CLUSTER ANALYSIS FOR BANK GROUPING BASED ON FINANCIAL STATEMENT

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Abstract

Grouping the company especially bank was important to comparing banks performance. In Indonesia, the initial banking grouping was based on BUKU (Commercial Banks based on Business Activities) and currently a grouping has been developed according to KBMI (Bank Groups Based on Core Capital). The purpose of this study is to grouping bank in Indonesia based on financial statement performance using common size analysis, to find the financial statement structure for each cluster and compare the results of the grouping by clustering with the KBMI method. Grouping was done using the cluster method on the financial statements of bank in Indonesia. The variables used for this study are common size in the balance sheet and income statement. The number of banks in this study were 42 commercial banks listed on the Indonesia Stock Exchange with asset values above 1 trillion rupiah. Using financial report data in 2020, clustering is carried out into 4 groups according to the KBMI grouping. The results showed that there were 23 banks in cluster 1, 1 bank in cluster 2, 2 banks in cluster 3 and 16 banks in cluster 4. The characteristics for each cluster have different banking strategies in terms of credit policy, deposit value and capital value. Another characteristic is cost-to-profit performance. The grouping results are significantly different from the grouping based on KBMI, where not every bank with good core capital will have better performance.

Keywords: Clustering, Bank, Common Size

Introduction

Bank grouping is done as part of measuring the performance and analysis of banking risk. Bank grouping makes it easier to evaluate financial policies and asset management carried out by banks. Bank grouping has been the focus of previous research with various clustering schemes. In August 2021, the OJK (Financial Services Authority) officially changed the banking grouping, previously based on BUKU (business activity commercial banks) to KBMI (Bank Group based on Core

Capital) [1] BUKU-based banking groupings are categorized into four categories, namely BUKU 1 for a group of banks having this capital under Rp. 1 trillion, BUKU II for banking with a capital of Rp. 1-5 trillion, Book III bank with a capital value of Rp. 5-30 trillion and BUKU IV for banks with core capital of more than Rp. 30 trillion (OJK, 2021). Meanwhile, based on KBMI, banks are grouped into KBMI 1 for banks with a core capital of up to Rp. 6 trillion, KBMI 2 for banks with initial capital of Rp. 6-14 Trillion, KBMI 3 for banks with core capital of Rp. 14-70 trillion and KBMI 4 for banks with a core capital of more than Rp. 70 trillion. The substance of this grouping was carried out as a form of adjustment because initially the need was in line with global changes in banking conditions, mainly based on changes in information technology. On fluctuations in core capital owned by banks.

This study tries to grouping banks in Indonesia with a different approach. Where the grouping of banks is not only seen from the side of core capital ownership but can also be seen from the analysis of the financial performance. In this study, all common size variables are used which are measures of financial statement performance analysis in the form of percentages derived from the balance sheet and income statement. Cluster analysis is used as a grouping method by considering all common size variables. The number of clusters is adjusted to the KBMI grouping, which is 4 clusters to be able to see the comparison of the grouping results. Clustering is carried out on banks that have met the requirements for classifying the KBMI in the Commercial Bank category as many as 42 banks, the data used are financial report data at the end of 2020.

The use of the common size variable as an analytical tool for measuring financial performance in banking or finance has been commonly used in several previous studies including [2], [3]analyzing the financial performance of Mandiri Syariah Banks by comparing financial data using common size analysis. Sathyamoorthi evaluated the financial performance of savings and loan cooperatives in Botswana [4, 5]. Rininda conducted a common size analysis in South Kalimantan banks to see financial performance in the income statement. Using a common size variable to perform the analysis provides more valid data because it considers all sides of the financial statements. Included in the financial grouping which is usually only measured by the amount of capital, income, or the value of banking assets. This study uses the cluster method to group based on the similarity of the characteristics or the closeness of the values of each common size variable [6]

The application of the cluster method as a grouping tool has been widely carried out in previous studies using financial statement ratios. Kurniawati clustered manufacturing companies listed on the Indonesia Stock Exchange based on 2006 financial statements [7]. Arumawadu conducted clustering research using profitability ratio data using the K-means cluster method in a telecommunications company in Sri Lanka[8]. Fodor conducted a clustering of companies in small palm oil processing industries in Ghana considering the profit value [9]. As for grouping using common size variables, among others, [9] conducted research on grouping listed companies in the United States using common size. The results of the cluster show that the groups formed in clusters are different from the grouping based on the type of industry, the results of grouping the characteristics of the financial statements are closer to the actual conditions and the information provided by the clustering results is more accurate [9].

Grouping the application of specific cluster methods in banking companies, including Salina (2020) uses 15 financial ratios for clustering, which can be used as a reference as an early warning about bank health [10, 11]. Cyree using 33 common size variables in financial statements for the clustering process at Banks in America, the results of this study were grouped into several clusters which have similarities in loan types, differences in funding and management strategies. The purpose of this study is to group banks listed on the IDX considering the value (common size) of financial statements in 2020 using the cluster method. This research was conducted

as part of the adoption of research [12]and [9] which made the common size variable as the basis for clustering. After conducting clusters, it is possible to identify banking characteristics in each cluster, then the results of the clusters can be compared with grouping based on KBMI. To achieve these objectives, this research is organized into five parts, namely introduction, literature review, materials and method, results and discussions, and conclusions.

Literature Review

In this session will explain about the concept and research before about common size analysis, bank grouping, clustering for grouping and common size variable for clustering.

Common Size Analysis

According to [13, 14] Common Size is the comparison of any changes in items with total assets or total liabilities or total sales. Thus it will be seen an increase or decrease whether it will be meaningful or have a certain meaning. In the common size report, all accounts are expressed as a percentage and the monetary amount is not shown. In financial statements, common size (reports of the same size) is because the total number of accounts in the group concerned is 100% [13]

Common Size analysis is analysis of the percentage per component (common size) is a financial statement analysis technique by analyzing the components in the financial statements, both on the balance sheet and income statement [13]. Meanwhile, according to Jumingan analysis of the percentage per component (Common Size) is an analytical technique to determine the percentage of investment in each asset to the total assets of all. Also to find out how big is the proportion of each asset and debt item to the total assets and debts [4]

Several previous studies focused on the analysis of the performance of banking or financial companies using common size analysis. [2]conducted an analysis of the financial performance of Islamic banks where Mandiri Syariah Banks were used as an example of analysis in 2013, the results of the study showed that the performance in 2013 was less than optimal [2]. [3]conducted a study using Common Size analysis to find out the comparison of the financial performance of Bank Syariah Mandiri before (2013-2015) and after (2016-2018), with a testing scheme using a difference test. The results showed that there were several performance components that were significantly different, including from the assets and profit and loss [13, 15]. Sathyamoorthi evaluates the financial performance of savings and loan cooperatives in Botswana using the 2008-2012 financial statements with common size analysis techniques, the results of the study show that there is a significant increase in income by balancing the balance of loan interest and deposit interest and increasing investment [4].

Cluster Analysis

[16] Cluster analysis is a method of grouping objects that have close/similar characteristics. The purpose of cluster analysis is to explore data, data reduction, hypothesis testing and prediction based on groups. Another goal of cluster analysis is to find subsets of the variables that have the highest correlation, so that these variables can describe the subsets without losing important information. Cluster analysis also aims to partition students into more homogeneous groups. Cluster analysis as a tool for data mining is a method for finding hidden information in data. K-Means Cluster is a non-hierarchical cluster method used to group large data. The grouping process with K-means is determine the number of clusters and determine the average of each cluster, calculate the average distance (centroid), repeat until

the closest grouping is found. Methods to measure proximity include using the Euclidean distance

Company Grouping Cluster using Financial Statement

Several previous studies focused on clustering using the cluster method to measure company performance based on financial ratios and/or financial statement, including [8] conducting clustering research using profitability ratio data using the K-means cluster method in telecommunications companies in Sri Lanka. The results showed that the telecommunications companies were grouped into three industrial clusters. [16] Kurniawati clustered manufacturing companies listed on the Indonesia Stock Exchange based on the 2006 financial statements. Thus, a comparative analysis of the average value of financial ratios for each cluster was carried out from the point of view of user interests. Gyampo conducted a clustering of companies in a small palm oil processing industry in Ghana. The results of the cluster analysis in the study categorize oil processing companies into three categories, namely companies that depend on suppliers (cluster 1), companies that control the market (cluster 2) and companies that rely on transportation and infrastructure (cluster 3). Oil refiners in cluster 3 show a higher profit value [17]. Fodor conducted a study on the grouping of listed companies in the United States using the general size of the financial statements, the percentage of the value contained in the balance sheet and income statement of the company. Previously the grouping of companies was based on the type of company industry. The results of the cluster show that the groups formed in clusters are different from the grouping based on the type of industry, the results of the clustering characteristically of the financial statements are closer to the actual conditions and the information provided by the clustering results from the cluster analysis [9].

Bank Grouping Cluster with Common Size Variable

The previous research grouped the application of specific cluster methods in banking companies. Salina uses the cluster method to assess the banking structure in Kazakhstan, using 15 financial ratios, the cluster results are able to show a value that can be used as a reference as an early warning about bank health, if the bank's ratio value changes [18]. Another research using cluster for grouping is Cyree, clustered banks registered in the Federal Financial Institutions Examination Council (FFIEC) database, as many as 6444 banks in America. By using 33 financial statement size variables and considering financial ratios (ROA, NIM), classifying banks into 10 clusters where in these 10 clusters the average financial size, financial ratios and other characteristics can be known [18].

Banks Grouping in Indonesia

Based on the regulation of the Financial Services Authority Number 12/POJK.03/2021 concerning Commercial Banks CHAPTER XVI BANKS GROUPING (OJK, 2021) Article 147

(1) Based on the Core Capital owned, banks are grouped into 4 (four) KBMI:

a. KBMI 1 is a bank with Core Capital up to Rp.6,000,000,000,000.00 (six trillion rupiah);

b. KBMI 2 is a bank with a Core Capital of more than IDR 6,000,000,000,000.00 (six trillion rupiah) up to IDR 14,000,000,000,000.00 (fourteen trillion rupiah);

c. KBMI 3 is a bank with a Core Capital of more than Rp.14,000,000,000,000.00 (fourteen trillion rupiah) up to Rp.70,000,000,000,000.00 (seventy trillion rupiah); and

d. KBMI 4 is a bank with a Core Capital of more than Rp70, 000,000,000,000.00 (seventy trillion rupiah).

(2) The grouping of banks based on Core Capital owned into 4 (four) KBMI as referred to in paragraph (1) applies to Bank BHI, KCBLN, commercial banks that carry out business activities according to sharia, and sharia business units of Banks as referred to in the Act. Regarding Islamic banking.

(3) KBMI for the sharia business unit of the Bank is based on the Core Capital of the Bank that is the parent.

Materials and Method

The data in this study is data on the financial statements of commercial banks listed on the IDX for the end of 2020. The commercial banks that are the object of research are banks that meet the minimum criteria of KBMI, which have a core capital of at least 1 trillion Rupiah, as many as 42 companies. Table 1 shows the grouping of 42 banks as research sample that are the object of research according to KBMI.

Table 1

Research Sample

KBMI	Code	Bank Name	KBMI	Code	Bank Name
KBMI 1	AGRO	Bank Rakyat Indonesia Agroniag	KBMI 2	ARTO	Bank Jago Tbk.
	AGRS	Bank IBK Indonesia Tbk.		BBKP	Bank KB Bukopin Tbk.
	AMAR	Bank Amar Indonesia Tbk.		BJBR	Bank Pembangunan Daerah Jawa B
	BABP	Bank MNC Internasional Tbk.		BJTM	Bank Pembangunan Daerah Jawa T
	BACA	Bank Capital Indonesia Tbk.		BSIM	Bank Sinarmas Tbk.
	BBHI	Allo Bank Indonesia Tbk.		MAYA	Bank Mayapada Internasional Tb
	BBMD	Bank Mestika Dharma Tbk.		MCOR	Bank China Construction Bank I
	BBSI	Bank Bisnis Internasional Tbk.		SDRA	Bank Woori Saudara Indonesia 1
	BBYB	Bank Neo Commerce Tbk.	KBMI 3	BBTN	Bank Tabungan Negara (Persero)
	BCIC	Bank JTrust Indonesia Tbk.		BNII	Bank Maybank Indonesia Tbk.
	BGTG	Bank Ganesha Tbk.		BTPN	Bank BTPN Tbk.
	BINA	Bank Ina Perdana Tbk.		MEGA	Bank Mega Tbk.
	BKSW	Bank QNB Indonesia Tbk.		NISP	Bank OCBC NISP Tbk.
	BMAS	Bank Maspion Indonesia Tbk.		BDMN	Bank Danamon Indonesia Tbk.
	BNBA	Bank Bumi Arta Tbk.		BNGA	Bank CIMB Niaga Tbk.
	BSWD	Bank Of India Indonesia Tbk.		BNLI	Bank Permata Tbk.
	BVIC	Bank Victoria International Tb		PNBN	Bank Pan Indonesia Tbk
	DNAR	Bank Oke Indonesia Tbk.	KBMI 4	BBCA	Bank Central Asia Tbk.
	INPC	Bank Artha Graha Internasional		BBNI	Bank Negara Indonesia (Persero
	MASB	Bank Multiarta Sentosa Tbk.		BBRI	Bank Rakyat Indonesia (Persero
	NOBU	Bank Nationalnobu Tbk.		BMRI	Bank Mandiri (Persero) Tbk.

Research Method

In this study, the data analysis technique used is quantitative data analysis, namely analyzing through quantitative data measurement in the form of numbers with statistical methods. The analytical method used for the clustering of Banking Clusters is cluster analysis. The test will be carried out through the stages of descriptive statistical analysis, and cluster analysis. Descriptive statistics are used to describe statistical measures for each research variable. The measurements used in this study include the size of the concentration in the form of the mean (mean), the size of the location in the form of quartile 1, median and quartile 3 values and the size of the spread in the form of standard deviation values. Descriptive statistics show a summary of the data to be analyzed.

Research Variable

The Common Size variable that is used as the basis for clustering comes from the balance sheet and income statement. To perform the grouping used variables in the balance sheet (assets, debt and capital) whose data is obtained from the normalized quotient of the value of the total assets. Variables in the income statement data are obtained from the results of the normalization of data by total income. Descriptive statistics for the variables used as the basis for grouping are shown in table 2.

The statistical descriptive value in table 2 shows that the average asset from 42 data banks is in the form of loans, worth 56.75% of total assets but the variation value is quite high with stdev 0.11, from descriptive statistics it is known that there are banks that provide loans worth 78.87% of the total assets. As for the debt side, the largest bank debt is due to savings deposits from customers worth 44.69%. The value of the variation in equity owned by banks is quite varied, there are banks that take quite a high risk because the value of equity owned is only 5.53% of total assets, but there are banks that have a fairly high equity value of 70.01%.

Table 2

Descriptive Statistics Research Variable

Variable	Mean	Median	Std. Deviation	Minimum	Maximum	Quartile		
						1	2	3
Asset								
Cash	0,1277	0,1199	0,0655	0,0414	0,4237	0,0934	0,1199	0,1469
Security	0,1258	0,1144	0,0810	0,0119	0,4099	0,0609	0,1144	0,1772
Loan	0,5675	0,5821	0,1144	0,3183	0,7887	0,4928	0,5821	0,6556
Fixed Asset	0,0374	0,0311	0,0248	0,0046	0,1276	0,0221	0,0311	0,0450
Other Asset	0,0936	0,0683	0,0799	0,0140	0,3871	0,0400	0,0683	0,1260
Liability								
Current account	0,1274	0,1123	0,0788	0,0058	0,2960	0,0653	0,1123	0,2000
Saving	0,1275	0,0998	0,0953	0,0110	0,3911	0,0513	0,0998	0,2158
Deposit	0,4469	0,4404	0,1354	0,1823	0,6877	0,3511	0,4404	0,5636
Other liability	0,0195	0,0170	0,0106	0,0067	0,0650	0,0122	0,0170	0,0240
Equity								
Equity	0,1873	0,1464	0,1211	0,0553	0,7001	0,1249	0,1464	0,2119
Income Statement								
Interest Income	0,8546	0,8626	0,0745	0,6497	0,9789	0,7949	0,8626	0,9117
Interest Expense	0,4561	0,4351	0,1730	0,1355	0,8954	0,3161	0,4351	0,5629
Other Income	0,1454	0,1375	0,0745	0,0211	0,3503	0,0883	0,1375	0,2051
Other Expense	0,5281	0,4571	0,3850	0,2102	2,7421	0,3566	0,4571	0,5490

Earning Before tax	0,0158	0,0794	0,3873	-2,0184	0,4649	0,0218	0,0794	0,1805

Result and Discussions

Clustering Results using Common Size Variable

The number of clusters formed is 4 clusters according to the grouping of the results of the KBMI, table 3 shows the results of the clustering calculation of 15 common size variables in the financial statements. In table 3, it is known that cluster 1 has 23 banks, cluster 2 has 1 bank, cluster 3 has 2 banks and cluster 4 has 16 banks. Due to the unique characteristics of a bank in cluster 2, there is only 1 bank whose characteristics do not approach the characteristics of other banks.

Table 3

Clustering Average Result

Cluster	Frequency	RMS standard Deviation	Maximum Distance	Nearest Cluster	Distance between centroid
1	23	0.1451	0.7700	4	1.402
2	1	0	0.000	3	3.216
3	2	0.6610	0.661	1	1.568
4	16	0.1818	0.879	1	1.335

Table 4 shows the average for each variable in each cluster. In value, significant differences between clusters are shown in the variables of cash ownership, securities, other asset values, current accounts, savings, time deposits, equity, interest expense, expenses and other income. Statistical descriptive for each Variable based on cluster is shown in table 4. Additional information on financial performance for each cluster is in terms of total asset value, total liabilities, total equity, profit and loss and credit score as well as ratio analysis showing financial performance including Return on Assets (ROA), Return on Equity (ROE), Net Interest Margin (NIM), Operating Expenses to Operating Income (BOPO), Cost to Income Ratio (CIR), Loan to Deposit Ratio (LDR) are shown in table 5. The performance ratio is not used as a variable in clustering.

Cluster 1: the main characteristic that is dominant in cluster 1 is that the credit value given is balanced with the value of deposits invested by customers, the capital owned by Cluster 1 tends to be smaller than the value of debt, in terms of risk, and banks in cluster 1 are banks with a high level of risk. This is quite high, it is also supported by the high value of operating expenses, which is 55% of total revenue. In terms of financial performance, banks in this cluster have good performance with a profit of 5.9% of total revenue. In terms of asset ownership, banks in this category are banks that have an average asset of Rp. 67 trillion. Investments in banks with this cluster have a fairly large profit opportunity, which is worth 2.23%.

Table 4

Average for Variable per Cluster

Variable	Cluster			
	1	2	3	4
Asset				
Cash	0,1100	0,2053	0,0800	0,1543
Security	0,1165	0,0631	0,2713	0,1249
Loan	0,5671	0,4165	0,5700	0,5772
Fixed Asset	0,0361	0,0697	0,0858	0,0312
Other Asset	0,1035	0,1796	0,0189	0,0834
Liability				
Current account	0,1131	0,0839	0,0385	0,1619
Saving	0,0901	0,0165	0,1349	0,1874
Deposit	0,5339	0,2685	0,3189	0,3489
Other liability	0,0162	0,0650	0,0144	0,0219
Equity				
Equity	0,1519	0,5653	0,4916	0,1766
Income Statement				
Interest Income	0,8582	0,9789	0,9215	0,8332
Interest Expense	0,5502	0,2763	0,2900	0,3529
Other Income	0,1418	0,0211	0,0785	0,1668
Other Expense	0,3906	2,7421	0,3140	0,6141
Earning Before tax	0,0592	-2,0184	0,3960	0,0330

Cluster 2: the main characteristic that is dominant in cluster 2 is the value of stability from the cash side, this is in line with the capital value which is quite high 56% of total assets but in terms of the company's financial statements, the company suffers significant losses due to other expenses which are quite high which is usually due to labor costs. Employment and promotion costs. This usually happens to newly established companies, this can be seen from the small deposits made by customers so that a lot of capital comes from personal finance. In terms of asset ownership, the company has assets under Rp.3 trillion.

Table 5

Financial Performance per Cluster

Financial Performance	Cluster			
	1	2	3	4
Member	23	1	2	16
(Million)				
Total Asset	67.272.673	2.179.873	7.800.495	348.107.282
Total Liabilities	58.342.226	947.540	5.291.372	296.557.710
Total Equites	8.930.447	1.232.333	2.509.123	51.549.572
EBIT	737.108	- 189.567	232.546	5.415.067
Total Loan	40.536.231	907.956	4.053.082	207.440.448
				(percent)
Return on Asset (ROA)	0,59	-11,27	3,66	0,55
Return on Equity (ROE)	2,23	-18,03	7,65	1,51
Net Interest Margin (NIM)	2,88	4,74	6,88	4,99
Operational Cost on Operational Ratio (BOPO)	89,76	261,10	60,43	96,38
Cost to Income Ratio (CIR)	83,10	357,40	19,93	64,73
Loan to Deposit Ratio (LDR)	76,03	111,07	146,98	83,62
Member	MAYA BBTN SDRA	ARTO	BBSI	BSIM AMAR

	BVIC BKSW PNBN		BBMD	BBNI BGTG
	BMAS BNBA BTPN			BDMN NOBU
	BBYB MCOR MEGA			BNGA AGRS
	AGRO BBHI BCIC			BNLI BJTM
	BABP BJBR BACA			BBRI DNAR
	INPC MASB NISP			BNII BBCA
	BSWD BINA			BMRI BBKP

Cluster 3: The main characteristics in cluster 3 are the bank has a fairly high capital value and current assets are still safe, the deposit value at this company is quite good, meaning that the company has been able to manage customers. The expenses incurred for operational activities tend to be smaller so that this company has a fairly high profit value, namely 39.6% of total assets. Investing in this company will have a significant return on profit, this is indicated by the ROA value reaching 3.66% and ROE 7.65%.

Cluster 4: the main characteristic that is dominant in cluster 4 is the credit score given is quite high. In terms of income, banks in this cluster, apart from interest income, also get other income which is quite high, namely 16.68% of the value of income. Banks in this cluster are banks that have very good performance. The average total assets in this cluster bank is Rp.348 trillion. Although operating expenses are quite high, banks with this categorization have more stable income values. The capital owned by banks in this cluster is quite high. Investing in this bank has a fairly good rate of return, especially for long-term investments, this is indicated by the NIM value of 4.99%.

Comparison Cluster Analysis Grouping and KBMI Grouping

The cluster grouping that has been done when compared with the KBMI grouping shows some condition, Table 6 shows the comparison of the members of the cluster results and the results of the KBMI grouping. In general, cluster 1 consists of banks with KBMI category 1, 2 and 3. Cluster 2 consists of banks with KBMI 2 category, while cluster 3 consists of banks with KBMI category 1. Meanwhile, cluster 4 consists of banks with KBMI category 2, 3 and 4.

Table 6

Comparison Member Clustering Group and KBMI

Cluster	KBMI	Bank				
1	KBMI 1	AGRO	BCIC	BSWD	BBYB	BBHI
		BABP	BINA	BVIC	BNBA	BACA
		MASB	INPC	BMAS	BKSW	
	KBMI 2	BJBR	MCOR	MAYA	SDRA	
	KBMI 3	BBTN	MEGA	PNBN	NISP	BTPN
2	KBMI 2	ARTO				
3	KBMI 1	BBMD	BBSI			
4	KBMI 1	AGRS	DNAR	BGTG	NOBU	AMAR
	KBMI 2	BBKP	BSIM	BJTM		
	KBMI 3	BNII	BDMN	BNLI	BNGA	
	KBMI 4	BBCA	BBRI	BBNI	BMRI	

Some exceptions to be noted include conditions that occur to banks with the KBMI category 3 but in terms of performance they still enter cluster 1, namely BBTN,

MEGA, BTPN, NISP and PNBN banks. An analysis that can be concluded that these banks have significant capital values but have not showing better financial performance this could be due to the relatively high percentage of credit and not being matched by variations in operational activities or fulfillment of income from other activities. The next note is that members who are included in cluster 2 are members of the KBMI 2 category, this shows that the amount of core capital owned does not guarantee the good performance of the bank. Cluster 3 contains banks with the category of KBMI 1, which means that the banking performance at this bank is very good, and has a profitable opportunity for investment. Banks with the KBMI 4 categorization are consistently all in cluster 4, and there are several banks that fall into the cluster 4 category from KBMI 1, meaning that operationally this bank has a fairly good.

Conclusion

Banking grouping can be done by considering several characteristics. In this study, grouping was carried out using 13 common size variables derived from the financial statements of the balance sheet and profit and loss of 42 banks in Indonesia. The characteristics for each cluster can be seen from the average of each variable. In each cluster, it can be seen the credit policy provided and the comparison to the value of deposits or the value of capital owned by the company. Furthermore, the company's financial performance can also be evaluated from the point of view of operating costs and profit value. With the average value of each cluster variable, it is possible to measure the position of banks that have the same characteristics.

The results of clustering are significantly different from the results of grouping based on core capital (KBMI), the data on the value of the KBMI are fixed but do not see the company's performance in general, this makes it difficult to see banking performance which causes banks that are included in the higher level KBMI will automatically enter higher cluster. Cluster analysis based on common size can be used as input for managers to determine financial strategies, be it capital, cost, credit and investment policies that cannot be done when using the core capital method.

The next study is to consider the common size for each period so the company can evaluate the anticipated strategy if there are unfavorable values. Furthermore, it can also be analyzed if the number of clustering is more varied.

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