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THE CAPITAL INVESTMENT DECISION UNDER INFLATION IN VIETNAM: A CASE STUDY

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ABSTRACT

Inflation and its adverse impacts on the economy are attacking Vietnamese enterprises at two-digit level at present. The managers need the effective foreseeing tools to prepare their budget to be suit to the complex evolvement of market economy and wait in front of the possible risks in future. A Cash Budget model which contains the trends of changes in variables under the impact of inflation will help Vietnamese soldering sticks manufacturers to control operational capital sources and forecast on the necessary borrowings as well as the payments in the near future better. ANOVA F-test experiments give the company more alternative choices between different types of machines and outline the initial investment costs of project. Finally, Capital Budgeting methods will assist to check the effectiveness in long-term of the investment. The theories on relationship between normal interest rate, real interest rate and inflation rate such as the Fisher equation, the discount rate of Cash flows therefore are studied carefully to discuss, argue and give out the deep understanding and new perceptions.

Keywords: Cash Budget, New investment, Inflation, Capital Budgeting methods

INTRODUCTION

Research Background

Vietnam is a country that lies in the Asia South East region, an economy area is growing robustly. The Vietnamese consumer price index according to General Statistics Office (2011) increased steadily each year about 10% to 14% and jumped up from 100% in 2005 (base year) to 164.32% in 2010. Those figures reflected a real fact that the inflation rate in Vietnam was too high in the past years.

Facing the troubles of finance companies were wiser to improve and enhance the old equipments by replacing them part-by-part and keeping maintenance regularly such as Viet Duc Welding Electrode Joint Stock Company (VIWELCO). A forecasting model for investing in new equipments in Vietnam under the impact of inflation is built in this paper in hoping to be useful for improving this situation.

Problem Statement and Research Objectives

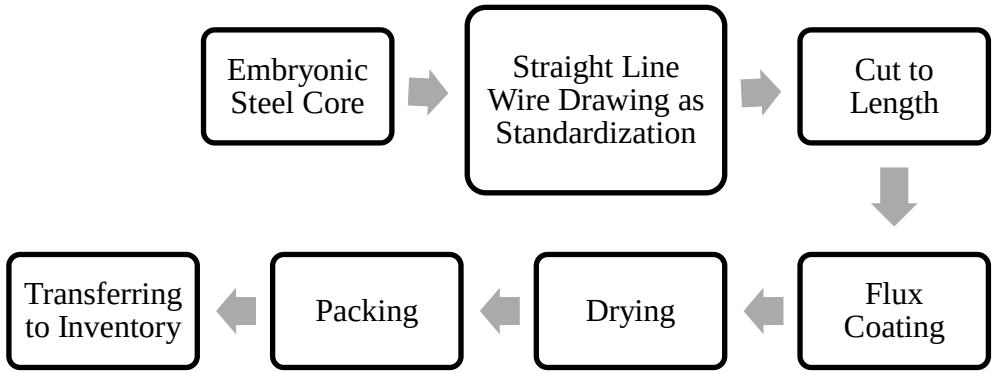
Welding electrodes is an industry which has to load the high input materials expenditures. We can envision total the process of welding electrodes production as the following schema of Ha Viet Company in Figure 1.1 and Figure 1.2:

The schema of process of producing the welding electrodes (2 steps)

Step-1. Flux Process

Figure-1.1. Flux production process

Step-2. Soldering stick Production Process



The Capital Budgeting with inevitable formulas of NPV (Net Present Value), IRR (Internal Rate of Return) compared to the RWACC (Weighted Average Cost of Capital Rate), Profitability index and some financial analysis methods such as the Break-even point analysis, ROA (Return on total assets), ROE (Return on Equity), Operating Leverage, Financial Leverage and Incremental Cash Flows are used to measure the forecasted finance results with illustrative charts. The statistic method of ANOVA – F-test is used to improve the effect on technique to choose the good machines. The NPV and IRR methods are also combined to set up the priority rank. Once one machine is chosen, the built model would be counted in progress. And the results will be discussed in the next Chapters.

Research Significance

A Cash Budget with the estimation on the probable expenditure and income and Pro forma Statements can bring out a whole picture for managers in decision-making process. The ANOVA-F-test will help to check the errors in technicality in trials to run the machines in the first time. It is also helpful for choosing a best machine between different machines, types and models.

LITERATURE REVIEW

To get used to Cash Budget model and financial forecasting methods, the following reviews for formulas will be provided as the guideline for the outcomes in Chapter 4. Follow the introduction in the previous Chapter, the Excel sheets assistant tools will be helpful to hereinafter framework: Firstly, the general assessment on the current financial status of the sampled company will be implemented with preliminary financial statements analysis. Secondly, choosing the best equipment to investment will be started with calculating NPV, IRR, Profitability index in the priority rank, hence transferred to technical experiments with ANOVA F-test, and then finished with computing the training costs for the first months of using. Thirdly, the Cash Budget model will be formulated in the short-term 2 years under the inflationary condition. Finally, the long-term effectiveness of the investment project will be assessed based on the Capital Budgeting combined with Break-even point Analysis methods.

Finance Analysis Formulas

As the starting point and the ending point to ensure a new investment project carried out smoothly, the break-even point analysis method is given to assess the potential of the project. The formulas often used are Break-even in Unit Sales and Break-even in Sales Dollars (Garrison *et al.*, 2011):

Break-even Unit Sales = Fixed expenses / Unit Contribution Margin

Break-even Dollar Sales = Fixed expenses / Contribution Margin Ratio

The odds between the break-even point and the actual sales will demonstrate the growth of Sales over the life-time of the project. A more important factor to assess the current financial health of the company as well as the effectiveness of the project is the rate of return over the operating process of the enterprise. The ratios are considered including:

Return on total assets (ROA) = Net Income / Average total Assets (1)

Or: Return on total assets (ROA) = Net Income / Total Assets (2)

Return on equity (ROE) = Net Income / Stockholders' Equity (3)

Degree of Financial Leverage (DFL) = Earnings before interest and taxes (EBIT) / (EBIT – Total Interest Expense) (4)

A vertical analysis along with the changes in percentage of each term - Common Size Percentages computed in the financial statements is given to compare across items of assets and non-assets over different periods of time and assess the efficiency in using them. Hence, some other accounting

ratios are implemented to allow the financial statements' users to have a nearer look at the current actual status of the company. They are in the following list (Garrison *et al.*, 2011):

Working capital = Current assets – Current liabilities (5)

Current ratio = Current assets / Current liabilities (6)

Acid-test (quick) ratio = (Cash + Accounts receivable + Short-term securities) / Current liabilities (7)

Accounts receivable turnover = Current Sales / Average accounts receivable balance (8)

Average collection period = 365 days / Accounts receivable turnover (9)

Inventory turnover = Cost of goods sold / Average inventory balance (10)

Average sale period = 365 days / Inventory turnover (11)

Debt-to-equity ratio = Total liabilities / Stockholders' equity (12)

All of them reflect the ability to liquidate liabilities of the company at the point of time to research and are used in combining with the industry's ratios or other companies' ratios to make the comparisons meaningful. Working capital, Current ratio and Acid-test (quick) ratio measure the ability to cover all short-term liabilities. Accounts receivable turnover, Average Collection period, Inventory turnover, Average sale period bring to managers information on the capital turnover in one year. And Debt-to-equity ratio shows the proportion of debts that has to be paid over the coverage ability of stockholders' equity in researched year. When the Debt-to-equity ratio and the average capital turnover period ratios go up, the risk for the company to go into liquidation becomes much higher. Other remainder indices once rise, they will help the company pass the finance crises easier, though somewhere in Current ratio can contain the risk of stagnant stock-in-trade or stockpiling due to capital structure of the assets.

ANOVA F-test

An ANOVA F-test will be valid only as if the experiment satisfied three following conditions (McClave *et al.*, 2011):

(1) Condition 1: The samples are selected independently and random from the number of treatment populations.

(2) Condition 2: The distributions of all sampled populations are approximately normal.

(3) Condition 3: All of popular variances are equal.

Regarding the content of this thesis, when the results inclined to the conclusions to protect Ho (the null hypothesis for equal treatment means), the Type II Error is considered. It is put under control since the probability (ρ-value) of F-test exceeded the observed significant level of $\alpha = .05$. Three t-tests in comparing each different pair for each experiment are conducted to check the result of ANOVA F-test. The conclusions then are made sure by comparing the probabilities of each t-test to others; the population variances of success rods' means in each machine are taken into account; and the treatment means are ranked in the priority order as the summary of Tukey multiple comparisons had ever displayed (McClave *et al.*, 2011). Based on those analyses on the treatment variances, one

machine which demonstrated its operating is the best would be chosen as the final investment decision-making. (i.e., the Randomized Block Design is not conducted even though the different sizes of cylinder diameter and dimension can become the blocks in the next researches because of limited data of the author, the thesis only focuses on one size-test of the welding rods have 2.5 mm of diameter and 350 mm in length which incurred the highest cost in the soldering stick production process).

CASH BUDGETING

The Meaning of Cash Budgeting

Cash budgeting simply is to prepare a plan for a budget which shows all the cash flows will get into and take out of the company in the near future. It is quite difficult because it is forecasting the finance status over the general data of overall company for a specific period of time. It often takes a lot of time to research, collect the necessary data and involved important information, calculate the figures, and produce the final outputs. But it cannot be lacked in the business operating process of any enterprises. A good prepared cash budget will help the manager to look out a generalized financial picture of the company at the present standpoint and at the future emphatic points.

Designing the Cash Budget

A fledged cash budget pattern is developed as the following framework (Garrison *et al.*, 2011):

1. The receipts section.
2. The disbursements section.
3. The cash excess or deficiency section.
4. The financing section.

The Budgeted Income Statement and Budgeted Balance Sheet will be built over the life-time of the invested equipment year-by-year. And then all established calculations will be helpful for the next formulas of Capital Budgeting to estimate the effectiveness in the long-term of the project.

Capital Budgeting

The capital budgeting methods such as NPV, IRR often go with the Cash Budget to assess the effectiveness in the long-term of the projects under the discounted cash flows. If the ANOVA F-test is used in this thesis for the sole purpose of the technical testing, the Cash budget gives to the managers the short-term sight angles, the capital budgeting methods will offset all those shortcomings by covering sprang up expenses accompanying with losses and generating profits over the long-term operating of the company. They live with the initial investments to the end of the project.

The NPV with the return on the real value of money is the most exact method in the priority to rank of this thesis. Under the impact of inflation whereby the NPV and the other methods are constituted, the discount rate becomes the most important factor.

Inflation rate with Cash Budgeting and Capital Budgeting

Inflation is defined as an increase in the general level of prices of all goods and services of overall economy over a particular period of time (Wikimedia Foundation, Inc., n.d.). Inflation exists in the economy every day as an objective impact which cannot be controlled in nature. There are three main causes resulting in inflation are realized: Excess of monetary supply, Pulling of Demand and Pushing of Cost (Tran, 2008). When the economy is going down, or the government lacks of money to cover their expenses, or the demand to buy the foreign currency is large, the practice of pumping more money into the market is given as the saving for the economy. A congruent and full classification of costs and the necessary estimations should be appeared in the Cash Budget of the firm. The next formulas will help the investors to forecast the changes in sales and costs well:

The percentage change in price = Inflation rate + estimated increasing rate

The percentage change in variable costs = Inflation rate + estimated increasing rate

The percentage change in fixed costs = Inflation rate

The changes in labor cost, exchange rate and interest rate should be separated from the above formulas since the changes in labor cost are slower than the changes in inflation rate, while the exchange rate and the interest rate have the extraordinary fluctuations compared to the fluctuations in the inflation rate.

That is very important to find the reasonable discount rate for the forecasted cash flows of the capital budgeting methods used in this thesis under the impact of inflation. There are two ways to calculate this discount rate, called Fisher effect, based on the real rate (R), the nominal rate (r) and the inflation rate (I) (Ross *et al.*, 2011):

The approximate estimating: $r = R + I$ (13)

The true estimating: $(1 + r) = (1 + R)(1 + I)$ (14)

The approximate estimating is only applied if the nominal rate and the inflation rate are small (Wikimedia Foundation, Inc., n.d.) and is argued that is incorrect by Spiegel and Stanton (2000). The multiplicative relationship between the inflation rate and two other factors of the cost of capital (real and nominal interest rates) in the true estimating formula was convinced by Mills (1996). Then, the common rule for the discount rates was stressed by both Spiegel and Stanton (2000) and Ross *et al.* (2011) that is:

The real cash flows must be discounted under the real rate (R);

The nominal cash flows must be discounted under the nominal rate (r).

And the consistency between the cash flows and the discount rate is ensured.

In this thesis, the true estimating for discount rate in formula (2) is supported. The cash flows forecasted from the Cash Budget are the nominal Cash flows. So the applied discount rate should be the nominal rate. Stemming from the formula for calculating Present value (PV) at fixed inflation rate over years (as cited in (Spiegel and Stanton, 2000)):

$$PV = F1 / [(1+R) (1+I)] \quad (15)$$

where F1 is the nominal cash flows of year 1, the formula for calculating Net Present. Value (NPV) at different inflation rates over different years is built as the following:

$$NPV = - F0 + F1 /[(1+R1) (1+I1)] + F2 /[(1+R1) (1+I1) (1+R2) (1+I2)] +\ldots+ Fi /[(1+R1) (1+I1) (1+R2) (1+I2) \ldots (1+Ri) (1+Ii)] \quad (16)$$

where F0, F1, F2, …, Fi are the cash flows of year 0, 1, 2, ..., i_{th} ; R1, R2, …, Ri are the real borrowing interest rates of year 1, 2, …, i_{th}; I1, I2, …, Ii are the inflation rates of year 1, 2, …, i_{th}. This formula reflects the changes in inflation rate in the market as well as the changes in real borrowing interest rate year-by-year of the company.

METHODOLOGY

Research Design

As the framework introduced in literature review, this section includes four parts: part 1 analyzes the current finance status of Ha Viet Company; part 2 chooses the investment equipment based on ANOVA F-test and Capital Budgeting design; part 3 finds the balance on the capital in the short-term through the Cash Budget model built for two years (in comparing between no inflation and inflation situations); part 4 calculates the forecasting profits earned from the investment project using the Capital Budgeting methods, with data sources based on Budgeted Income Statement and Budgeted Balance Sheet built over the life-time of the investment project which have formed in Part 3 (in comparing between no inflation and inflation situations).

Sampling Design with ANOVA F-test

From the researches on the market to find out the trustworthy suppliers for the investment, three types of the powder coating machine are considered: SLT-100A, SLT-140A, and HTY-250. To display all possible results, two ANOVA F-test experiments are implemented: One with three different types of machines, one with three different machines in the same type.

The order of these experiments takes place in the sequence from three different types of machines experiment first; after one best type was decided, the experiment with three different machines in the same type is the next conduct to make the final decision. The records of the technical parameters in two experiments are given as the following:

Table-3.1. Data of ANOVA F-test for three different types of machines

Statistics – ANOVA F-test for three different types of machines				
5 times 480 rods/time	3 machines	Total	7200 rods	2,520,000 mm
	0.0243 kg/rod			0.175 tons
Compare the different in the times of trials which count the successful rods				
	Data analysis			
	Times	SLT-100A	SLT-140A	HTY-250
	1	330	260	250
	2	411	350	370
	3	480	380	410
	4	480	480	480
	5	480	480	440
	Total (rods)	2181	1950	1950
	Total (tons)	0.0530	0.0474	0.0474

Table-3.2. Data of ANOVA F-test for three different machines in the same type SLT-100A

Statistics – ANOVA F-test for three different types of machines				
5 times 480 rods/time	3 machines	Total	7200 rods	2,520,000 mm
	0.0243 kg/rod			0.175 tons
Compare the different in the times of trials which count the successful rods				
	Data analysis			
	Times	Machine 1	Machine 2	Machine 3
	1	180	280	290
	2	270	390	360
	3	380	480	410
	4	400	480	480
	5	460	480	480
	Total (rods)	1690	2110	2020
	Total (tons)	0.0411	0.0513	0.0491

The successful finished products will be sold as the revenues of the tests of running machines at the first time. The chosen machine hence is turned onto production process. The costs for these tests are counted as an expenditure term in the Cash Budget hereafter.

Variables and the Fundamental Assumptions

Each different stage of the analysis process and building the model needs the exclusive input factors. For the special struggles to control the exchange rate VND/USD of Vietnamese government, the Relative Purchasing Power Parity equation of Ross *et al.* (2011) should not be applied. Following the formula E(St) = S0 x [1+(hFC – hUS)], where

E(St) = Expected exchange rate in t periods

S0 = Current (Time 0) spot exchange rate (foreign currency per dollar)

hUS = Inflation rate in the United States

hFC = Foreign country inflation rate (Vietnamese inflation rate)

with hUS2010 = 1.6%, S2010 = 21,000 VND/USD, hFC2010 = 9.19%, E(S2011) = 19,742 VND/USD; with hUS2011 = 3%, S2011 = 18,350 VND/USD, hFC2011 = 22%, E(S2012) = 24,990 VND/USD.

The last and most important factor as the inflation rate changes is the interest rate. In this section, all borrowings are assumed that come from the commercial banks – the independent and most objective organizations to the business process of the company. Any lenders and banks' managers often run to catch up the spiral of the inflation. The interest rate sometimes is over the profitable level or the rate of return that the normal company can earn and they should not be set up like that

ANALYSES OF RESULTS

Assessment on the Current Finance Status of Ha Viet Company

Looking at the figures in Appendix B – Data for Current Finance Status Analysis of Ha Viet Company, we can see that Ha Viet Company now is in the tense period of finance. In 2010, the company lost more than 2 billion VND, equivalent to – 2.6% in total gained revenues, while the enterprise's capital structure contained a lot of the risky factors.

The difference in the capital structure of two companies lay in the Debt-to-Equity ratio. In VIWELCO Company, it was 1.5 times in 2007 and 1.4 times in 2008. In Ha Viet Company, it was 3 times in 2011. While VIWELCO sequentially accrued its gained profits to complement the capital for its stockholders' equity, Ha Viet Company was raising more debts for its current liabilities from 69.2% in 2010 to 75% in 2011 on its total capital, although both of the companies were declined in face of the attack of the inflation.

More debts mean high risk toward the pressure of payment urging from the lenders, especially when the large part of debts of Ha Viet Company came from the Credit liabilities which was 71.4% out of total capital in 2011. The total Working Capital of 4,811,149 thousand VND in 2011 was low to cover a part of large amount of the input variable costs in routine. The Average Collection Period of one month and a half and the Average Sale Period of two months were normal if the company was making profits, but now it became a bit slowly to be able to take back the capital faster. The degree of financial leverage will be bigger if the company is more in debts.

To meet the requirements of production and ensure the ability to make more profits in the future, the new investment now is necessary and cannot cross out. The project can help the company to recover its payments ability. The lending sources in USD which are being offered from the commercial banks may be attractive with low interest rate 6% to 9% per year (GMT+7, 2012). However the changes in the exchange rate may cause the high risk in the future. So the lending sources in VND are more stable and used in this thesis as the next calculations of the Cash Budget.

CHOOSING ONE MOST SUITABLE EQUIPMENT TO INVEST IN

Choosing Equipment by Using Capital Budgeting Methods

The first step to invest in the new equipment anywhere for any projects that is researching on the market. Whenever the researchers collected all enough information as requirement, then the comparisons between the products and the services are carried out. The benefits in the profitability and the initial costs of the capital are always interested at first. The NPV, IRR and Profitability Index methods with the discounted Cash Flows are checked to make the ranking in monetary term. But the economic effectiveness on the financial aspect may be the mere theory. The choosing on the actual market might need some technical techniques to check the errors and to give the defense against the worst unexpected situation. The settlement to buy the good quality machine would be facilitated if the relationships with the suppliers were established before. In the assumptions of this thesis, the good relationships assumed that are existent. The company then had the best condition to implement its own purchases choosing power. After that, the ANOVA F-tests are conducted in turn of three different types of machines first, then with three different machines in the same type.

Choosing Equipment by Using Anova F-test

Firstly, we can confirm that these two experiments are the designed experiments. Then the results of each experiment are reported as the following:

- For the three different types of machines experiment:

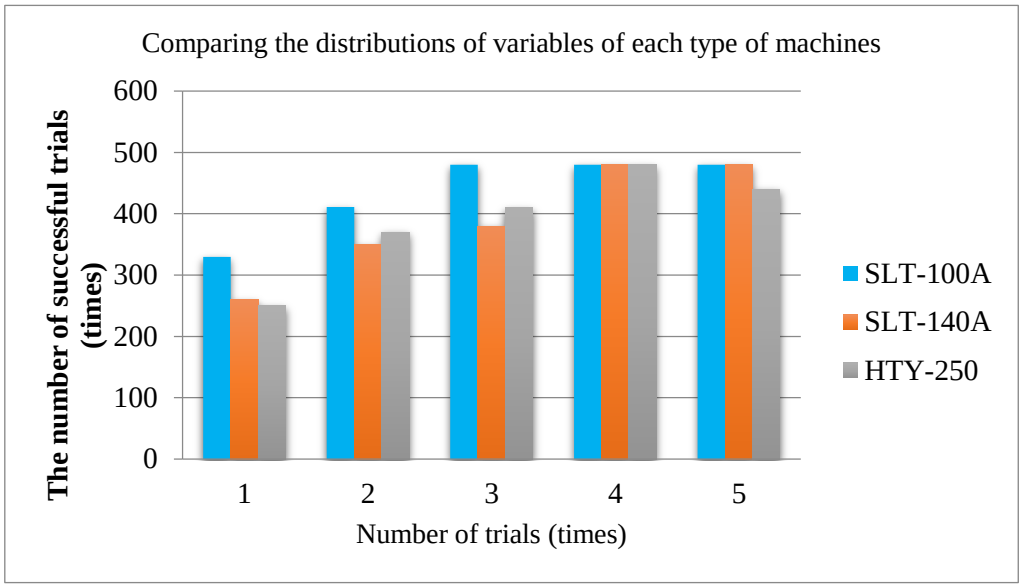
The database is given in Chapter 3 - Table 3.1. Because our suppliers and buyers want to assess the effect of each type of machines, each type is a treatment. The method of assigning the experimental welding electrode rods to each treatment is running the powder coating machines. We now check Three Required Conditions for a Valid ANOVA F-test of Completely Randomized Design, respectively. The Condition 1 is satisfied by selecting randomly the sampled welding electrodes of the same size in 5 times of observations for each treatment with the same independent batches of 480 rods each time from three treatment populations. The Condition 2 is confirmed by the Descriptive Statistics that computed by Excel as the table following:

Table-4.1. Descriptive Statistics of three different types of machines

SLT-100A	**SLT-140A**	**HTY-250**		
Kurtosis	0.88237 Kurtosis	-1.07372 Kurtosis	1.49719	Close to 0
Skewness	-1.36491 Skewness	-0.41282 Skewness	-1.15425	Close to 0

Because the values of Kurtosis and Skewness of each distribution are close to zero, the distributions of the sampled populations are approximately normal. We can image the variation of sampling as well as the nearly normal distribution of variables in the sampled populations through the following diagram:

Figure-4.1. Distributions of variables of each type of machines in experiment



It is the prerequisite for all the next tests and the support to Condition 3 of ANOVA F-test. We use The F-test of Two-Tailed Test run in Excel for two sampling populations in pair (one has the smallest sampling population variance is SLT-100A and one has the largest sampling population variance is HTY-250) to check whether the population variances of three sampled treatments are equal or not.

At the significant level of $\alpha = .05$, the null hypothesis Ho on the equality of the variances of SLT-100A and HTY-250 does not be rejected. Because the difference between two sampling population variances decided the Probability of F-test is larger than the level of significance $\alpha = .05$, the Type II errors of accepting Ho did not happen. And we can infer that the other sampling population variances in pairs have the Probabilities of F-tests are larger than $\alpha = .05$. So from the above test, we can conclude that the Population Variances of three sampled treatments are not different from each other. (They are equal and satisfied the third condition of ANOVA F-test). The ANOVA F-test now can be carried out to find out whether or not there are the differences between the sampling population means of trials on each type of machines. The results are recorded in Table 4.2:

Table-4.2. ANOVA F-test for the different types of machines

H_0 :	**$\mu_1 = \mu_2 = \mu_3$**	
H_α	At least two population means of three treatments differ	
Rejection region	$F > F_\alpha$ Where	μ_1: The population mean of SLT-100A μ_2: The population mean of SLT-140A μ_3: The population mean of HTY-250
Anova – F test		
SUMMARY		

Groups	Count	Sum	Average	Variance		
SLT-100A	5	2180	436.2	4417.2		
SLT-140A	5	1950	390	8740		
HTY-250	5	1950	390	7750		
ANOVA						
Source of variation	SS	df	MS	F	P-value	F-crit
Between groups	7114.8	2	3557.4	0.51143	0.612135491	3.8852938
Within groups	83,468.8	12	6955.73			
Total	90,583.6	14				

Looking at the above table, the F-statistic value is lower than the F-critical value and the P-value is larger than $\alpha = .05$ enough to avoid the Type II Error when accepting Ho. No difference between the sampling population means of three types of machines means all machines run well as the same as each other. The distance between three treatments means are small with Mean Square for Treatments (MST) of 3,557.4, while the variability of variables within each treatment is large with Sum of Squares for Sampling Error (SSE) up to 83,468.8. It can be explained by the first trials to each machine may have a bit difficulty for starting up. A little difference between the sampling population variances of each type of machines also has some meanings to rank each tested machine following the standards of operating stably. According to that, the SLT-100A has the best operation with the minimum sampling population variance of 4,417.2, the next is HTY-250 with the sampling population variance of 7,750, and the last one is SLT-140A with the sampling population variance of 8,700.

The confidence for the result of ANOVA F-test can be checked again by Two-Tailed t-tests in pairs of the sampling population means of different types of machines assuming equal variances at the significant level of $\alpha = .05$. Excel prints out the same results that there is no evidence to conclude three sampling population means differ from each other. And the probability of the homogeneity between the sampling population means is given in the order from high to low: 1.0 for the pair of SLT-140A and HTY-250, 0.39 for the pair of SLT-100A and SLT-140A, 0.38 for the pair of SLT-100A and HTY-250. The less probability of two-tail tests is; the more different possibility between the sampling population means of each pair of machines can happen. Then we can use the Tukey multiple comparisons method to rank the operating level of each type of machines as the following table 4.3:

Table-4.3. Rank follows the Tukey multiple comparisons

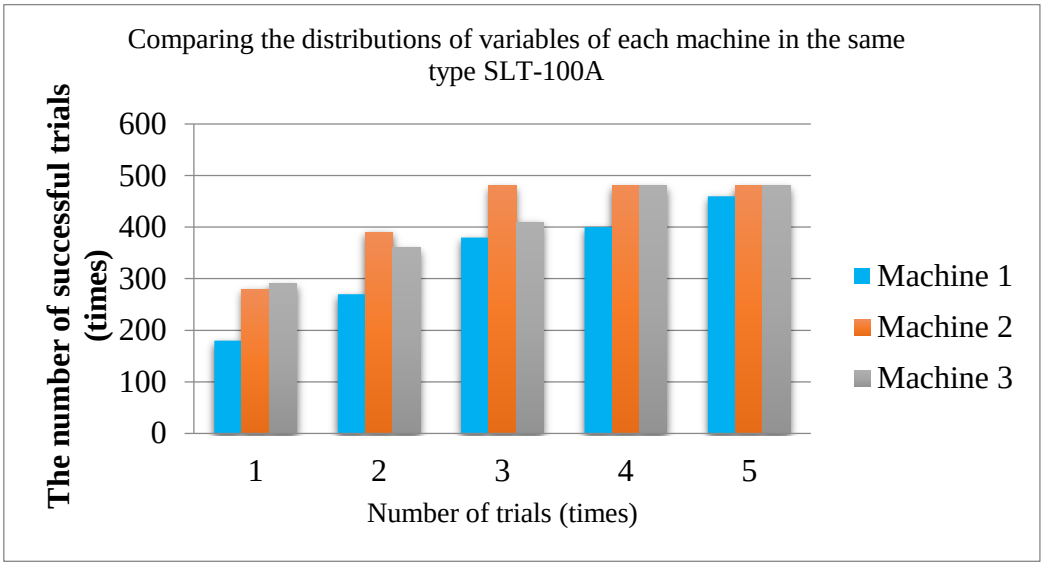
Rank follows the Turkey multiple comparisions			
Mean	390	390	436.2
Machine	SLT-140A	HTY-250	SLT-100A
Classification	Good	Good	Best

All results are toward the SLT-100A. So the type of powder coating machine SLT-100A should be chosen to invest in. We then move to the ANOVA F - test for three different machines in the same type of SLT-100A.

For three different machines in the same type of SLT-100A:
The database is given in Chapter 3 - Table 3.2. Similarly to the above ANOVA F-test implementing process of three different types of powder coating machines, three required conditions for Valid ANOVA F-test must be confirmed. The treatments now are assigned to each machine.

The Condition 1 is set up by the sampled welding rods which are randomly selected of the same size in 5 times of observations for each treatment with the same independent batches of 480 rods each time from three treatment populations. The Condition 2 is proven with the approximately normal distributions of variables within each treatment which are shown in the following diagram:

Figure-4.2. Distributions of variables of each machine in the same type



The Descriptive Statistics Data is helpful to make sure the format of distributions are approximately normal with the values of Kurtosis and Skewness of each distribution are close to zero as indicated in the below table 4.4:

Table-4.4. Descriptive Statistics for three different machines in the same type

Machine 1	**Machine 2**	**Machine 3**		
Kurtosis	0.95054 Kurtosis	1.02632 Kurtosis	-1.19306	Close to 0
Skewness	-0.63367 Skewness	-1.39228 Skewness	-0.53145	Close to 0

The Condition 3 then is taken in care with the confirmative results on the equality of the sampling population variances of three sampled treatments from the F-test of Two-Tailed Test for two sampling populations in pair (one has the smallest sampling population variance and one has the largest sampling population variance) at the significant level of $\alpha = .05$. The probability for this equality of sampling population variances is larger than $\alpha = .05$ enough, so the Type II error for accepting Ho is not taken into account here. And from this result, we can infer the other pairs of sampling population variances are equal as the confidence for controlling the variability of variables in the bounded interval. The ANOVA F-test now has enough validity to serve the analysis with the results are given in
Table 4.5 hereinafter:

Table-4.5. ANOVA F-test for three different machines in the same type

H_0 :	**$\mu_1 = \mu_2 = \mu_3$**					
H_α	At least two population means of three treatments differ					
Rejection region		$F>F_\alpha$	Where	μ_1: The population mean of Machine 1 μ_2: The population mean of Machine 2 μ_3: The population mean of Machine 3		
Anova – F test						
SUMMARY						
Groups	Count	Sum	Average	Variance		
Machine 1	5	1690	338	12520		
Machine 2	5	2110	422	7820		
Machine 3	5	2020	404	6630		
ANOVA						
Source of variation	SS	df	MS	F	P-value	F-crit
Between groups	19,560	2	9780	1.08787	0.3679688	3.885293835
Within groups	107,880	12	8990			
Total	127,440	14				

The same results happened again to the experiment of three different machines in the same type: the sampling population means of all treatments are not distinguished clearly in the manner of ANOVA F-test. The null hypothesis Ho of 'all the sampling population means are equal' does not be rejected at the level of significance $\alpha = .05$ with the P-value of 0.37. The Type II error is avoided. However, the variability of variables out of all measures between treatments and within each treatment is large with Sum of Squares for Treatments (SST) is 19,560 and Sum of Squares for Error (SSE) is 107,880. The lack of confidence for the results of ANOVA F-test leads to the checking by Two-Tailed t-tests in pairs of the sampling population means of different machines in the same type assuming equal variances at the significant level of $\alpha = .05$. The test conducting brought the same results in order of the probabilities of the similarity of the sampling population means from high to low: 0.75 for the pair of Machine 2 and Machine 3, 0.32 for the pair of Machine 1 and Machine 3, 0.22 for the pair of Machine 1 and Machine 2.

In general comment, the effectiveness of all machines in their coating capability is similar. The selecting process become more difficult since the results of Variances Comparison method which

rank the observed machines following the stability in operating of each machine are different from the ranking of Tukey multiple comparisons method. The Variances Comparison method ranked Machine 3 first with Variance of 6,630, Machine 2 was the second with Variance of 7,820, and Machine 1 was the last one with Variance of 12,520. While Tukey multiple comparisons method ranked them as the following table 4.6:

Table-4.6. Rank follows the Tukey multiple comparisons

Rank follows the Turkey multiple comparisions			
Mean	338	404	422
Machine	Machine 1	Machine 3	Machine 2
Classification	Worst	Better	Best

Both of these methods agreed that the Machine 1 was the worst machines among other machines. However the ranking for Machine 2 and Machine 3 is in arguments since the sampling population and the operating stability of them were similar to each other. Then the most successful rods of shooting times in each trial to each machine decided the best one. The final decision to purchasing would be the Machine 2.

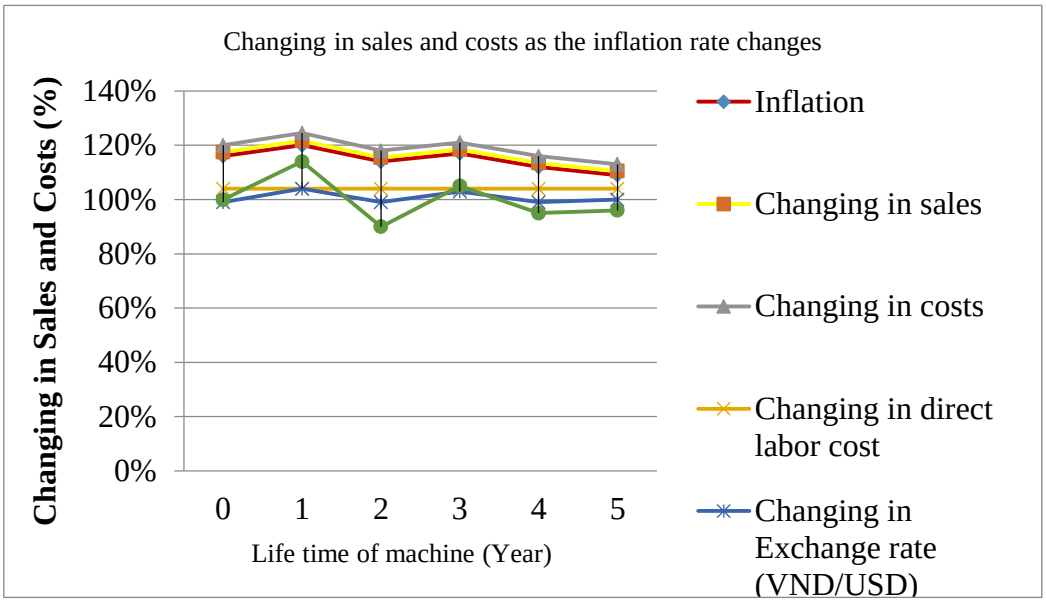
In summary of all results for both methods of using Capital Budgeting techniques and ANOVA F-test experiments to select the best machine, the final decision making is choosing the Machine 2 in type of powder coating machine SLT-100A to invest in. The sequence operating of the business process of the company will be continued with foreseeing the effectiveness after the initial investment of manipulating the Cash Budgeting in the short-term (two next years) and more techniques of the Capital Budgeting in the long-term.

A Balance on Finance in the Short-Term – The Next Two Years after Original Investment

As the purpose of this thesis to find the stable capital sources for the business operation of the company in the long-term, the new investment must create some new benefits for the company in the short-term. At least it has to satisfy the condition to help the company to pay back the borrowing principal promptly or make some reserves to cover all its matured debts in the near future. A Cash Budget which will be built in this section can give the managers a useful tool to control and estimate the flows of cash, especially in the short-term with the specific forecasts on inflation and risks from the supply market.

The trends of the exchange rate of VND/USD in the future market which will influence on the importing input materials of Ha Viet Company therefore should be kept in the oscillated interval from 1% to 5%. And no formulas fit with these trends to settle the relationship to the variability of inflation rate. All the changes in different costs, sales, interest rate and exchange rate of VND/USD will be briefed in the graph below.

Figure-4.3. Graph of changing in sales and costs as the inflation rate changes



The data for the Cash Budget and the Budgeted Income Statement can be expanded to the following years after two first years out of the life-time of the investment project with the same structures and the similar formulas.

We can make some adjustments for the last year of the project to suit with the fiscal year. Then the Budgeted Balance Sheets for years over the life-time of the investment project are built in Appendix I based on the collected data from Appendix G and Appendix H.

The case of ignoring the impact of inflation is also mentioned and formulated as the comparison to the case of inflation. The results are reported in Appendix J for Cash Budget, Appendix K for Budgeted Income Statements and Appendix L for Budgeted Balance Sheets.

Now we can see how much money is needed to borrow from the banks in each case and how much earned money is enough to cover all costs each year.
Putting them together, we will get two graphs as the following:

Figure-4.4. Comparing total borrowings in two different situations

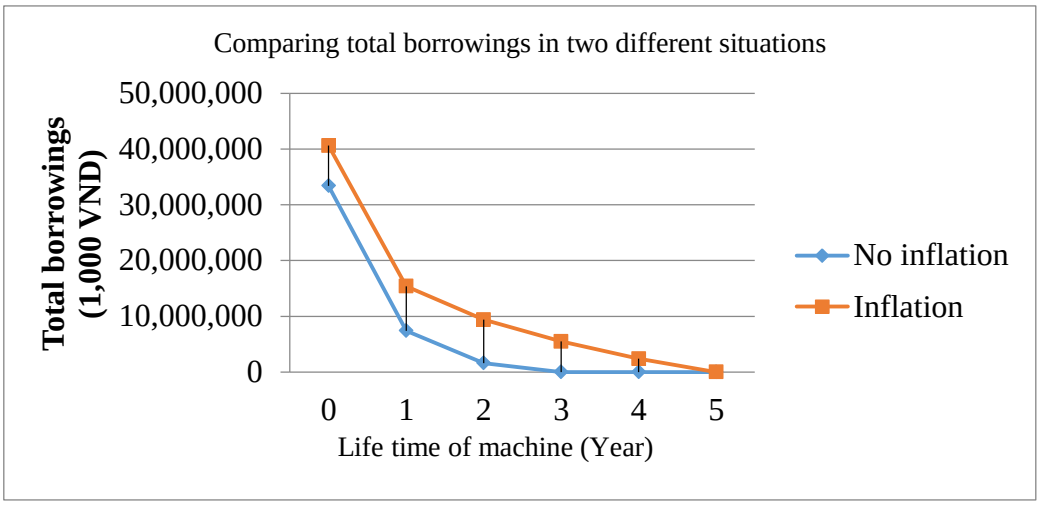


Figure-4.5. Comparing Profits after taxes in two different situations

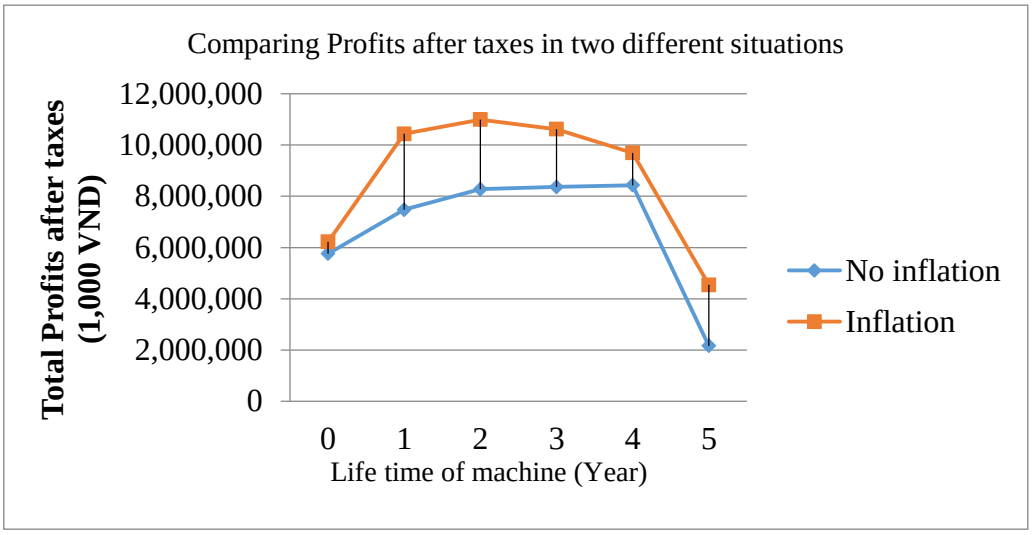


Figure 4.4 showed us that Ha Viet Company still has to borrow more money for their production capital costs during the life-time of the investment project under the impact of inflation; while it would be much lower in the case of no existing of inflation. The company could stand on its feet after three years before closing the project if there were no inflation. But the inflation brings to the company a lot of risks even the higher return on investment the company can earn and the debts would reduce overtime as shown in Figure 4.5, comparing to the case of no existing of inflation.

The Cash Budget model thereafter gives some meaningful information for the managers of Ha Viet Company to decide what strategies are the most suitable and appropriate to their enterprise to encounter the threats from the risks of increasing in inflation rate. The Cash Budget model also allows to setting up the input data for the next calculations of Capital Budgeting which points out the effectiveness of the investment project in the long-term.

Long-term Effectiveness of the Investment Project

The estimated sales leave far from the break-even point over years. This proves the trends of falling down of the profitability of the project during its useful time as the variable costs are increasing under the impact of inflation. Nonetheless as the calculating of other methods such as ROA, Financial leverage and ROE, the trends of the earned profits and the accruals seem to be going up passing over time. This reflects the trends of borrowing costs that will reduce gradually and transfuse their value to the ownership, while the inflation rate is estimated to gain the lowest rate at the end of the project. So these results are not contradicted to each other. In contrast, they contribute to the final decision-making of the managers of Ha Viet Company to choose the SLT-100A powder coating machine for the investment project with the persuaded effects both in the short-term and long-term periods.

Table-4.7. NPV, IRR and Break-even point methods

Long-term effectiveness				*Measure in units: 1,000 VND*		
	The price of machine	**Cost of trials**	**Cost of training**	**Total cost**		
Total cost for this investment	(130,709)	(215)	(2,273,282)	**(2,404,206)**		
Year	**2012**	**2013**	**2014**	**2015**	**2016**	**Q1-2017**
Profit after taxes	6,222,611	10,438,504	10,996,748	10,621,378	9,699,007	4,542,775
Plus: **Depreciation**	360,127	366,663	366,663	366,663	278,431	6,535
Plus: **Prepaid costs**	47,269	0	0	0	0	0
Less: **Delayed Sales in Account Receivables**	(4,456,658)	(1,118,100)	(864,087)	(1,191,186)	(1,030,054)	8,660,085
Net cash inflow	**2,173,350**	**9,687,066**	**10,499,323**	**9,796,855**	**8,947,383**	**13,209,396**
NPV (Net cash inflow) =	**16,191,519**	**> 0**				
R_{WACC} =	**31.58%** where		R_S =	49.198%	R_B =	15.044%
IRR =	**198%** > R_{WACC}		Accept the project.			
Break-even point						
In VND Sales	18,603,977	21,744,430	28,422,119	39,598,045	53,216,316	8,954,679
In Unit Sales (kg)	**387,350**	**374,442**	**423,726**	**498,177**	**589,874**	**89,934**
Odds to the estimated sales in VND	107,518,466	155,838,445	176,671,568	203,437,973	222,629,566	67,355,764

To make sure our final decisions are true and reasonable, there is one another simple way to check again our results that is Incremental Cash Flows method. The data in Appendices G, H, I, and Tables 4.7, 4.8 become the useful sources to formulate the parameters in computing the Incremental Cash Flows for the new machine (See Appendix M: Calculations for Incremental Cash Flows Method and the Case of No Debt – Inflation). Holding these results, the positive NPV for this project of replacing the old machine with the new machine convinces the feasibility of the project and the reasonability of the decision-making to invest in the type of SLT-100A. The results of the current Case of Debt – Inflation then are shown as the following tables.

Table-4.8. Incremental Cash Flows method

	Incremental Earnings Forecast	Measures in unit: 1,000 VND					
	Year	2012	2013	2014	2015	2016	Q1-2017
1	**Sales**	**29,623,876**	**54,973,142**	**63,485,673**	**75,230,523**	**85,386,644**	**23,649,785**
2	Less: **Variable expenses**	**(24,808,628)**	**(47,933,845)**	**(56,971,056)**	**(69,594,844)**	**(81,121,761)**	**(21,061,931)**
	- Merchandise purchased	(22,521,399)	(43,622,299)	(52,086,764)	(63,937,846)	(74,756,579)	(19,317,088)
	- Direct labor cost	(766,438)	(1,332,423)	(1,385,546)	(1,440,967)	(1,498,606)	(389,647)
	- Manufacturing overhead cost	(1,076,433)	(2,154,526)	(2,546,462)	(3,087,572)	(3,585,776)	(1,000,448)
	- Selling and Administrative expenses	(444,358)	(824,597)	(952,285)	(1,128,458)	(1,280,800)	(354,747)
3	**Contribution margins**	**4,815,248**	**7,039,296**	**6,514,617**	**5,635,679**	**4,264,883**	**2,587,854**
4	Less: **Fixed expenses**	**(118,058)**	**(211,783)**	**(245,199)**	**(291,201)**	**(333,610)**	**(93,395)**
	- Manufacturing overhead cost (Utilities)	(98,452)	(185,641)	(219,057)	(265,059)	(307,468)	(86,860)
	- Depreciation	(19,606)	(26,142)	(26,142)	(26,142)	(26,142)	(6,535)
5	**EBIT**	**4,697,190**	**6,827,513**	**6,269,419**	**5,344,478**	**3,931,273**	**2,494,459**
6	Less: **Income tax (25%)**	**(1,174,298)**	**(1,706,878)**	**(1,567,355)**	**(1,336,120)**	**(982,818)**	**(623,615)**
7	**Unlevered Net Income**	**3,522,893**	**5,120,635**	**4,702,064**	**4,008,359**	**2,948,454**	**1,870,844**
8	Plus: **Depreciation**	**19,606**	**26,142**	**26,142**	**26,142**	**26,142**	**6,535**
9	Less: **Capital Expenditures**	**(2,404,206)**					
10	Less: **Delayed Sales in Account Receivables**	**(1,137,925)**	**(390,161)**	**(277,526)**	**(382,583)**	**(330,831)**	**2,519,026**
11	***Free Cash Flow***	***369***	***4,756,616***	***4,450,680***	***3,651,917***	***2,643,765***	***4,396,406***
12	**Gross Norminal interest rate each year**	1.34	1.41	1.32	1.37	1.30	1.13
13	**Discount factor**	**0.75**	**0.53**	**0.40**	**0.29**	**0.22**	**0.20**
14	**NPV**	**6,811,282.95**		**> 0**			
	→ Accept the project						

Net Working Capital Forecast	Measures in unit: 1,000 VND							
Year	2011	2012	2013	2014	2015	2016	Q1-2017	Q2-2017
Current assets	24,087,789	22,245,890	27,947,846	38,697,338	47,960,256	57,630,236	60,460,803	58,946,545
Current liabilities	19,276,640	10,982,711	5,879,501	5,265,583	3,540,459	3,233,002	1,514,258	0
Net Working Capital	4,811,149	11,263,179	22,068,345	33,431,755	44,419,796	54,397,234	58,946,545	58,946,545
Allocated NWC to new machine	**0**	**2,645,517**	**6,831,550**	**10,348,624**	**13,749,915**	**16,838,378**	**18,268,445**	**0**
Changes in NWC of new machine		**(2,645,517)**	**(4,186,033)**	**(3,517,074)**	**(3,401,290)**	**(3,088,463)**	**(1,430,067)**	**18,268,445**

CONCLUSION

It is time for managers of Ha Viet Company to make the final decision whether to afford for this project or not. To avoid the blind from importing of the technological rubbish machines as some Vietnamese managers did, the ANOVA F-test experiments are conducted with checking the technical efficiencies in operating of the alternative machines. As the results, the SLT-100A demonstrated its capacity to operating stably stronger than two other types of powder coating machine are SLT-140A and HTY-250, while the capacity to coating is assessed the same good quality for all of three types. Fortunately, the NPV, IRR and Profitability Index methods gave the same answer to choose the SLT-100A is the best type of machine to invest in.

Although the higher risks are confirmed when comparing to the Cash Budget in case of ignoring the impact of inflation, all the borrowings are higher and the time to get the returns is longer. The new powder coating machine SLT-100A is accepted to invest in after the effect of capital balance

in the short-term has been proved and the results from IRR, Break-even point analysis and some other methods (ROA, Financial Leverage and ROE, Incremental Cash Flows) aggregated at the same point with the NPV method to support the effectiveness of production in the long-term of the project. That also foresees for the ability to recover the losses of the current business operation of Ha Viet Company in the bright future. The managers of Ha Viet Company then will make the final decision to select the SLT-100A to be the substitute machine for their old powder coating machine.

Beside the pure mathematical formulas are applied to analyze the financial status of an enterprise, the application of ANOVA F-test experiments can extend to the actual situations of the life more and more. This thesis used ANOVA F-test to check the technical errors in the effect of operating each welding electrodes powder coating machine to help Ha Viet Company to choose the most appropriate equipment to their production. It is good to evaluate the quality of machines in the first stages of running machines as well as running tests. In term of real purchasing power, the purchasing power parity is not equal across countries that reverses with the equality perceptions as Ross *et al.* (2011) pointed out in their equation of International Fisher Effect under the effect of inflation. Finally, the incremental cash flows method noted that the inflation rates are estimated as the average percentage per year which equate among days, months and quarters, while the interest rates are ratios showed the accumulation over days in a year in term of currency. Especially, the lending and borrowing interest rates can be calculated and regulated exactly by money owners. This has the important meaning to formulate the discount factor in NPV calculating formula.

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