

Analysis of the Effect of Industrial Concentration on Profit of the Indonesian Plastic and Packaging Industry



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ABSTRACT: The Indonesian plastics and packaging industry can have a considerable opportunity to continue to grow because the plastics and packaging industry has a significant role in the economic development of the industrial sector. This study aims to determine and analyze the effect of the level of industrial concentration on the profits of the Indonesian plastics and packaging industry. This research uses secondary data in the form of time series originating from the Indonesian Statistics for the period 2010 – 2019. The analytical technique used in this research is using qualitative and quantitative analysis techniques. The analytical method used is the calculation of the concentration ratio of 4 companies, profit calculation using Price Cost Margin and simple linear regression. The results showed that the plastic and packaging industry was concentrated with a concentration ratio of 16 percent. According to Joe S. Bain's theory, the plastics and packaging industries fall into the fifth level oligopoly category. The profit rate in this industry is relatively decreasing with an average of 34.76 percent. Based on the results of simple linear regression, it is stated that industry concentration is not significant to the profits of the Indonesian plastics and packaging industry.

KEYWORDS: CR4; Profit; Price Cost Margin; Plastic and Packaging Industry.

INTRODUCTION

Plastic-based products are products that are in demand by the global community. This can be seen from the increase in production of plastic-based products. Since 1950, the global production of plastic-based products has always increased. Global plastic production fell in 2020 due to the coronavirus pandemic, with global production falling 0.3 percent to 367 million tons in 2020 from 368 million tons in 2019. China, which currently accounts for a third of global plastic production, saw production growth of 1, 0 percent during 2020. Meanwhile, in the European region, plastic production fell 5.1 percent from around 58 million tons to 55 million tons in 2020. One of the biggest consumers for the plastics industry is the automotive industry. In 2020, the consumption of plastic in Europe will decrease by 18 percent (Plastic Europe, 2021).

Indonesia's economic development is supported by many sectors, including the manufacturing industry which is dominantly holding on to economic growth in Indonesia because it is directly related to people's everyday purchasing power. One of the manufacturing industries that plays an important role is the plastics and packaging industry. The plastic and packaging industry is one sector that is needed by society. Plastic is one of the most widely used materials and is used for various purposes. In addition to its widespread use, plastic is also easy to obtain because the price is relatively cheap. The plastics industry has become a supply chain (Suhartono et al. 2021).

Plastic consumption per capita in Indonesia has reached 17 kilograms per year, with consumption increasing by 6-7 percent per year. People need plastic for various purposes, and a number of industries also use plastic as packaging to support their products. There are many industries that use plastic as packaging or raw materials, such as the automotive industry, the food and beverage industry, the pharmaceutical industry, the agricultural industry, the construction industry, the electronics industry and the cosmetic industry (Lembaga Ilmu Pengetahuan Indonesia, 2016).

Table 1. Import and Export Volume of Plastic and Packaging in Indonesia in 2014-2019

Year	Import (US\$)	Export (US\$)
2014	7,794,290	2,674,254
2015	6,831,597	2,251,319
2016	6,999,782	2,251,946

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2017	7,729,180	2,396,582
2018	9,210,567	2,587,556
2019	8,784,619	2,453,179

Source: Trademap, Trade Statistics for International Business Development (2022)

Table 1 shows that the volume of imports is higher than the export volume of the plastic and packaging industry. In 2018 the volume of plastic and packaging imports was the highest, namely 9.2 million, an increase from the previous year, which was 19.17 percent. Compared to 2014, the import volume of the plastic and packaging industry only increased by 1.98 percent from the previous year. Export volume from 2014 to 2018 continues to decline every year, the highest import decline occurred in 2016 of 6.04 percent. According to Nugroho (2017) One reason is the limited production capacity due to a shortage of raw materials. The high domestic demand for plastic and packaging has caused Indonesia to import to meet domestic needs. Most of these imports come from China, Singapore and Thailand.

According to data from the Central Statistics Agency for the development of the plastic and packaging industry, the number of companies has increased every year from 2014 to 2019, the number of companies continues to grow, with an increase of 326 companies. The following is a table of the number of plastic and packaging industry companies:

Table 2. Number of Companies and Workers in the Indonesian Plastic and Packaging Industry

Year	Number of Companies	Number of Labor (people)
2014	551	83.928
2015	570	138.331
2016	837	117.930
2017	922	130.222
2018	833	113.720
2019	877	124.908

Source: BPS, Indonesian Statistic (2022)

Judging from Table 2 shows that there is a relationship between the number of companies and the number of workers. If the number of companies increases, the number of workers also increases and vice versa. The plastics and packaging industry continues to experience an increase in the number of companies and workforce from 2014 - 2019. In 2019 the increase in the number of companies increased by around 59.17 percent, initially in 2014 there were 551 companies increasing to 877 companies in 2019. The number of workers has also increased around 48.83 percent where in 2014 the number of workers was 83,928 to 124,908 in 2019.

The increase in world oil prices to US\$ 70 per barrel had an impact on the Indonesian petrochemical industry. The plastic industry manufacturers are no exception. Rising world oil prices have pushed up the price of raw materials for plastic goods to reach \$10 to \$25 per metric ton. The price of plastic raw materials in January 2018 for the polyethylene type was US\$ 1,567 per ton and the polypropylene type was US\$ 1,400 per ton (Rahma, 2018).

Increasing market concentration in an industry is a barrier for new companies to enter and the reluctance of clients to change providers of goods or services, setting high prices by providers of goods or services. For the plastic and packaging industry itself, there are consequences of increasing industry concentration which will result in reduced choices for buyers to choose the product they want. a large selection of types of plastic and packaging is a necessity because the use of plastic and packaging has different functions. With fewer choices of plastic and packaging to choose from, it will create its own problems in the plastic and packaging market in Indonesia (Wicaksana, 2016).

All companies, whether large or small, always try to increase their profits. Profits obtained can be maximized by reducing production costs and operational costs that will be incurred by the company (Casmadi & Aziz, 2019).

In plastic and packaging production activities costs are incurred called production costs, which include raw materials, auxiliary materials, fuel, electricity and gas costs. According to Sayyida (2014) high production costs have an impact on sales levels. In terms of quantity, a company has limited its production results by adjusting the production costs that must be incurred. When product yields are reduced in quantity, of course it also has an impact on the profits obtained. Poor management of production costs resulted in a decrease in income received. The use of good quality raw materials will produce good products as well. Poor management of production costs resulted in a decrease in income received. The use of good quality raw materials will produce

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good products as well. These production costs determine the selling price of a product or service which will affect the amount of profit earned. The following is a table for the amount of local raw materials, the amount of imported raw materials and the total amount of raw materials for the plastic and packaging industry:

Table 3. Total Raw Materials for the Indonesian Plastic and Packaging Industry

Year	Local Raw Materials (Rp)	Imported Raw Materials (Rp)	Amount of Raw Materials (Rp)
2014	18.609.376.480	2.783.889.907	21.393.266.387
2015	34.852.818.910	9.767.222.193	44.620.041.103
2016	36.657.249.372	5.055.720.110	36.657.249.372
2017	39.052.103.038	11.230.437.327	50.282.540.365
2018	26.351.194.365	7.866.356.607	34.217.550.972
2019	27.413.427.852	9.694.591.895	37.108.019.747

Source: BPS, Statistik Indonesia Industri Besar-Sedang, (Data diolah, 2022)

Table 3 reveals that the use of local raw materials is more widely used than imported raw materials. From 2014 to 2019 the use of local raw materials has fluctuated. The highest usage occurred in 2017 amounting to 39.05 billion, an increase of 6.53 percent from the previous year. Meanwhile, the amount of imported raw materials from 2014 to 2019 has also fluctuated. The highest usage occurred in 2017 amounting to 11.23 billion, an increase of 12.13 percent from the previous year. It can be seen that the use of local raw materials is more widely used than imported raw materials.

The reason why local raw materials are used more is the existence of the recycling industry which contributes to reducing imports of plastic raw materials. The growth of the plastic recycling industry is to meet the demand for raw materials for a number of manufacturing sectors in Indonesia. The development of the plastic recycling industry in the country continues to be accelerated by the government because it is a strategic effort to substitute imported raw materials because the need for plastic raw materials is still very high (Anggraeni, 2019). The availability of raw materials is often an important factor in industrial development. This is because industrial developments in places where raw materials are abundant provide high industrial competitiveness in market competition.

Because it has a role in other sectors, of course the growth of the plastics and packaging industry is influenced by the growth of these other strategic industries. If one or several of these other sectors experience a decline in sales, it will also have an impact on decreasing demand for plastic and packaging industrial products. The plastic and packaging industry is also faced with environmental issues due to the difficult nature of plastic materials to decompose which can have a long term impact on the environment, this issue is certainly an obstacle for the plastic and packaging industry in increasing the growth and sustainability of its business. (Putriana, 2019).

Based on the background description, the problems to be discussed in this study relate to how the industry concentrates on the plastics and packaging industry in Indonesia; what are the advantages of the plastic and packaging industry in Indonesia; as well as how the influence of industrial concentration on profits in the plastics and packaging industry in Indonesia.

DATA AND RESEARCH METHODS

The scope of this study discusses how big the level of industrial concentration and profits of the plastics and packaging industry in Indonesia is, as well as to find out how much influence industry concentration (CR4) as an independent variable has on profit (Price Cost Margin) as the dependent variable, using time series data period 2010 to 2019 to analyze this research. During this research the data used were secondary data in the form of annual data (time series) from 2010 to 2019. Secondary data sources used in this study were obtained from third parties/indirectly. Data taken from various sources, namely the Central Statistics Agency (BPS), the Ministry of Industry (Kemenperin) & supporting literature.

The concentration level can be calculated through the concentration ratio (CR). The concentration ratio is a percentage of the total industrial output. The ratio of a number of companies measures the relative market share of the total industrial output that these companies are responsible for. The formula is as follows:

$$CR_n = \sum_{i=1}^n \frac{X_i}{T} \dots \dots \dots (1)$$

Information: CR_n = Industry Concentration Ratio; n = The number of industrial companies measured; X_i = The magnitude of the absolute value of the variable being observed in a number of company-i; T = Represents the sum total of the absolute values of the variables measured or observed in that industry

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Profit analysis is carried out to analyze the profits of the plastic and packaging industry by using Price Cost Margin (PCM) analysis. PCM is used by using the following formula:

$$PCM = \frac{\text{Nilai tambah-upah}}{\text{Nilai tambah yang dihasilkan}} \times 100\% \dots\dots\dots(2)$$

PCM is one of the performance indicators used as a rough estimate of industry profits. PCM in this study is obtained by dividing the difference between added value minus wages to output value. PCM is also defined as the percentage of profit from the excess of revenue over direct costs.

The method used in analyzing the structure and factors that affect performance is to use a simple linear regression method with Ordinary Least Square (OLS). In this method, the concentration ratio is the independent variable and profit is the dependent variable. The model can be written:

$$Y = \alpha + \beta X_1 + e_i \dots\dots\dots(3)$$

Information: Y = PCM (%); X₁ = Industry concentration of the four largest companies/CR4 (%); α = Constant; β = Coefficient; e_i = Annoying error (*error term*).

FINDING AND DISCUSSION

Industry concentration is one way to measure the structure of a market in an industry. A high level of industry concentration describes an uncompetitive market structure or imperfect competition, whereas a low level of industry concentration describes competition to seize the market and leads to industrial efficiency.

The method used to calculate the level of industrial concentration in the plastics and packaging industry uses the Concentration Ratio (CR). The number of industries used to calculate the concentration ratio is the entire existing plastic and packaging industry. The concentration ratio measurement in this study was carried out using the overall output value of the plastics and packaging industry and the sum of the largest output of the 4 largest companies in the plastics and packaging industry in Indonesia. The following is a table of industrial concentrations in the plastics and packaging industry:

Table 4. Concentration of the Plastic and Packaging Industry in 2010 – 2019

Year	Output Value of the Biggest Four Companies (Rp)	Total Output Value (Rp)	CR4 (%)
2010	3.201.524.178	18.654.943.596	17,16
2011	4.981.018.697	30.295.346.832	16,44
2012	3.853.471.081	29.748.237.804	12,95
2013	2.796.412.082	24.197.753.204	11,55
2014	10.553.873.382	45.418.662.385	23,23
2015	19.686.841.901	78.818.527.244	24,97
2016	16.452.452.877	86.205.600.287	19,08
2017	8.422.648.905	90.756.516.188	9,28
2018	5.218.417.992	62.373.751.602	8,36
2019	5.914.309.617	69.855.134.911	8,46
Average	8.108.097.071	3.419.745.871	16

Source : Indonesian Statistics (Data processed, 2022)

Table 4, it shows that the Indonesian plastic and packaging industry has an average industrial concentration of 16 percent. This means that the plastic and packaging industry belongs to the fifth type of oligopoly. with an explanation that four companies control 22 percent of an industry's supply, while on average CR4 in the plastics and packaging industry is 16 percent.

According to the data in Table 4, the concentration growth of the plastic and packaging industry fluctuates every year. The highest industrial concentration occurred in 2015 at 24.97 percent. The lowest concentration occurred in 2018 at 8.36 percent. From 2010 to 2013 the concentration of the plastic and packaging industry continued to decline due to the increase in the number of companies. The large number of new players in this industry has led to a lot of competition and as a result the plastics and packaging industry is not concentrated in a few companies. From 2014 to 2015 the concentration of the Indonesian plastics and packaging industry has increased quite a lot, this is due to changes in the number of output of the largest companies which have increased and the amount of industrial output which has also increased.

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Another reason the concentration of plastic and packaging is not too high is because there is little possibility of scarcity of the main raw material, namely petroleum, because Indonesia is one of the large countries that produces oil which can be used as a source of raw material for production. the scarcity factor is a determining factor for concentration because if scarcity occurs, there will be barriers to entry so that few companies compete in an industry and vice versa.

These results are in line with research conducted by Siregar & Lubis (2015) which found that the Indonesian Textile Industry has a CR4 value with an average of 12.02 percent. According to Joe S. Bain's theory, the Indonesian textile industry is included in the fifth level oligopoly category with the explanation that four companies control 22 percent of an industry's supply.

Profit is the difference obtained from the total income earned by an industrial sector from the results of the production process with the total costs sacrificed by an industrial sector in the production process. The profit earned by an industry depends on production costs and selling prices set by the producer concerned.

In this study, profit analysis was carried out using Price Cost Margin (PCM). is the ratio of profits to revenue (sales revenue). The PCM value is between 0 and 1. This shows the level of profit received by the company. The greater the PCM value, the greater the profit the company gets. The movement of PCM in the Indonesian plastics and packaging industry as a whole from 2010 to 2019 will be presented in the following table:

Table 5. Profits for the Plastics and Packaging Industry in 2010 – 2019

Year	Value-added (Rp)	Wages (Rp)	Output (Rp)	PCM (%)
2010	8.831.717.883	1.205.780.511	18.654.943.596	40,87
2011	10.694.759.171	1.727.509.251	30.295.346.832	29,59
2012	8.470.150.780	1.605.150.368	29.748.237.804	23,07
2013	8.528.510.678	1.846.857.409	24.197.753.204	27,61
2014	22.603.378.348	2.465.782.013	45.418.662.385	44,33
2015	28.862.947.127	4.583.575.084	78.818.527.244	30,80
2016	46.142.149.062	3.534.268.959.	86.205.600.287	49,42
2017	37.238.832.232	6.046.662.623	90.756.516.188	34,36
2018	24.712.630.537	4.816.915.667	62.373.751.602	31,89
2019	31.269.472.272	6.364.956.828	69.855.134.911	35,65
Average	22.735.454.809	3.419.745.871	3.419.745.871	34,76

Source : Indonesian Statistics (Data processed, 2022)

Table 5 it can be seen that the development of profits in the plastics and packaging industry when viewed from the Price Cost Margin (PCM) value has fluctuated. In 2014 the total profits of the plastic and packaging industry increased by 60.56 percent from the previous year. The increase in the number of industrial profits was due to the high demand due to the election campaign in 2014 which resulted in an increase in plastic demand from the food and beverage sector such as plastic bottles, plastic cups and straws as well as from the printing industry such as billboards, posters and banners. This has an impact on increasing the added value that can be obtained in this industry. The demand for plastic increases causing the industry to produce more so that the output produced is more than before. The resulting output causes more added value generated to also increase and increase the profits earned.

In 2018, the profit rate for the plastic and packaging industry experienced the highest decline, namely 7.19 percent. This decrease was caused by a decrease in demand for plastic due to a national policy from the government, namely the ban on using disposable shopping plastic bags. As a result, household consumption of plastic has decreased, such as the use of plastic bags, straws and styrofoam.

The level of profits for the plastics and packaging industry in Indonesia tends to be unstable in terms of the profits received by the industry. The average profit for the plastic and packaging industry in 2010-2019 was 34.76 percent. Profits are unstable because the plastic pellets used as the basic material in the manufacture of plastic and packaging come from imports and often experience price increases. The increase in the price of plastic pellets was due to the price of plastic pellets following the world oil price. If the world oil price rises, the price of plastic pellets will also experience a price increase. The utilization and management of local raw materials is not yet optimal due to the lack of oil refineries, therefore to cover the shortage, the plastic and packaging industry imports raw materials from other countries.

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These results are in line with research conducted by Munawaroh (2020) which found that the average profit rate for the creative industry sub-sector in Indonesia fluctuates every year. It is known that the average level of profit obtained is 36%, this means that each creative industry sub-sector has an advantage on the basis of a market structure that tends to be oligopoly.

The Normality Test or also called the Jarque-Bera Test is used to see the term error. The results of the normality test are analyzed through the probability values obtained to determine that the error terms in the model can be normally distributed. The probability value in the normality test is 0.799924 or 79.99 percent which is greater than the significance level of 5 percent, meaning that the error terms in the model are normally distributed.

Heteroscedasticity testing was carried out using the White Heteroskedasticity test with the proviso that the Obs*R-Squared probability value must be greater than the real level to prove that there are no confounding variables that have the same vance in the model. The calculation results show that by using the White Heteroskedasticity test, it can be concluded that there is no heteroscedasticity problem or the data is said to be homoscedasticity. This is proven from the calculation value, the calculated probability value is $0.6218 > 0.05$, which means that there is no heteroscedasticity problem.

The autocorrelation test is used to test whether there is a relationship in a linear regression model between the confounding errors in period t and the confounding errors in the $t-1$ (previous) period. The Breusch-Godfrey Serial Correlation LM Test statistical test is one of the general autocorrelation tests. The following are the results of the tests that have been carried out.

The calculation of the regression results, it was found that the Durbin-Watson (DW) value was 1.915818 or still ranged from 1.5 to 2.5. chi square 0.9024 and greater than α which is 5 percent ($0.9024 > 0.05$), this means that the regression model has no autocorrelation problems. After several tests, the results show that the regression model passes the classical assumption test. So it can be concluded that the model in this study is BLUE (Best Linear Unbiased Estimator) or in other words has a good ability to explain the relationship between variables in the model.

The F test was conducted to find out whether the independent variables jointly or simultaneously affect the dependent variable significantly or not. The test is carried out using the F distribution by comparing the calculated F-value obtained from the regression results with the F-table.

Based on the f-test the statistical F value is 1.414351 greater than the value of the f table (critical value) with $\alpha = 5$ percent with 10 and $df = 1$. namely 4.96 which indicates that H_0 is accepted and H_a is rejected with a 95 percent confidence level. This means that the independent variable, namely industry concentration, has absolutely no effect on profits so that the dependent variable, namely profits, cannot be explained and linked to the independent variable, namely industrial concentration.

The t test is used to test the significance of the independent variable's effect on the dependent variable Asngari (2013). To test the proposed hypothesis. significant test approach is used. The following is the value of the t test results.

Based on the regression results, it was found that the calculated t value of the CR4 variable was 3.812630 with a t table value at $\alpha = 5$ percent, where $1/2\alpha = 0.025$ percent (2-way testing) and $Df = n-k = 10-2 = 8$, then the value of t- table = 2.3060. Thus t count is greater than t-table ($3.812630 > 2.3060$). This means that industrial concentration has a significant influence on the profits of the plastics and packaging industries.

The R test is used to calculate how much the variation of the dependent variable can be explained by the independent variable. The results of the study found that the Coefficient of Determination (R^2) was 0.150233 or 15.02 percent, meaning that only about 15.02 percent of the variation in the profit variable could be explained by the industry concentration variable, the remaining 84.98 percent was influenced by other variables. The regression model can be written as follows:

$$PCM = 26,90569 - 0,518439 CR_4$$

$$t\text{-count} = (2,3060) (3,812630)$$

$$R^2 = 0,150233 = 15,02 \text{ persen}$$

$$f\text{-count} = 1,414351$$

$$d w = 1,915818$$

After testing the classical assumptions and simple linear regression analysis, the estimated model is obtained as follows:

$$(PCM) = 26,90569 - 0,518439 (CR_4) + vt$$

$$t\text{-count} = 3,812630$$

$$R^2 = 0,150233 \text{ atau } 15,02 \text{ persen}$$

From the results of the estimation model above, it can be explained that the relationship that occurs in the effect of concentration on the profits of the plastic and packaging industry in Indonesia is a positive relationship. This can be seen from the value of the regression coefficient which is equal to 26.90569. Thus, this figure gives the meaning that the higher (lower) the

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concentration of the industry, the profit will increase (decrease). For example, if the input industry concentration is increased (decreased) by one percent, the profits of the plastics and packaging industry will increase (decrease) by 26.90569 percent.

There are many things that can explain the relationship between CR4 and PCM, namely prices, collusive behavior, increased consumption, decreased concentration of the four largest companies due to absorption from other companies. It is important to note that concentration has little effect on the profitability of the plastics and packaging industries. In accordance with the theory, the influence of concentration on profit is not too large, it can be influenced by the existence of collusive practices in the form of cartels in the industry, so that the determination of quotas, production allocations, markets and profits can be regulated by the management of the cooperative (Hasibuan 1991).

The concentration level of the plastics and packaging industry in 2016 showed a decrease of 4.2 percent from the previous year. If calculated based on the regression model, there will be a decrease in profits of 0.91 percent. However, the data in table 4.9 shows that the profits of the plastic and packaging industry in 2016 increased by 60.45 percent from the previous year. This shows the phenomenon that a high level of concentration or mastery of market share is not always followed by an increase in industry profits and vice versa.

This is in accordance with the theory, because according to Douglas F. Greer (quoted in Hasibuan, 1991: 123) there are four main influences, namely good luck (lucky), technical factors, the existence of government policy (the existence of an anti-monopoly law). And the existence of company policies (mergers, product differentiation, and business practices that restrict other companies from operating).

CONCLUSIONS

The plastics and packaging industry is categorized as having a monopolistic structure, because the average concentration during 2010-2019 was 16 percent. Profit levels during the year of observation in the plastics and packaging industry fluctuated. Based on the simple regression results, it is explained that industry concentration has a positive but not significant effect on profits in the plastic and packaging industry.

For plastic and packaging industry companies in Indonesia to be able to improve the process in the overall related production so that it can be carried out more efficiently so that it will be able to increase the added value and profits of the goods produced and obtain higher quality production results. For further research, it is hoped that it will be able to develop research on the variables that influence the course of the production process related to the plastics and packaging industry so that it can be understood what things can affect the industry.

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