GOING CONCERN ESTIMATION BANKING INDUSTRY IN INDONESIA WITH ADAPTIVE NEURO FUZZY INFERENCE SYSTEM APPROACH (USING IPSA 30.2)

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Abstract

The growing activities of the economy the way it is today. The users of the financial statements, in which case it is investors sometimes cannot understand the meaning contained in the financial statements the company made. Investors will be easier to read and more trust financial statements audited . This research aims to observe granting the assumption of going concern (variable output) so it could be assessed by observe the five variables that are used by the auditor in granting the assumption of going concern an enterprise that is CAR, LDR, ROA, net income growth and the Z-Score (input variables). The population of this research is a banking company listed on the Indonesia stock exchange period 2007-2011. The Total sample of the research is 15 company that determined throught purpose sampling. Analysis tools used is adaptive neuro fuzzy inference system. Adaptive neuro fuzzy inference system approach is a blend of artificial neural network and fuzzy logic. Overall analysis and preparation is done with the help of variable Matlab R2010b. Based on the analysis that was done, fuzzy system generates 6 fuzzy rules can define input-output behavior. The results of this research indicates the level of accuracy is quite high with an average error rate is able to achieve 0 i.e. 0,1820 afterwards in test with sample 4 banking company which are Bank Pan Indonesia period 2008-2011, Bank Permata, Bank Rakyat Indonesia and Bank Victoria International in the period 2007-2011.

Keywords: *Adaptive Neuro Fuzzy Inference System, Fuzzy, Going Concern Assumption*

INTRODUCTION

Nowadays, the continued development of economic activity makes competition in the business world getting more tight. The companies that are not able to compete won't long last and will be eliminated from the business that being operated. This relates to the one of goals which is important and should be sought by all types of businesses that is maintain the survival of the company in a long time (going concern).

Audit opinion is an integral part of the audit report, the auditor's responsibility in the opinion given, while the contents of the audited financial statements are the responsibility of management entirely. There are five opinions given by the auditor based on the results of audits of financial statements that are unqualified opinion, unqualified opinion with explanatory language, a qualified opinion, adverse opinion, and disclaimer opinion. This opinion is given by the auditor based on certain conditions that must be understood by the auditor. During the auditing process until giving the opinion, in carrying auditor out all stages of the audit is influenced by the knowledge, experience, and judgment.

IPSA 30.1 had issued in Indonesia about, "Independent Auditor's Report on the Impact of The Worst Economic Conditions in Indonesia against with Survival Entities". IPSA 30.1 is about the

interpretation of PSA 30, "Auditor Consideration of The Ability for Sustain Their Operations" when became effective on March 2, 1998 as a result of the worst economic conditions.

Prolonged economic crisis from 1998 to 2001, providing a significant impact of the survival of all business entities in Indonesia. PSA 30 does not regulate how should the auditor's opinion and presentation of financial statements under conditions of prolonged economic crisis. Therefore, issued an interpretation or 30.1 IPSA about, "Independent Auditor's Report on the Impact of The Worst Indonesia's Economic Conditions with Survival Entities."

IPSA 30.1 does not explain what conditions the interpretation of the applicable auditing standards. How long the disclosure did about economic conditions in the audit opinion and the notes to the financial statements? There are no standard guidelines and measures when it is applied. It is need to be an explanation of the auditing standard setting. On 6 March 2009, the Indonesian Institute of Certified Public Accountants (IAPI) issued IPSA 30.2 about, "The Auditor's Ability of The Considerations in Continuity of His life: Interpretation of Statement of Auditing Standards No. 30". This interpretation confirmed that IPSA 30.1 only applies during the period economy from 1998 until 2000. IPSA 30.1 has more limit the time from 1998 until 2000. IPSA 30.1 has more limit the time and place that should be revoked a long ago.

This research using CAMEL (Capital, Assets, Management Earnings, Liquidity). To evaluate the performance of the banking companies use CAMEL ratio of five ratios are Capital Adequacy Ratio (CAR), Return on Assets (ROA), and the ratio of loans to the funds received (LDR).The process of reasoning is a very important part in intelligent systems.

One way to determine the company's assumption of going concern based on the factors above are the models of Adaptive Neuro Fuzzy Inference System (ANFIS). Adaptive Neuro Fuzzy Inference System (ANFIS) model is a merger of the two systems, namely Artificial Neural Network (ANN) or artificial neural networks and fuzzy logic or the logic of vague. Adaptive Neuro Fuzzy Inference System (ANFIS) in demand by researchers in his research because of the implementation of the machine language easily and efficiently. As well as extensive implementation in the fields of social psychology and economics.

Research Objective

The research was conducted with the aim to: (1) Know the state of CAR, LDR, ROA, net income growth, Z-Score, and the going concern assumption in the provision of banking companies listed on the Stock Exchange from the year 2007-2011; (2) Determine the level of accuracy of ANFIS in assuming going concern; (3) Determine the ratio of going concern assumption ANFIS method when compared to the actual going concern assumption; (4) Determine the level of accuracy of ANFIS in assuming going concern.

Literature Review

Capital is one of the important factors in the development of business and accommodates the risk of loss. The amount of capital a bank will have an effect on whether or not a bank is able to efficiently carry out its activities, and may affect the level of public confidence (especially for the borrower) to the performance of the bank. The use of bank capital is also intended to meet all the needs of the bank to support the bank's operations, and as a tool for business expansion. Public confidence will be seen from the amount of funds accounts, time deposits, and savings beyond the amount of capital injection from its shareholders.

The element of trust is an important issue and a factor in the successful management of a bank (Sinungan, 2000).

Loan to Deposit Ratio (LDR) is the ratio between the size of the entire volume of loans extended by the bank and amount of the receipt funds from various sources. Understanding other LDR is the ratio of the banking company's financial aspects related to liquidity. LDR is a traditional measurement showed deposits, current accounts, savings accounts, etc. that are used in meeting the loan application (loan requests) customers.

Incomeability is the ability of the company made a income in relation to sales, total assets, and equity. Total net income is often compared to the scale of the operation or financial condition such as sales, assets, stockholders equity to evaluate performance as a percentage of some activity or investment. Return on Assets (ROA) is the ratio to measure the ability of company management in the overall income.

Growth is a measure that describes the growth of the company posts from year to year. All the important information contained in the financial statements can be calculated growth as ROI, ROA, current assets, cost of capital, and so forth (Munawir, 1995).

Z-Score model using a combination of several formula ratio analysis (Ross, Westerfield & Jaffe, 2002).

RESEARCH METHODS

The sample in this study are banking companies which is listed in the Indonesia Stock Exchange in the period 2007-2011. The data in this study were obtained by using the method of documentation. Secondary data is CAR, LDR, ROA, Net Income Growth and Z-Score that acquired in Published Financial Statements period 2007-2011 were obtained from a banking site and www.idx.co.id.

RESULT AND DISCUSSION

The results of the calculation CAR, LDR, ROA, Net Income Growth, Z-Score and Going Concern Assumption on the banking companies listed on the Stock Exchange the period 2007-2011 in table 1a and table 1b.

Table 1a. Calculation Results of CAR, LDR, ROA, Net Income Growth, Z-Score and Going Concern Assumption

No.	Name Of Bank	Year	CAR (%)	LDR (%)	ROA (%)	Net Income Growth	Z-Score	Going Concern Assumption
1.	Bank Artha Graha	2007	12.240	48.192	0.003	-0.511	0.481	1
		2008	14.930	74.851	0.002	0.451	0.671	1
		2009	13.870	84.049	0.003	0.914	0.838	1
		2010	14.520	76.140	0.005	0.999	0.789	1
		2011	12.670	82.222	0.005	0.2	0.575	1
2.	Bank Bukopin	2007	12.840	65.260	1.63	0.191	0.484	1
		2008	11.200	83.600	1.66	-0.017	0.453	1
		2009	14.360	88.800	1.46	-0.018	1.908	1
		2010	13.280	93.800	0.01	0.336	6.227	1
		2011	12.710	98.300	0.016	0.505	0.695	1
3.	Bank Capital	2007	50.370	73.260	2.130	0.880	8.064	1
		2008	28.400	67.720	1.140	0.317	1.475	1
		2009	44.620	49.650	1.420	0.854	14.98	1
		2010	29.290	50.257	0.005	0.032	4.319	1
		2011	21.580	43.786	0.006	0.200	1.940	1
4.	Bank Central Asia	2007	19.200	43.600	3.300	0.058	5.050	1
		2008	15.800	53.800	3.400	0.287	1.419	1
		2009	15.300	50.300	3.400	0.178	6.777	1
		2010	13.500	55.200	0.026	0.246	5.975	1
		2011	12.700	61.700	0.028	0.276	1.321	1

Table 1b. Calculation Results of CAR, LDR, ROA, Net Income Growth, Z-Score and Going Concern Assumption

No.	Name Of Bank	Year	CAR (%)	LDR (%)	ROA (%)	Net Income Growth	Z-Score	Going Concern Assumption
5.	Bank Danamon	2007	20.300	87.083	0.024	0.597	1.290	1
		2008	15.400	43.105	0.014	-2.394	0.969	0
		2009	20.700	40.591	0.016	0.002	12.342	1
		2010	16.000	92.000	0.025	0.849	0.991	0
		2011	17.500	99.400	0.024	0.156	1.689	1
6.	Bank Himpunan Saudara	2007	14.990	93.870	3.730	1.414	68.935	1
		2008	12.750	102.190	3.000	0.192	1.266	1
		2009	13.760	94.940	2.410	-0.053	44.875	1
		2010	19.690	98.299	0.018	0.682	40.546	1
		2011	18.000	81.016	0.018	0.502	0.940	1
7.	Bank Internasional Indonesia	2007	20.190	88.010	0.650	-0.418	0.939	0
		2008	19.440	86.530	0.840	0.328	1.234	1
		2009	14.710	82.930	-0.070	-1.087	1.359	0
		2010	12.650	89.030	0.680	-13.964	1.956	1
		2011	12.030	95.070	0.790	0.264	0.775	1
8.	Bank Mandiri	2007	21.100	50.732	0.014	0.795	0.893	1
		2008	15.700	56.254	0.015	0.222	1.301	1
		2009	15.600	57.797	0.018	0.347	7.911	1
		2010	14.700	68.925	0.021	0.309	7.026	1
		2011	16.100	77.714	0.023	0.355	1.275	1
9.	Bank Mega	2007	14.210	46.740	1.770	0.000	0.803	1
		2008	16.160	64.670	1.980	-0.037	1.137	1
		2009	18.840	56.820	2.330	0.071	0.278	1
		2010	14.780	57.342	0.018	0.771	0.26	1
		2011	11.700	65.601	0.017	2.347	0.784	1
10.	Bank Negara Indonesia	2007	15.700	60.600	0.900	-0.534	0.817	1
		2008	13.500	68.610	1.120	0.361	0.924	1
		2009	13.800	64.060	1.720	1.032	0.278	1
		2010	18.600	70.400	0.019	0.881	11.089	1
		2011	17.600	70.200	0.020	0.282	1.245	1
11.	Bank Nusantara Parahyangan	2007	17.000	49.390	1.290	0.048	0.847	1
		2008	14.040	66.120	1.170	-0.109	1.043	1
		2009	12.560	73.640	1.020	0.036	1.031	1
		2010	12.940	80.487	0.010	0.738	0.957	1
		2011	13.450	84.982	0.010	0.334	0.863	0
12.	Bank Pan Indonesia	2007	21.580	92.360	3.140	0.307	1.313	1
		2008	20.310	78.930	1.750	-0.177	1.064	1
		2009	21.790	73.310	1.780	0.305	1.715	1
		2010	16.580	73.968	0.013	-0.842	1.438	1
		2011	23.900	80.560	0.016	0.417	1.280	0
13.	Bank Permata	2007	13.300	88.000	1.900	0.602	0.389	1
		2008	10.800	81.800	1.700	-0.093	0.318	1
		2009	12.200	90.600	1.400	0.061	0.470	0
		2010	14.100	87.500	0.014	1.106	1.074	0
		2011	14.800	83.100	0.011	0.144	0.787	0
14.	Bank Rakyat Indonesia	2007	15.840	68.800	4.610	0.136	0.942	1
		2008	13.180	79.930	4.180	0.232	2.611	1
		2009	13.200	80.880	3.730	0.227	8.436	1
		2010	13.780	74.273	0.028	0.570	8.736	1
		2011	14.960	74.018	0.032	0.315	1.206	1
15.	Bank Victoria Internasional	2007	15.430	55.920	1.640	0.649	0.665	1
		2008	22.770	53.460	0.880	-0.288	0.963	1
		2009	16.860	50.430	1.100	0.311	2.232	1
		2010	10.800	40.220	0.010	1.310	1.093	1
		2011	14.860	63.620	0.016	0.755	0.921	1

From the calculation above. it can be deduced the entire banking companies listed on the Stock Exchange 2007-2011 period CAR level is high. It is seen from

the overall data processing showed the highest yield of 50.370% Bank Capital acquired in 2007 and the second lowest earned the Permata Bank in 2008 and the Victoria International Bank in 2010 amounted to 10.800%. From the overall data processing show that company categorized liquid LDR < 100%. Bank has the best LDR is Victoria International Bank. It was indicated from the results of 40.220% in 2010 while the worst rate of liquidity is Bank Himpunan Saudara indicated from the LDR reached 102.190 % in 2008. The period of ROA level is low. It is seen from the overall data processing showed the highest yield of 4.610% obtained by Bank Rakyat Indonesia in 2007 and the lowest was Artha Graha Bank amounting to 0.002% in 2008. The highest yield of 2.347% acquired by Mega Bank in 2011 and the lowest is the International Bank Indonesia equal to -13.964% in 2010 due to the bank's losses in 2009 amounted Rp.40.969.000.000. The results of Z < 1.23 contained 39 samples. 1.23 to 2.90 between the Z 1.23 - 2.90 as many as 20 samples and Z > 2.90 as many as 16 samples.

Samples were categorized into two groups. such as: companies receiving going concern assumption were given a value of 1 and a company that received a non-going concern assumption were given a value of 0.

From a total of 75 samples obtained of the data distribution in table 2.

In 2007. 93.3% of the sample received a going-concern assumption as many as 14 samples. In 2008 the number of recipients going concern assumption is still the same as in 2007 reached 93.3% as many as 14 samples. In the year 2009 decreased to 86.7% as much as 13 samples. While in 2010 the number of recipients going concern assumption is still the same as in 2009 reached 86.7% as many as 13 samples. And in 2011 the number of recipients going concern assumption has decreased to 80% as many as 12 samples. So overall during the study period from a total of 75 samples. 66 samples or 88% received a going-concern assumption as for the remaining 9 samples or 12% received non-going concern assumption. which means having financial condition is not good so be unable to sustain its operations.

This research using subtractif clustering algorithm. Clustering is used to identify the fuzzy rules that can be model the behavior of data input-output relation with the minimum rule.

By setting the radius of 0.5 accept ratio of 0.5 and reject ratio of 0.15. there are 4 data center cluster of size 75x6 matrix (Table 3).

Table 2. Audit Opinion on the Banking Companies which are Listed on the Stock ExchangePeriod 2007-2011

Going Concern Assumption	**Year 2007**		**Year 2008**		**Year 2009**		**Year 2010**		**Year 2011**		**Total**	
	S	**%**	**S**	**%**	**S**	**%**	**S**	**%**	**S**	**%**	**S**	**%**
GCAO	14	93.3	14	93.3	13	86.7	13	86.6	12	80	66	88
NGCAO	1	6.7	1	6.7	2	13.3	2	13.3	3	20	9	12
Total	**15**	**100**	**15**	**100**	**15**	**100**	**15**	**100**	**15**	**100**	**75**	**100**
Going concern assumption	**Year 2007**		**Year 2008**		**Year 2009**		**Year 2010**		**Year 2011**		**Total**	
	S	**%**	**S**	**%**	**S**	**%**	**S**	**%**	**S**	**%**	**S**	**%**
GCAO	14	93.3	14	93.3	13	86.7	13	86.6	12	80	66	88
NGCAO	1	6.7	1	6.7	2	13.3	2	13.3	3	20	9	12
Total	**15**	**100**	**15**	**100**	**15**	**100**	**15**	**100**	**15**	**100**	**75**	**100**

Based on data that is processed

Table 3. Output Subtractive Clustering

Cluster	Input 1	Input 2	Input 3	Input 4	Input 5	Output 1
Cluster 1	14.960	74.018	0.032	0.315	1.206	1
Cluster 2	16.860	50.430	1.100	0.311	2.232	1
Cluster 3	14.800	83.100	0.011	0.144	0.787	0
Cluster 4	13.300	88.000	1.900	0.602	0.389	1
Cluster 5	15.800	53.800	3.400	0.287	1.419	1
Cluster 6	17.500	99.400	0.024	0.156	1.689	1

Based on data that is processed

From the table output clustering above shows there are six central clusters. The first cluster center is located on the vector of Bank Rakyat Indonesia in 2011 as follows: CAR of 14.960%. 74.018% of LDR. ROA of 0.032%. net income growth of 0.315%. Z-score of 1.206 and get the going concern assumption. The second cluster is the vector of Victoria International Bank in 2009 as follows: CAR of 16.860%. 50.430% of LDR. ROA of 1.100%. net income growth of 0.311%. Z-score of 2.232 and get the going concern assumption. The third cluster is the vector Permata Bank in 2011 as follows: CAR of 14.800%. 83.100% of LDR. ROA of 0.011%. net income growth of 0.144%. Z-score of 0.787 and obtain non-going concern assumption. Cluster fourth vector Permata Bank in 2007 as follows: CAR of 13.300%. 88.000% of LDR. ROA of 1.900%. net income growth of 0.602%. Z-score of 0.389 and get going-concern assumption. Cluster fifth on vectors Bank Central Asia in 2008 with details: CAR of 15.800%. 53.800% of LDR. ROA of 3.400%. net income growth of 0.287%. Z-score of 1.419 and get the going concern assumption. Cluster sixth vector Danamon Bank in 2011 as follows: CAR of 17.500%. 99.400% of LDR. ROA of 0.024%. net income growth of 0.156%. Z-score of 1.689 and get the going concern assumption (Figure 1).

Based on the cluster centers that have been successfully established in the previous stage. the adaptive neuro fuzzy inference system will define fuzzy rules by training data.

In the view above. it appears that the resulting output fuzzy system looks in the direction of training. Output is shown by the red star symbol and the training data with a blue circle symbol.

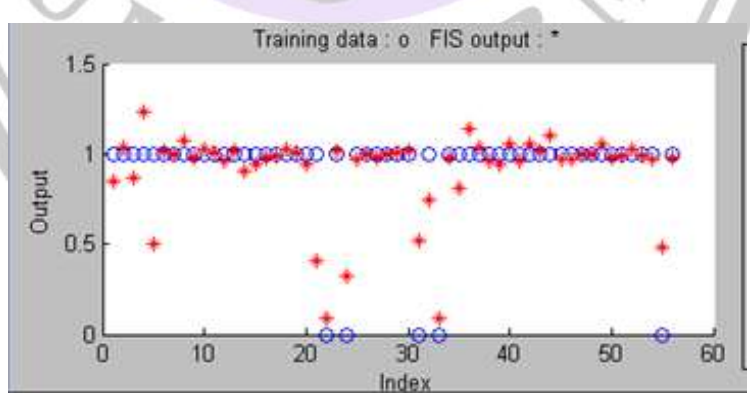

Figure 1. plots the data to the output training fuzzy inference
Based on data that is processed

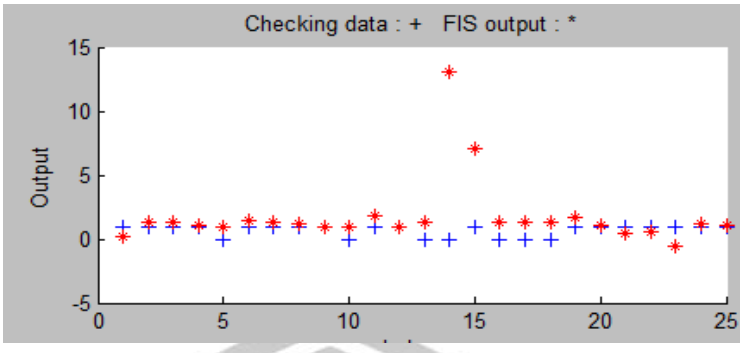

Figure 2. Plot checking the data on output fuzzy inference
Based on data that is processed

Further checks will be conducted on a model that has been created with 25 data is prepared before the data 5 banks of 15 banks under investigation. Here's the data going concern assumption were successfully tested with Adaptive Neuro-Fuzzy Inference System (Figure 2).

In the view above. it appears that the resulting output fuzzy systems seem to follow directions checking. Output is shown by the red star symbol and checking the data with a blue cross symbol.

Furthermore. from the process of checking the data will be obtained that ANFIS asummed output resultst can be compared with the actual output assumptions. Output ANFIS assumptions will illustrate how much accuracy of ANFIS. the comparison in table 4.

Table 4. Checking Results Data

No	Bank	Year	Actual Assumption	Anfis Assumption	Error
1.	Bank Pan Indonesia	2008	1	0.9677	0.0323
		2009	1	1.0094	-0.0094
		2010	1	0.7715	0.2285
		2011	0	0.3308	-0.3308
2.	Bank Permata	2007	1	0.7645	0.2355
		2008	1	1.0914	-0.0914
		2009	0	0.5701	-0.5701
		2010	0	0.4875	-0.4875
		2011	0	0.4706	-0.4706
3.	Bank Rakyat Indonesia	2007	1	1.0016	-0.0016
		2008	1	0.9539	0.0461
		2009	1	1.0443	-0.0443
		2010	1	1.0606	-0.0606
		2011	1	1.1097	-0.1097
4.	Bank Victoria Internasional	2007	1	1.0803	-0.0803
		2008	1	0.9758	0.0242
		2009	1	1.0964	-0.0964
		2010	1	1.1073	-0.1073
		2011	1	0.9945	0.0055

Based on data that is processed

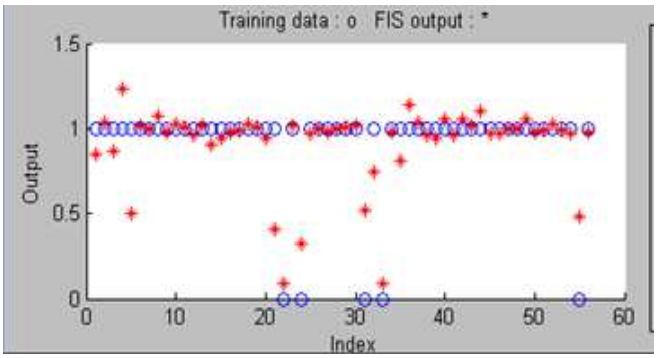

Figure 3. Comparing the actual output plot with ANFIS
Based on data that is processed

From the above table. it can be calculated that the average error of 0.1820 assuming it describes the results of the data that has been trained by ANFIS can be said to have a level of accuracy of the results is quite high.

Going Concern Assumption Comparison between Actual and ANFIS

Below the graphic shows the comparison of the output going concern assumption adaptive neuro fuzzy models (*) with the actual going concern assumption (+). However. the overall model is able to explain the well input-output relations. This is evidenced by the movement (*) coincide with (+) (Figure 3).

CONCLUSION

Based on data analysis and the discussion that has been done. it can be taken any conclusions as follows:

1. Based on the calculation of the variable CAR. LDR. ROA. net income growth. Z-Score and observations going concern assumption in the study sample as a whole showed good results.
2. Based on the results of tests on the sample results using ANFIS modeling produces shows the six fuzzy rules that can model the behavior of input variables (CAR. LDR. ROA. Net income Growth and Z-Score) to variable output (Going Concern Assumption).
3. Based on the results of tests on samples by using ANFIS results show comparison of accuracy between the assumption of ANFIS assuming ACTUAL is good enough. this is evidenced by the average difference in the level of error was able to reach 0 is equal to 0.1820.
4. Based on the results of tests on samples by using ANFIS results. Data successfully tested with good training. it is indicated by checking the output of the data is the difference in the smallest negative error of -0.0016 and the smallest positive error of 0.005.

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