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Research article

Concentration and Competition in the Pharmaceutical Sector in an Era of Challenges

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Abstract: In 2018, the Central Bureau of Statistics noted that the pharmaceutical industry grew 7.36 percent and slowed by 5.59 percent during the Covid-19 pandemic in 2020. Fluctuations in the growth of the pharmaceutical sector before and during the Covid-19 pandemic encouraged increased competition and concentration. This study examines the concentration and competition *of* pharmaceutical businesses listed on the Indonesia Stock Exchange from the first quarter of 2018 to the third quarter of 2020. The method used in this study is a quantitative approach with a concentration ratio model (CR) and *the Hirschman-Herfindahl index* (HHI). The calculation results show that the Kalbe Farma company controls over 65 percent of the market share, while 9 pharmaceutical companies contest the other 35 percent. KLBF is a company with the most sustainable competitive advantage compared to others; this can be seen from product differentiation, use of technology, and a superior market share of 65.39%. In addition, from the aspect of market competition, it shows that the pharmaceutical industry before and during the Covid-19 pandemic was in a tight oligopoly market with scores of 99.20 and 99.22. The results show the implications that pharmaceutical sector actors can carry out our policies related to competitive price competition. Another procedure is that companies must constantly observe and analyze the actions of other pharmaceutical companies in making business decisions.

Keywords: Concentration and competition, pharmaceutical Industry, tight oligopoly market

JEL Classification: L11, L13, L16

Abstrak: Pada tahun 2018, Badan Pusat Statistik mencatat industri farmasi tumbuh 7,36 persen dan melambat sebesar 5,59 persen selama pandemi Covid-19 tahun 2020. Fluktuasi pertumbuhan sektor farmasi sebelum dan selama pandemi Covid-19 mendorong peningkatan kompetisi dan konsentrasi. Penelitian ini mengkaji konsentrasi dan persaingan industri farmasi yang terdaftar di Bursa Efek Indonesia dari triwulan I 2018 sampai dengan triwulan III 2020. Metode yang digunakan dalam penelitian ini model rasio konsentrasi (CR) dan Hirschman Herfindahl Index (HHI). Hasil perhitungan menunjukkan Kalbe Farma (KLBF) menguasai lebih dari 65 persen pangsa pasar, sedangkan 9 perusahaan farmasi memperebutkan 35 persen lainnya. KLBF merupakan perusahaan dengan keunggulan kompetitif paling berkelanjutan dibandingkan perusahaan lain; hal ini terlihat dari diferensiasi produk, pemanfaatan teknologi, dan penguasaan pangsa pasar yang unggul yaitu sebesar 65,39 persen. Selain itu, dari aspek persaingan pasar menunjukkan bahwa industri farmasi sebelum dan selama pandemi Covid-19 berada dalam pasar oligopoli ketat dengan skor 99,20 dan 99,22. Implikasi hasil penelitian yaitu sektor farmasi diharapkan dapat menjalankan kebijakan persaingan harga yang lebih kompetitif. Cara lainnya adalah perusahaan harus selalu mengamati dan menganalisis tindakan perusahaan farmasi lain dalam mengambil keputusan bisnis.

Kata Kunci: Konsentrasi dan persaingan, industri farmasi, pasar oligopoli ketat

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1. INTRODUCTION

The growth of the pharmaceutical industry, based on data from the Ministry of Industry of the Republic of Indonesia in the first quarter of 2018, grew 7.36 percent annually. This growth was driven by domestic demand, the government's health insurance program implementation, and an increase in the export market for traditional medicines. The Covid-19 pandemic in 2020 changed people's consumption behavior; there was panic and worry, resulting in panic buying primary food products, masks, hand sanitizers, immune supplements, and vitamins. There was increased public awareness of the body's resistance to prevent infection with Covid-19, from sports to taking health supplements. According to BPS (2020), the chemical, pharmaceutical, and traditional medicine industries grew slowly by 5.59 percent in the first quarter but increased by 17 percent on an annual basis (BPS, 2020)

The Indonesian Pharmaceutical Association (GPFI) records that the Covid-19 pandemic increased the need for medicinal raw materials (BBO) by 30-300 percent. Pharmaceutical factory utilities at the end of the first quarter of 2020 were 55-60 percent, which rose to near normal due to the high demand for health supplements and vitamins. The performance of the national herbal medicine industry aligns with the Fior Markets Institute's research, which predicts that the global market for products related to health supplements will increase by 7.4 percent over the next 7 years.

In parallel, the high demand for supplements and multivitamins increases the profitability of the pharmaceutical and traditional medicine industries that are listed on the Indonesia Stock Exchange. Their profitability is measured by the ratio of Return on Assets (ROA). ROA measures the company's ability to generate profits with the total assets available. ROA is also called earning power ratio (Silalahi et al., 2015).

Table 1. ROA of the pharmaceutical industry for the third quarter 2018 – 2020

No	Company	ROA (%)		
		Q3 2018	Q3 2019	Q3 2020
1	Merck	21,352	3,632	7,847
2	Sido Muncul	25,540	21,707	22,239
3	Indo Farma	3,032	3,249	1,260
4	Kalbe Farma	13,778	13,138	11,972
5	Tempo Scan Pacific	7,127	6,913	7,704
6	Merck S. D. Pharma	6,619	7,715	14,297
7	Phapros	2,607	4,049	2,968
8	Kimia Farma	4,135	0,580	0,392
9	Darya Varia	13,090	12,907	34,708
10	Pyridam Farma	3,099	3,494	0,095

Source: Indonesia Stock Exchange Report (IDX, 2020), processed by the author

Data shows that Darya Varia 2020 had the largest ROA of 34.70 percent compared to other pharmaceutical companies. Meanwhile, in 2020, the lowest ROA was Pyridam Farma at 0.0095 percent. In general, ROA growth in the third quarter of 2020 increased compared to the same quarter in the previous year. This means that the average pharmaceutical industry experienced growth and generated profits during the Covid-19 pandemic due to the increasing public demand for supplements or multivitamins.

Increased profitability is related to market share, especially in pharmaceutical company, both firm size and market power show positive significant relationships with return on asset (ROA) but negative significant relationships with earning per share and sales growth and company efficiency have no significant relationship with ROA (Lim & Rokhim, 2020). The pharmaceutical industry has its market share (Minangsari, Robiani, & Mukhlis, 2019); some industries control almost 50 percent of the market, and some only 0.02 percent. Domination of industrial market share uses a concentration ratio (CR) approach. According to Edeling and Himme (2018), CR measures

concentration as the average market share of a particular sample, with an average high market share indicating a low number of competitors, thus, a high level of concentration. The concentration ratio consists of CR 4 or CR 8, which means concentration based on the highest market share in the industry (Edeling & Himme, 2018). Pharmaceutical company concentration ratio based on market share. Here are 10 pharmaceutical companies based on market share.

Table 2. Market share of pharmaceutical industry for the third quarter of 2020

No	Company	Market share (%)
1	Kalbe Farma	65,390
2	Tempo Scan Pacific	30,950
3	Indo Farma	2,866
4	Pyridam Farm	0,747
5	Kimia Farma	0,027
6	Merck Sharp Dohme Pharma	0,008
7	Darya Varia	0,007
8	Phapros	0,003
9	Merck	0,002
10	Sido Muncul	0,0000086

Source: Indonesia Stock Exchange Report (IDX, 2020), processed by the author

The table shows that Kalbe Farma is the pharmaceutical company with the highest market share, namely 65.390 percent, while the second is Tempo Scan Pacific, with 30.950 percent. The lowest market share is Merck with 0.002 percent and Sido Muncul with 0.0000086 percent.

Market share in business practice is the company's goal. Companies with large market shares will benefit from product sales and price increases. Market share is vital for companies, such as customer management, value chain management, customer value, and marketing strategy. The high market share also increases competition, both domestic and international market competition. In addition, high customer needs and wants, technological advances, changes in policies and laws, and the ever-changing marketing environment are factors for high competition. Moreover, competition is an essential actor behind managers' decisions in allocating company finances (Gyimah et al., 2021).

Market domination of 10 pharmaceutical companies encourages a high level of competition. Industry competition can be measured using market competition. Market competition is the company's ability to increase its relative price compared to its competitors without losing sales. Market power is the difference between price and marginal cost expressed relative to price, formulated L = (P-MC) / P, where L is the Lerner index, which is an indicator of market power, P is the price at which firms sell their output, and MC is the firm cost margin for firm volume. When P = MC, the company competes in perfect competition where products are sold homogeneously, then L = If P > MC, then L > 0 means that the monopoly company's profit is maximized (Sunarmo, 2018). Other methods that can be used to measure the degree of competition are the Concentration Ratio (CR) and the Hirschmann Herfindahl Index (HHI) (Saeed et al., 2023). The CR and HHI methods have the advantage of analyzing the level of market concentration based only on the group of companies with the highest market share. Generally using four market share concentrations (CR4) or eight market share concentrations (CR8), the results of concentration ratio measurements are then classified in the form of market structure based on market criteria, namely the form of a monopoly market structure has the characteristics of only one company controlling the market. In addition, other forms of market structure have intense competition, namely oligopoly, monopolistic and perfect competition (Emamgholipour & Agheli, 2019). HHI is a concentration level analysis tool to eliminate gaps in the results shown from CR. The use of HHI is necessary to obtain an accurate description. The results shown by HHI are identical to CR, but HHI is considered more accurate in categorizing levels of concentration and market power (Hussain et al., 2020). Industries with a low market share tend to have high concentration and are increasingly dynamic (Hoskins & Carson, 2022).

The findings of the imperfect competition market also occur in the insurance industry, where the insurance market is highly concentrated, and several companies control a large share of the premium market, so the competitive situation is classified as an oligopoly (Jaloudi, 2019). Other researchers stated that the Turkish pharmaceutical industry has a concentrated market structure. Therefore, although the Turkish pharmaceutical sector is considered a market structure with low concentration, it has a more concentrated market structure compared to developed and developing countries (Ipek & Ipek, 2018). A concentrated market encourages high competition; research states that the pharmaceutical industry is a market that is quite concentrated and very competitive, especially in terms of price (Wouters et al., 2019). Based on previous problems and research, the CR and HHI approaches are more widely used in the bank and non-bank financial industries. Although there is also research in the pharmaceutical industry sector, studies on applications in the pharmaceutical industry, especially detecting conditions before and during the Covid-19 pandemic, are still relatively rare, this is the novelty of this paper. The systematics in this study includes a discussion of the background, research methods, results, and discussion as well as conclusions and policy suggestions.

2. METHODOLOGY

The type and source of data used in this research are quantitative. The research sample is 10 pharmaceutical industry sub-sectors listed on the IDX for the first quarter of 2018 to the third quarter of 2020. The following is data on 10 pharmaceutical companies listed on the IDX.

Table 3. Pharmaceutical industry sub sector listed on IDX

No	Pharmaceutical Industry Name
1	PT Merck Indonesia Tbk.
2	PT Sido Muncul Herbal Medicine and Pharmaceutical Industries Tbk.
3	PT Indofarma Tbk.
4	PT Kalbe Farma Tbk.
5	PT Tempo Scan Pacific Tbk.
6	PT Merck Sharp Dohme Pharma Tbk.
7	PT Phapros Tbk.
8	PT Kimia Farma Tbk.
9	PT Darya VariaTbk.
10	PT Pyridam Farma Tbk.

Source: Indonesia Stock Exchange Report (IDX, 2020), processed by the author

Calculating the market share of 10 pharmaceutical companies is done using the formula market share by dividing the company's total sales compared to the total sales in the market, then multiplying by 100 percent. Period market share is divided into before (2018Q1 – 2019Q3) and during the *Covid-19* pandemic (2020Q1 – 2020Q3). Here is the formula market share:

$$MS = \frac{Total\ sales\ of\ the\ company}{Total\ sales\ of\ the\ market} \times 100 \quad (1)$$

The analysis and methods used to determine concentration and competition are the Concentration Ratio (CR) and Hirschman Herfindahl Index (HHI) approaches. CR is an index measuring concentration or monopoly power that is common and easy to use in the market. In other words, CR shows what percentage of industry shares large companies own. Concentration ratios can involve components of sales, production, labor, and use of inputs. The Concentration Ratio measures the proportion of the total sales in an industry based on the company with the largest market share.

$$CR = \sum_{i=1}^{n} Xi \quad (2)$$

Based on the concentration ratio equation, it can be explained that CRN is the notation of the centration ratio, n is the number of companies selected based on the ranking of the most significant sales, while Xi is the total market share percentage in the industry of company i = 1, 2, 3, n (Emamgholipour & Agheli, 2019).

The HHI is more comprehensive than the concentration ratio because it uses all the information of every company in the industry, not just the big companies. In addition, HHI also calculates the distribution of market size among companies. The Herfindahl-Hirschman index measures the level of market concentration, which includes all companies in the same industry.

$$HHI = \sum_{i=1}^{n} {s_i}^2 \quad (3)$$

On the HHI equation, S is the number of sales from the i-th company in the industry, and Si is the total sales. The HHI value can be obtained from the square of the S value divided by the Si (Emamgholipour & Agheli, 2019).

The market competition reflects the type and market competition. The type of market is determined by using each company's market share and the number of companies. The types of markets include monopoly, oligopoly, monopolistic, and perfect competition. If a company controls 100 percent of the market, that market is in a monopoly position. An oligopoly is a firm having a market share of between 50 and 100 percent; it is the dominant firm in the market, and the demand for its product is inelastic. If the cumulative market share of the four largest firms is on the interval (60, 100 percent), the market is a tight oligopoly. However, if the cumulative share of the four largest firms is less than 40 percent of the total market, it is called a loose oligopoly. Monopolistic competition forms when there are many competitors, but none has a share greater than 10 percent of the total market. Perfect competition is formed when there are more than 50 companies in the market, and none of them has a large enough market share (Lelissa & Kuhil, 2018).

3. RESULTS AND DISCUSSION

Market share is an indicator that is important enough to determine the degree of market power. Besides that, market share is a proxy for efficiency; the more concentrated the market indicates that the industry is in a monopolistic competition environment (Talpur, 2023). The results of market share calculations, as in Table 1, show that the pharmaceutical industry has a good market share from 2018 to 2020. This means the pharmaceutical sector could still survive before and during the Covid-19 pandemic.

Table 5. Market share of 10 pharmaceutical industries in Indonesia Q1 2018 – Q3 2019

Pharmaceutical industry	Before Covid-19					
	2018Q1	2018Q2	2018Q3	2019Q1	2019Q2	2019Q3
Kalbe Farma	55.090	54.260	53.443	53.197	65.616	65.276
Tempo Scan Pacific	26.175	52.768	25.299	26.814	53.147	31.701
Kimia Farma	16.370	17.783	18.091	17.993	0.027	0.027
Indofarma	1.636	2.192	2.520	1.351	3.657	2.264
Pyridam Farma	0.713	0.642	0.632	0.633	1.203	0.717
Merck Sharp D. P.	0.007	0.006	0.006	0.004	0.005	0.006
Darya Varia	0.005	0.004	0.004	0.005	0.009	0.005
Merck Indonesia	0.003	0.003	0.003	0.002	0.002	0.002
Phapros	0.002	0.002	0.002	0.002	0.003	0.003
Sido Muncul	0.000	0.000	0.000	0.000	0.000	0.000
Total Market Share	100	100	100	100	100	100

Source: Financial reports of 10 pharmaceutical companies (data processed). Description: in percentage (%).

The order of market share from largest to smallest is Kalbe Farma, Tempo Scan Pacific, Kimia Farma, Indofarma, Pyridam Farma, Merck Sharp D.P, Darya Varia, Merck Indonesia, Phapros and Sido Muncul. Kalbe Farma's market share, before and during the Covid-19 pandemic, experienced a significant increase of more than 50 percent. Meanwhile, Tempo Scan Pacific is in second place with a fluctuating market share of more than 25 percent, but during the pandemic, there was a decline in market share. Eight other pharmaceutical companies experienced a significant decline in market share from the first quarter to the third quarter of 2020.

The market share value of the pharmaceutical industry ranges from 0 to 100 percent of the total market output. The large market share of Kalbe Farma aligns with the theory of neo-classical literature, which explains that the basis of the company's bargaining position is the market share achieved. The company's goal is market share in business practice; the company with the highest market share will enjoy the benefits. Therefore, changes in market share accompanied by changes in market penetration will significantly impact company profits. One way to increase market share is to create a pricing strategy and price diversification through deepening promotions (Romaniuk et al., 2018).

Table 6. Market share of 10 pharmaceutical industries in Indonesia Q1 2020 – Q3 2020

Pharmaceutical industry	During Covid-19		
	2020Q1	2020Q2	2020Q3
Kalbe Farma	65.918	66.176	65.392
Tempo Scan Pacific	31.453	30.536	30.951
Kimia Farma	0.027	0.027	0.027
Indofarma	1.685	2.551	2.866
Pyridam Farma	0.899	0.693	0.747
Merck Sharp D. P.	0.008	0.008	0.008
Darya Varia	0.005	0.005	0.007
Merck Indonesia	0.002	0.002	0.002
Phapros	0.003	0.003	0.003
Sido Muncul	0.000	0.000	0.000
Total Market Share	100	100	100

Source: Financial reports of 10 pharmaceutical companies (data processed). Description: in percentage (%).

In addition, fluctuations in slowing growth and market share control by several pharmaceutical companies during Covid-19 were also influenced by several factors, including changes in demand, supply chains, and product trends (Ayati et al., 2020). The slowdown in market share is both a challenge and an opportunity for the pharmaceutical industry to carry out digital transformation strategies, including research and development, competence and digital mindset, digital collaboration, and data science (Furtner et al., 2022).

The degree of concentration indicates a specific type of industrial structure. The concentration ratio measures the proportion of the total sales in the industry, and the four largest companies or CR4 are selected (Sahile et al., 2015). The concentration ratio is done by ranking the four pharmaceutical companies with the largest market share. The concentration calculation table shows that before Covid-19, namely in the third quarter of 2018 to the third quarter of 2019, the concentration ratio value was above 60 percent with an average value of 99.22 percent. Meanwhile, during Covid-19, quarter 1 2020 to quarter III 2020 showed an average value of 99.20. Referring to theory, it means that in the period before and during the Covid-19 pandemic, the pharmaceutical industry was in a tight oligopoly market. This means that during this period, four companies controlled the pharmaceutical industry as six other pharmaceutical companies contested the leading players and 0.79 percent market share. The four companies controlling the market can influence the price of pharmaceutical products.

Table 6. Concentration ratio of 4 pharmaceutical companies

Company	Concentration 4 Based on Market Share (%)								
	Before *Covid-19*						Moment *Covid-19*		
	2018Q1	2018Q2	2018Q3	2019Q1	2019Q2	2019Q3	2020Q1	2020Q2	2020Q3
Kalbe Farma	55.09	54.26	53.443	53.197	60.004	65.275	65.918	66.175	65.39
Tempo Scan	26.175	25.108	25.299	26.813	35.1	31.701	31.453	30.536	30.95
Pacific Kimia Farma	16.37	17.783	18.09	17.993	0.026	0.027	0.027	0.027	0.027
Indofarma	1.636	2.192	2.52	1.351	3.65	2.264	1.685	2.551	2.866
Amount	**99.271**	**99.343**	**99.352**	**99.354**	**98.78**	**99.267**	**99.083**	**99.289**	**99.233**
Average	**99,22**						**99,20**		
The criterion for a tight oligopoly market structure is the value ratio of 60 percent to 100 percent.									

Source: processed by the author

The oligopoly findings align with previous researchers who stated that the pharmaceutical industry is more dominant in the form of oligopoly; therefore, apart from the price factor, future competition challenges need to look at factors such as research and development, patents, dependence on imported medicines, competition in the global market, increased competitors, drug discovery costs and stringent safety and efficacy testing (Mahajan, 2019). The oligopoly conditions were tight during Covid-19; one policy focused on export regulation aimed at strengthening productivity and efficiency through a strict policy framework in general and for the upstream segment of pharmaceutical products (Ahmed et al., 2020).

The Herfindahl Hirschman Index (HHI) measures market competition and the concentration ratio. HHI is another type of concentration measure that is often used to measure the level of market concentration. The Herfindahl Hirschman index is the sum of the square of the market share of all companies in the industry. Based on calculations in the first quarter of 2018, the HHI value was 3,988 in 2018, in the second quarter, 3,891, and in the third quarter, 3,823. The HHI values were 3,873, 4,846, and 5,271 in the first to third quarters. Based on the calculation results, before Covid-19, the pharmaceutical industry had a tight oligopoly structure. During Covid-19, the HHI value for three quarters was more significant than 1,800, meaning it has a tight oligopoly market structure.

Table 7. Market Structure Based on HHI in Q1 2018 – Q3 2020

Year	HI	Criteria	Market Structure
Before *Covid-19*			
2018 Q1	3.988	>1.800	Strict oligopoly
2018 Q2	3.891	>1.800	Strict oligopoly
2018Q3	3.823	>1.800	Strict oligopoly
2019 Q1	3.873	>1.800	Strict oligopoly
2019 Q2	4.846	>1.800	Strict oligopoly
2019Q3	5.271	>1.800	Strict oligopoly
Moment *Covid-19*			
2020 Q1	5.337	>1.800	Strict oligopoly
2020 Q2	5.318	>1.800	Strict oligopoly
2020Q3	5.242	>1.800	Strict oligopoly

Source: processed by the author
Description: >1800 strict oligopoly, <1800 ordinary oligopoly

A tight oligopoly structure is characterized by the four largest firms controlling 60 to 100 percent market share. In this form of market structure, there is an opportunity for collusion in competition through a price competition strategy (Emamgholipour & Agheli, 2019).

During the Covid-19 pandemic, the pharmaceutical industry was in a tight oligopoly market, meaning that companies competed on prices. Based on the findings of Behera and Rath (2021), the average return on the pharmaceutical sector was positive during Covid-19. Stabilizing prices for pharmaceutical products during a pandemic and helping pharmaceutical companies by providing subsidies, tax reductions, incentives, and corporate rates so that the pharmaceutical industry can export (Behera & Rath, 2021). Other researchers say that aspects of ownership in the oligopoly market structure often overlap, giving rise to competition in terms of homogeneous prices and products. Therefore. it is necessary to carry out strategies and invest in research and development aspects (Vives, 2020).

The tight oligopoly through price competition was also due to the high public demand during the Covid-19 pandemic when the healthcare system was shocked by the surge in patient requests and the high public demand for health products. To get around the high price, a mixed-integer linear programming scheme was created that connected the vaccine supply chain and the pharmaceutical sector in one scope (Kochakkashani et al., 2023).

Competition must also lead to sustainable and superior long-term performance. Reinvestment in skills and human capital is essential to strengthen competitive advantage. Research shows that knowledge-oriented leadership has a direct effect on sustainable competitive advantage, while human resource development does not have a significant direct effect on sustainable competitive advantage. In addition, knowledge-oriented leadership and human resource development indirectly affect sustainable competitive advantage through innovation factors (Banmairuroy et al., 2022). In addition, one of the policies companies in an oligopoly market can carry out is product pricing (Devine & Siddiqui, 2023)

4. CONCLUSIONS

Calculation of the market competition ratio uses the concentration ratio approach and the Hirschman–Herfindahl Index. The conclusion based on market share shows that Kalbe Farma controlled 10 pharmaceutical companies from 50 to 65.39 percent during the first quarter of 2018 to the third quarter of 2020, while 9 pharmaceutical companies enjoyed the other 35 percent. Meanwhile, the concentration ratio approach calculations show that the pharmaceutical industry before and during the Covid-19 pandemic was in a tight oligopoly market with values of 99.20 and 99.22. The results of market competition with the Hirschman–Herfindahl Index (HHI) show that the pharmaceutical industry during and before the Covid-19 pandemic was in a tight oligopoly market with a value greater than 1,800. The implications for pharmaceutical business actors are making pricing policy schemes; prices are an essential part of the oligopoly market structure; the pharmaceutical sector also needs to make strategies outside of pricing policies, such as investment in research and development, market penetration, and supply chain integration.

The approach in this study is limited to the conventional Structural Conduct Performance (SCP) method, namely the CR and HHI models. Therefore, future researchers can use qualitative and quantitative approaches to obtain more comprehensive results, mainly discussing the development of the pharmaceutical industry in Indonesia.

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