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EVIDENCE ON STRUCTURE CONDUCT PERFORMANCE PARADIGM IN THE INDONESIAN BOTTLED WATER INDUSTRY: A LONGITUDINAL CASE STUDY

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Abstract

Bottled water has become popular due to its quality and affordability. The industry's homogeneity encourages competition, leading to various business behaviors. This study analyzes the bottled water industry in Indonesia, focusing on market structure, conduct, and performance, as well as the relationship between these factors and internal efficiency. Using fixed-effects (within) IV regression and large and medium manufacturing industry survey data, this study found a simultaneous relationship between market concentration, internal efficiency, and price-cost margin, with all SCP variables significantly affecting each other. The results show that market concentration, internal efficiency, and market growth positively and significantly affect price-cost margins. The four-firm concentration ratio has fluctuated with a downward trend over time. Due to changing laws and regulations, the bottled water market structure shifted from a tight oligopoly to a loose oligopoly between 1990 and 2005, and then to effective competition from 2006 to 2014. The findings support the quiet-life hypothesis and the efficient-structure hypothesis, which suggest that firms with significant market power that exist in a highly concentrated market will quietly generate high profits with no pressure or incentive to improve efficiency, whereas a firm with a low-cost structure can increase profits by lowering prices and increasing market share.

Keywords: structure-conduct-performance, bottled water industry, internal efficiency, price-cost margins, quiet-life hypothesis

JEL Classification*: D22, D43, L22, L25*

Abstrak

Produk air minum dalam kemasan semakin menjadi pilihan konsumen karena kualitasnya dan harga yang terjangkau, serta konsumsinya yang praktis. Industri mendorong persaingan karena produknya homogen, sehingga memunculkan perilaku. Studi ini menganalisis industri air minum kemasan di Indonesia, dengan fokus pada struktur pasar, perilaku, dan kinerja, serta hubungan antara faktor-faktor tersebut dan efisiensi internal. Dengan menggunakan regresi fixed-effects (dalam) IV dan data survei industri manufaktur besar dan menengah, penelitian ini menemukan hubungan simultan antara konsentrasi pasar, efisiensi internal, dan margin harga-biaya, dengan semua variabel SCP saling mempengaruhi secara signifikan. Hasil penelitian menunjukkan bahwa konsentrasi pasar, efisiensi internal, dan pertumbuhan pasar berpengaruh positif dan signifikan terhadap margin harga-biaya. Rasio konsentrasi empat perusahaan telah berfluktuasi dengan tren menurun dari waktu ke waktu. Karena perubahan undang-undang dan peraturan, struktur pasar air kemasan bergeser dari oligopoli ketat ke oligopoli longgar antara tahun 1990 dan 2005, dan kemudian ke persaingan efektif dari tahun 2006 hingga 2014. Temuan ini mendukung hipotesis quiet-life and hipotesis efficient-structure, yang menunjukkan bahwa perusahaan dengan kekuatan pasar yang signifikan yang ada di pasar yang sangat terkonsentrasi diam-diam akan menghasilkan keuntungan tinggi tanpa tekanan atau insentif untuk meningkatkan efisiensi, sedangkan perusahaan dengan struktur berbiaya rendah dapat meningkatkan keuntungan dengan menurunkan harga dan meningkatkan pangsa pasar.

Kata kunci*: struktur-perilaku-kinerja, industri air minum dalam kemasan, efisiensi internal, margin harga-biaya, quiet-life hypothesis*

Klasifikasi JEL*: D22, D43, L22, L25*

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INTRODUCTION

In the last two decades, the global processing industrial sector has experienced remarkable and consistent annual growth. The growth gains considerable competitive and comparative advantages in adding value to economic activities in domestic and global markets. This industry generally includes the food, beverage, chemical, pharmaceutical, packaged consumer goods, and biotechnology industries. Based on data from the Indonesian Ministry of Industry, the food and beverage sector increased by 7,9 percent throughout 2018, or more than the overall economy's 5,1 percent growth. This sector accounts for the largest GDP contribution from the processing industry sub-sector. This is supported by the gains of the food and beverage industry, which has expanded significantly by IDR 71.4 billion over the last eight years (see Appendix 1). In 2007, this industry contributed 136,7 billion dollars; by 2014, it had increased to 208 billion dollars. Meanwhile, the drink industry's production expanded by 23,4 percent in the fourth quarter of 2018, which shows that this type of processing industry may play an essential role in the growth of the national economy. Because of this significant increase, the beverage industry was named one of the top five manufacturing industries contributing to total industrial growth (Kementerian Perindustrian RI, 2020).

This is in line with the rising demand for bottled drinking water, which is necessary to ensure the availability of sufficient drinking water sources. Bottled water has become the second most purchased drink after sodas since its introduction by major beverage firms, and it will soon become the most purchased (Miller, 2006). Furthermore, the data from the Indonesian Central Bureau of Statistics show that a large market share from the soft drink industry group, with a market share of 85 percent, has also been spurred by the rise in demand for bottled drinking water in Indonesia. It can be seen as highly promising, as fresh capital flows from many producers, implying that bottled drinking water products are becoming more competitive. Since Indonesia is a country that supports clean tap facilities that are readily available and may be consumed at low or no cost, this might be a factor that contributed to the Indonesian beverage industry's growth as well (Wilk, 2006). Most people believe bottled water is cleaner than tap water, and despite the increasing demand for bottled water, governments in developing countries continue to subsidize it, selling it at a loss to the private sector (Pang, 2019). If the government's efforts to eliminate burdensome regulations prevail, the market situation will undoubtedly be more promising, incentivizing many bottled drinking water-producing firms to expand and build new factories. However, as more competitors enter the market, the existing market competition will become highly competitive.

From the producers' side, they typically provide packaged drinking water products that are either affordable or technically highly practical to meet the community's need for clean drinking water. Given that customers may turn to healthier beverage choices, it has the potential to increase demand for clean drinking water in the community and benefit this industry. However, the rising demand for bottled drinking water will be led to scarcity if not followed by adequate supply chain management. Engineering and bottled and packaged water technologies are closely tied to producing, distributing, and supplying high-quality water purification systems, resulting in more effective supply chain management (Jain et al., 2019)the most important substance in our evolution, is an integral part of the human life and health in particular. The devoid of water makes life impossible and next to air, it is the most indispensable thing. A man can survive for a month without food but cannot live even for 10days without water. Every day we have to drink; the amount of drinking water required, however, is variable and depends on individuals, their physical condition, life cycle, and the climate. To ensure a healthier life, it is imperative to drink water that is safe to drink. Soft drinks and beverages, in particular, sugar-sweetened beverages became popular. But health concerns from the use of such sugary beverages have shifted the bias to bottled water. As the name implies, bottled water is a drinking water, packaged in either plastic or glass containers without any

added sweetener. In consideration of the today's life style, bottled water rendered it as a smart and healthy choice among other drinks. Bottled water is, however, not proven to be better than tap water under normal conditions. Rather, manufacture of bottled water may increase CO2 level of the environment. To ease the contamination of tap water in case of poor supply and the emergencies during natural disaster, bottled water has evolved as the best option. Water is packaged mainly in polyethylene terephthalate (PET. These are important for designing and manufacturing the finest and most cost-effective water. The problem arises when the clean drinking water supply chain is disrupted by population growth that is not accompanied by an increase in the drinking water supply. This industry's challenge is retaining consumer demand for enhanced water products while maintaining the benefits of plain water, naturalness, and hydration (Rani et al., 2012) the total global bottled water market for 2010 stands at approximately є66bn. The year 2000 was highly impressive with the annual growth rate reaching 11.4%. Whilst it has not been as high in the years since, the rate has remained above 6.0%, displaying the market's strength and resilience, proving that the fundamental bottled water values of quality, purity, availability and hydration are as strong today as they have ever been. For consumers seeking health and well being, bottled water is an alternate to the traditional soft drinks. The media attention on the growing obesity problem in the West, particularly in the European and North American populations, the links made between it and the increased consumption of soft drinks by children has reinforced the growth of bottled water. A closer look at the dynamics of the global market reveals that with respect to the spilt between still and sparkling water, still formats have steadily gained share over their sparkling counterparts as sparkling water remains the preserve of the households. Sparkling water is becoming increasingly out of vogue and reflecting a wider overall trend towards still beverage consumption. Much of the growth in still water consumption has been driven by water for coolers and other bulk formats. Parallel to this, the increasing consumer preference for still water hydration on the above has bolstered the still water sector. Traditionally, still water hydration has been a substitute for tap water in countries where shortages occur during hot summers or the tap water is not of the required drinking quality. Sparkling water is often seen as a substitute for carbonates and this is particularly true for flavoured sparkling water. Despite facing increasing competition from 'mains fed' point of use (POU. These challenges will impact the bottled water industry's behavioral traits. Therefore, the government will typically respond by maintaining fixed prices and supplies to meet the community's needs and establish healthy competition for all firms in this industry.

However, as compared to other countries, the Indonesian population's annual consumption of bottled water is still fairly low, although it is increasing year after year. Even when the monetary crisis hit, Indonesians' consumption of bottled water decreased by about 300 thousand kiloliters, approximately from 2,4 million to 2,1 million kiloliters, with a growth in public consumption of bottled water minus 12,1 percent (see table 1). This situation did not last long after the reformation; the consumption of bottled drinking water increased again, reaching 3,1 million kiloliters in 1999 and continuing to rise until it reached 10,4 million kiloliters in 2005, with the level of consumption reaching 47,5 liters per capita per year. Thus, the bottled drinking water industry has been rapidly expanding, making this commodity a consumer product with a high company-set selling value.

In theory, this increase in demand will respond to changes in the supply of clean drinking water, driving firms in this industry to raise production volumes to maintain market equilibrium (See Pepall et al., 2014; Shepherd & Shepherd, 2003). Figure 1 shows that, despite being quite volatile, the nation's bottled water production growth after the crisis was above 10 percent. The bottled drinking water industry began to recover in 1999 when production volumes increased to 3,1 million kiloliters. However, this improvement still resulted in a production shortfall of about 24 thousand kiloliters needed to meet post-crisis bottled drinking demand. Therefore, the bottled water industry is starting to potentially attract

Table 1. Indonesia's Population Growth Rate and Drinking Water Consumption in 2000 - 2005

Year	Population (in thousands of inhabitants)	Consumption (kiloliter)	Consumption Growth (%)	Consumption/capita (liters)
1997	196.353,1	2.417.342	-----	12,31
1998	198.333,4	2.124.907	-12,10	10,71
1999	200.951,8	3.142.845	47,90	15,64
2000	203.025,3	4.068.963	29,47	20,04
2001	206.193,3	5.600.555	37,64	27,16
2002	209.192,4	6.583.290	17,55	31,47
2003	213.722,0	7.824.276	18,85	36,61
2004	216.415,0	9.205.587	17,65	42,54
2005	219.142,0	10.412.460	13,11	47,51

Source: Capricorn Indonesian Consult (2006)

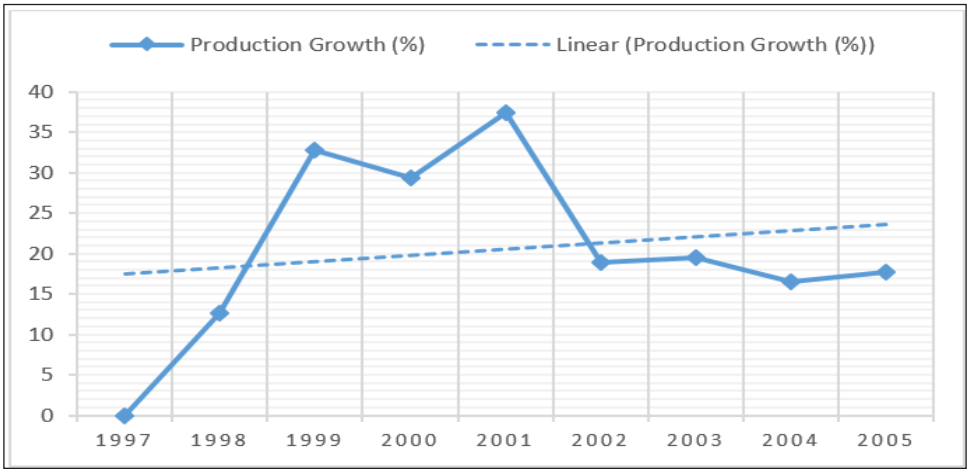

Figure 1. Bottled Water Production Growth in Indonesia After Financial Crisis
Source: Capricorn Indonesian Consult (2006)

new firms to enter the market with production growth above 10 percent.

Despite its substantial growth prospects, this industry may confront sustainability challenges, such as the restricted supply of clean water due to groundwater contamination brought on by non-eco-friendly industrial activity, which makes it more challenging to obtain clean, safe, and healthy water (Daud et al., 2017; Jha et al., 2020). The rising cost of raw materials for plastic bottles and gallons (Polyethylene Terephthalate, or PET) and glass-size plastic (Polypropylene, or PP) as a result of rising oil costs in the global market could be an external factor that this industry frequently encounters. The cost of production could rise because of the rising price of plastic raw materials, which could also have an immediate effect on the industry's profit margins. As a result, competitors in the drinking water and mineral water industries compete by maintaining quality control throughout the manufacturing process.

Previous studies have been conducted in Indonesia that address the issues the bottled water (AMDK) sector confronts. A few studies have focused on the impact of packaged drinking water (refill water) on drinking water affordability and equity. Walter et al. (2017)yet receives little attention within international development research and policy. This study investigates the impact of packaged drinking water (refill water, for example, observed a moderately positive and significant correlation between the level of income and the amount of refilled water consumed for drinking. Zivin et al. (2011), York et al. (2011), and Francisco (2014) also found that purchasing

bottled mineral water in comparison to tap water consumption is now well structured across income classes, ages, and geographic areas. Meanwhile, other research conducted by Wen & Haller (1994) and Ichoroh et al. (2021)resource allocation and water sector standards on the performance of firms in the bottled water industry. Motivation: For firms in the bottled water industry to remain afloat, their performance against their targets needs to be assessed (Murugesan et al., 2016 has focused more on resource allocation for measuring a firm's performance and calculating brand prices from the firm's concentration on the bottled drinking water industry. In addition, the study by Scalamonti (2021) examines the factors that affect operating volume, cost structure, and the expected firm's profit margins in the bottled mineral water industry. Most studies have investigated some of the issues in this industry subsector. Additionally, the study of the degree of competition in the bottled drinking water industry and how the industry's structure, conduct, and performance (SCP) are interrelated in determining the firm's profit margins is hardly found in the published literature. The information about the relationship between economic or market structure, market conduct, and its performance will provide further insight for policymakers on whether the firms in the industry compete imperfectly. Therefore, the investigation of firm performance and market concentration has a high relevance for policymakers, and it can be done using the analysis purview of SCP.

The SCP paradigm refers to this interaction where the three have reciprocal influence over how the firm responds to its rivals. Because market power and the firm's concentration ratio are closely related, they can be used to define the state of the market structure, where high and low degrees of concentration have different implications for the performance of an industry (Mahesa, 2010). This SCP paradigm will determine each firm's market position if there is a mutually influential relationship between structure and industry performance. Firms that compete fiercely in a given industry typically have a modest market share. Meanwhile, firms with a larger market share usually experience less competition.

This study aims to analyze the structure, conduct, and performance of the bottled water industry in Indonesia by examining the relevance of the SCP paradigm. It will address to following fundamental question: to what extent structure, conduct, and performance of this industry and the influence of SCP from the concentration level of the four largest firms, internal efficiency, market growth, firm size, capital-output ratio, and price-cost margin. The single and simultaneous equation is used to determine the relationship between the variables in the SCP model.

LITERATURE REVIEW

Bottled drinking water is defined by the Ministry of Industry (2011) as water that has been processed, packaged, and is safe to drink without adding other ingredients or additives. Business actors who own an AMDK factory that meets the legal provisions and regulations to produce bottled drinking water are also defined as AMDK industrial firms. Firms are separated into two categories in terms of production and brands in the structure of the bottled drinking water industry in Indonesia, namely (1) producers who produce bottled water and (2) brand holders, namely firms with brands but no factory or management of bottled drinking water.

Structure - Conduct - Performance (SCP) Approach

The SCP paradigm is a methodology used in industrial organizations to examine a firm's structure, conduct, and performance. This analytical framework has been evolving since 1930, and modern economists developed it. This theory was first proposed by Edward S. Mason, a Harvard University economist, in 1939, and Bain, Clark, and Caves later developed the SCP approach. According to Mason, the structure of an industry determines the conduct of existing business actors, such as the corporation, and thus influences the industry's performance. It is also feasible that the firm's conduct and performance have an inverse impact on the market structure. Meanwhile, Bain's viewpoint,

a Manson development, argues that the SCP paradigm assumes that the market structure will determine the firm's behavior and performance (Lelissa & Kuhil, 2018)but also in others, such as business management especially in the areas of strategic management. The Structure Conduct Performance (SCP.

This SCP paradigm will determine each firm's market position if there is a mutually influential relationship between structure and industry performance. Firms that compete fiercely in a given industry typically have a modest market share. Meanwhile, firms with a larger market share usually experience less competition. As a result, SCP analysis is frequently used to assess market structural conditions and competition (Rekarti & Nurhayati, 2016). The relationship between market concentration will drive firms in an industry to distinguish products, where a high market concentration tends to restrict price competition in the market, resulting in profits, as in a monopoly market (W. Stewart Howe, 1978). Figure 2 depicts the approach to market structure, conduct, and performance.

The industry's structure

Each actor in a market with a competitive environment is separated into a specific market structure. A market structure can describe the characteristics and market composition of an industry. The quantity and size of the aggregate distribution of firms in the economy are also determined by market structure (Ferguson, 1988). Furthermore, as the market structure can affect competition through price levels, it is often used as a firm measurement in observing variations in industry behavior and performance.

Market structure is defined as the classification of firms into several types of markets based on characteristics such as the type of product produced, the number of firms in the industry, the ease with which they enter or leave the industry, and the role of advertising in industrial activities (Nikensari, 2012). The market structure can also be defined as the context in which a market operates within an industry. Thus, the supply side of the product can also be identified, such as the conduct of the organization that produces the

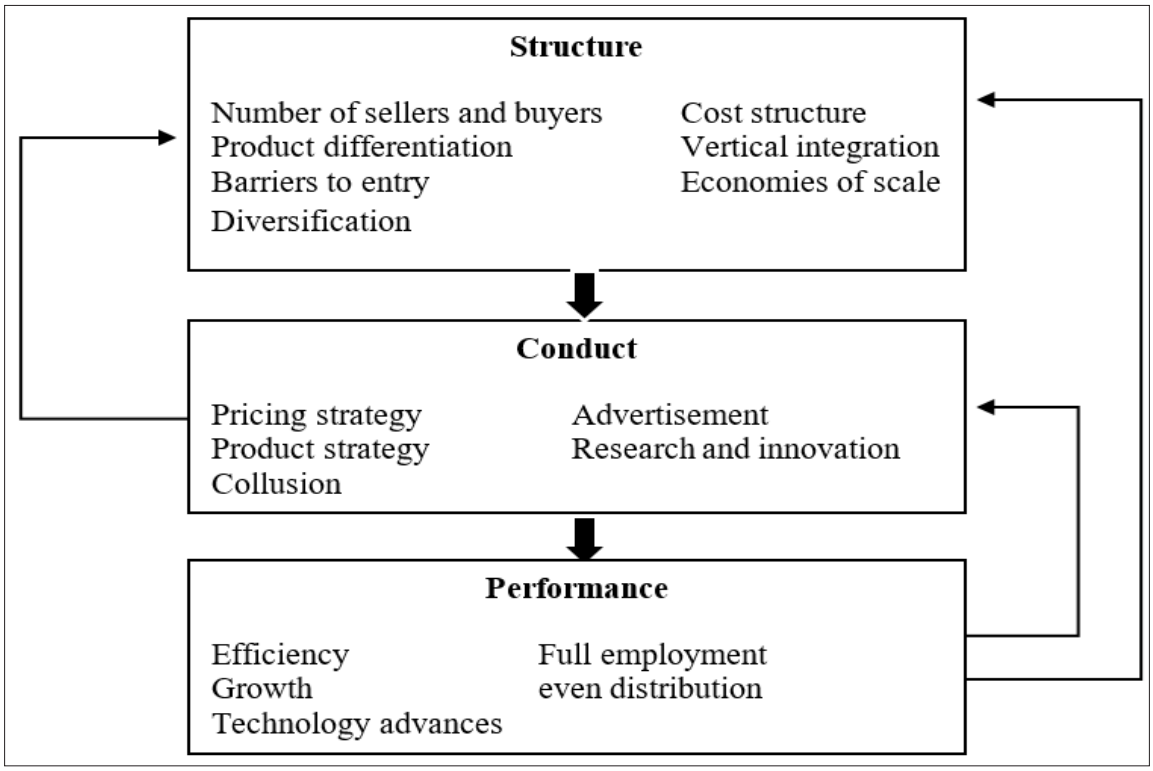

Figure 2. Relationship between Structure, Conduct, and Performance
Source: Hasibuan (1994)

product, the characteristics or types of production costs, the presence or absence of barriers to entry, as well as the relative size and size of each firm's market power. The elements related to the market structure include market share, market concentration, the effectiveness of entry barriers, the breadth of product differentiation, and the extent of vertical integration.

The industry's conduct

Market behavior consists of policies on price competition and product characteristics set by the firm. Market behavior also refers to the actions taken by a firm due to the market structure it is confronted with, such as the pattern of responses and adjustments of firms in an industry to achieve their objectives and compete in the context of selling their product. Firms behave considerably differently from one another, and this distinction is due to differences in industry market structure. According to Martin (1988), the behavior of companies in the industry will be interesting to observe if the company has an imperfect structure. When there is a dominating firm in a market, that firm will typically act as a monopoly, raising prices to increase profits and using price discrimination against all consumers. In an oligopoly market, however, the firm's decision is based on a strategy frequently influenced by its nearest competitors' policies.

The industry's performance

Market performance in an industry is the result of work that is influenced by the structure and behavior of the industry (Hasibuan, 1994). When market performance deviates significantly from the appropriate efficiency benchmark, a market failure occurs, detrimental to all parties involved. Price-cost margin is one of the variables that can be used to examine the performance of an industry. PCM is the most commonly used measure for empirically analyzing performance and competitiveness (Prince & Thurik, 1992). Apart from PCM, alternative performance measurement methods include the ratio of excess profit to sales, the rate of return on assets or capital, and the market value of the company's shares. Meanwhile, activities that affect market performance are also related to firms' research and development (R&D) (not determined by consumers) in an industry, such as product characteristics, product variety, product quality, and product standardization.

One of the concepts in measuring market performance can be seen from its efficiency. Allocation efficiency and internal efficiency are the two types of efficiency. If the output is at marginal cost (MC) equal to price, allocating efficiency can be achieved. Meanwhile, internal efficiency (X-eff) depicts a firm's capability to cut production costs and can be used to assess how well a firm is managed. It also reflects the workers' maximum effort in the firm's operations. This efficiency is measured by comparing each firm's added value and input value in the industry. The types of markets that cover the SCP paradigm within the industrial economy framework are shown in Table 2.

RESEARCH METHOD

This study used the structure-conduct-performance (SCP) approach to examine the market structure and performance of the bottled water industry. The data sources were obtained from the Central Bureau of Statistics of Indonesia (BPS) through the annual surveys of manufacturing industry firms. The data is at the firm level and refers to large and medium industry data. This study used panel data, combining time series and cross-section data from 1990 to 2014, covering approximately 4,763 observational data points. The chosen period for analysis is due to the tractable and comparable data for all periods over the years. During the period covered by the data, there were, on average, 4763 firms in the market. In 1990, the bottled water industry had 111 firms. This number increased to 233 in 2014. Despite this, the number of firms decreased from 228 to 200 in 1999, coinciding with an Asian financial crisis in Indonesia.

$$CR4_j = \sum_{i=1}^{4} s_i \qquad (1)$$

Where indexes the bottled water industry, indexes firm in the industry, and is the market share of firm in the industry. We also used the Hirschman-Herfindahl Index (HHI) to measure the level of competition from firms' dominance of all market shares that can alter the market structure. HHI determines the total of all values on the concentration curve, or the square of the market share of all firms in an industry, as opposed to the concentration ratio (Scherer & Ross, 1990). Equation 2 formulates the HHI model as follows:

$$HHI_j = \sum_{i=1}^{n} s_i^2 \qquad (2)$$

considers both market share inequality and on firm numbers in the industry. The market share of firms is denoted by , while the HHI value ranges from 0 to 1. All players in the market have zero market share if the HHI value is also zero. They are more likely to have the lowest HHI index if plenty of small firms have a small market share. The CR4 and HHI measures are complementary, although each has limitations. Therefore, both concentration measures must be used to identify the industry's market structure precisely. This study also examines the effect of industrial concentration on industrial performance as measured by the price-cost margin (PCM). We used a PCM variable as the dependent variable and a proxy to reflect a firm's ability to raise prices over production costs. This variable is

Table 2. Market Type Based on Owned Characteristics

Characteristic features	Monopoly	Dominant Firm	Oligopoly	Monopolistic Competition	Pure Competition
Key conditions	Have a full market share	Controls 50% to 100% market share without strong competitors	Combined leading firms with market shares ranging from 60% to 100%	There are numerous effective competitors, but none have a market share greater than 10%.	There are over 50 competitors, none of whom have a large market share.
Hirschman-Herfindahl Index (HHI)	HHI= 1000	2500<HHI< 1000	1000<HHI< 1800	1000<HHI< 100	HHI<100
Number of Producers	One	Many	Few	Many	Huge
Entry/exit barrier	Very high	Relatively low	High	Relatively low	Low
Product differentiation	Relatively	Relatively	Relatively	Relatively	No
The power to make decisions	Very powerful	Relatively	Relatively	Few	No
Competition other than price	No	High	High	High	No
Information	Very restricted	Quite open	Restricted	Quite open	Open
Profit	Excessive	Excessive	Quite excessive	Normal	Normal
Efficiency	Deficient	Deficient	Deficient	Quite efficient	Efficient

Source: Pepall et al. (2014)

most commonly used to assess firms' efficiency and competitiveness empirically. The relationship arises because increased industrial concentration may result in increased industrial performance (Bain, 1951; Gupta, 1983; Prince & Thurik, 1992)

Because of the nature of the panel data for this study, which focused on the firm as the individual unit, we used the simple average of firm price-cost margins to capture the central tendency for each year over the analysis period. Equation 3 is a formula for calculating price-cost margin, and it determines PCM value as the difference between market price and the level of

$$PCM = \frac{Value\ added - Total\ wage + \Delta Inventories}{Total\ output + \Delta Inventories} \quad (3)$$

This formula accounts for variations in inventories (), which are essential in light of the changes in the economic cycle of the Indonesian economy from 1990 to 2014. Before computing the PCM value, we also take into account labor efficiency to determine how many goods are produced by workers in a given amount of time. The efficiency of labor value is calculated as the difference between the total value-added and the total wages. Meanwhile, the sales minus intermediate inputs, except the cost of labor salaries, are used to compute value-added.

The capital-output ratio (COR), utilized by Bhattacharya (2002) is used in the model to quantify capital intensity. Since the cost of capital is included in the price-cost margin, it is required to account for differences in capital intensity across firms by using the capital-to-output ratio as an explanatory variable (Gupta, 1983). As given by equation 4, we used COR as an exogenous that can measure industrial concentration.

$$COR = \frac{Share\ of\ capital\ cost}{Share\ of\ total\ output} \quad (4)$$

Meanwhile, we also used growth variables to identify changes in the market's production growth (sometimes seen as a demand for bottled water). The main instrumental variables estimating the industrial concentration are COR and firm size. Although this data is too heterogeneous, this may not affect the estimation's accuracy because these two variables exist only as instruments in the model. Instead, we control the internal efficiency variable) variable to measure a firm's capacity to minimize costs since it can also capture the efficiency of resource allocation and identify a well-managed firm. Equation 5 calculates the level of internal efficiency by dividing the value added by the industry's inputs. The value added is obtained from reducing input costs to the output value. We also consider the intermediate and primary inputs as part of the firm's input value.

$$X - eff = \frac{Value\ added}{Input\ value} \quad (5)$$

Based on the explanation above and referring to Setiawan et al. (2013), the model for estimating the industrial concentration in order to see the simultaneous relationship is as follows:

$$IC_{it} = \alpha_i + \beta_1 APCM_{it} + \beta_2 COR_{it} + \beta_3 growth_{it} + \mu_{it} \quad (6)$$

where is the capital-output ratio, and is the production (or market) growth in period and firms . Additionally, the econometric model of industrial performance-concentration used in this study is as follows:

$$X - eff_{it} = \alpha_i + \beta_1 IC_{it} + \mu_{it} \quad (7)$$

$$APCM_{it} = \gamma_i + \theta_1 IC_{it} + \theta_2 X - eff_{it} + \theta_3 Size_{it} + \theta_4 Growth_{it} + \varepsilon_{it} \quad (8)$$

where $APCM_{it}$ is the average price-cost margin (or a proxy for firm profit). $IC_{it}$is a market concentration which consists of $CR4_{it}$(the four largest firms' concentration ratio) and HHI_{it} (the Herfindahl-Hirschman Index). $X - eff_{it}$ is the firms' internal efficiency. μ and ε are error terms that capture statistical noise. Equations 7 and 8 are estimated using fixed-effects (within) instrumental variables regression since there is a correlation between firm-as-individual effects and other regressors.

RESULTS AND DISCUSSION

Summary Statistics

The descriptive statistic of the variables from 1990 to 2014 is shown in the table below.

Table 5. Summary Statistics of Variables

Variables	Mean	Standard Deviation	Min	Max
Average price-cost margin (APCM)	7.106	27.713	8.180	14.780
Capital-output ratio (COR)	6.804	93.06	0	4.631
CR4	0.513	0.195	0.209	0.779
HHI	0.172	0.129	0.0209	0.460
Internal efficiency	12.050	40,332	2.674	86.274
Market Growth	0.012	0.0654	-0.335	0.557
Firm Size	2.563	0.650	2	4
Industry Size	21.061	0.823	18.675	21.825

Source: Author's calculation, Central Bureau of Statistics of Indonesia.

Table 5 shows the data distribution for each variable in this study, including the mean, standard deviation, minimum value, and maximum value. The data are relatively heterogenous, with relatively high standard deviations. The average CR4 over time is 0.513, which according to Shepherd & Shepherd (2003), indicates the bottled water industry as an oligopoly. Meanwhile, the 0.172 average HHI value suggests that this market structure is slightly concentrated. The average PCM of 7.106 suggests that the industry's players have a positive pricing markup. Capital-output-ratio (COR), internal efficiency, market growth, firm size, and industry size exhibit positive coefficients during the estimating period. However, market growth and COR are heterogeneous due to the economic environment and capital-output applied by firms in the industry, respectively.

The Market Concentration

From 1990 to 2014, there were annual fluctuations in the concentration of the four largest firms in the bottled water industry. However, the trend of these fluctuations tends to decrease during the estimating period. This can be seen in Figure 3.

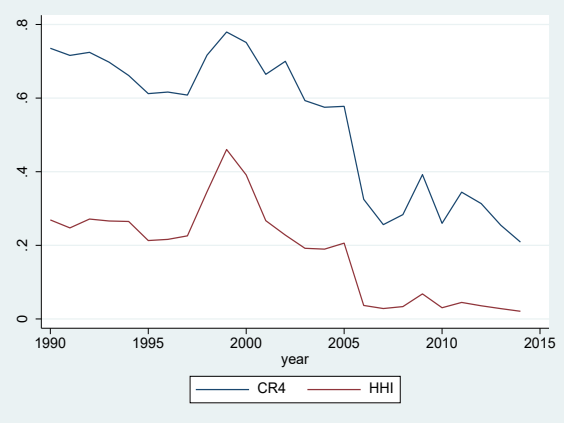

Figure 3. Fluctuations in the Market Concentration of the Bottled Water Industry with CR4 and HHI from 1990-2014

Source: Author's calculation, Stata 17, 2023.

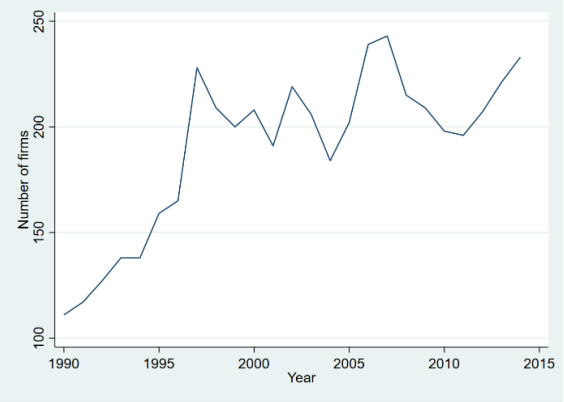

Figure 4. The number of firms in the bottled water industry, 1990-2014

Source: Author's calculation, Stata 17, 2023.

Table 6. Market Structure Based on Industry Concentration

Year	Average CR4 (%)	The collective number of firms	Average PCM	Market Structure
1990-2002	68,71	2210	1.105	Tight Oligopoly
2003-2005	58,20	2802	9.374	Loose Oligopoly
2006-2014	29,31	4763	1.771	Effective Competition

Source: Author's calculation, Central Bureau of Statistics of Indonesia, processed.

Notes: According to equation 1, CR4, which represents the four firms with the largest market shares, is estimated.

From 1990 to 2014, Indonesia's bottled water industry's concentration value has been downward (see Figure 3). Because more firms are entering the market, the concentration value is steadily declining, which means this industry's market share is shrinking. Firms will enter the market if profits exceed the long-run competitive level. As a result of firms' entry, profit will shrink to a long-run competitive level. During the analyzed period, 1999 can be recognized as the year when this industry's concentration increased quite quickly. Meanwhile, as shown in Figure 4, the number of firms entering this industry gradually increases. Fluctuations between these intervals are typically driven by economic cycles, which cause firms to determine whether or not to enter or quit the market. The table below shows how this industry was classified in market structure based on the concentration level during the estimating period.

Table 6 shows that Indonesia's market structure for the bottled water industry from 1990 to 2014 is an oligopoly. Market concentration was high from 1990 to 2002 but gradually declined, especially after 2005, indicating a significant downturn. The average price cost margin is always positive and increased significantly from 1990 to 2005 but began to decline after the global financial crisis. Meanwhile, the market structure in the industry between 2006 and 2014 can be categorized as effective competition. This is a result of an increase in the number of new firms. Previous research has suggested the importance of effective competition, implying that firms will not be able to regulate competitive markets effectively and that the results provided by effectively competitive markets are worth trying to imitate in markets that do not satisfy effective competition. Effectively competitive markets provide a benchmark for regulators to seek to achieve the characteristics and outcomes of an effectively competitive market (Shogren et al., 2004). Therefore, regulators can anticipate that the adequate drinking water and mineral water sector will create standards that must be followed.

Sargan Test

The assumption test is the most critical part of parametric and nonparametric regression methods. The study's assumptions require identical independence and normally distributed data. We employ the Sargan test to get around the study model's inconsistency. The independent residual value in the Arellano-Bond test for panel regression indicates that autocorrelation may not occur in the second-order first-difference error (Damaliana & Setiawan, 2016). Table 7 shows that this model is consistent because the Sargan test value is $0.6484 < \alpha$.

Table 7. Sargan Test Results

Order	z	Prob > z
1	-2.1732	0.0298
2	0.45598	0.6484
: *no autocorrelation*		

Notes: The null hypothesis suggested that the residual data in the second order is independent (no autocorrelation occurs). Meanwhile, the alternative hypothesis states that the residual data is not independent in the second order (autocorrelation occurs)

Estimation Results

In order to analyze this study, two econometric models are used, as described in equations (7) and (8). The simultaneous correlations were observed using an industrial concentration estimating model as in equation (1). Due to the endogeneity problem with the industrial

concentration variables HHI and CR4, this study employs an estimating strategy using instrumental variables (IV). A similar problem can be seen in Waterson (2003), where endogeneity causes the biased estimation of the correlation between industry concentration and price-cost margin. Thus, we used the instrumental variables COR (capital-output-ratio) and firm size to overcome endogeneity.

According to the SY rule, the instrument variable has a simultaneous test value of 18.20, as indicated in table 8, making it a strong candidate for IV. If the instrument variable has an f-statistic value greater than 10, it is considered to be a not weak instrument (Stock & Yogo, 2003). The following table shows the results:

Table 8. Instrument Variable Accuracy Detection

F (2, 4530)	**Prob > F**
907.71	0.000

Regression estimation uses fixed effect because we assume that the unobserved effect has a functional relationship with the independent variable. The results of the regression estimation are as follows:

Table 9. Hausman's (1978) specification test

Coefficients		
Equation 6 with *CR4*	Chi-square test value	12.25
	P-value	0.002
Equation 6 with *HHI*	Chi-square test value	18.36
	P-value	0.000
Equation 7 with *CR4*	Chi-square test value	5.99
	P-value	0.014
Equation 7 with *HHI*	Chi-square test value	6.30
	P-value	0.012
Equation 8 with *CR4*	Chi-square test value	39.81
	P-value	0.000
Equation 8 with *HHI*	Chi-square test value	18.36
	P-value	0.000

Source: Authors' calculations

Notes: The null hypothesis of the Hausman test is that the fixed-effects model is appropriate, and its acceptance signifies that the appropriate model for the sample panel data is a fixed-effects model.

Table 10. Regression results on the relationship between internal efficiency, price-cost margin, and industrial concentration using fixed-effects (within) IV regression.

Independent variable	**Dependent variable: *X_eff***	
	Coefficients	**Coefficients**
CR4	-48.792***	
	(11.418)	
HHI		-12.999***
		(31.854)
Constant	37.778***	35.349***
	(5.911)	(5.597)
Observations	4,533	4,533
R-squared	0.0802	0.1123
Number of psid	611	611

According to table 9, the fixed-effects model is used because the random effects specification was rejected by the Hausman test (see Hausman, 1978). Meanwhile, table 10 shows the estimation results of Equations 6,7, and 8, which are estimated using a fixed-effects model within instrumental variable regression. We found that market concentration negatively affects firms' internal efficiency with a coefficient of -48.792 and -12.999 for the model with CR4 and HHI measures and significance at a 1 percent critical level. The coefficients indicate that market concentration raises internal inefficiency in the bottled water industry. The findings confirm the quiet-life hypothesis, which posits that firms in a highly concentrated industry have high market power and will create high profits quietly, with no pressure to increase their efficiency. Higher market power, resulting from the limited competition (or low barriers to entry) as indicated by a high PCM, might eventually cause firms without incentive or competitive pressure to be more efficient (Setiawan, 2019). In other words, firms in an industry with high internal efficiency can increase their capacity to reduce costs at the minimum level. Meanwhile, table 9 indicates a simultaneous relationship between market concentration, internal efficiency, and price-cost margin, with all SCP variables significantly

affecting each other (at the minimum of 1 percent critical level). Market concentration has a significant effect on the average price-cost margin.

The CR4 coefficient of 49.656 indicates that the PCM will rise by 49.646 percent following a 1 percent increase in market concentration. Additionally, the HHI coefficient of 67.253 shows that the PCM will rise by 67.253 units for every 1-unit increase in HHI. This PCM value can also be considered a firm's industry profits. Therefore, the findings indicate that firms in the bottled water industry benefit from the oligopoly market structure. It also reveals that the likelihood of a firm engaging in imperfect competition increases as market concentration value climbs. Furthermore, there is a two-way correlation between market concentration and price-cost margin, with market concentration positively affecting price-cost margin and price-cost margin affecting market concentration positively. The same is found where high internal efficiency leads to a significantly higher price-cost margin. This result supports the efficient-structure hypothesis proposed by Demsetz (1973), which states that a firm with a low-cost structure (high-cost minimization capabilities) can enhance profits by lowering prices and increasing market share. As a result of the gains in market share obtained by more efficient firms, there may be a positive relationship between firm profitability and market structure in the bottled water industry. Therefore, the more efficient a firm is, the greater the profits that will be obtained.

Industry size has a significant positive effect on the average price-cost margin with a coefficient of 4.832 (modeled by CR4) and 3.185 (modeled with HHI) at the 1 percent critical level. The results suggest that a larger industry size allows firms to invest more money and more considerable capital in their workers in order to have more production capacities to create profits. Although market growth has a positive and significant effect on price-cost margin only in the CR4 model, this growth corresponds to a significant rise in market concentration at a critical level of 1 percent. This suggests that market growth might positively affect price-cost margins through larger sales channels in a concentrated industry. In contrast, the capital-output ratio does not influence market concentration. Additionally, the models' R-Squared (R2), or the coefficient of determination for equation 8, obtained from the estimation results, has a value above 0.85 percent. This indicates that the independent variables (CR4, HHI, Size, Growth, and X-eff) may account for approximately above 85 percent of the variation in the average price-cost margin, while other variables outside the model explain the remaining 15 percent.

Discussion

The results showed that market concentration had a significant effect on the price-cost margin in the bottled water industry. This evidence confirms the findings of Zeller (1989), Kalirajan (1993), Go et al. (1999) Delorme et al. (2002) and Mishra (2008), which also found a positive effect of market concentration on PCM. A low market concentration means that the industry is more competitive. Meanwhile, a high market concentration suggests that several firms control the market, making it more concentrated. Market concentration is expected to increase the price-cost margin because few firms in a concentrated industry might utilize their market power to influence price and quantity (Setiawan et al., 2013). Therefore, market concentration increases the industry's sales intensity, which correlates with higher PCM. The degree of the firm's price-cost margin can also represent the level of the firm's market entry and exit (Hackl et al., 2014). This finding backs up the idea that unfair business practices will increase when firms compete to raise prices above the cost of production. Many firms in this industry competed in a market with only a few big players.

The form of the market, which specific firms dominate, indicates that profits depend on other business actors in the market. Business actors with market dominance can influence market pricing. Prices in a tight oligopoly market depend on the behavioral strategies used by other business actors, so actors then attract each other's market share to gain greater profits through selling prices (Nabila & Firmansyah,

Independent variable	Dependent variable: *APCM*		Dependent variable: *CR4*	Dependent variable: *HHI*
	Coefficients	Coefficients	Coefficients	Coefficients
CR4	49.656**			
	(19.550)			
HHI		67.253***		
		(25.933)		
X_eff	0.591***	0.591***		
	(0.008)	(0.008)		
Size	4.832***	3.185***		
	(1.569)	(0.934)		
APCM			8.00e-09	2.25e-08
			(1.40e-07)	(9.96e-08)
COR			-0.0000373	-0.00002
			(2.74e-05)	(1.96e-05)
Growth	8.605**	5.379	0.084**	0.110***
	(3.615)	(4.274)	(0.039)	(0.0278)
Constant	-12.740***	-78.944***	0.509***	0.172***
	(42.882)	(23.913)	(0.002)	(0.001)
Observations	3,866	3,866	3,866	3,866
R-squared	0.8756	0.8864	0.002	0.005
Number of psid	538	538	538	538

Source: Regression results, Central Bureau of Statistics of Indonesia, processed

Notes: Standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

2021). This reduces the level of profitability as the market share value increases. Another piece of evidence found in this study is that the market structure of the bottled water industry shifted to a loose oligopoly between 2003 and 2005. This change is likely because industry competition is shifting toward strategies that make products such as mineral water, demineralized water, natural mineral water, and dew drinking water stand out in the concentrated market. These innovations can change the bottled water business's landscape, making it hard for other firms to enter the market (barrier to entry). Product differentiation strategies, however, are not always effective in every industry due to the difficulty of changing customer perception. Many customers consider the product comparable to lower-cost alternatives available in the market.

Meanwhile, one of the things that can become an obstacle to market entry is the presence of the largest firms that have existed in the industrial environment (Kadir et al., 2020). The change in the bottled water industry's map from a tight oligopoly to a loose oligopoly indicates that the firm's market share, with the largest percentage of the industry's total output, is going up. A high market share can be a barrier to new competitors entering an industry's market. Furthermore, the market structure of the bottled water industry has shifted to effective competition from 2006 to 2014. Effective competition can also be interpreted as an industry working competitively where the market's structural characteristics have dynamic strengths that do not result in more significant losses or social benefits (Markham, 1950). Fair market competition in an industry is a big part of making sure that there is effective

competition. The prerequisites for effective competition in restructured markets like the bottled water industry are determined by several factors, such as price deregulation, sufficient transmission capacity, and no excessive post-reform government intervention (Haas & Auer, 2006).

In terms of regulation, the Indonesian bottled water industry has undergone several regulatory improvements. The shift in the market structure of this industry toward more competitive competition cannot be separated from the role of supervising business competition through Law Number 5 of 1999 (UU No.5 of 1999) concerning the Prohibition of Monopolistic Practices and Unfair Business Competition, as well as the existence of a Supervisory Commission Business Competition (KPPU) in Indonesia. Based on this regulation, any imperfect competition in the industry that can hurt consumers, such as market players controlling prices without lowering their consumers, can be mitigated. Another regulation is stated in the Decree of the Minister of Industry and Trade No. 705/MPP/Kep/11/2003 about regulations for reusable bottled water, which the brand firm can only refill. This regulation was enacted since bottled water firms lost money because many had invested their funds in the brand's packaging. In addition, regulations related to Indonesian National Standard (SNI) certification, as contained in Minister of Industry Regulation No. 78 of 2016, were also worked out by the government for the bottled water industry as one of the requirements for distribution permits. Furthermore, bottled water firms must follow the standards for safe raw materials, production process sessions, and packaging control to retain competitive effectiveness in the market.

CONCLUSION AND RECOMMENDATION

Using the structure-conduct-performance approach, this study investigated the nature of the bottled water industry in Indonesia. It has also examined the link between industrial concentration and PCM. The market structure of the bottled water industry in Indonesia from 1990 to 2002 is known by using the concentration ratio of the four largest firms, which are tight oligopolies. From 2003 to 2005, the market structure was a loose oligopoly, and from 2006 to 2014, it was an industry with a market structure that fostered effective competition. However, there was a downward trend in the concentration of the four largest firms in the industry during the estimated period. The results show that market concentration has been found to have a negative effect on firms' internal efficiency. The average price-cost margin is positively and significantly affected by the concentration of the four largest firms (CR4).

This study confirms the quiet-life hypothesis, which holds that firms in a highly concentrated industry have high market power and will generate high profits quietly, with no pressure to improve efficiency. The competition law and regulations for reusable bottled water have been considerably more successful in decreasing PCM in the market with substantial industrial concentration. From the market performance, it was found that internal efficiency and market growth have a positive and significant effect on the growth in the average price-cost margin. This finding also supports the efficient-structure hypothesis, which states that a firm with a low-cost structure can increase profits by lowering prices and increasing market share. Meanwhile, industry size has a significant positive effect on the average price-cost margin due to the possibility of a sizeable capital investment by firms in the market. The government's evaluation of this industry's transition to new market structures must be applied to other sectors mired in imperfect competition (oligopoly). Additionally, firms experiencing positive growth must maintain their internal efficiency because higher levels of efficiency will enable them to lower production costs, maximize profits and demonstrate sustainable growth.

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APPENDICES

Appendix 1

Gross domestic product (GDP) in constant prices year 2000 in Indonesia.

Business field	GDP (Billion Rp)							
	2007	2008	2009	2010	2011	2012	2013	2014
Food, Drinks and Tobacco	**136722.4**	**139921.9**	**155620.2**	**159947.2**	**174566.7**	**187787**	**194063**	**208105.4**
Textiles, Leather Goods and Footwear	52922.5	50994	51299.9	52206.2	56131.1	58527.1	62076.7	63536.2
Wood Goods & Other Forest Products	19657.6	20335.8	20055	19359.7	19427.4	18817.8	19980.8	21446.3
Paper and Printed Goods	25861	25477.2	27092.4	27544.7	27930.3	26603.5	27786.1	29494.6
Fertilizers, Chemicals & Rubber Products	65470	68389.6	69514.2	72782	75657.5	83598.2	85449.3	86530.8
Cement & Non-Metal Minerals	16233.3	15990.7	15908.9	16255.6	17424.1	18783.4	19346.5	19640.3
Base Metals Iron & Steel	8213.3	8044.7	7702	7885.6	8915.2	9437.4	10091.1	10515.8
Transport Equipment, Machinery, and Equipment	161375.6	177178.3	172085.1	189947.9	202892	217152.1	240031.6	254564.1
Other items	3805.9	3769.5	3889.9	4006.7	4079.8	4033.5	4005.3	4362.3

Source: Central Bureau of Statistics of Indonesia (2014).