THE CONSTRUCTION OF DEBT PAYMENT ABILITY MODELS PREDICTIONS USING FINANCIAL INDICATORS BASED ON HISTORICAL COST ACCOUNTING AND GENERAL PRICE LEVEL ADJUSTED ACCOUNTING

(An Empirical Evidence from Textile manufacturing data in West Java INDONESIA)

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Abstract: The purpose of this research is to measure the effect of economic crisis in Indonesia in the period of 1997-2001 and the effect of inflation on the financial indicators of the textile industries in West Java. Research method used descriptive analytic method, and the data used are collected by using a survey method. Using discriminant analysis and logistic regression the research find out that there are 8 models that can be used to predict the firm ability to pay their debt. The logistic regression using inflation accounting data turns out to be more accurate than the discriminant analysis. The logistic model using inflation data can predict correctly 95.4% of the actual data. The fact indicates that the high inflation rate during the crisis affect the financial condition which resulted the financial information about firms ability to pay their debt.

Keywords: Financial indicators, Accounting inflation, Historical cost, debt payment ability.
1.1. Research background

Indonesia's economic condition in the middle of 1997 had been decreased drastically with the decreased of economic growth by 3.82% (Biro Pusat Statistic financial economic statistic : 1997 1998), this decreased was caused by global monetary crisis. The impact of high inflation could be feel in business world. Companies, even though had tried to do efficiency and effectively in their operational, the performace were still decreasing. That could be seen when many companies closed their operational because of bankruptcy in 1997-1998 period. The performance that achieved by a company is shown in a Financial Statement for a certain period. The inflation phenomena that occurs in economic situation is not included in making Financial Statement, because of using assumption Historical Cost Accounting. Historical Cost Accounting defines that prices that occur in economic situation in general is stable from year to year, so Financial Statement that is made hasn't included price changing. The assumption that price is stable is considered as a weakness because price in general changes from time to time. This weakness can be solved with Inflation Accounting (Davidson et al: 1976).

Two methods Inflation Accounting that usually used are (Davidson et al: 1976): 1) Current Cost Accounting Method; 2) General Price Level Adjusted (GPLA) Method. Current Cost Accounting Method adjust every account in Financial Statement with relevant market price, as for GPLA adjust every account with relevant inflation factor. If in the process for adjusting inflation has a difference so it will be called as purchasing power gain / loss in current period Income Statement (Godfrey et al: 2000; Beams: 2003: 421). Next in this research, definition of inflation accounting is representing to GPLA accounting.

Company financial condition can be shown by company's ability in Debt Payment Ability. This information is shown by Financial Ratios, they are (Kieso et al: 2003): 1) Quick Ratio; 2) Liquidity Ratio; 3) Leverage Ratio; 4) Debt Equity Ratio; and 5) Debt Asset Ratio. The Financial Ratio that is being researched is hoped can be used to measure inflation impact in economic condition compared to the changing of company's ability in paying debts. If the credibility of the company is decreased based on the information that is made by inflation accounting, it will show that inflation accounting does influence company's financial condition.

The changing of financial condition because of counting inflation is compared to creditor's opinion about company's financial condition based on Historical Cost Accounting and Inflation Accounting. Analysis of the comparison can explain that inflation phenomena influences company's financial condition, and when it comes to its turn also influences creditor's decision.

1.2. Research Formulation

a. Which mathematic model is able to predict company capability in paying its
liabilities based on company's financial ratio, using historical cost accounting compares to inflation accounting
b. Is there any difference in predicting model's accuracy towards company capability in paying its liabilities based on company's ratio, using historical cost accounting compares to inflation accounting (GPLA)
c. Is there any difference in decision for giving credit using historical cost accounting information compares to inflation accounting information.

1.3. Conceptual framework, and Hypothesis
Conceptual Framework
AFS (1996) which regulates the organization of financial report stated that company's report have to be composed, using historical cost accounting basis, which assumes that price in general is stable in every year (Indonesian Financial Accounting Standard / IFAS: 1996: 23). The impact of continous changes in price is never counted in historical cost accounting. This case causes two massive problems in accounting, those are: (a) most part of historical value which is included in financial report is economically not relevant, because the price has already changed; (b) the values in financial reports provide different purchasing power, because they're spent in different time as well (Godfrey et Al: 2000: 177). GPLA method which counted impact of inflation in organizing company's financial report, is founded on adjustment each entry with the general price rate (Godfrey et Al: 2000: 307; Davidson: et Al: 1976: 4).

Prior Research
Research about inflation accounting, done by Skogsvik et Al (1988) which compares prediction of the failure of company business based on financial information on inflation accounting to historical cost accounting basis. Inflation accounting also has vast influence to stock value (Davis; 1996). Davis used company samples in Mexico based on cross-sectional analysis with an inflation rate of 130%. Inflation accounting also influences the value of the firm (Gordon; 1998). Using company samples in Mexico, the result of his research was significant and consistent in showing the inflation rate between 8%-52%. Research of the company financial ratio which is based on historical cost accounting and inflation accounting was used to predict cash flow, stock value and the failure of the firm. This method had been done by other researcher. In this research, the financial indicator based on historical cost accounting and inflation accounting are used to predict the ability of the company to pay their debt. The prediction was done by forming a mathematical model based on the financial indicator, which describes the ability of the company to pay their debt. The research of financial indicator which was used to predict the ability of the company to pay their debt was already done by Beaver (1966) with the
conclusion that:
1. Ratio between cash (current asset) to total liabilities can predict the ability of the company to pay mature bonds up to 87%.
2. The change of leverage ratio highly influences investors in investment decisions.
3. Ratio between total liabilities to total asset was more dominant in predicting The ability of the company to pay debt; for example in paying their mature bonds, as opposed to ratio based only on current asset.

Predicting bankruptcy which uses financial ratio indicator is thought to be useful, although it may not be the best method. (Schiedler PL: 1981). The financial statement based on historical cost accounting and based on inflation accounting in this research was gave to the creditors to see whether there is a different decision in granting loan based on historical cost accounting compared to inflation accounting. Creditor's decision will show whether there is conformity for a company which is predicted being unable to pay their debt based on the model agree with creditor's decision. The conceptual framework above is drawn as the scheme below:

**Conceptual Framework Scheme**

![Conceptual Framework Scheme](image)

*Figure 1. Conceptual framework scheme*
Hypothesis Formulation

Based on the premises which are the phenomenon of research result and accounting and the other science experts' consideration, also based on conceptual framework which has been explained, it is able to take some conclusion and information about research problem in hypothesis form as a temporary answer. The hypothesizes are:

1st Hypothesis.
It is able to be arranged the mathematical model to predict company's ability in paying their loans based on company's financial ratio by using both historical cost accounting and inflation accounting, both in high and low inflation circumstances. (It is supported by 1st, 2nd, 3rd, 4th, 5th, 6th, and 7th premise).

2nd Hypothesis.
There is a difference in prediction model accuracy of company's ability to pay their loans between historical cost accounting basis and inflation accounting basis related to both high and low inflation circumstances. (It is supported by 9th, 10th, and 11th premise).

3rd Hypothesis.
There is a difference decision in granting loan given by the creditors based on information of historical cost accounting compared to inflation accounting basis both in high and low inflation circumstances. (It is supported by 8th and 11th premise).

2. Research Object And Methodology
2.1. Research Object
The examined variables are: Changes in company's financial condition, changes in general price index, changes in company's ability to pay their loans which is stated in score based on mathematical model computation, and changes in granting loan's decision by the creditors.

2.2. Research Methodology
The type of research is verification, while the methodology is descriptive analytical. This method reflects the presentation of variables which are examined by high common sense by collecting, presenting, analyzing, and validate them scientifically (in hypothetical testing) that can give a pretty clear explanation about object variable, which finally a conclusion can be made. (Sekaran: 1992).
2.3. Data Collection Procedures
The population in this research will be the whole textile industry especially at Bandung's urban and suburb area and generally at West Java at the amount of 921 textile companies. By statistical computation, 110 companies are taken as samples. The companies' financial statement is collected by requesting directly, the financial statement used is 1997-2001 period (5 years). In conclusion, the data in this research is secondary and in ratio scale data.

2.4. Analysis Methodology
Statistical analysis in this research is: discrimination analysis, logistic regression, t-test paired sample, Chi-square. Before the data is processed by statistical means, the 550 data of financial statements are first converted according to the data based on inflation happened during the period of 1997-2001.

Discrimination of analysis equation generally form as: \( Y = (X_i - X_j)^T S^{-1} X \)
Which means : \( Y_1 = (X_i - X_j)^T S^{-1} X_i \) and \( Y_2 = (X_i - X_j)^T S^{-1} X_j \)
Logistic regression equation generally form as: \( F(z) = \frac{1}{1+e^{-z}} \)

3. Research Outcomes And Discussion
3.1. Research outcomes
550 historical-cost-based financial statements were converted into General-Price-Level-Adjusted (GPLA)-based financial statements or, for this research purposes were called, inflationary accounting. Financial indicators based on historical cost and inflationary accountings were used to create mathematical models to predict company's ability in meeting future financial obligations. A part of data about financial indicators summaries as follow:

<table>
<thead>
<tr>
<th>Company</th>
<th>Quick ratio</th>
<th>Liquidity ratio</th>
<th>Solvability ratio</th>
<th>Debt to equity</th>
<th>Debt to Total asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Trisulatex Corporation</td>
<td>1997: histories</td>
<td>26.6</td>
<td>35.2</td>
<td>69</td>
<td>2332</td>
</tr>
<tr>
<td></td>
<td>1998: histories</td>
<td>29.2</td>
<td>46.5</td>
<td>80</td>
<td>370</td>
</tr>
<tr>
<td>2. Kewalram Indo Textile</td>
<td>1997: histories</td>
<td>25.7</td>
<td>54.5</td>
<td>479.3</td>
<td>321.1</td>
</tr>
<tr>
<td></td>
<td>1998: histories</td>
<td>19.7</td>
<td>61.1</td>
<td>762.5</td>
<td>198.9</td>
</tr>
<tr>
<td>3. GPT Textile</td>
<td>1997: histories</td>
<td>31.8</td>
<td>108.4</td>
<td>2059.8</td>
<td>143.5</td>
</tr>
<tr>
<td></td>
<td>1998: histories</td>
<td>56.0</td>
<td>166.1</td>
<td>5382.3</td>
<td>319</td>
</tr>
<tr>
<td>4. AJM Textile corporation</td>
<td>1997: histories</td>
<td>3.9</td>
<td>20.8</td>
<td>58.1</td>
<td>-475</td>
</tr>
<tr>
<td></td>
<td>1998: histories</td>
<td>48.6</td>
<td>98.5</td>
<td>47.5</td>
<td>216.7</td>
</tr>
</tbody>
</table>
8 prediction models were created in this research; they were: a) discriminatory analytical model in high inflation condition based on historical cost accounting; b) discriminatory analytical model in low inflation condition based on historical cost accounting; c) discriminatory analytical model in high inflation condition based on inflationary accounting; d) discriminatory analytical model in low inflation condition based on inflationary accounting; e) logistic regression model in high inflation condition based on historical cost accounting; f) logistic regression model in low inflation condition based on historical cost accounting; g) logistic regression model in high inflation condition based on inflationary accounting; and h) logistic regression model in low inflation condition based on inflationary condition. All 8 models were significant at \( \alpha = 1\%, 5\%, \) and 10%. These are consistent with outcome from researches done by Altman (1968), Beaver (1966/68), and Ohlson (1980). High inflation condition were based on 1997 - 1999 period at 11.05% - 77.63%, whereas low inflation condition were based on 2000 - 2001 period at 3.75% - 5.91% in general Indonesian economic condition.

3.2. Discussion
Hypothesis (1) was proven to be correct because the 8 models created could be used to predict company's ability in meeting its financial obligations. Value of the 8 models was 0.000. Total debts to total assets ratio is a dominant variable in predicting company's credibility. This is consistent with Beaver's research, which concluded that this ratio was a better indicator than others in predicting company's ability in meeting its matured obligations. Hypothesis (2) was proven with
conclusion as follows: a) in high inflation condition, logistic regression model based on inflationary accounting was more accurate than discriminatory analytical models, whether based on historical cost or inflationary accounting, because compliance level between prediction and reality amounted to 95.4%; b) in low inflation condition, discriminatory analytical model based on historical cost accounting was more accurate than logistic regression models, with 50% level of compliance to reality.

Hypothesis (3) was proven with conclusion that credit-granting decisions of the creditors were indifference to information used in preparing financial statement, whether based on historical cost or inflationary accounting. Further explanations regarding those 3 hypotheses are laid of at the following explanation.

**Hypothesis (1)**

**H₀**: Mathematical models have not yet been created to predict company's ability in meeting its financial obligations, based on financial ratios using either historical cost or inflationary accounting, in high or low inflation condition.

**H₁**: Mathematical models could be created to predict company's ability in meeting its financial obligations, based on financial ratios using either historical cost or inflationary accounting, in high or low inflation condition.

**Schema for hypothesis (1):**

![Schema for hypothesis (1)](image link)

**Figure 2. Hypothesis schema (1)**

**Hypothesis (2)**

Second hypothesis which used on this research is as follow:

**H₂**: There is no different in the prediction model accuracy to company's ability for paying the debts of company based on the historical cost accounting compared to the inflation accounting at the condition either of high or low inflation.
H₂: There is a different in the prediction model accuracy to company's ability for paying the debts of company based on the historical cost accounting compared to the inflation accounting at the condition either of high or low inflation.

Based on statistical of data result process have explained before, indicated that the strength data logistic regression of the prediction model was great similar compared to data analysis discrimination (in the high level inflation), it was 86.67%. And then, for the low level inflation, the strength data model indicated that data built by the historical cost accounting, with the discrimination analysis was more powerful compared to the logistic regression model, the result was 91.84%. Based on the model implementation result to another data which indicated to measure model adjustment with the real fact, the result for the high level inflation that the data logistic regression of the prediction model was more accurate compared to the analysis discrimination model, and then, the inflation data was more accurate than the historical data with adjustment level with the real fact 95.4% and 17%. Such a way that for the low level inflation, on the logistic regression model was judgment less accurate compared to the discrimination analysis model used historical cost accounting data.

Based on data processing above, about the accuracy prediction of logistic regression used inflation data compared to the accuracy of human prediction on inflation, that the statistical of condition for the prediction high level inflation, showed the real fact was 95.4% but for the human prediction of the DMH company was 59%, for statistic prediction of TDMH company was 17% and for the human prediction was 84%. This explanation that statistic prediction was more accurate compared to the human prediction. And then, in the low level inflation, the human prediction was more accurate than the statistic prediction with adjustment level with the real fact 50% compared to the statistic prediction 33.3%.

The schema of explanation of hypothesis (2) before was:

**High inflation condition:**

```plaintext
Discriminant Analysis model
                  Conformity with reality 63.6% & 50%
                       Conclusion:
                           Regression logistic model more accurate than discriminant analysis model

Regression logistic model
                  Conformity with reality 95.4% & 17%
```
Hypothesis (3)
The next hypothesis is formulated to show whether there is any different creditor
decision in giving credit, if the basis of decision that is used to give the credit is the
financial information based on the historical cost accounting and inflation
accounting, therefore the hypothesis that will be used is as follow:

Ho: There is no difference decision in granting loan given by the creditors based on
information of historical cost accounting compared to inflation accounting at
the condition either of high or low inflation

H1: There is a significant difference decision in granting loan given by the creditors
based on information of historical cost accounting compared to inflation
accounting at the condition either of high or low inflation

Hypothesis (3) as seen above is tested using the average result of the hypothesis test
for matching data. With using the realistic degree $\alpha = 0.05$ and the degree of
freedom $dk = n - 1 = 2$; we have the value of $t = -3.464$ for liquid companies data and
the value of $t = 1.796$ for unliquid companies data, with p-value = 0.148 and 0.428
at a high inflation condition. On the other hand at a low inflation condition, with $p$
value = 1.000 the $t$ value is 0.846 for liquid and unliquid data. Both of this things
show that there is no difference on the decision of giving credit based on historical
cost and inflation information, at $\alpha = 1\%$, $\alpha = 5\%$ and $\alpha = 10\%$. So then, because H3
was refused or Ho was accepted so it can be concluded that there is no difference in
decision on loan which is given by the creditor based on the historical cost
accounting information compared to the inflation accounting. Other finding is the
creditor's decision generally is very influenced by the total debt ratio on total assets
because they want to have a guarantee that the loan given can returned. This is
consistent to the dominant variable which is located in each of the four model, the
dominant variable is total debt on total sales. Even though the total debt ratio on
total assets is the prime ratio that used when considering a credit decision, but there
is still another ratio that is also considered which is liquidity ratio, because the
creditor want to have a guarantee that the credit interest received will be smoothly.
The creditor received the liquidity ratio to see the debit cash flow, because if only
considering the total debt ratio on total assets which will guarantee the return of debt
at the end of period, although if the companies cash flow is not flowing smoothly,
then the return of debt will take much time, according to the creditor this kind of
problem should be avoided. All of the explanation above about hypothesis (3) can
be figured in a schema as follow:
### High level condition And Low level condition:

<table>
<thead>
<tr>
<th>Credit decision</th>
<th>Paired sample t test result: ( t = 3.464 ) and ( p )-value: 0.148</th>
<th>Conclusion: Not significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average value</td>
<td>(25.3 and 27.3)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Credit decision</th>
<th>Paired sample t test result: ( t = 1.796 ) and ( p )-value: 0.428</th>
<th>Conclusion: Not significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average value</td>
<td>(24.6 and 24.3)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Credit decision</th>
<th>Paired sample t test result: ( t = -1.000 ) and ( p )-value: 0.846</th>
<th>Conclusion: Not significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average value</td>
<td>(5.67 and 5.33)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Credit decision</th>
<th>Paired sample t test result: ( t = 1.000 ) and ( p )-value: 0.846</th>
<th>Conclusion: Not significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average value</td>
<td>(4.33 and 5.00)</td>
<td></td>
</tr>
</tbody>
</table>

Picture 4. Hypothesis Scme (3)

### 4. Conclusion And Suggestion

#### 4.1 Conclusion

The result of research about arranging prediction model of company's credibility using economic indicator based on historical cost accounting and general price level accounting (inflation), can be concluded as follow:

1. There are 8 prediction model, which are the output of economic ratio about company's ability to settle the debts. All of the model have significant at \( =1\% \), \( =5\% \), although \( =10\% \). This is similar with Beaver's Model (1968), which make prediction model about company's ability to settle the debts based on company's economic ratio. It similar with Altman model (1968), which concluding that there is prediction model based on analysis discriminant, which is from company's economic ratio to predict bangruptcy. Research by Ohlson (1980) shows that there is prediction model based on logistic regression which is made from company's economic ratio to predict another company's bangruptcy.

2. In the high level inflation, model, which is produced by regression of logistic based on data of inflation is more accurate than model, which is produced by analysis discriminant based on historical data as well as inflation data. Therefore, model of logistic regression based on inflation data can be used to predict company's credibility better than model of analysis discriminant. On the contrary, in the low level inflation, model of analysis discriminant based on historical cost accounting is more accurate than model of logistic regression.
Dominant variable on both of the model, which produced based on historical cost accounting as well as inflation accounting is total debts to total assets. This is consistent with opinion of creditors, who using total debts to total equity ratio as the prime ratio, which is used in decision to give credit (Bank, analyst of Financial Statement, bank notes holder: 2002).

Result of comparison between the accuracy of logistic regression model data of inflation and creditor’s prediction showed that statistic prediction model is more accurate than man’s prediction (in condition of high inflation rate). Meanwhile, at low inflation rate, man’s prediction is deemed more accurate than statistic prediction, with conformity rate at 50% compared to statistic prediction at 33.34%.

3. There is no difference for creditor’s decision on granting credit according to historical cost accounting or inflation accounting at high or low rate of inflation. Based on statistic test, it is appeared that the result are insignificant at $\alpha = 1\%$, $\alpha = 5\%$, and $\alpha = 10\%$.

5.2. Suggestion

1. According to result of the research above that is although inflation on level 11.05% - 77.63% created different prediction model upon firms’ financial statement, as shown in difference firms’ credibility based on historical cost accounting compared with inflation accounting, but it is not suggested that firms prepare their financial reports use inflation accounting because its result does not make any difference in creditor’s decision.

2. For groups, who are still interested to see the effect of inflation in company’s income statement, especially about the ability of company to pay its debts, is suggested to use regression logistic prediction model which using accounting file that can predict better than analysis discrimination model.

3. Groups, who are still interested to do further research is suggested to observe the same topics in goods and service sector, so the result can be used to become comparison with research result, which is manufacture sector as population research.

4. Further research can be done with using this manufacture sector data, but the conversion can be done based on current cost input price or current cost exit price, so the result can be compared with this research result, which is using conversion factor based on general price level adjusted accounting.

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