structure of the manufacturing industry in North Sumatra can be classified into four types, namely (1) the structure of industry that has CR = 100 including monopoly, (2) the value of CR4 between 60 and 99 percent classified as oligopoly, (3) industry with the concentration ratio between 40 and 60 percent including medium oligopoly and (4) the industry with the concentration ratio between 20 and 60 percent including loose oligopoly. From Table 1, it can be seen that the CR4 for each industry group in the manufacturing industry has considerable various values. However, in general manufacturing industries in North Sumatra Province tend to be tight oligopolies and monopolies. While the other than manufacture industries in North Sumatra can be classified as tight oligopoly. Basically the industry market structure in this province is oligopolistic with varying levels of monopoly up to loose oligopoly. While the structure of the manufacturing industry market in Indonesia is an oligopoly, where the rate of its oligopoly varies between tight, medium and loose oligopolies (Winsih, 2007).

Tabel 1: Concentration Ratio Value (CR4) Manufacturing Industry in North Sumatera Province, period 2005-2009

ISIC 2	CR4				
	2005	2006	2007	2008	2009
Food and drink	43.23	40.12	43.04	38.11	33.53
Tobacco	99.59	99.96	99.81	99.58	99.83
Textiles	71.54	67.24	89.72	83.13	67.20
Confection	77.84	48.42	74.50	67.70	73.58
Leather and leather products	90.59	84.04	87.29	92.93	95.82
Wood, wood producrs and wickerwork's	51.95	55.00	60.94	64.66	55.80
Paper and paper products	91.09	78.90	81.45	74.00	83.09
Publishing, printing & reproduction of recorded media	90.98	51.62	75.49	70.49	86.86
Coal Industry, Oil and Gas	100.00	100.00	100.00	94.31	100.00
Chemicals and items of chemicals	62.81	59.91	47.79	54.53	73.70
Rubber and rubber products	25.43	24.62	28.75	29.91	23.74
Nonmetallic minerals Goods	79.70	79.55	81.62	94.14	84.00
Base metals	98.27	90.77	95.94	95.07	95.62
Goods of metal	79.83	45.32	43.74	67.89	50.60
Machinery and its equipment	76.24	69.92	69.83	67.77	84.92
Electrical machinery and its equipment	88.31	86.99	79.23	87.24	90.46
Radio, television and communication equipment	100.00	95.00	97.32	88.23	100.00
Medical equipment	100.00	100.00	100.00	100.00	100.00
Motor vehicle	100.00	91.86	96.78	94.89	94.05
Transportation means, other than motor vehicles R2 and R4	87.67	69.35	74.02	79.72	87.20
Furniture and other manufacturing	55.91	43.51	61.88	69.18	80.61
Recycling	100.00	71.33	71.58	74.37	75.28

Source: BPS, 2005-2009, calculated data

The result also shows that the structures of industry in North Sumatra which is monopoly are the coal industry, oil and gas; radio, television and communication equipment, and medical equipment. Rubber and rubber products, and food and beverage industries are inclded in loose oligopoly markets including while the rest industries are tight oligopoly market. According to the Mega (2007), in Indonesia the industry structures of the base metal iron and steel which is strategic industry for motor is belonging to tight oligopoly.

Three industry groups that have the highest CR4 or monopoly are (1) Coal Industry, Oil and Gas, (2) Radio, television and communication equipment, and (3) Medical Equipment. High concentration ratio indicates a large market share. Industries using production technology or certain raw materials which are relatively difficult to be followed by new companies that do not have large capital.

There are only two industry groups included in the loose oligopoly, namely (1) rubber industry and rubber products, and (2) the food and beverage industries. It indicates that the market structure in North Sumatra tends to be a perfectly competitive market. This drives companies to work efficiently to stay put in this industry.

Market Entry Barriers

The concept of market entry barriers can be due to the strength of the industry in terms of its technology and input factors of production. It can also be due to property rights granted by the government. Property rights can be licensed, patents and so forth which is generally occurs in the case of public goods. Technological mastery or control of input factors of production would lead to a monopoly market where no substitution factor input in the production process.

Market entry barriers are all things that allow the reduction of the chance or the speed of entry for a new competitor. The entry of new entrant firms will cause a number of implications for companies that

already exist such as the capacity increases, the seizure of the market (market share) as well as the seizure of a limited production resources. These conditions pose a threat to existing companies (Koutsyiannis, 1997).

One of entry barrier is the existence of large companies which have been there before in the industry. Big companies in this case are described from the concentration of the output on the total output in the industry. MES value is obtained from percentage of the largest company output to total manufacturing industry output. The high MES is be a barrier for new competitors to enter the market of an industry. MES Values of the manufacturing industry in North Sumatra in 2005-2009 are shown in Table 2.

According to Alistair (2004), if the MES is greater than 10 percent so it describes the high entry barriers to an industry. Based on Table 2, it can be seen that the barriers to entry in North Sumatra Province was high. Only one industry that had MES value less than 10 percent that was the rubber industry and rubber products.

The high MES value described the higher barriers for new firms to enter into the market of manufacturing industry in North Sumatra province. Some of the factors inhibiting the entry of new entrants into an industry are the economies of scale, capital adequacy, switching costs, access to distribution channels, cost disadvantage independent and government regulations.

The ease of a company to enter into an industry is also affected by the ease of obtaining permits. The survey of World Bank (2006) suggested that to obtain an investment license in Indonesia, a firm went through 12 procedures and required 97 days. It was much longer than that of in Thailand and Malaysia where the procedure to obtain an investment license needed only 8 stages and 33 days (Thailand) and 9 stages and 30 days (Malaysia). This certainly would affect the overall performance of the national industry.

Tabel 2: The Value of *Minimum Efficiency Scale* (MES) Manufacturing Industry in North Sumatra Province, period 2005-2009

MES	MES				
	2005	2006	2007	2008	2009
Food and drink	20.37	17.49	15.77	16.97	19.23
Tobacco	81.35	97.2	95.2	83.6	96.0
Textiles	20.91	26.6	53.1	38.3	21.0
Confection	29.15	18.3	48.7	25.6	48.3
Leather and leather products	37.49	38.7	46.3	37.9	43.0
Wood, wood producrs and wickerworks	18.56	21.6	28.2	19.6	19.6
Paper and paper products	68.53	49.8	49.8	24.1	49.7
Publishing, printing & reproduction of recorded media	52.44	20.9	34.8	29.2	66.5
Coal Industry, Oil and Gas	50.22	47.8	69.0	53.1	704
Chemicals and items of chemicals	29.11	28.6	13.9	20.9	32.3
Rubber and rubber products	8.64	8.07	9.46	11.7	7.68
Nonmetallic minerals Goods	29.03	39.5	38.6	63.6	35.0
Base metals	48.72	49.3	47.6	54.5	52.4
Goods of metal	65.34	17.1	16.6	34.0	15.0
Machinery and its equipment	39.12	44.33	26.71	32.56	65.26
Electrical machinery and its equipment	67.12	64.46	47.46	52.66	56.79
Radio, television and communication equipment	100.00	67.83	88.99	48.40	87.87
Medical equipment	88.89	57.55	66.04	62.31	65.02
Motor vehicle	73.67	29.38	65.13	71.25	58.85
Transportation means, other than motor vehicles R2 and R4	61.97	25.48	31.18	31.33	48.73
Furniture and other manufacturing	36.31	27.46	39.93	52.67	63.60
Recycling	66.05	23.75	27.31	28.36	36.08

Source: BPS, 2005-2009, calculated data

In the Doing Business Report in 2012, Indonesia was ranked 129 out of 183 countries. In group of ASEAN countries, the Philippine ranks the lowest, that was 136 and Singapore ranked the highest, followed by Thailand (17), Malaysia (18), Vietnam (98). In the last five years of the same report, Indonesia's ranking in the business environment conducivity was relatively unimproved. However, there have been improvements in terms of the number of days and the number of procedures that a firm should follow when starting a new business.

Dealing with market share and difficulties to enter and exit the industry, it can be drawn a substantive correlation. There is a relationship between market shares held by the companies and the level of difficulty to enter and exit the industry. The results obtained shows that the market share held by the companies tend to be higher in the group of industries that are relatively difficult to exit/enter.

Industry Performance Analysis

The estimation of industry performance in North Sumatra is influenced by some factors which also affect the manufacturing performance industry. The approach uses a data pooled approach in which the series are 2005 to2009, while the observation is an industry with ISIC2 code in North Sumatra. The estimation technique uses double log random effects. The analysis is divided into three, namely the analysis of the factors affecting the performance of small, medium and large industries, and the analysis is done on an aggregate basis.

Large Industry Performance Analysis

Generally, the performance of the industry can be seen through two approaches namely the added value (NT) and Price Cost Margin (PCM). The first approach is simply to see the difference in the output with the input. The second approach is done by using Price Cost Margin (PCM) indicator. In this study the performance of big and medium industries is directly measured with the approach of the company's profit in the industry.

In Table 3, it is shown the estimation result of the factors affecting the performance of manufacturing industry in aggregate basis Some goodness of fit indicators explain that the estimation met the criteria of a good model. The value of R Square (R^2) or the determination coefficient of 0.957 indicates that about 95.7 percent of the profits variation in the manufacturing industry can be explained by the independent variables (number of employees, expenses for raw materials and intermediate expenses for fuel and lubricants), while the rest is explained by other variables that are not observed in the model.

Indication of the absence of autocorrelation in the model are shown by the DW statistic value = 1.9356. In the panel data approach, the estimation can be done with the guarantee of homoskedasticity assumptions. It is because random effect is with a choice of cross section weights and white heteroskedasticity. Non heteroscedasticity is also indicated by Sum Square Resid Weigthed Statistics which is smaller than Sum Square unweighted Statistic.

Tabel 3: Panel Data Estimation Result of Large Industry Performance

Parameter	Approx Estimate	Std Err	Approx t Value	Pr > |t|	Variable
a0	5.83586	0.2540	22.98	<.0001	Constants
a1	0.19616	0.0371	5.28	<.0001	The number of labour
a2	0.45362	0.0206	22.05	<.0001	The expenditure of supporting raw materials
a3	0.12250	0.0202	6.07	<.0001	The expenditure of fuel and lubricant

R^2 = 0.957; D_w= .9356

Tabel 4: The Effect of Some Economic Variables for Each Type of Large Industrial Manufacturing

Industry	QLBOR	VBP	VBBM
Aggregate	***	***	***
Food and Drink	***	**	***
Texstiles dan Texstile products	*	*	*
Footwear	***	***	*
Wood Products	*	*	*
Pulp and Paper	***	*	*
The chemical industry and goods from chemicals	*	***	*
Rubber and Rubber Products	*	***	***
Electrical Machinery and Equipment	*	*	*

Source: data calculated

Note : ***) Significant at 0.01 level of significance;
**) Significant at 0.05 level of significance;
*) Significant at > 0.05 level of significance

From the results, the number of labour (QLBOR), the expenditures of the supporting raw materials (VBP) and the expenditures of materials fuel oil and lubricants (VBBM) affected positively the profits of big manufacturing industry. This was relevant to the initial hypothesis proposed in this study. The more production inputs were used, the more profits of the company would be reached in an industry. This finding indicated that the manufacturing industry with large scale had not reached the economies of scale. Aggregate industrial output was still able to increase without reducing the profit received by the industry.

The results of the analysis for each sector in the big manufacturing industry priorities can be briefly seen in Table 4. The model estimation was also done by random effect model of panel data. The results had been examined of not violating the basic assumption of non multicollinearity, homoscedasticity and non autocorrelation. Additionally, the coefficient of determination was more than 90 percent which indicates that the estimation model had run as expected. Aggregately, it was seen that the number of labor, the expenditures of supporting raw material and the expenditures of fuel is statistically significant at 99 percent of confidence level.

In food and beverage industry, factors that had a significant and positive impact on the profit was the number of labor (QLBOR), the expenditures of supporting raw materials (VBP) and the expenditures of fuel and lubricants. All the three affected positively on the profits. These characteristics corresponded to the performance of aggregate industry (Table 4). The use of workforce positively affected the food and beverage industry profits, in the sense that the greater use of labor would increase the added value received by the industry so that it would directly improve profitability of food and beverage industry.

The factors that significantly positive affected at larger than 5 percent of significance on the profit of the textile industry and textile product were the number of labour, the expenses of fuel and the expenses of supporting raw materials. It was also in accordance with the characteristics of the aggregate performance of industry. In the rubber industry and rubber products, the expenditure of supporting raw material, and fuel and lubricants were significant at 1 percent level, while the number of workers was significantly more than 5 percent level of significance.

Medium Industry Performance Analysis

In the previous discussion, it has been described the various factors that affect the performance of the manufacturing industry. In this section the analysis will continue in the medium-scale industry. The analysis also uses panel data, and the technique used is the same that is the random effect.

Tabel 5: Panel Data Estimation of Medium Industry Performance

Param	Approx Estimate	Std Err	Approx t Value	Pr > |t|	Variable
a0	10.24994	0.1916	53.49	<.0001	Constanta
a1	0.152189	0.0308	4.94	<.0001	The number of labour
a2	0.106157	0.0138	7.67	<.0001	The expenditure of supporting raw materials
a3	0.039156	0.0116	3.37	0.0008	The expenditures of fuel and lubricant

Source: data calculated
$R^2 = 0.9865$; $D_w = 1.872$

Tabel 6: The Effect of Some Economic Variables for Each Type of Medium Industrial Manufacturing

Industry	QLBOR	VBP	VBBM
Aggregate	***	***	**
Food and Drink	*	**	***
Textiles and Textile products	*	***	***
Footwear	**	***	*
Wood Products	***	*	*
Pulp and Paper	**	**	***
The chemical industry and goods from chemicals	**	***	*
Rubber and Rubber Products	*	***	**
Electrical Machinery and Equipment	***	**	*

Source: data calculated
Note: ***) Significant at 0.01 level of significance;
**) Significant at 0.05 level of significance;
*) Significant at > 0.05 level of significance

In Table 5, as with the previous panel data model estimation, the result shown is the result of selection against several alternative models. Some indicators had been confirmed to show that the model had been appropriate. The determination coefficient of 0.9865 indicated that 98.65 percent of the profit variation was explained by the independent variable of the number of labor (QLBOR), the expenditures of supporting raw materials (VBP) and the expenditures of fuels and lubricants (VBBM). While the rest was explained by other variables outside the model. This meant that the variables of QLBOR, VBP and VBBM significantly affected on the medium industry profit in North Sumatra, so that the estimator model was feasible to estimate the parameters in the function.

The indication of the insignificant multicollinearity was reflected by looking at the probability of t-statistics in the regression. Of the 3 independent variables, there was no variable which was not significant at the 95 percent of confidence level. The result showed no autocorrelation because the value of the Durbin-Watson statistic was very close to 2 that was $D_w = 1872$.

The estimation result showed that the variable of the number of labour (QLBOR), the expenditure of supporting raw materials (VBP) and the expenditures of fuel and lubricants affected significantly positive on the profits at 0.01 level of confidence. However, economically the third variable was inelastic. It meant that the changes of one percent of QLBOR, VBP and VBBM resulted on less one percent increase of the profits of medium industry.

The estimation results of each the profit of medium industry was briefly seen in Table 6. In the food and beverage industry, the number of labor significantly influenced the increase in industry profits at less than 5 percent level. While the expenditure on supporting raw materials was significant at 5 percent level, and the expenditure of fuels and lubricants was significant at 1 percent level. This indicates that in food and beverage medium industries, the main

factor which determined the performance was the expenditure of fuel and lubricants.

In the textile industry and textile products, the number of labour and the expenditure of raw materials constituted the factors that had a positive and significant impacts on the profits. Thus, this showed that the medium scale of textile product and industry was labor-intensive industry. In the footwear industry, the total expenditure of supporting raw materials and fuel constituted the factors that had positive and significant impact on the profits. While the number of labour was a significant influencing factor but the significance level is less than 5 percent.

In the wood product industry, labor was a significant factor to increase the industry profit. While other factors were not significant. As the characteristics of the manufacturing industry, in the pulp and paper industry, the workforce factor also had a positive and significant impact on the industry profit. Similarly, in the Electrical Machinery and Equipment industry, the workforce factor significantly influenced the increase of the industry profit, while the expenditure factor for supporting raw materials was significant at 5 percent level and the expenditure of fuel and lubricant was significantly different at more than 5 percent level.

Small Industry Performance Analysis

This section will explain the various factors that affected the performance of small manufacturing industry. The analysis also used panel data with random effects method. In Table 7, it is shown the estimation result was a result of selection against several alternative models. Some indicators had unquestionably shown that the model has been appropriate.

The determination coefficient of 0.9782 indicated that 97.82 percent of the profit variation in small-scale manufacturing industries was be explained by the independent variables (QLBOR, VBP, VBBM), while the rest was explained by other variables outside the model. This means that all the independent variables significantly affected the dependent variables, so that the estimator modelwas feasible to estimate the parameters in the function. From the estimation result, the variable VBP positively affected the industry profits. On the contrary, the QLBOR variables and the expenditure of fuel and lubricants negatively affected the profits of small manufacturing industry.

The most influential factor in the increasing of the profits of small-scale manufacturing industry was the expenditure of supporting raw materials and it was consistent with the hypothesis proposed. This means that the greater the raw materials used, the higher the company's profits in an industry for small-scale industry will be. However, the response of the profit changes on the changes of the expenditure of supporting raw materials were inelastic.

From the estimation results, it can be seen that if there was an increase in the supporting raw material by 1 percent, it will increase the impact of the profit industry respectively by 0.13 percent. While other factors negatively influenced to the company profit of small manufacturing. This result was in contrast to what happened in the large and medium industries.

Tabel 7: Panel Data Estimation Result of the Small Industry Performance

Param	Approx Estimate	Std Err	Approx t Value	Pr > |t|	Variable
a0	9.498621	0.3816	24.89	<.0001	Constanta
a1	-0.16406	0.0822	-2.00	0.0465	The number of labour
a2	0.138378	0.0267	5.19	<.0001	The expenditure of supporting raw materials
a3	-0.01885	0.024	-0.78	0.433	The expenditures of fuel and lubricant

Source: data calculated

R^2 = 0.9782; Dw = 1.9241

Tabel 8: The Effect of Some Economic Variables for Each Type of Small Manufacturing Industry

Industry	QLBOR	VBP	VBBM
Aggregate	(-)**	***	(-) *
Food and Drink	(-) *	**	(-)***
Texstiles dan Texstile products	*	**	(-) *
Footwear	(-)**	**	*
Wood Products	(-) *	*	*
Pulp and Paper	(-)**	**	***
The chemical industry and goods from chemicals	**	*	(-)**
Rubber and Rubber Products	***	*	**
Electrical Machinery and Equipment	***	**	(-) **

Source: data calculated

Note : ***) Significant at 0.01 level of significance;
**) Significant at 0.05 level of significance;
*) Significant at > 0.05 level of significance

It was also known that 1 percent additional expense for fuel and lubricants significantly reduced the level of profits of the small-scale industries by 0.018 percent. While a 1 percent additional increased in the labor force by 1 percent significantly lowered the company's profits in small manufacturing by 12.16 percent. Nevertheless, the sector had a different impact among the industries, see Table 8.

It is interesting to trace that the addition of 1 percent of labor and the expenses for fuel and lubricants will reduced profits in the small industries. Some logical reasons to justify why it happened were (1) the significant number of workers in small industries was relatively unpaid labor, (2) the production scale in the small industries came into decreasing stage III (irrational region), where the additional cost was greater than the additional revenue (MC> MR). In this case, the companies in the industry were actually not feasible to operate. By sector, it was seen that the small industry which relatively survived was the rubber industry and rubber products, where the number of labour, the expense of supporting raw material, and the expense of fuel and lubricants had still a positive impact to the performance of small-scale industries in the rubber and rubber product sectors.

From the calculation of the minimum efficiency scale (MES), inefficiency occured in almost all industry groups in North Sumatra. There was only one industry that is included in the efficient group that is rubber industry and rubber product. It also reinforced that only rubber industry and rubber product which was efficient and on the rational stage of production, where the additional revenue equals to the additional cost in the sense that this industry was still in the optimum production conditions.

CONCLUSION

The majority of industry market structure in North Sumatra was tight oligopoly. There were three industries included in the category of monopoly: (1) the coal industry, oil and gas, (2) the radio, television and communication equipment, and (3) medical equipment industry. While industry included in the perfect rivalry competition were (1) food and beverage industry, and (2) rubber industry and rubber products. Government intervention such as the liberalization of trade and investment especially were urgently required to avoid inefficiencies and monopoly. This inefficiency was also reinforced by high-value of Minimum Efficiency Scale (MES) in the entire industry in North Sumatra. There was only one industry that belongs to the efficient industry, i.e. rubber industry and rubber products.

On a small industry, it was only raw materials that provided a positive influence on the performance of small scale industries, while the additional labor and the expenditure for fuel and lubricants had negative effect to the company profits. This was because the number of labour was relatively large and the condition of the production had been already in decreasing stage except for the rubber industry and rubber products.

Some industries which have an important role for the economy in North Sumatra were the palm oil industry, food and beverage industries, rubber industry and rubber products, and iron and steel basic industries and basic non-ferrous metals. It was shown by the magnitude of the industry's contribution to economic growth in North Sumatra. One of the palm oil plantation industries significantly affected the development of the area in North Sumatra (Afifuddin and Sinar, 2007).

Government intervention such as licensing facilities, tax holidays were also needed to stimulate perfectly competitive industries to be more productive. This policy will provide a significant contribution to the economy in North Sumatra, especially for the food and beverage industries as well as rubber industry and rubber products.

REFERENCES

Afifuddin, S. and S.I. Kusuma (2007), "Analisis Struktur Pasar CPO: Pengaruhnya terhadap Pengembangan Ekonomi Wilayah di Sumatera Utara", *Wahana Hijau, Jurnal Perencanaan dan Pengembangan Wilayah*, Vol.2, No.3 April 2007, 124-136

Alistair, A. (2004). *Analisis Pendekatan Struktur Perilaku Kinerja Pada Industri Tepung Terigu di Indonesia Pasca Penghapusan Monopoli Bulog*, Departemen Ilmu Ekonomi Studi Pembangunan, Institute Pertanian Bogor.

Bangun, O. and M.P. Hutagaol (2008). "Peran Sektor Industri Pengolahan Dalam Perekonomian Nasional", *Jurnal Ekonomi dan Kebijakan Pembangunan*, I(2), 90-111

BPS Sumatera Utara (2010), *Sumatera Utara Dalam Angka Tahun 2010*, Badan Pusat Statistik Sumatera Utara.

Dumairy, D. (1996), *Perekonomian Indonesia*, Penerbit Erlangga Jakarta.

Greene, W.H. (2012), *Econometric Analysis*, 7th Eds., Pearson.

Gujarati, D. (2011), *Econometrics by Example*, Palgrave Macmillan.

Jaya, W. K. (2001), *Ekonomi Industri*, Edisi Ke-2, BPFE, Yogyakarta.

Johnston, J. and J. Dinardo (1997), *Econometric Methods*, Fourth Edition, McGraw Hill.

Mason, E. (1939), "Price and Production Policies of Large-Scale Enterprises," *American Economic Review*, Volume 29, 61-71.

Darmayanti, M. (2007), *Analisis Struktur Kinerja dan Kluster Industri Logam Dasar Besi dan Baja di Indonesia*, Departemen Ilmu Ekonomi Fakultas Ekonomi dan Manajemen, Institut Pertanian Bogor.

Md. Nor, M., et. al (2000), "Trends in the Malaysian Industrial Market Structures", *Jurnal Ekonomi Malaysia*, 34 (2000), 3 – 20.

Muslim, E., V. Evertina, and R. Nurcahyo (2008), *Structure, Conduct, and Performance Analysis in Palm Cooking Oil Industry in Indonesia Using Structure Conduct Performance Paradigm (SCP)*, Proceeding, International Seminar on Industrial Engi-

neering and Management Santika Hotel, Jakarta, October 25th, 2008 ISSN : 1978-774X.

Naylah, M. (2008), *Pengaruh Struktur Pasar terhadap Kinerja Industri Perbankan Indonesia*, Magister Ilmu Ekonomi dan Studi Pembangunan (MIESP) Fakultas Ekonomi, Universitas Diponegoro.

Prasetyo, P (2007), "Hubungan Struktur Pasar dan Perilaku Pasar serta Pengaruhnya terhadap Kinerja Pasar", *Jurnal Ekonomi Pembangunan*, Vol. 12 No. 2, Agustus 2007, 111 – 122.

Puspasari, C. (2006), *Analisis Struktur Perilaku Kinerja Industri Mi Instan di Indonesia*, Fakultas Ekonomi dan Manajemen, Institut Pertanian Bogor.

Ridhuan, B.M., and S. A. Djalil (2006), "Industrial Structure and Concentration in Malaysian Manufacturing Industry", *IJMS* , 13 (Special Issue), 83-101.

Romer, D. (1996), *Advanced Macroeconomics*, McGraw Hill Companies, Inc. Berkeley.

Sucianti, F. (2011), *Analisis Struktur, Perilaku dan Kinerja Industri Pakan Ternak di Indonesia,* Departemen Ilmu Ekonomi. Fakultas Ekonomi dan Manajemen Institut Pertanian Bogor.

Winsih, W. (2007), *Analisis Struktur, Perilaku dan Kinerja Industri Manufaktur Indonesia,* Departemen Ilmu Ekonomi, Fakultas Ekonomi dan Manajemen, Institut Pertanian Bogor.