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Data Envelopment Analysis for Stocks Selection on Bursa Malaysia

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ABSTRACT

In this study, DEA (Data envelopment analysis) is used to measure efficiency of listed companies in Bursa Malaysia in term of the financial performance. It is believed that only good financial performer will give a good return to the investors in the long run. The study combines all the critical criteria for evaluating the performance of the companies in term of financial performance. There are 2 portions: First, absolute amount that represent the financial status of the companies were used to be the variables in the study. It includes total assets, current assets, current liabilities, total expenses, net income after taxes and revenue. The second portion where the financial ratios were treated as the inputs and outputs. The financial ratios include current ratio, debt ratio, debt-to-equity ratio, return on investment, return on equity and earning per share. From the result, the companies that were recommended to the investors were Genting Berhad, Maxis and YLI. These were the companies that showed 100% efficiency. Whereas, ACP Industries Berhad, Autoindustries Corporation (AIC) Berhad, AKN Technology Berhad, ASTRO All Asia Networks plc, Berjaya Group Berhad, Globetronic Technology Berhad, HeiTech Padu Berhad, Malaysia Mining Corporation Berhad, MSNIAGA Berhad, Patimas Computers Berhad, PLB Engineering Berhad, Tenaga Nasional Berhad (TNB) Berhad, Unisem (M) Bhd and WCT Engineering Berhad were showed inefficient. For each and every inefficient company, there is a set of optimum company to be their reference company. To improve the efficiency, those companies need to either increase their output (maximize-output model) or reduce their inputs (minimize-input model).

Keywords: DEA, linear programming, financial performance, stock market. 2000 Mathematics Subject Classification: 90B50, 90C05, 90C90

INTRODUCTION

Indices are the indicators of the performance of the stock market. Bursa Malaysia computes an index for each of the main sectors. The most common indices is the KLSE Composite Index

(CI). Stock market is the quickest method for investors to make money but the investment involve very high risk. The number of people making money in stock market is less compare to number of loser in the stock market. To increase the chances of making money, we should analyze the company by tracking the financial performance. It is believed that only good financial performer will give a good return to the investors in the long run. In the normal condition, financial ratio will be used to predict the financial performance of a company. However, while analyzing the performance using financial ratio, investors need to look at the many ratios. The investors need to look at all the ratio calculated and make their own conclusion. There is no a single ratio that can tell the investors is the company worth to be invested. This problem can be solved by using DEA (data envelopment analysis). DEA allows multiple factors to be combined and get a single ratio, which tell the investors the efficiency of the company.

This study focus on the financial performance of the companies listed in Bursa Malaysia. The study will combine all the critical criteria together for evaluating the performance of the companies in term of financial. The good company will be selected and recommended to the investors. The poor performer will be highlighted and the area for improvement will be suggested.

1. Data and Methodology

Twenty companies from the, which are listed in Bursa Malaysia, were chosen. The data calculated are base on the year 2003 Financial Annual report published by the respective company. The counters selected are ACP Industries Berhad, Autoindustries Corporation (AIC) Berhad, AKN Technology Bhd, ASTRO All Asia Networks plc, Berjaya Group Berhad, Genting Berhad, Globetronic Technology Bhd, HeiTech Padu Berhad, KOBAY Technology Bhd, LITYAN Holding Bhd, LKT Industrial Bhd, Maxis Communications Berhad, Malaysia Mining Corporation Berhad, MSNIAGA Berhad, Patimas Computers Bhd, PLB Engineering Berhad, Tenaga Nasional Berhad (TNB) Berhad, Unisem (M) Bhd, WCT Engineering Berhad dan YLI Holding Berhad.

The value for total assets, fixed assets, current assets, total liabilities, current liabilities and long term liabilities were taken from balance statement. Data for total expenses, revenue and net income after taxes are taken from income statement.

Data envelopment analysis (DEA), occasionally called frontier analysis, was originated by Charnes, Cooper and Rhodes in 1978. It is a performance measurement technique, can be used for evaluating the relative efficiency of the decision-making units (DMU's) in the organizations. It is a method for identifying efficient points in the mixed case. That is, when there are both "less is better" and "more is better" measures. An attractive feature of DEA is it does produce an efficiency score between 0 and 1. It does this by making slightly stronger assumptions about how efficiency is measured. Specially, DEA assumes each performance measures can be classified as either an inputs or an output. For outputs, more is better, whereas for inputs, less is better. The score of a point or a decision-making unit is then the ratio of an output score divided by an input score. DEA is concerned with measuring the relative efficiency of a sample of producers, referred to as decision-making units (DMU). Another commonly use DEA is Banker, Charnes and Cooper (BCC) model. BCC version is more flexible and allows variable return to scale. That

means if an increase in a unit's inputs does not produce a proportional change in its outputs then the unit exhibits variable returns to scale. As the unit changes its scale of operations its efficiency would either increase or decrease. The main advantage of the variable return to scale is that scale inefficient companies are only compared to efficient companies of a similar size. However, when imposing variable returns to scale the company may be technically efficient but not operating at its optimal scale. Under the assumption of variable returns to scale a unit found to be inefficient has its efficiency measured relative to other units in the data-set of a similar scale size only. As a result no unit will obtain a lower efficiency score using variable returns to scale and some units are likely to achieve higher efficiency results. The number of 100% efficient units is also likely to be higher under the assumption of variable returns to scale as all units with the lowest value for any of the inputs or highest value for any of the outputs are rated as efficient.

The result of transformation to linear programming problem is as below:

Maximize:
$$\sum_{r=1}^{s} U_{r}Y_{r_{0}} - U_{0}$$
(1)
Subject to:
$$\sum_{r=1}^{s} U_{r}Y_{r_{i}} - \sum_{i=1}^{m} V_{i}X_{ij} - U_{0} \le 0$$

$$\sum_{i=1}^{m} V_{i}X_{i_{0}} = 1$$

$$- U_{r} \le -\varepsilon$$

$$- V_{i} \le -\varepsilon$$

where,

$$U_{r} = \text{weight given to output}$$

$$Y_{r} = \text{amount of output produced by DMU}$$

 Y_r = amount of output produced by DMU V_i = weight given to input X_i = amount of input produced by DMU

In the model, the U_0^* indicates the return to scale possibilities. An $U_0^* < 0$ implies local increasing returns to scale. If $U_0^* = 0$, this implies local constant returns to scale. If $U_0^* > 0$ implies local decreasing returns to scale. BCC model only evaluate technical inefficiencies (Bowlin, 1998).

Every linear programming problem has two alternative forms, the primal and the dual. The objective of the primal model is to maximize the outputs, where limiting by the inputs. It is as shown in Formula 1. The primal formulation approached the problem from the standpoint of maximizing the outputs whereas the dual model will be concerned with minimizing the inputs (Hughes & Grawiog, 1973). In maximizing output model, we are looking for the output the companies should achieved base on the inputs given. In minimizing input model, we are looking for how much input should reduce by maintaining the current level of output.

Two studies have been carried out. The first study is based on absolute amount from income statement and balance statement. The second study is based on financial ratio. These two values cannot be combined into one study because the value for absolute amount is much higher compare to financial ratio. It would make the effect of financial ratio becomes insignificant if the values are combined in a study.

Case A: Absolute amount

There are 4 inputs and 2 outputs were studied. The factors that were treated as input are

- 1. total assets
- 2. current assets
- 3. current liabilities
- 4. total expenses

The factors treated as outputs are

- 1. net income after taxes
- 2. revenue

Case B: Financial ratio

The second study is based on financial ratio. 3 inputs and 3 outputs were selected to be the criteria to evaluate the financial performance of the company. The input factors are

- 1. current ratio
- 2. debt ratio
- 3. debt-to-equity ratio

The factors there are treated as outputs are as below.

- 1. return on investment
- 2. ROE
- 3. Earning per share

In this study, these factors are screen by using coefficient analysis.

RESULT

Data analysis for Case A

A correlation coefficient study was carried out before start the DEA analysis. It is to screen out not relevant input / output factors. There are 7 inputs and 2 outputs were involved. Table 3.1 showed the correlation of the input and output.

The result showed the coefficient between fixed asset and total asset is 0.98. It showed the effect of these 2 factors on the output are the same. While comparing the *R*-square value between total asset and fixed asset to the outputs, total asset gives higher *R*-square value. It means total asset has higher correlation with the output factors. With this, fixed asset was not included in the analysis.

The correlation between total liability and non-current liabilities is 1.0. Total liability has very little impact on net income and revenue. It is because the major portion of the liabilities is the non-current liabilities. Non-current liabilities did not play important role in generating revenue

and net income. In additional, the correlation coefficient between non-current liabilities and total asset is 0.98. Thus, non-current liabilities and total liabilities were removed from the study.

Total expenses and current liabilities have 0.99 *R*-square values. But both of them are retained in the study because it is a variable that the companies can play around.

	total asset	fixed asset	current asset	total liabilities	current liabilities	Non current liabilities	total expenses	net income	revenue
total asset	1.0	0.98	0.90	0.99	0.95	0.98	0.95	0.54	0.96
fixed asset	0.98	1.0	0.82	0.99	0.91	0.99	0.91	0.50	0.92
current asset	0.90	0.82	1.0	0.84	0.88	0.81	0.90	0.60	0.93
total liabilities	0.99	0.99	0.84	1.0	0.95	1.0	0.95	0.49	0.95
current liabilities	0.95	0.91	0.88	0.95	1.0	0.93	0.99	0.55	0.99
non-current liabilities	0.98	0.99	0.81	1.0	0.93	1.0	0.92	0.42	0.92
Total expenses	0.95	0.91	0.90	0.95	0.99	0.92	1.0	0.48	0.99
Net income	0.54	0.50	0.60	0.49	0.55	0.42	0.48	1.0	0.56
revenue	0.96	0.92	0.93	0.95	0.99	0.92	0.99	0.56	1.0

 Table 3.1. Correlation Coefficient of the input/output factors in Case A

There are 4 inputs and 2 outputs are used in Case A. There is 2 portions of the study, 1st is BCC model was used and we are looking for minimize the input to produce the same output. 2nd part is to maximize the output base on the input given.

Data analysis of Case A with minimize input model

There are 4 inputs (current asset, total asset, current liabilities and total expenses) and 2 outputs (revenue and net income) in the study. Table 3.2. showed the relative efficiency of the companies.

The companies with a score of 1 are said to be 100% efficient. 100% companies are Bjgroup, Genting, Globetronic, Kobay, LITYAN, LKT, Maxis, PLB, TNB, UNISEM, WCT and YLI. The most inefficient company is MMC with the score of 72.15%. The result is not appropriate because some companies like Bjgroup, which lost money, also showed as 100% efficiency. It is because in BCC model, under the assumption of variable return to scale, all the DMUs with the lowest value of inputs for any of the input or the highest value for any of the output will be consider efficiency. For Bjgroup, though it has lost money in year 2003, it has high revenue. Therefore it appeared as 100% efficiency company. The input/output contribution as shown in Table 4.3 for this study revealed net income does not contribute to the score for most of the optimum efficiency companies like Bjgroup, Globetronic, PLB, TNB, UNISEM.

DMU	Score
ACPI	76.59
AIC	90.24
AKN	89.39
Astro	93.9
Bjgroup	100
Genting	100
GTRONIC	100
Heitech	94.61
KOBAY	100
LITYAN	100
LKT	100
Maxis	100
MMC	72.15
MSNIAGA	96.48
PATIMAS	91.71
PLB	100
Tenaga	100
UNISEM	100
WCT	100
YLI	100

Table 3.2. Relative efficiency of the companies (Case A) with minimize input

 Table 3.3. Input/Output Contributions for Case

	Total	current	current	total	net		_
Companies	asset	asset	liabilities	expenses	income	revenue	Score
ACPI	38	0	0	62	0	100	76.59
AIC	56	44	0	0	0	100	90.24
AKN	16	0	12	72	0	100	89.39
Astro	66	34	0	0	0	100	93.9
Bjgroup	100	0	0	0	0	100	100
Genting	0	0	100	0	27	73	100
GTRONIC	9	0	9	81	0	100	100
Heitech	26	0	0	74	0	100	94.61
KOBAY	100	0	0	0	0	100	100
LITYAN	83	17	0	0	97	3	100
LKT	100	0	0	0	100	0	100
Maxis	0	100	0	0	0	100	100
MMC	0	15	0	85	0	100	72.15
MSNIAGA	69	0	0	31	0	100	96.48
PATIMAS	22	0	0	78	0	100	91.71
PLB	100	0	0	0	0	100	100
TNB	0	100	0	0	0	100	100
UNISEM	0	13	0	87	0	100	100
WCT	100	0	0	0	10	90	100
YLI	0	0	0	100	100	0	100

DMU	Score
ACPI	26.76
AIC	24.55
AKN	44.44
Astro	68.6
Bjgroup	1.23
Genting	100
GTRONIC	62.95
Heitech	58.73
KOBAY	100
LITYAN	100
LKT	100
Maxis	100
MMC	34.64
MSNIAGA	61.88
PATIMAS	39.68
PLB	74.27
Tenaga	18.26
UNISEM	42.71
WCT	31.55
YLI	100

Table 3.4. Relative efficient of the companies- (only net income as output)

Table 3.5. Input/Output Contributions for Case A (net income as output)

Companies	Total asset	current asset	current liabilities	total expenses	net income	Score
ACPI	0	0	0	100	100	26.76
AIC	38	62	0	0	100	24.55
AKN	10	90	0	0	100	44.44
Astro	100	0	0	0	100	68.6
Bjgroup	53	47	0	0	0	1.23
Genting	0	10	90	0	100	100
GTRONIC	100	0	0	0	100	62.95
Heitech	100	0	0	0	100	58.73
KOBAY	89	11	0	0	100	100
LITYAN	0	100	0	0	100	100
LKT	0	84	16	0	100	100
Maxis	0	2	98	0	100	100
MMC	0	0	0	100	100	34.64
MSNIAGA	100	0	0	0	100	61.88
PATIMAS	58	42	0	0	100	39.68
PLB	100	0	0	0	100	74.27
TNB	0	2	98	0	100	18.26
UNISEM	0	66	34	0	100	42.71
WCT	100	0	0	0	100	31.55
YLI	100	0	0	0	100	100

The result shown net income does not play important role to determine the efficiency of the companies as compare to revenue. However, the investors have more concern on the net income of the companies. With this, revenue was removes as output factor, we remain net income as the only output factor in the study.

There are 6 companies get optimum efficiency. They are Kobay, Lityan, LKT, Maxis, Genting and YLI These were the companies have 100% relative efficiency compare to other companies. These 6 companies have their own strength base on the weight giving to the factors. The input/output contributions in Table 3.5 show the different.

From the table 3.5, we observed that YLI has optimum efficiency because it has low total asset but giving high net income in term of ratio compare to other companies. It is expected that by increasing the investment in equipments or expanding in production floor, it will increased the net income for this company.

Current liability is referring to the short term loan. Usually a company borrows money to expend their company with hoping that can generate more revenue and income. In the case for Maxis, it has low current liability with high net income.

Kobay, Lityan & LKT are the companies losing money in Year 2003. Due to the adjustment on the net income value, these companies were shown as efficiency DMU. It is because base on the asset they have, the lost in this year is small as compare to other companies like Bjgroup.

	Optimum							
Inefficient		-	DN	10				
DMUs	KOBAY	LITYAN	LKT	Maxis	Genting	YLI		
ACPI			Х			Х		
AIC	Х	Х				X		
AKN		Х		Х		X		
Astro				Х		Х		
Bjgroup	Х	Х						
GTRONIC				Х		Х		
Heitech			Х					
MMC				Х		Х		
MSNIAGA			Х			Х		
PATIMAS	Х		Х			Х		
PLB			Х			Х		
TNB				Х	Х	Х		
UNISEM	X	Х				X		
WCT				Х		Х		
Total number	4	4	5	6	1	12		

Table 3.6. Reference set for inefficiency companies

Table 3.5 showed that Genting, Maxis and YLI do not have input/output contribution from total expenses. It is because total expense is not an important factor to determine the net income of these companies. For some companies, they may spend a lot of money but the return does not grow relative with the expenditure. However, for some companies, they may spend money in the

right ways that help to increase the company's revenue. One of the examples is proper advertising and promotion.

For the companies that do not getting the optimum efficiency, Frontier analysis gives a set of optimum DMU as their reference. The reference DMU for the inefficient companies in this study is showed in Table 3.6. Only company with similar input and output will be chosen as reference DMU. For Genting, the company size is bigger than many other companies, therefore it is not chosen to be the reference DMU for any of the companies in the study except TNB.

Each inefficient DMU have one or more optimum DMU as their reference to increase their efficiency. As an example, Maxis and YLI were proposed to be the reference DMU for Astro by Frontier Analysis.



Chart 3.1. Potential improvement chart for Astro against Maxis

Chart 3.1 is a chart display in the Potential Improvements with all the input/output variables along the side (Y axis), and the potential percentage improvement along the bottom (X axis). The percentage improvement for each input and output that the DMU would need to make in order to become efficient is shown in the form of graphical bars. Chart 4.1 showed the comparison between Astro and Maxis. The table shows Maxis is bigger than Astro in term of size. Maxis is operating at very high cost to generate the high net income. It is a good reference for Astro.

YLI is one of the well-managed companies in this study. It has very minimum asset, liabilities and expenses, which is used to generate a very good return. However, it may not be a good reference for Astro because Astro just started its business. Astro may not able to reduce its expenses because it needs to spend more money to grasp business in oversea. At the same time, it needs to do more investment and promotion to enhance its reputation. Meanwhile, it is not advisable to reduce the liabilities and asset for improving the efficiency. The only way for Astro to improve its efficiency is by increasing the net income at the same or slightly higher level of expenses.



Chart 3.2. Potential improvement chart for Astro against YLI



Graph 3.1. Reference Contribution for Astro

Graph 3.1 is a graph displays the extent to which each reference DMU has in determining the efficiency rating given to the displayed DMU in the Reference Contributions panel. The contribution by each reference DMU to each input or output comparison is displayed as a percentage. This graph can help us to judge the information provided by the reference comparison panel. If a DMU had little influence in it's rating, then it is probably not a good reference DMU to compare the inefficient DMU with. However, if such a reference DMU has great influence on just one or two inputs or outputs, then it can prompt investigation of those aspects. The Graph 3.1 show Maxis is a better reference DMU to Astro.

For an inefficiency company to improve their efficiency, they need to reduce their input or increase their output. It is shown in Potential Improvement Table. Tables 3.7 show the target and % of changes that can be made by the DMU to increase the efficiency. In this study, minimize input was selected. The table showed how much the input amount has to be reduced while maintaining the output, so that the efficiency of the company can be improved.

		Actual	Target	Potential improvement
Inputs	total asset	17.82	12.23	-31.4
	current asset	5.15	3.27	-36.56
	total liabilities	29.67	5.81	-83.78
	current liabilities	16.42	3.48	-78.81
	total expenses	12.53	5.2	-58.48
Outputs	net income	7.4	7.4	0

Base on Table 3.7, the negative value of the % of changes for input indicates that the input do not fully utilized. Base on the data for Astro, the % of changes for current asset is -36.56%. It shows that there is 36.56% current asset was not fully utilized. Astro can increase the efficiency by fully utilize the Deposits, cash and bank balances which is RM 1,740,255000 (equal to 84.7% of the current asset). At the same time, Astro can improve the inventory control (mainly for set top box), which is RM 36,653000 (equal to 1.8% of current asset) for year 2003.

Table 3.8. The relative ef	ficiency of the companies
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DMU	Score
	75.4
ACPI	75.4
AIC	74.12
AKN	89.18
Astro	82.49
Bjgroup	0
Genting	100
GTRONIC	94.36
Heitech	93.04
KOBAY	100
LITYAN	100
LKT	100
Maxis	100
MMC	64.96
MSNIAGA	93.15
PATIMAS	84.81
PLB	92.03
Tenaga	66.77
UNISEM	84.78
WCT	69.85
YLI	100

Data analysis of Case A with maximize output model

There are 4 inputs (current asset, total asset, current liabilities and total expenses) and one output (net income) in the study. Table 3.8 showed the relative efficiency of the companies. The companies with optimum efficiency were Genting, KOBAY, LITYAN, LKT, Maxis and YLI. Bjgroup achieved 0 % efficiency. It was the 3rd largest company in term of input amount in the list but it lost the most money in year 2003.

Table 3.9 showed the input / output contribution. Both Genting and Maxis has high net income to current liabilities ratio. Whereas YLI has low total asset value (RM 150204683) with high net income (RM 26870795).

	total	current	current		net	
Companies	asset	asset	liabilities	total expenses	income	Score
ACPI	100	0	0	0	100	75.4
AIC	100	0	0	0	100	74.12
AKN	6	0	94	0	100	89.18
Astro	100	0	0	0	100	82.49
Bjgroup	12	31	26	31	100	0
Genting	0	10	90	0	100	100
GTRONIC	100	0	0	0	100	94.36
Heitech	100	0	0	0	100	93.04
КОВАҮ	61	39	0	0	100	100
LITYAN	0	100	0	0	100	100
LKT	0	84	16	0	100	100
Maxis	0	2	98	0	100	100
MMC	0	0	0	100	100	64.96
MSNIAGA	100	0	0	0	100	93.15
PATIMAS	100	0	0	0	100	84.81
PLB	100	0	0	0	100	92.03
TNB	25	25	25	25	100	66.77
UNISEM	0	90	10	0	100	84.78
WCT	100	0	0	0	100	69.85
YLI	100	0	0	0	100	100

Table 3.9. Input/Output Contributions

Table 3.10 showed reference set frequency for Maxis and YLI is 14 and 11 respectively. It is because they have high output to input ratio. They became the reference company for most of the companies in the list.

			Optim	um				
Inefficient	DMU							
DMUs	KOBAY	LITYAN	LKT	Maxis	Genting	YLI		
ACPI				Х		Х		
AIC				Х		Х		
AKN				Х	Х	Х		
Astro				Х		Х		
Bjgroup				Х				
GTRONIC				Х		Х		
Heitech				Х				
MMC				Х		Х		
MSNIAGA				Х		Х		
PATIMAS				Х		Х		
PLB				Х		Х		
Tenanga				Х				
UNISEM		X		Х		X		
WCT				Х		Х		
Total number	0	1	0	14	1	11		

 Table 3.10. Reference set for inefficiency companies

In maximize output model, the objective of the companies is to increase their output by maintaining their input. Table 3.11 showed the potential improvement of the companies. For ACPI, it should achieve RM 472000000 with the input given as refer to the reference company, Maxis and YLI. It has 31.97% room for improvement.

DMUs	Actual	Target	Potential Improvement
ACPI	3.58	4.75	32.63
AIC	3.28	4.42	34.91
AKN	3.62	4.06	12.13
Astro	6.13	7.43	21.23
Bjgroup	0	21.78	2178200
GTRONIC	3.66	3.88	5.98
Heitech	3.6	3.87	7.48
MMC	4.48	6.89	53.94
MSNIAGA	3.56	3.82	7.35
PATIMAS	3.42	4.03	17.9
PLB	3.38	3.67	8.67
TNB	14.55	21.78	49.76
UNISEM	3.34	3.93	17.95
WCT	4.11	5.88	43.17

 Table 3.11. Potential Improvement Table

Comparison between Min-input and Max-output model

Minimize input model and maximize output model give different efficiency level in BCC approach. In CCR approach, it will give the same score for all the DMUs. Table 3.12 showed the

comparison of the efficiency of the company by using minimize input model and maximize output model.

	Score		
DMUs	Max-output	Min-input	
ACPI	75.4	26.76	
AIC	74.12	24.55	
AKN	89.18	44.44	
Astro	82.49	68.6	
Bjgroup	0	1.23	
Genting	100	100	
GTRONIC	94.36	62.95	
Heitech	93.04	58.73	
KOBAY	100	100	
LITYAN	100	100	
LKT	100	100	
Maxis	100	100	
MMC	64.96	34.64	
MSNIAGA	93.15	61.88	
PATIMAS	84.81	39.68	
PLB	92.03	74.27	
TNB	66.77	18.26	
UNISEM	84.78	42.71	
WCT	69.85	31.55	
YLI	100	100	

Table 3.12. The	comparison	of relative	efficiency	of max-out	out and m	in-innut model
1 abic 5.12. 11c	comparison	of relative	cificiency	or max-out	put anu m	m-mput mouci

The 6 companies achieved optimum efficiency in min-input model do achieved optimum efficiency in max-output model. There are Kobay, Lityan, LKT, Maxis, Genting and YLI. Table 4.12 showed that max-output model gave higher efficiency value. ACPI and AIC have 75.4 % and 74.12% of efficiency in Max-output model whereas in min-input model, they got 26.76% and 24.55% of efficiency respectively. This result revealed that it is easier for those inefficiency company to improve and become efficiency company if they follow maximize output approach.

In minimize input model, ACPI needs to reduce its input amount and maintaining the output to make it to be an efficiency company. ACPI need to reduce total asset value by 77.06%, current asset by 81.24%, total liabilities by 92.58%, current liabilities by 92.87% and total expenses by 73.24% as shown in Table 3.13. Whereas in minimize input model, current asset by 52.2%, current liabilities by 0.87% and total expenses by 3.42% and at the same time increase its net income by 32.63% in Table 3.14. From Table 3.13 and Table 3.14, it revealed that it is easier for ACPI to follow minimize-input model than maximize-output model

Table 3.15 showed the ranking of the company in term of efficiency score from the worst to the best. In maximize output approach, the worst is Bjgroup, followed by MMC, TNB, WCT, AIC, ACPI, Astro, Patimas, Unisem, AKN, PLB, Heitech, MSNIAGA, Globetronic. Genting, Kobay, Lityan,LKT, Maxis and YLI are the company achieved optimum efficiency. In minimize-input

model, the worst is Bjgroup, followed by TNB, AIC, ACPI, WCT, MMC, Patimas, AKN, Unisem, Heitech, MSNIAGA, Globetronic, Astro and PLB. Genting, Kobay, Lityan, LKT, Maxis and YLI are the company achieved optimum efficiency.

Inputs	total asset	6.26	1.44	-77.06
	current asset	3.93	0.74	-81.24
	current liabilities	1.62	0.12	-92.87
	total expenses	2.84	0.76	-73.24
Outputs	net income	3.58	3.58	0

Table 3. 13. Potential Improvement Table for ACPI in minimize inp

Table 3.14. Potential improvement Table for ACPI in maximize output model

Inputs	total asset	6.26	6.26	0
	current asset	3.93	1.88	-52.2
	current liabilities	1.62	1.61	-0.87
	total expenses	2.84	2.74	-3.42
Outputs	net income	3.58	4.75	32.63

Table 3. 15	. Ranking o	of the com	pany from	the worst	to the best
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	Max output model		Min inp mode	out I
Rank	DMUs	Score	DMUs	Score
1	Bjgroup	0	Bjgroup	1.23
2	MMC	64.96	TNB	18.26
3	TNB	66.77	AIC	24.55
4	WCT	69.85	ACPI	26.76
5	AIC	74.12	WCT	31.55
6	ACPI	75.4	MMC	34.64
7	Astro	82.49	PATIMAS	39.68
8	PATIMAS	84.78	AKN	42.71
9	UNISEM	84.81	UNISEM	44.44
10	AKN	89.18	Heitech	58.73
11	PLB	92.03	MSNIAGA	61.88
12	Heitech	93.04	GTRONIC	62.95
13	MSNIAGA	93.15	Astro	68.6
14	GTRONIC	94.36	PLB	74.27
15	Genting	100	Genting	100
16	KOBAY	100	KOBAY	100
17	LITYAN	100	LITYAN	100
18	LKT	100	LKT	100
19	Maxis	100	Maxis	100
20	YLI	100	YLI	100

Table 3.16 showed the number of the optimum companies to be the reference set of inefficiency company. YLI and Maxis have 23 and 20 times to be the reference set respectively. Both companies have very good financial performance in year 2003. Whereas for Genting, due to the outbreak of the Severe Acute respiratory Syndrome ("SARS") and Iraq war, the performance of the company was adversely affected. Another reason is the size of Genting is big compare to most of the companies in the list. Hence it was not used as reference company. We can conclude that the best company from the list is YLI and followed by Maxis.

Inefficient	Optimum DMU					
DMUs	KOBAY	LITYAN	LKT	Maxis	Genting	YLI
Min-input	4	4	5	6	1	12
Max-output	0	1	0	14	1	11
Total Number	4	5	5	20	2	23

Table 3.16. Frequency to be reference set companies

Data analysis for Case B

First of all, a correlation coefficient study was carried out. There are 3 inputs and 3 outputs involved in the study. Table 3.17 showed the correlation of the input and output.

]	Table 3.17. Cor	relation Co	efficient o	of the input/out	put fa	ctors i	n Case I
1		current ratio	debt ratio	debt-equity ratio	ROE	ROA	EPS/100
	Current ratio	1.0	-0.65	-0.23	0.30	0.20	0.25
	Debt ratio	-0.65	1.0	0.53	-0.52	-0.28	-0.24
	debt-equity ratio	-0.23	0.53	1.0	-0.73	-0.29	-0.34
	ROE	0.30	-0.52	-0.73	1.0	0.63	0.70
	ROA	0.20	-0.28	-0.29	0.63	1.0	0.69
	EPS	0.25	-0.24	-0.34	0.70	0.69	1.0

B

Table 3..17-showed debt ratio and debt to equity ratio have negative relation with the outputs. It means the increase of the debt ratio and debt-to-equity ratio will cause the decrease of the output and vice versa. Therefore the value for debt ratio and debt-to-equity ratio were inversed.

Table 3.18. Correlation Coefficient of the input/output factors in Case B (with the inverse value of debt ratio and debt-to-equity ratio)

	current ratio	debt ratio	debt-equity ratio	ROE	ROA	EPS
Current ratio	1.0	0.81	0.28	0.30	0.20	0.25
Inverse of debt ratio	0.81	1.0	0.42	0.29	0.24	0.12
Inverse of debt-equity ratio	0.28	0.42	1.0	0.25	0.19	0.05
ROE	0.30	0.29	0.25	1.0	0.63	0.70
ROA	0.20	0.24	0.19	0.63	1.0	0.69
EPS	0.25	0.12	-0.05	0.70	0.69	1.0

Table 3.18 showed the correlation between the input and output is low. This result revealed that the increase of the input do not have much impact on the output. That means the current ratio, inverse of debt ratio and the inverse of debt-to-equity ratio do not determine the ROE, ROA and EPS of the companies. The selection of the input and output factors is not appropriate. The conclusion from this study may not be meaningful. To further confirm the statement, a comparison of the efficiency of the companies for Case A and Case B was carried out.

	Score		
DMU	Case B	Case A	
ACPI	63.62	26.76	
AIC	54.04	24.55	
AKN	52.98	44.44	
Astro	100	68.6	
Bjgroup	54.75	1.23	
Genting	100	100	
GTRONIC	100	62.95	
Heitech	85.44	58.73	
KOBAY	34.54	100	
LITYAN	100	100	
LKT	100	100	
Maxis	100	100	
MMC	48.49	34.64	
MSNIAGA	100	61.88	
PATIMAS	100	39.68	
PLB	79.78	74.27	
TNB	87.74	18.26	
UNISEM	100	42.71	
WCT	63.8	31.55	
YLI	100	100	

Table 3.19. Efficiency comparison of companies for Case A and Case B

Table 3.19 showed Astro, Genting, Globetronic, MSNIAGA, Patimas and Unisem are the companies achieve 100% efficiency in Case B but not in Case A. With this, we confirmed the result from Case B is doubtful.

To verify the selection of current ratio, inverse of debt ratio and inverse of debt-to-equity ratio as output factors, the correlation coefficient study for current ratio, inverse of debt ratio and inverse of debt-to-equity ratio against net income of the companies was carried out. Graph 3.2 showed there is no pattern between current ratio and net income. The *R*-square value is -0.15. Graph 3.3 showed the inverse of debt ratio has no impact to net income of the companies. Graph 3.4 showed there is no trend for the inverse of debt-to-equity ratio against net income. Some companies has low debt-to-equity ratio with low net income. Whereas, for some companies has high debt-to equity ratio with low net income. AKN has 1.45 inverse of debt-to-equity ratio with RM 25391000 net income. Globetronic has 79.86 inverse of debt-to-equity ratio with RM 29163703 net income. With this, we can conclude that there is no significant relationship

between these input factors with companies' net income. With the analysis in above, we can conclude that the further analysis of this study is not necessary.



Graph 3.2. The correlation of current ratio against net income

Graph 3.3. The correlation of inverse of debt ratio against net income



Graph 3.4. The correlation of inverse of Debt-to-equity ratio against net income



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28

CONCLUSION

Kobay, Lityan, LKT, Maxis, Genting and YLI were the companies achieved 100% efficiency. Strong financial background and high profit margin make Genting, Maxis and YLI to be an efficient company. From the result, we believe that Genting, Maxis and YLI are the company worth to be invested. These are the company able to give good dividend and good stock price appreciation in long run.

Whereas, Kobay, Lityan & LKT were the companies losing money in Year 2003. Due to the adjustment on the net income value, these companies were shown as efficiency DMU. While compare to the lost in Bjgroup, the lost in Kobay, Lityan & LKT were negligible. However, we should not recommend these companies to the investors. These companies have some room for improvement. It is not recommended to reduce the input amount in these companies because they are average size. It would be better for the companies to increase their output value base on the input value that they have. From this study, we can conclude that the solution method that we used to overcome the negative value in the output factor has its limitation. Therefore, we need to study and interpret the result before jump into the conclusion.

In the other hand, ACPI, AIC, AKN, Astro, Bjgroup, Globetronic, Heitech, MMC, MSNIAGA, Patimas, PLB, TNB, Unisem and WCT were not performed in year 2003. The main reason were the slow down of the global IT and telecom industries since 2001, the Severe Acute respiratory Syndrome ("SARS") outbreak and Iraq war in the first half of year 2003. However, SARS outbreak was over and the global industry is gradually showing signs of recovering. As the global semiconductor market is improving, it is expected the business condition to improve. The next challenge to these companies is the international competition, which is likely to be much stronger. In order for the inefficient companies to improve, the management should work even harder. The potential improvement table in Appendix B and C can be used as a guideline for them to improve their business. The study showed that it is easier for the inefficiency company to become efficiency company if they follow maximize-output model compare to minimize-input model.

However, we need to remember that the calculations are based on historical figures. The figures can be twisted and squeezed into various numbers, depending on how a company wants to present it. In trading, it is impossible to be right all the time; in the other word, no trading system can make us make money all the time. The goal is to cut our losses when we are wrong and let the profits run when we are right.

From the study, we can conclude that the selection of the input and output factors are crucial. We may need to study and understand the relation of the input and output factors before we start the analysis. The result from Case B showed that there is no strong relationship between inputs and outputs factors. With this, the result and conclusion from the study is doubtful.

DEA make the analysis of the financial performance easier and simpler. The investors only need to look at the percentage of efficiency of the company. It tells which company able to give good return and which company not performing. DEA result serves as the first pass screening result. It shorter the time of the investor to look into those poor performs companies. They can further

study on the financial performance on the companies with giving good percentage of efficiency by using other financial analysis tools.

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Appendix A

Potential Improvement Table for Case A (Minimize-input model)

Company	Inputs / Outputs	Factors	Actual	Target	Potential Improvement
1 2	1			U	
	Inputs	total asset	6.26	1.44	-77.06
		current asset	3.93	0.74	-81.24
ACPI		current liabilities	1.62	0.12	-92.87
		total expenses	2.84	0.76	-73.24
	Outputs	net income	3.58	3.58	0

Company	Inputs / Outputs	Factors	Actual	Target	Potential Improvement
	Inputs	total asset	4.86	1.19	-75.45
		current asset	2.13	0.52	-75.45
AIC		current liabilities	1.4	0.21	-85.32
		total expenses	4.44	0.73	-83.52
	Outputs	net income	3.28	3.28	0

Company	Inputs / Outputs	Factors	Actual	Target	Potential Improvement
	Inputs	total asset	3.61	1.6	-55.56
		current asset	1.68	0.75	-55.56
AKN		current liabilities	0.68	0.18	-74.26
		total expenses	2.18	0.8	-63.11
	Outputs	net income	3.62	3.62	0

Company	Inputs / Outputs	Factors	Actual	Target	Potential Improvement
Company Astro	Inputs	total asset	17.82	12.22	-31.4
		current asset	5.15	3.27	-36.56
Astro		current liabilities	16.42	3.48	-78.81
		total expenses	12.53	5.2	-58.48
	Outputs	net income	6.13	6.13	0

Company	Inputs / Outputs	Factors	Actual	Target	Potential Improvement
	Inputs	total asset	111.1	1.37	-98.77
		current asset	36.23	0.45	-98.77
Bjgroup		current liabilities	33.05	0.33	-99.01
		total expenses	68.38	0.73	-98.93
	Outputs	net income	0	3.25	324401.44

	Inputs /				Potential
Company	Outputs	Factors	Actual	Target	Improvement
	Inputs	total asset	2.54	1.6	-37.05
	•	current asset	1.48	0.79	-46.42
Globetronic		current liabilities	0.62	0.14	-77.25
		total expenses	3.04	0.82	-73
	Outputs	net income	3.66	3.66	0
	Inputs /				Potential
Company	Outputs	Factors	Actual	Target	Improvement
	Inputs	total asset	2.48	1.46	-41.27
		current asset	1.3	0.75	-42.49
Heitech		current liabilities	0.56	0.11	-79.69
		total expenses	1.98	0.77	-61.3
	Outputs	net income	3.6	3.6	0
		1			11
	Inputs /				Potential
Company	Outputs	Factors	Actual	Target	Improvement
	Inputs	total asset	70	5.11	-92.7
		current asset	8.5	1.61	-81.05
MMC		current liabilities	4.79	1.24	-74.02
		total expenses	6.55	2.27	-65.36
	Outputs	net income	4.48	4.48	0
	T . /				
Company	Inputs /	Factors	Actual	Targat	Potential
Company	Junuto	Factors			
		total asset	2.29	1.42	-36.12
	mputs	aurrant accat	1 72	0.72	57.06
MSNUAGA	mputs	current asset	1.73	0.73	-57.96
MSNIAGA	inputs	current asset current liabilities	1.73 0.78	0.73 0.12	-57.96 -84.99 70.80
MSNIAGA	Outputs	current asset current liabilities total expenses	1.73 0.78 2.59 3.56	0.73 0.12 0.75 2.56	-57.96 -84.99 -70.89
MSNIAGA	Outputs	current asset current liabilities total expenses net income	1.73 0.78 2.59 3.56	0.73 0.12 0.75 3.56	-57.96 -84.99 -70.89 0
MSNIAGA	Outputs	current asset current liabilities total expenses net income	1.73 0.78 2.59 3.56	0.73 0.12 0.75 3.56	-57.96 -84.99 -70.89 0
MSNIAGA	Outputs Outputs / Outputs	current asset current liabilities total expenses net income	1.73 0.78 2.59 3.56	0.73 0.12 0.75 3.56	-57.96 -84.99 -70.89 0 Potential
MSNIAGA Company	Outputs Outputs Inputs Inputs	current asset current liabilities total expenses net income Factors total asset	1.73 0.78 2.59 3.56 Actual	0.73 0.12 0.75 3.56 Target	-57.96 -84.99 -70.89 0 Potential Improvement -60.32
MSNIAGA Company	Outputs Inputs / Outputs Inputs	current asset current liabilities total expenses net income Factors total asset current asset	1.73 0.78 2.59 3.56 Actual 3.2 1.64	0.73 0.12 0.75 3.56 Target 1.27 0.65	-57.96 -84.99 -70.89 0 Potential Improvement -60.32 -60.32
MSNIAGA Company Patimas	Outputs Inputs / Outputs Inputs	current asset current liabilities total expenses net income Factors total asset current asset	1.73 0.78 2.59 3.56 Actual 3.2 1.64 1.47	0.73 0.12 0.75 3.56 Target 1.27 0.65 0.13	-57.96 -84.99 -70.89 0 Potential Improvement -60.32 -60.32 -91.13
MSNIAGA Company Patimas	Outputs Inputs / Outputs Inputs	current asset current liabilities total expenses net income Factors total asset current asset current liabilities total expenses	1.73 0.78 2.59 3.56 Actual 3.2 1.64 1.47 3.12	0.73 0.12 0.75 3.56 Target 1.27 0.65 0.13 0.71	-57.96 -84.99 -70.89 0 Potential Improvement -60.32 -60.32 -91.13 -77.3
MSNIAGA Company Patimas	Outputs Outputs Inputs Inputs Outputs Outputs	current asset current liabilities total expenses net income Factors total asset current asset current liabilities total expenses net income	1.73 0.78 2.59 3.56 Actual 3.2 1.64 1.47 3.12 3.42	0.73 0.12 0.75 3.56 Target 1.27 0.65 0.13 0.71 3.42	-57.96 -84.99 -70.89 0 Potential Improvement -60.32 -60.32 -91.13 -77.3 0
MSNIAGA Company Patimas	Outputs Inputs / Outputs Inputs Outputs	current asset current liabilities total expenses net income Factors total asset current asset current liabilities total expenses net income	1.73 0.78 2.59 3.56 Actual 3.2 1.64 1.47 3.12 3.42	0.73 0.12 0.75 3.56 Target 1.27 0.65 0.13 0.71 3.42	-57.96 -84.99 -70.89 0 Potential Improvement -60.32 -60.32 -91.13 -77.3 0
MSNIAGA Company Patimas	Outputs Outputs Inputs Outputs Inputs Inputs Inputs Outputs Inputs	current asset current liabilities total expenses net income Factors total asset current asset current liabilities total expenses net income	1.73 0.78 2.59 3.56 Actual 3.2 1.64 1.47 3.12 3.42	0.73 0.12 0.75 3.56 Target 1.27 0.65 0.13 0.71 3.42	-57.96 -84.99 -70.89 0 Potential Improvement -60.32 -60.32 -91.13 -77.3 0
MSNIAGA Company Patimas	Outputs Outputs Inputs Inputs Outputs Outputs Inputs Inputs Outputs Inputs	current asset current liabilities total expenses net income Factors total asset current asset current liabilities total expenses net income Factors	1.73 0.78 2.59 3.56 Actual 3.2 1.64 1.47 3.12 3.42	0.73 0.12 0.75 3.56 Target 1.27 0.65 0.13 0.71 3.42 Target	-57.96 -84.99 -70.89 0 Potential Improvement -60.32 -60.32 -91.13 -77.3 0 Potential Improvement
MSNIAGA Company Patimas Company	Outputs Outputs Outputs Inputs Outputs Outputs Inputs / Outputs Inputs	current asset current liabilities total expenses net income Factors total asset current liabilities total expenses net income Factors total asset	1.73 0.78 2.59 3.56 Actual 3.2 1.64 1.47 3.12 3.42 Actual 1.65	0.73 0.12 0.75 3.56 Target 1.27 0.65 0.13 0.71 3.42 Target 1.23	-57.96 -84.99 -70.89 0 Potential Improvement -60.32 -60.32 -91.13 -77.3 0 Potential Improvement -25.73
MSNIAGA Company Patimas Company	Outputs Outputs Inputs Outputs Inputs Outputs Inputs Inputs Inputs Inputs Inputs Inputs Inputs Inputs	current asset current liabilities total expenses net income Factors total asset current asset current liabilities total expenses net income Factors total asset current asset	1.73 0.78 2.59 3.56 Actual 3.2 1.64 1.47 3.12 3.42 Actual 1.65 1.18	0.73 0.12 0.75 3.56 Target 1.27 0.65 0.13 0.71 3.42 Target 1.23 0.63	-57.96 -84.99 -70.89 0 Potential Improvement -60.32 -60.32 -91.13 -77.3 0 Potential Improvement -25.73 -46.71
MSNIAGA Company Patimas Company PLB	Outputs Outputs Inputs Outputs Inputs Outputs Inputs Inputs Inputs Inputs Inputs Inputs Inputs	current asset current liabilities total expenses net income Factors total asset current liabilities total expenses net income Factors total asset current asset	1.73 0.78 2.59 3.56 Actual 3.2 1.64 1.47 3.12 3.42 Actual 1.65 1.18 0.63	0.73 0.12 0.75 3.56 Target 1.27 0.65 0.13 0.71 3.42 Target 1.23 0.63 0.13	-57.96 -84.99 -70.89 0 Potential Improvement -60.32 -60.32 -91.13 -77.3 0 Potential Improvement -25.73 -46.71 -78.81
MSNIAGA Company Patimas Company PLB	Outputs Outputs Inputs Inputs Outputs Outputs Inputs Inputs Inputs Inputs Inputs Inputs	current labilities current liabilities total expenses net income Factors total asset current liabilities total expenses net income Factors total asset current liabilities total asset current asset current asset current asset current liabilities total asset current liabilities total asset current liabilities total asset current liabilities total asset current liabilities	1.73 0.78 2.59 3.56 Actual 3.2 1.64 1.47 3.12 3.42 Actual 1.65 1.18 0.63 1.7	0.73 0.12 0.75 3.56 Target 1.27 0.65 0.13 0.71 3.42 Target 1.23 0.63 0.13 0.63 0.13 0.69	-57.96 -84.99 -70.89 0 Potential Improvement -60.32 -60.32 -91.13 -77.3 0 Potential Improvement -25.73 -46.71 -78.81 -59.19

	Inputs /				Potential
Company	Outputs	Factors	Actual	Target	Improvement
Company	Inputs	total asset	599.57	52.71	-91.21
		current asset	74.29	13.57	-81.74
TNB		current liabilities	80.99	14.79	-81.74
		total expenses	137.94	20.36	-85.24
	Outputs	/ Factors Actual s Factors Actual total asset 599.57 current asset 74.29 current liabilities 80.99 total expenses 137.94 s net income 14.55	14.55	0	

Company	Inputs / Outputs	Factors	Actual	Target	Potential Improvement
Company	Inputs	total asset	7.07	1.73	-75.5
		current asset	1.01	0.43	-57.29
UNISEM		current liabilities	1.09	0.47	-57.29
		total expenses	2.1	0.76	-64.04
	Outputs	net income	3.34	3.34	0

	Inputs /				Potential
Company	Outputs	Factors	Actual	Target	Improvement
	Inputs	total asset	11.13	3.51	-68.45
		current asset	6.39	1.24	-80.62
WCT		current liabilities	5.06	0.74	-85.33
		total expenses	8.47	1.61	-81
	Outputs	net income	4.11	4.11	0

Appendix B

Potential Improvement Table for Case A (Maximize-output model)

	Inputs /				Potential
Company	Outputs	Factors	Actual	Target	Improvement
Company ACPI	Inputs	total asset	6.26	6.26	0
		current asset	3.93	1.88	-52.2
ACPI		current liabilities	1.62	1.61	-0.87
		total expenses	2.84	2.74	-3.42
	Outputs	net income	3.58	4.75	32.63

Company	Inputs / Outputs	Factors	Actual	Target	Potential Improvement
Company	Inputs	total asset	4.86	4.86	0
		current asset	2.13	1.55	-27.12
AIC		current liabilities	1.4	1.17	-16.72
		total expenses	4.44	2.17	-51.23
	Outputs	net income	3.28	4.42	34.91

	Inputs /				Potential
Company	Outputs	Factors	Actual	Target	Improvement
	Inputs	total asset	3.61	3.61	0
		current asset	1.68	1.32	-21.48
AKN		current liabilities	0.68	0.68	0
		total expenses	2.18	1.55	-28.95
	Outputs	net income	3.62	4.06	12.13
· · · · · · · · · · · · · · · · · · ·		1			1
	Inputs /				Potential
Company	Outputs	Factors	Actual	Target	Improvement
	Inputs	total asset	17.82	17.82	0
		current asset	5.15	4.57	-11.26
Astro		current liabilities	16.42	5.24	-68.09
		total expenses	12.53	7.51	-40.07
	Outputs	net income	6.13	7.43	21.23
					1
G	Inputs /			m .	Potential
Company	Outputs	Factors	Actual	Target	Improvement
	Inputs	total asset	111.1	79.49	-28.45
- 1		current asset	36.23	18.93	-47.75
Bjgroup		current liabilities	33.05	24.62	-25.51
Bjgroup		total expenses	68.38	32.94	-51.83
	Outputs	net income	0	21.78	2178200
	T . /				D 1
Company	Inputs /	Factors	Actual	Torgot	Potential
Company	Inputs	total asset	2 54	2 54	
	mputs	ourrant asset	1.74	2.34	21.61
Globetronic		current liabilities	0.62	0.44	-31.01
Olobettollie		total expenses	3.04	1.21	-29.34
	Outpute	not incomo	3.04	2.99	-00.24
	Outputs	net income	5.00	5.88	5.90
	Inpute /				Potential
Company	Outputs /	Factors	Actual	Target	Improvement
company	Inputs	total asset	2.48	2.48	0
	mputo	current asset	13	1	-23.22
Heitech		current liabilities	0.56	0.42	-25.36
		total expenses	1.98	1.18	-40.2
	Outputs	net income	3.6	3.87	7.48
	Outputs	net meome	5.0	5.07	7.10
	Inputs /				Potential
Company	Outputs	Factors	Actual	Target	Improvement
	Inputs	total asset	70	15.49	-77.87
		current asset	8.5	4.03	-52.61
MMC		current liabilities	4.79	4.51	-5.9
		total expenses	6.55	6.55	0
	Outputs	net income	1 18	6.89	53.9/

	Inputs /				Potential
Company	Outputs	Factors	Actual	Target	Improvement
	Inputs	total asset	2.29	2.29	0
		current asset	1.73	0.95	-44.86
MSNIAGA		current liabilities	0.78	0.36	-54.07
		total expenses	2.59	1.11	-57.31
	Outputs	net income	3.56	3.82	7.35
	Inputs /				Potential
Company	Outputs	Factors	Actual	Target	Improvement
Patimas	Inputs	total asset	3.2	3.2	0
		current asset	1.64	1.17	-28.91
		current liabilities	1.47	0.64	-56.17
		total expenses	3.12	1.48	-52.53
	Outputs	net income	3.42	4.03	17.9
		I			I
	Inputs /				Potential
Company	Outputs	Factors	Actual	Target	Improvement
PLB	Inputs	total asset	1.65	1.65	0
		current asset	1.18	0.8	-31.79
		current liabilities	0.63	0.16	-75.06
		total expenses	1.7	0.84	-50.48
	Outputs	net income	3.38	3.67	8.67
G	Inputs /	F (A (1	т (Potential
TNB	Outputs	Factors	Actual	Target	Improvement
	Inputs	total asset	599.57	/9.49	-86.74
		current asset	/4.29	18.93	-74.52
		current habilities	80.99	24.62	-69.6
	0 / /	total expenses	137.94	32.94	-/6.12
	Outputs	net income	14.55	21.78	49.76
	Termente /				Detential
Company	Outputs /	Factors	Actual	Target	Improvement
Company	Inputs	total asset	7 07	3 02	
	mputs	current asset	1.01	1.01	0
UNISEM		current liabilities	1.01	1.01	0
		total expenses	2.1	1.65	-21.36
	Outputs	net income	3 34	3.93	17.95
	Outputs	net meome	5.51	5.75	17.55
	Inputs /				Potential
Company	Outputs	Factors	Actual	Target	Improvement
	Inputs	total asset	11.13	11.13	0
		current asset	6.39	3.01	-52.86
WCT		current liabilities	5.06	3.14	-38.02
		total expenses	8.47	4.75	-43.91
	Outputs	not incomo	4.11	5 88	13.17