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Heteroscedastic Variance in Estimation and Decision Making: A Managerial Perspective

Prahlad Mishra¹ and Sangeeta Agasty²

ABSTRACT

The manager is concerned with the estimation of the dependent variable with one or more independent variables when business related variables have relations in functional form. The equation with which s/he estimates has to be the most efficient one so that the estimates are best, i.e., with minimum error which may be used for decision making. In the process of estimation, s/he comes across a problem of unequal variance which reduces the efficiency of the estimator. This paper examines this problem of unequal variances in the regression equation when both time series and cross section data are used and the issues related to such a problem. The paper uses four different cases and examines the problem of unequal variance or heteroscedasticity in regression equations. The findings vary with respect to the data set. The paper articulates the issues involved in addressing the problem and suggests ways for the manager to take a decision.

Key Words: *Covariance Matrix, Heteroscedastic Variance, Data Transformation, MAPE*

1. Introduction

Estimation of econometric models and managerial decision making on the basis of the results of such estimation have gained importance in the recent years. Decision making using the econometric models normally concerns the estimation and forecasting. A large number of econometric models use the dependency relationship, such as regression and its variants. In the dependency relationship, often, managerial decision making concerns both time series and cross section data when the manager forecasts and estimates the value of the dependent variables with the estimated model. Forecasts are necessary to guide the future course of action, such as planning and target

fixing for sale or production for the organization. There are several methods of forecasting of the dependent variable. The efficiency of a forecasting model is judged by looking at the forecast error of the respective model. Similarly, when a research organization or a consultancy firm or a manager uses cross section data s/he uses different specifications relating to the different types of statistical or econometric models and estimates the equations. The value of the dependent variable thus can be found out by putting the values of the independent variables in the estimated equation. Obviously, the efficiency of an econometric model depends on the explanatory power or the coefficient of determination. Thus, the basic purpose is to get

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a high coefficient of determination and minimize the standard error of the estimates. With the help of these statistics evaluation of the different models representing the actual behaviour of the variables in the economy can be done. These estimates are often used for decision making in the market/economy (may it be commodity market, labour market or financial market). Because the organization or the researcher or the manager is not interested only in the sample. S/he goes outside the sample and tries to estimate the value of the dependent variable. Thus, the coefficients of the independent variables in the estimated equation are of prime importance. The values of the estimates of the coefficients are efficient when and only when a set of assumptions are fulfilled in the dependency method, like regression models. One of the important methods to estimate the above mentioned coefficients in a regression model is the Least Square Estimate (LSE). There are several assumptions in the estimation process using the Least Square Estimates, but one of the important assumptions is that the variance of each disturbance term conditional upon the chosen values of the explanatory variables is some constant number equal to σ^2 . This can be restated in a specification of the variance covariance matrix for the disturbance term or the U is, i.e., $E(UU') = \sigma^2 I$. The variance covariance matrix gives the variance of the U is in the diagonal and the covariances in the off diagonal terms. The diagonal term has a constant value equal to σ^2 , i.e., the U has the same variance (homoscedastic) across the fixed values of the independent variable. If this assumption is violated, the problem of Heteroscedastic Variance is faced in the estimation of the regression equation (Johnston, 1991; Gujarati, 2012).

2. Type of Data and Heteroscedasticity

The problem of heteroscedasticity is more common in Cross Section Data as compared to Time Series Data. The reasons are very obvious. Cross section data deal with members of a sample/population at

a given point of time. Regression equations using the data on dependent and independent variable(s) relating to individual consumers, firms, industries, etc. are often used. They may be different or may be heterogeneous in character. But in the time series data, the variable tends to be of similar order since the entity is same and data are collected over a period of time for the same entity. Thus, it is said that the problem of heteroscedasticity in cross section data is a rule rather than an exception. However, often there could be problem of heteroscedasticity even in time series data. In the presence of the heteroscedastic variances in the regression model the most important consequence is that the estimates do not have minimum variance.

3. Managerial Decisions and Heteroscedasticity

Managerial decision making using the estimated equation presupposes that the estimates are best linear unbiased estimates. Once the problem of heteroscedasticity is there these are not the estimates having minimum variance. This means that the 't' test will give inaccurate result while testing the hypothesis relating to the regression. Thus, the decision making on the basis of this will not be proper. The following examples will clarify this concept.

Let us consider the following cases when decisions are taken by the researcher or a consulting firm or the manager in the organization.

A manager may believe that profit after tax is highly influenced by the revenue of a firm. If the revenue of a firm increases, it is expected that, the profit after tax (PAT) will also increase. A researcher may use these variables in a functional form using PAT as the dependent variable and the revenue as the independent variable. S/he may try to estimate the relationship and with the use of such a relationship, s/he may focus on the expected PAT when revenues are used as independent variable for any other similar organisation. In other words,

s/he uses the results to generalise the behaviour.

The small and medium enterprises (SMEs) in India have an important role to play in the industrial sector so far as the employment generation is concerned. The employment in the SMEs has lots of bearing in the turnover. Thus, one may relate these two variables, estimate the equation and focus on the employment elasticity. The elasticity coefficient will be valid if and only if no econometric problem in estimation is encountered. Since this is a case of cross section data the unequal variance has to be addressed if found during the estimation. Unequal variance may be encountered since there may be differences in the sizes of the SMEs with respect to the fixed capital, turnover and employment. It may so happen that the problem of heteroscedasticity may arise in the process of estimation giving rise to the wrong estimation of the employment elasticity since the units may have differences amongst themselves as mentioned above. There are several clusters of SMEs in the country, and these clusters may be different with respect to product, the market they catered to (local and foreign), technology, labour source (migrants or local), labour replacing technology to cope up with the shortage of labour, etc. These factors may be responsible in the presence of heteroscedasticity variance in the error term when regression equations are estimated.

One may hypothesise that the R&D expenditure is influenced by the sale revenue. More the sale revenue the company will be in a position to allocate more funds for R&D expenditure which may help the company in terms of innovation, improving the product quality, etc. Thus, a researcher may take data from firms of different sizes in the same industry or different firms across the product categories and estimate a relationship to examine the influence on R&D s/he may come across the problem of heteroscedasticity since the large firms with larger sale revenue will have more capacity to assign funds for R&D expenses as a

percentage of their sale revenue. In such cases, the asymmetry in the behaviour leads to the unequal variances, which is the prime cause of the presence of heteroscedasticity. Similarly, when relationships between profits of a company and dividend paid, profits and R & D expenditure, savings and income, net profits and advertising expenditure, sales and advertising expenditure, expenditure on clothing and household income, etc. are examined, after collecting data from different entities which are of different sizes, the researcher may come across the problem of unequal variances of the disturbance term.

In all the above cases, a researcher collects cross section data from different entities and relates them. The equations when estimated using the LSE may show the problem of heteroscedasticity which in turn will give rise to estimates without minimum variance. If the variance is not minimum, the 't' test gets affected since the 't' value will not be the actual 't'. This happens since the coefficient will be divided by a larger variance giving rise to an underestimated 't' value. On the basis of this underestimated value, the test of the null hypothesis will be erroneous giving rise to a Type 1 error. Therefore, the researcher in such a case will not be able to conclusively establish the relationship on the basis of which he could take a decision. This is the major consequence of the presence of heteroscedasticity, which adversely affects the decision making. The decision making process is affected since the researcher uses a set of cross section data from a sample and goes to estimate the dependent variable outside the sample with the estimated equation. Thus, if the estimates are not the actual estimates, the decision will be erroneous. These cases highlight the differences in the entities from which data are collected, which may lead to the unequal variances.

Although this difference in the entities is one of the most important reasons for the presence of

heteroscedastic variances, there may be some other reasons where heteroscedasticity may be observed in the process of estimation. For example, if there is an entity which has the extreme values of the variables as compared to the other observations, one may face a problem of heteroscedasticity. This is otherwise known as the presence of an outlier which can be observed in a scatter plot. Misspecification of the actual relation in terms of form/ variables or exclusion of observation in small sample or skewness in the distribution of the independent variable, etc. may lead to the problem of heteroscedasticity. However, the most important reason is the differences in the size of the entities on which data are collected to estimate the regression equation.

In view of the above, a test for the presence/absence of heteroscedasticity will be a necessary condition in the estimation of the regression equation when such estimated equations are used for decision making. There are a few tests to arrive at the conclusion on the presence/absence of heteroscedasticity in a regression model. All these tests are based on the relationship between the square of the error term with the independent variable(s). Some of the important and widely used tests are Graphical Method, Park Test, Spearman's Rank Correlation Test, Goldfeld Quandt Test, Glejser Test, Breusch-Pagan-Godfrey (BPG) Test and White's General Heteroscedasticity Test. All these tests are based on the behaviour of the error term, the relationship between the squares of the error term with the independent or the estimated dependent variable or the assumptions on normality of the distribution of the error term or the σ^2 (the variances) in the regression models (Gujarati, 2012; Johnston, 1991; Dougherty, 2010).

It is customary to use a graphical method with which a relationship between the squares of the error terms and the independent variables or the estimated dependent variable could be found out.

In case a pattern is observed in the relationship as represented in the figure, one can hypothesize the presence of heteroscedasticity. However, one or more statistical methods like the ones mentioned above may be used to confirm the presence or absence of the problem. It may be mentioned that since the tests are based on the error term and its variance, the results of the different tests may converge, but in some cases they differ.

In case of the detection of the problem of heteroscedasticity, the data could be transformed using a few standard procedures and a fresh set of coefficients could be obtained. The procedures are on the basis of the assumption about the relationship between the squares of error term and the independent variables or the estimates of the independent variables. Such uses of transformation of the data and use of a different model with the transformed data refer to the Generalised Least Square (GLS) method to treat the problem (Wooldridge, 2006; Gujarati, 2012). These estimates could in turn be used to estimate the dependent variable which may be used for decision making. Thus, the error of the estimates has to be compared using the original and the revised estimates. Often simple augmentation of the data, i.e., the number of observations or the change in the form of the relationship from linear to log linear reduces the problem of heteroscedasticity.

4. Objectives of the Study

The specific objectives of the study are derived from the arguments presented above relating to the estimation of regression equation in the presence of heteroscedastic variances and decision making. Thus, the objectives in this exercise are as follows:

- i. To examine a few cases to explore the presence/ absence of the problem of heteroscedasticity when cross section data are used for the entities which may have differences in their size or other

characteristics.

- ii. To examine the efficiency of the estimates in the presence of the above problem and its implication in managerial decision making process.

5. Methodology

To address the objectives, the following method using cases in the Indian Economy has been used.

- i. Four cases relating to the Indian corporate sector have been identified and data have been collected for estimation.
- ii. Only two variable regression models have been used for the exercises.
- iii. The regression equations have been estimated using software and the presence / absence of the problem of heteroscedasticity have been examined with the help of several statistical methods for each case.
- iv. In the presence of the problem, a data transformation has been attempted and the regression rerun.
- v. Efficiency of the coefficients been evaluated using the error of the estimates of the dependent variable using mean absolute percent error.

6. Data Analysis and Findings

Five cases have been considered from different fields from the Indian Economy. Cross section data have been used to address the objectives. Data collected for the cases/ exercises have been collected from different sources which have been mentioned in the respective tables. The data set with the sources of data may be seen in Appendix 1.

6.1 Case 1

The Stock Price of a particular organization goes up only when there is a high demand for

that particular Stock in the share market and the investors' confidence on that particular organization soars due to its financial performance including profit. With the surplus generated, the company tries to attract investors by doling out high dividends to shareholders. So with increase in Stock Price the Dividend declared would also go up. Dependent variable is the dividend as last declared on March 2012, Financial Closing and the independent variable is the Stock Price as on 10th July. Normally, it is expected that companies would give higher dividends whose stock price would be high. High Stock Price indicates the demand for the Stock in the Market that pushes the price higher through competitive bidding.

The companies in India belonging to three different sectors have been taken - Nationalized Banks, Private Banks and Agri-Input considering the fact that the dividend payment is discretionary depending on the sector. In the present exercise the specification is as follows.

Y - Dependent variable (Dividend as last declared on March 2012, Financial Closing)

X- Independent variable (Stock Price as on 10th July)

The Estimated Equation is

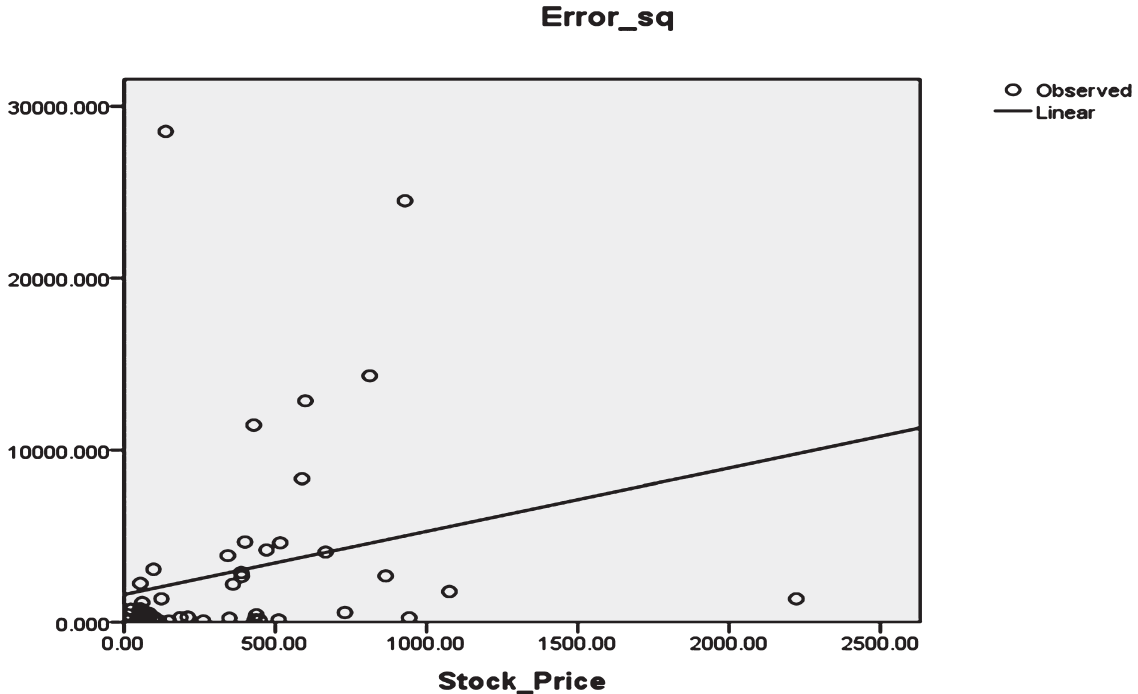
$$Y\text{-Cap} = 28.964 + 0.161 * X$$

Sig Levels (0.004) (0.000)

$$R^2 = .572$$

Tests for Heteroscedasticity

Graphical Test

Figure 1

The scatter plot of u^2 with the independent variables stock price by its shape shows curvacious deviation from a centralized dataset which indicates the possibilities of heteroscedasticity especially when there are evident outliers in the graph.

Park Test

On running regression between Residual Square (log) and Stock Price (log), the estimated equation is:

$$\ln U_i^2 = 0.015 + 2.119 * \ln_Stock\ Price$$

Sig Levels (0.980) (0.000)

It may be observed that the coefficient is significant suggesting that there is a significant relationship between $\ln U_i^2$ and $\ln X$. Thus, there is heteroscedasticity in the error variance.

Glejser Test

On running regression between Modulus (absolute

values of the error) and Stock Price, the estimated equation is:

$$\text{Modulus (Error)} = 26.999 + 0.033 * \text{Stock Price}$$

(0.000) (0.012)

The above regression results suggest that there is significant relationship between Modulus (Error) and Stock Price and hence there is a problem of heteroscedasticity in the error variance.

Spearman's Rank Correlation (RS) Test

Spearman's Rank Correlation Coefficient:

$$RS = 1 - 6 (\sum d_i^2) / (n(n^2 - 1))$$

$$RS = 2.877019646$$

$$'t' \text{ value for RS : } 3.421765$$

For 52 df ($df = n - 2$) this 't value' is significant even at less than 10 per cent of level of significance, thus there is evidence of a systematic relationship

between the explanatory variable and the absolute values of the residuals, which might suggest that there is heteroscedasticity in the error variance.

Transformation to Remove Heteroscedasticity

Since the presence of heteroscedasticity has been observed in the error variance, attempt has been made for three transformations with different assumptions, e.g., error variance is proportional

to X_i^2 , error variance is proportional to X_i^3 and error variance is proportional to $\ln X_i$. Using these transformations, the revised estimates of the intercept and constant are calculated to get the revised estimates for the dependent variable. The standard error of the estimates has been calculated to compare these with that of the original equation. The following table summarises the findings:

Table 1: Summary of Estimated Error

Original Equation /Transformation Cases	Mean Absolute percent Error of the Y estimate
Original Equation	0.19
Transformation 1	0.10
Transformation 2	0.06
Transformation 3	0.03

The table shows that the three transformations yield different errors of estimates. This indicates that when the data is transformed the estimates are more efficient having lower errors.

6.2 Case 2

The earnings per share (EPS) of any company are a reflection of the performance of the company. If the company is generating enough revenue for itself, it means that every shareholder is also benefitted. Given the confidence of the shareholders and the good performance in the market, the traders would be confident about the company resulting in a high share price. Therefore, the EPS of a company has relation with the market price of the shares of the given company. These two variables are used to estimate the regression equation taking cross section data set pertaining to BSE 30 companies in India as on 11 July, 2010. Since cross section data of the companies of different size and character have been taken, it is hypothesised that there may be heteroscedastic variance in the error term. It is attempted to test the presence of the said problem

with the different statistical tools, such as graphical method, Park Test, Gleijser Test, Goldfeld-Quandt Test and Spearman's Rank Correlation Test. In case of the presence of the problem, the data have been transformed using different assumptions and the revised estimates have been arrived at.

The original Regression Equation is as follows. The dependent variable is the earnings per share (EPS) and the independent variable is the share price. The estimated equation is as follows:

$$\hat{EPS} = 0.038 \text{ Share Price} + 9.533$$

$$R^2 = 0.736$$

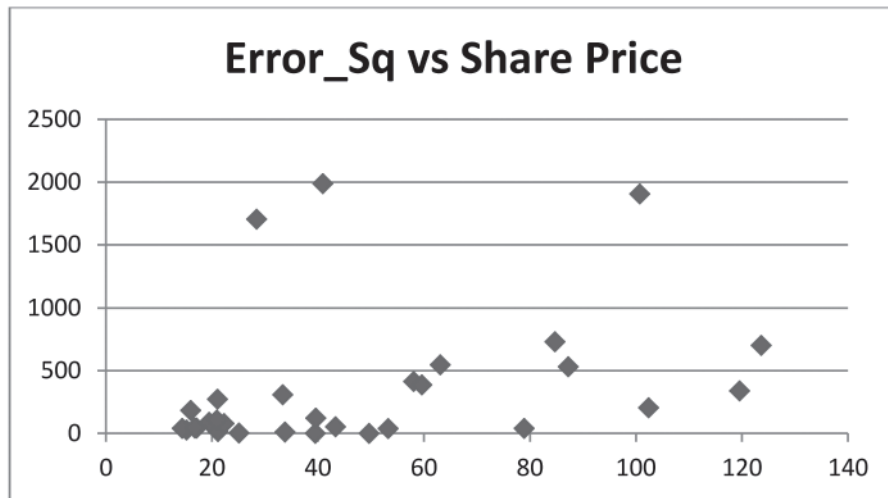
$$\text{Sig Levels } (0.023) \quad (0.000)$$

The equation has a good explanatory power with significant slope. However, as mentioned earlier, an attempt has been made here to test the presence/absence of the problem of heteroscedasticity since there are differences in the entities.

Tests for Heteroscedasticity

Graphical Test

Figure 2



From the graphical test it appears that some heteroscedasticity is present in data and squared residual seems to be linearly related to share price.

Park Test

Regression Equation: $\log(\text{error}^2) = 0.196 + 0.636 \log(\text{share price})$ $R^2 = 0.050$
 't' Sig Levels (0.057) (0.23)

Given the level of the Log of Share Price = 0.233, it can be concluded that it is statistically insignificant and thus the hypothesis is not rejected, and there is homoscedasticity in the data set.

Glejser Test

Regression Equation: $\text{absolute error} = 8.49 + 0.006 \text{ share price}$ $R^2 = 0.185$
 Sig Levels (0.016) (0.018)

The significance level of the share price = 0.018. Thus coefficient is statistically significant and hence heteroscedasticity is present in the data set.

Goldfed-Quandt Test

For first 13 values

Regression equation: $\text{Share Price} = 0.66 + 0.06 \text{ EPS}$
 $R^2 = 0.26$, $\text{RSS} = 2624.42$

For last 13 values

Regression equation: $\text{Share Price} = 0.03 \text{ EPS} + 19.79$
 $R^2 = 0.519$, $\text{RSS} = 5677.15$

Out of the 30 data points, four central data points are eliminated and the test is carried out with the remaining 26 data points. The derived F value = 2.16. But the critical F value at 5% significance level = 2.82. Since F value < F critical, it can be concluded that heteroscedasticity is present in the data set.

Spearman's Rank Correlation

Spearman's Rank Correlation Coefficient calculated for absolute value of error and share price = 0.4629 and the value of t-statistic = 2.7637.

For 28 degrees of freedom and at 5% significance level, the p value = 2.048

As t statistic is greater than p-value, hence it can be concluded that heteroscedasticity is present in the data.

Since there arises some confusion about the existence of heteroscedasticity in the data, the

Square Root transformation technique is chosen to remove heteroscedasticity.

Square-root Transformation

In this process, the original regression equation is divided by $\sqrt{\text{share price}}$ and the regression analysis is run with constant = 0. The estimated equation is as follows:

$$\text{EPS} / \sqrt{\text{Share price}} = 0.042 \sqrt{\text{Share price}} + 4.447 (1 / \sqrt{\text{Share price}})$$

Using the above equation the reverse operation is done to go to the original equation and the error of the Y estimate is estimated and compared. The following table summarizes the results.

Table 2: Summary of Errors

Original Equation /Transformation Cases	Mean Absolute Percent Error of the Y Estimate
Original Equation	0.18
Transformation	0.11

It is observed that the error decreases in the transformed model which could be accepted for taking decision. It means that if the manager is interested to use data of the independent variable, which have not been used in the estimation, it is very likely that he will get an estimate of the dependent variable with less error as compared to the original model.

6.3 Case 3 and 4

It has been mentioned above that there may be differences in the sizes of the SMEs with respect to the fixed capital, turnover and employment. It may so happen that the problem of heteroscedasticity may arise in the process of estimation giving rise to the wrong estimation of the employment elasticity since the units may have differences amongst themselves. There are several clusters of SMEs and these clusters may be different with respect to product, the market they cater to (local and foreign), technology, labour source (migrants or local), labour replacing technology to cope up with the shortage of labour, etc. These factors may be responsible in the presence of heteroscedasticity variance in the error term when regression equations are estimated.

Two sets of clusters, viz., the machinery and textile, are taken in the study. In both the cases, the

relation between turnover as the dependent variable and employment as the independent variable is examined. In such a relationship, a manager may be interested to examine the employment elasticity of the clusters. These two cases are presented below.

6.3.1 Case 3: Machinery Products

As mentioned above, the dependent variable Y is the turnover and the independent variable X represents employment. In these two cases, the manager's objective is to highlight the employment elasticity in the clusters. Thus, the log linear model is used instead of a simple linear model. The estimated regression equation based on the data is as follows:

$$\ln Y_i = 1.674 + 0.669 \ln X_{2i} \quad (R^2 = 0.330)$$

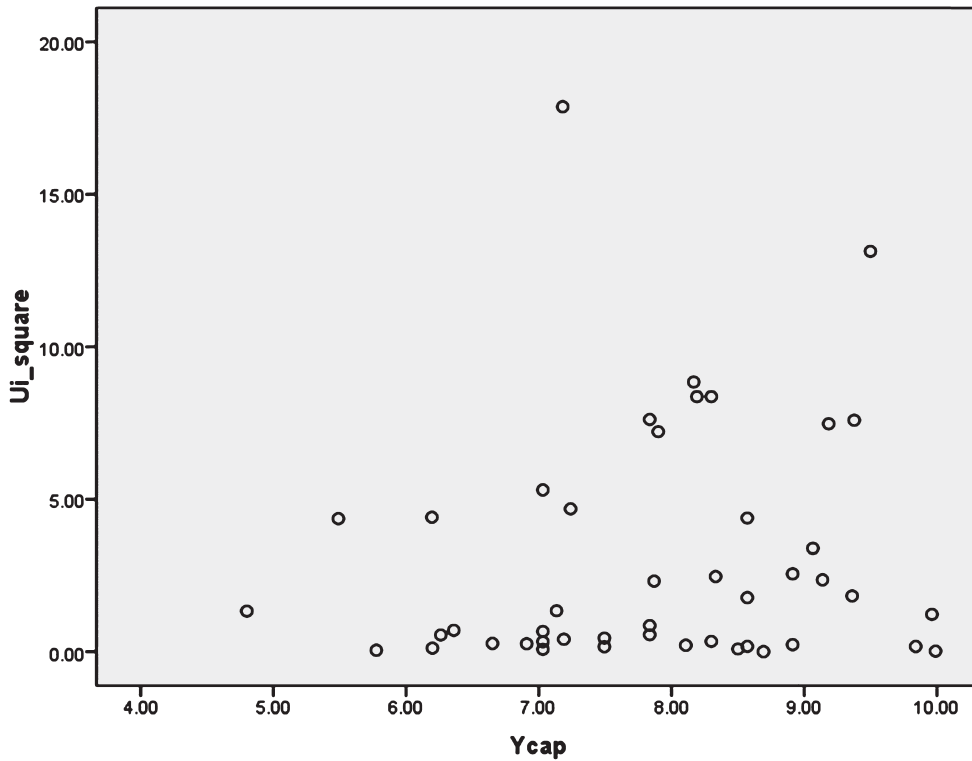
Sig Levels (0.015) (0.00)

As may be seen that the explanatory power is not very high. However, the employment elasticity is observed to be 0.67. Since the clusters may be different, efforts are made to confirm the results by testing for the presence or/absence of heteroscedasticity. The tests and the results are as follows:

Tests for Heteroscedasticity

Graphical Test

Figure 3



It is seen that there is no pattern shown in the plot, and there is no heteroscedasticity in the error variance.

Park Test

The model used in the park test for regression and the estimated equation are as follows:

$$\ln u_i^2 = \alpha + \beta \ln (\ln X_i) + v_i$$

$$\ln u_i^2 = -0.646 + 0.233 \ln (\ln X_i) \quad (0.153)$$

As there is no statistically significant relationship between the two variables, it may be concluded that there is no heteroscedasticity in the error variance.

Glejser Test

Model used in the test is:

$$|u_i| = \beta_1 + \beta_2 \ln X_{2i} + v_i$$

After regressing the absolute value of residual obtained from the original equation on log of workers, the following results are obtained:

$$|u_i| = 0.703 + 0.073 \ln X_{2i} \quad (R^2=0.016) \quad (0.895)$$

As there is no relationship between the absolute value of residual and the regressor, log of workers, there is no heteroscedasticity in the error variance.

White's General Heteroscedasticity Test

The model and the estimated one are as follows:

$$u_i^2 = \alpha_1 + \alpha_2 \ln X_{2i} + \alpha_3 (\ln X_{2i})^2 + v_i$$

$$u_i^2 = -5.856 + 1.733 \ln X_{2i} - 0.081 (\ln X_{2i})^2 + v_i$$

$$(R^2 = 0.024)$$

$$(0.660) \quad (-0.558)$$

$$n.R^2 = 45 \times 0.024 = 1.08$$

As value of nR^2 is less than chi square value at two degrees of freedom (5.99), there could be no heteroscedasticity in the error variance.

In all the above tests the presence of heteroscedasticity is not found. Thus, the original equation can be used for estimation.

6.3.2 Case 4: The Textile Clusters

$$\ln Y_i = \beta_1 + \beta_2 \ln X_{2i} + u_i$$

where,

Y_i = Turnover of the cluster firms and X_{2i} = Number of workers in the cluster firms. The

estimated regression equation is as follows:

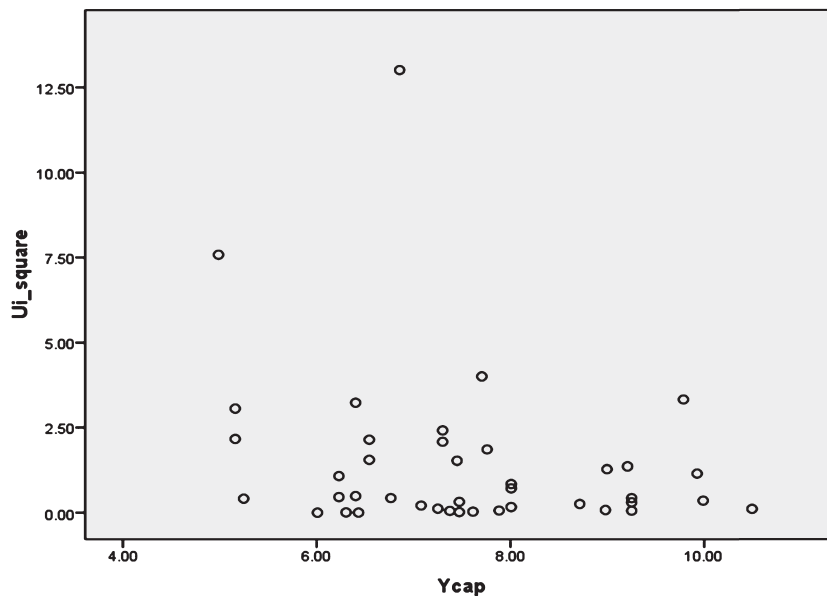
$$\ln Y_i = 0.362 + 0.772 \ln X_{2i} \quad (R^2 = 0.580)$$

$$(0.00)$$

Again the same process is adopted to test for heteroscedasticity in the data, the results of which are as follows:

Tests for Heteroscedasticity Graphical Test

Figure 4



As can be seen from the graph that there is no pattern shown in the plot and there is no heteroscedasticity in the error variance. However, it is observed that there are a few outliers, which may pose the problem of heteroscedasticity. Therefore, effort has been made to test the presence/absence of heteroscedasticity using the above tests.

Park Test

The model used in the Park test for regression is: $\ln u_i^2 = \alpha + \beta \ln (\ln X_i) + v_i$ and the estimated equation is as follows:

$$\ln u_i^2 = 0.127 - 0.502 \ln (\ln X_i)$$

$$(0.287)$$

As there is no statistically significant relationship between the two variables, it may be concluded

that there is no heteroscedasticity in the error variance.

Glejser Test

Model used in the test is:

$$|u_i| = \beta_1 + \beta_2 \ln X_{2i} + v_i$$

After regressing the absolute value of residual obtained from the original equation on log of workers, the following results are obtained:

White's General Heteroscedasticity Test

$$\begin{aligned} u_i^2 &= \alpha_1 + \alpha_2 \ln X_{2i} + \alpha_3 (\ln X_{2i})^2 + v_i \\ u_i^2 &= 11.371 - 1.850 \ln X_{2i} + 0.081 (\ln X_{2i})^2 + v_i \\ &\quad (R^2=0.078) \end{aligned}$$

$$(0.994) \quad (0.827)$$

$$\begin{aligned} n.R^2 &= 40 \times 0.078 \\ &= 3.120 \end{aligned}$$

$$X_{df=2} = 5.99$$

$$|u_i|_{df=2} = 1.827 - 0.096 \ln X_{2i} \quad (R^2=0.055)$$

$$(0.503)$$

As there is no relationship between the absolute value of residual and the regressor, log of workers, there is no heteroscedasticity in the error variance. As value of nR^2 is less than chi square value at two degrees of freedom (5.99), there is no heteroscedasticity in the error variance.

7. Implications and Conclusions with reference to Managerial Decision Making

In the above four exercises, cross section data have been used. The observations in the cases have important implication on the use of regression equations with heteroscedastic variances for decision making.

- i. It may be mentioned here that the manager is not interested in the sample observation only. S/he wants to know the statistical valid relationship between the variables. Once this is established, the manager has to go outside the sample to draw conclusions on the relationship and may take decision. Thus, the prime concern for a manager is

to have an efficient equation, i.e., best and unbiased estimates in decision making. This aspect may be seen in the four cases reported in the study. In two cases, the problem of heteroscedasticity has been found, and in the other two cases there has not been any problem of heteroscedasticity. In the former cases, the data have been transformed to get a fresh set of coefficients and with the help of these the value of the dependent variable (where the manager is interested in) has been estimated. The findings suggest that the transformed equations have the estimates of the dependent variable where the error is minimized. Thus, the manager may use these equations for decision making.

- ii. Different methods have been used to examine the presence/absence of heteroscedastic variance in the data. These tests relate to the very nature of the problem of heteroscedasticity, i.e., the behaviour of the U_i s or the error term with respect to the independent variables or the estimated dependent variable. This is supposed to be the reason why in some tests for the same data set, the presence/absence of the problem is not confirmed, whereas, in other it is confirmed. Moreover, the transformation is also based on certain assumption on the variances of the error term. Thus, the trial and error method has to be used to examine the problem with respect to the proportionality of the error with the dependent or the independent variables. However, calculation of the error in the Y estimate and the comparison are must to identify the best fitted equation. Often it is found that the equation with a specific transformation of the data will result in the least error which should be accepted as the best one or the most efficient one. Such an equation should be used for decision making since the power of generalization

will be more for such an equation. As mentioned earlier, the manager is interested in the generalisation rather than the sample phenomenon. The equation which is efficient will have more power of generalisation to use for those cases which were not included in the model.

- iii. Interesting results have been found in the exercise in cases 3 and 4. As mentioned earlier, data have been taken for several clusters of MSME in the country. Each cluster is having large number of MSMEs. It has been hypothesized that the manager is estimating the employment elasticity using cross section data and thus uses a log linear model since the slope coefficient will give the measure of elasticity when turnover is used as the dependent variable and the employment as independent variable. There had been a priori reasoning that there could be differences in the MSME units which may reflect in the differences in clusters. The reasons, which were articulated, are related to the differences in the sizes of the SMEs with respect to the fixed capital, turnover, employment, product, the market they catered to (local and foreign), technology, labour source (migrants or local), labor replacing technology to cope up with the shortage of labour, etc. These factors may be responsible in the presence of heteroscedasticity variance in the data. Therefore, different tests were used to find the presence of heteroscedasticity, but none of the tests could confirm that there is a problem of unequal variances in the error term or heteroscedasticity. This may be due to several factors. It may be pointed out here that a log linear model has been used instead of a linear one in these cases. Moreover, the data set is quite large. In each cluster there have been hundreds of units. The data on turnover and employment for hundreds of

units have been added for each cluster and these data have been for several clusters to find the employment elasticity. This large data set may be reducing the ‘severity’ of the heteroscedasticity in the variances. In this case, reliance may be on the estimates since the problem in estimation could not be found. And therefore it may be concluded about the employment elasticities, i.e., the estimated coefficient in the loglinear model. The finding in the two cases is consistent with the present day scenario of employment inelastic turnover in the sector. This means that the output is not elastic to the employment since the value of the coefficient is less than one. One of the important reasons could be the fact that the technologies and labor efficiency have not been considered separately.

- iv. The assumption that the time series data will not have the problem of heteroscedasticity since the data set relates to one entity may not be valid in some cases. In cases when the outliers are observed in the scatter plots the presence or absence of the problem may be suspected. Theoretically speaking such a phenomenon leads to the presence of the problem of heteroscedasticity irrespective of the type of data. Therefore, statistical tests are necessary conditions even for the time series data.
- v. One has to rely more on the different tests and arrive at a conclusion rather than restricting oneself to one or two tests. The results of the study confirm that the problem of unequal variance or heteroscedasticity could not be found in one test but was confirmed in the other. This could be because of the assumption made on the behavior of the square of the error and the other entities in the equation, like the independent variable or the reciprocal of the variable, etc. This will be more so when more than one

independent variable are being used. In the exercises of the study only one variable has been used. However, in cases where a set of independent variables is used this problem will have to be addressed more seriously, because there will be a large number of assumptions on the behaviour of the error term with the set of independent variables. Thus, the researcher or the manager has to rely on the comparison of the errors when different models are used with various assumptions. There are different methods to evaluate the errors. Mean Absolute Percent Error (MAPE) may be used to evaluate the relative extent of errors in different estimated models. Thus, one has to select an estimated equation where one gets the minimum error. This is because the researcher or the manager is interested in the estimated dependent variable for decision making. It may also be mentioned here that the standard error of the estimate may give some indications while comparing the estimated equation. However, in such cases the specified equations which are being compared have to be the same with respect to specification of form and variables. For example, one cannot compare the standard error of estimates of two equations with different specification, such as a linear and the other a log linear one.

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Appendix 1

Data Sets Case 1

Cross Sectional Data Set

Sector : Nationalised Banks						
Company	Stock Price In INR	Dividend in INR		Company	Stock Price in INR	Dividend in INR
IOB	84.75	45		State Bank of Hyderabad	516.05	180
Corporation Bank	428.6	205		Syndicate Bank	110.45	38
Andhra Bank	117	55		Oriental	261.85	79
Bank of India	49.95	22		Dena Bank	101.45	30
Vijaya Bank	59.25	25		Punjab & Sind	70.4	20
Allahabad Bank	147.9	60		Canara Bank	431.4	110
Indian Bank	185.75	75		PNB	864.85	220
United Bank of India	62.05	24		Central Bank	82.8	20
Union Bank	210.6	80		State Bank of Trivancore	729.9	170
State Bank of India	387.5	145		State Bank of Mysore	348.1	70
UCO Bank	81.05	30		State Bank Baroda	510.85	100
IDBI Bank	97.85	35				
Sector : Private Banks						
Company	Stock Price in INR	Dividend in INR		Company	Stock Price in INR	Dividend in INR
JK Bank	928.5	335		Axis Bank	1075.25	160
Lakshmi	81.6	25		Yes Bank	359.85	40
Karnatak Bank	99.35	30		ING Vyasya	388.5	40
KarurVyasa	437.4	120		Dhanlaxmi	59.8	5
South Indian	25.25	60		HDFC Bank	588.4	215
Federal Bank	447.5	90		IndusInd Bank	343	22
ICICI Bank	942.55	165		Kotak	599.3	12
City Uni	53.7	85				

Sector : Agri Inputs						
Company	Stock Price in INR	Dividend in INR		Company	Stock Price in INR	Dividend in INR
Kilpest	12.05	10		Excel Cr	106.75	40
Meghmani	8.37	40		Camson B	53.5	10
Paushak	54.15	20		Rallis I	137.45	220
Monsanto	665.95	200		Bharat R	123.15	12
Excel	67.75	40		Insectic	399.65	25
Super Cr	21	5		Bayer Cr	812.1	40
Nagarjun	63.2	15		PI Indus	470.85	40
Dhanuka	97.15	100				

Source: Moneycontrol.com

Data Case 2

Company	Share Price in INR	EPS in INR		Company	Share Price in INR	EPS in INR
ACC	826.2	85.51		Larsen	1,825.55	72.66
Bharti Airtel	305.25	24.82		Mahindra & Mahindra	637.9	36.89
BHEL	2,443.30	88.06		Maruti Suzuki	1,408.75	86.45
Cipla	335.8	13.48		NTPC	199.35	10.59
DLF	302.75	4.53		ONGC	1,276.60	78.39
HDFC	3,002.50	97.15		Reliance	1,055.75	49.55
HDFC Bank	2,044.30	64.15		Reliance Communications	190.6	23.27
Hero Honda	1,978.80	111.77		Reliance Infrastructure	1,150.25	47.03
Hindalco	149.5	10.01		SBI	2,399.55	144.37
HUL	261.95	10.09		Sterlite India	169.8	2.47
ICICI Bank	889.5	36.1		Tata Motors	788.45	39.26
Infosys	2,894.95	101.13		Tata Power	1,317.55	39.93
ITC	299.85	10.63		Tata Steel	497.3	69.7
Jaiprakash Association	127.55	8.04		TCS	791.45	28.62
Jindal Steel	627.4	15.84		Wipro	409.45	23.36

Source: Moneycontrol.com

Data Set Case 3: Machinery Product Cluster Firms (2005-2011)

Sl. No.	Cluster Name	State	No. of Firms	No. of Workers	Turnover (in million INRs)	In (Turnover)*	In (Worker)*
1	Noida Engineering	Uttar Pradesh	8043	120000	500000	13.122	11.695
2	Ghaziabad Mechanical Engineering	Uttar Pradesh	750	75000	150000	11.918	11.225
3	Bangalore Granite Cutting & Polishing	Karnataka	150	3750	90000	11.408	8.230
4	Tiruchirappalli Engineering	Tamil Nadu	300	20000	72570	11.192	9.903
5	Rajkot Engineering	Gujarat	2190	62800	54500	10.906	11.048
6	Madurai Tie & Dye	Tamil Nadu	222	10000	40000	10.597	9.210
7	Malegaon Power loom Textiles	Maharashtra	5850	11000	39600	10.587	9.306
8	Rajkot Diesel Engines	Gujarat	5500	250000	25000	10.127	12.429
9	Power Loom Cluster	Bihar	1200	30000	20000	9.903	10.309
10	Mohali General Engineering	Punjab	2600	21000	20000	9.903	9.952
11	Jaipur Gem Cutting	Rajasthan	25000	200000	12400	9.425	12.206
12	Coimbatore Engineering	Tamil Nadu	600	50000	12000	9.393	10.820
13	Guntur Power Loom	Andhra Pradesh	550	30000	8000	8.987	10.309
14	Maunath Bhanjan Powerloom Textiles	Uttar Pradesh	40000	240000	7000	8.854	12.388
15	Bangalore Machine	Karnataka	57	36000	5900	8.683	10.491
16	Vadodara Power Distribution Transformer	Gujarat	32	860	4000	8.294	6.757
17	Meerut Transformers & Voltage Regulators	Uttar Pradesh	100	3500	4000	8.294	8.161
18	Ludhiana Sewing Machine	Punjab	800	27000	3650	8.202	10.204
19	Kannur General Engineering	Kerala	2000	6000	3500	8.161	8.700
20	Ichalkaranji Powerloom Textiles	Maharashtra	1100	97700	3000	8.006	11.490
21	Coimbatore Wet Grinding Machines	Tamil Nadu	700	20000	2250	7.719	9.903
22	Salem Starch & Sago	Tamil Nadu	790	15000	2100	7.650	9.616
23	Narsaraopet General Engineering	Andhra Pradesh	170	3000	2000	7.601	8.006
24	Rajkot Cutting Tools	Gujarat	2000	70000	2000	7.601	11.156
25	Khushiguda Electronics	Andhra Pradesh	200	3000	1500	7.313	8.006
26	Faridabad Light Engineering	Haryana	203	50000	1500	7.313	10.820
27	Kishangarh Power Loom	Rajasthan	300	1700	1300	7.170	7.438
28	Ranipet General Engineering	Tamil Nadu	200	6000	1200	7.090	8.700
29	Perungudi General Engineering	Tamil Nadu	2300	10000	1200	7.090	9.210
30	Ernakulam General Engineering	Kerala	1800	10000	1000	6.908	9.210
31	Vasanasi Electric Fans	Uttar Pradesh	5000	100000	750	6.620	11.513
32	Malappuram General Engineering	Kerala	1000	3800	700	6.551	8.243
33	Tandur Slab Cutting & Polishing	Andhra Pradesh	500	30000	650	6.477	10.309
34	Rajahmundry Auto General Engineering	Andhra Pradesh	200	2500	600	6.397	7.824

35	Mauranipur Powerloom	Uttar Pradesh	1500	10500	570	6.346	9.259
36	Hubli General Engineering	Karnataka	150	3000	500	6.215	8.006
37	Alappuzha Ready Made Garments	Kerala	47	107	386	5.956	4.673
38	Ahmedabad Powerloom Textiles	Gujarat	90	865	350	5.858	6.763
39	Coimbatore Motors & Pumps	Tamil Nadu	5000	460	260	5.561	6.131
40	Beawar Power Loom	Rajasthan	60	950	250	5.521	6.856
41	Siliguri Lead Acid Battery	West Bengal	75	1100	250	5.521	7.003
42	Jahanganj Powerloom Textiles	Uttar Pradesh	2500	17000	200	5.298	9.741
43	Ghosi Mau Powerloom Textiles	Uttar Pradesh	5000	16400	180	5.193	9.705
44	Jaipur Wire & Cable	Rajasthan	200	4100	160	5.075	8.319
45	Madanapally Bus Body Building	Andhra Pradesh	150	3000	113	4.727	8.006
46	Thrissur Dies and Moulds	Kerala	50	300	30	3.401	5.704

Source: Cluster Observatory, MSME Foundation.

Note: *refers to the natural logarithm with base e.

Data Set: Case 4: Textiles Product Cluster Firms (2005-2011)

S.No.	Cluster Name	State	No of Firms	No of workers	Turnover (Millions)	In (Turnover)*	In (Worker)*
1	Tirupur Knitwear	Tamil Nadu	7010	2,00,000	1,10,000	11.608	12.206
2	Ludhiana Hosiery	Punjab	12000	5,00,000	50,000	10.820	13.122
3	Bangalore Readymade Garment	Karnataka	2500	4,500	35,000	10.463	8.412
4	Noida Ready Made Garments	Uttar Pradesh	6014	94,736	32,000	10.373	11.459
5	Bhadoli Carpets	Uttar Pradesh	2500	72,000	25,000	10.127	11.184
6	Ambattur Ready Made Garments	Tamil Nadu	800	1,00,000	20,000	9.903	11.513
7	Agra Leather	Uttar Pradesh	5000	1,00,000	13,200	9.488	11.513
8	Panipat Madeups	Haryana	7475	260000	12000	9.393	12.468
9	Panipat Floor Covering	Haryana	331	50,000	10,100	9.220	10.820
10	Nagpur Ready Made Garments	Maharashtra	1500	8,000	7,000	8.854	8.987
11	Adari Mau Powerloom Textiles	Uttar Pradesh	40000	2,40,000	7,000	8.854	12.388
12	Kanpur Ready Made Garments	Uttar Pradesh	700	20,000	7,000	8.854	9.903
13	Indore Ready Made Garments	Madhya Pradesh	1500	100000	6000	8.700	11.513
14	Amroha Textile Waste Processing	Uttar Pradesh	2500	70500	6000	8.700	11.163
15	Sovabazar Hosiery	West Bengal	950	17000	3400	8.132	9.741
16	Kanpur Powerloom Textiles	Uttar Pradesh	300	3000	3000	8.006	8.006
17	Unjha Isabgol Husk	Gujarat	33	400	2300	7.741	5.991
18	Mumbai Leather	Maharashtra	1100	8800	2000	7.601	9.083
19	Kanpur Cotton Hosiery	Uttar Pradesh	400	10000	2000	7.601	9.210
20	Pilkhwa Textile Printing	Uttar Pradesh	400	20000	2000	7.601	9.903
21	Serampore Silk Printing	West Bengal	220	12000	1700	7.438	9.393
22	Pamidi Ready Made Garments	Andhra Pradesh	3000	20000	1200	7.090	9.903
23	Ballary Jeans	Karnataka	830	10000	1000	6.908	9.210
24	Meerut Musical Instruments	Uttar Pradesh	160	7500	1000	6.908	8.923
25	Raebareli Banarsi Saree	Uttar Pradesh	60	500	1000	6.908	6.215
26	Amravati Readymade Garments	Maharashtra	105	2000	1000	6.908	7.601
27	Rayadurg Ready Made Garments	Andhra Pradesh	2300	6000	750	6.620	8.700
28	Nalgonda Powerloom Textiles	Andhra Pradesh	450	2600	650	6.477	7.863
29	Vita Textile	Maharashtra	90	14500	600	6.397	9.582
30	Rajapalayam Powerloom Textiles	Tamil Nadu	85	2200	500	6.215	7.696
31	Ichalkaranji Garments	Maharashtra	650	9700	500	6.215	9.180
32	Gorakhpur Powerloom Textiles	Uttar Pradesh	400	4000	450	6.109	8.294
33	Amritsar Powerloom Textiles	Punjab	200	1500	400	5.991	7.313
34	Sangli Power Loom	Maharashtra	160	8000	350	5.858	8.987
35	Sricilla Powerloom Textiles	Andhra Pradesh	450	13500	300	5.704	9.510
36	Allahabad Floor Covering	Uttar Pradesh	600	2500	300	5.704	7.824
37	Alappuzha Food Processing	Kerala	2000	3000	200	5.298	8.006
38	Pareo Brass Utensils	Bihar	500	2000	180	5.193	7.601
39	Bhavani Powerloom Textiles	Tamil Nadu	300	560	100	4.605	6.328
40	Gorakhpur Ready Made Garments	Uttar Pradesh	300	2500	100	4.605	7.824
41	Joya Textile Waste Processing	Uttar Pradesh	70	500	40	3.689	6.215

Source: Cluster Observatory, MSME Foundation (* refers to natural logarithms)

Foreign Aid and its Impact on Economic Growth – A Study of CMLV Nations

Kim Kanika¹

ABSTRACT

Foreign aid plays a key role in promoting economic growth of a number of Third World countries. The role of foreign aid in promoting economic development of the recipient economies is explained in terms of concepts, such as “the savings gap” and “the foreign exchange gap”. However, the role of foreign aid in the growth process of developing countries has been a topic of intense debate. Empirical studies have largely failed to provide a conclusive picture as to the extent that aid contributes to economic growth and development. In this context, the present paper attempts to analyze the foreign aid positions and examine the impact of foreign aid on the economic growth of the four countries in South-east Asia, such as Cambodia, Myanmar, Lao PDR and Vietnam, commonly known as CMLV nations. Further, in the light of the poorness of the selected economies, examining the role of foreign aid in enhancing the economic growth of CMLV nations assumes special significance.

The study revealed that in all the years under study, while Vietnam was the largest; Myanmar was the smallest recipient of foreign aid. Foreign aid flows to CMLV nations during the period 2000 to 2009 though mostly had increased, but aid as a percentage to GDP of the respective economies had fallen during the same period. For the CMLV nations as a whole, foreign aid as a percentage to GDP was 5.62 in 2000 which had fallen to 3.57 in 2009. Though the foreign aid flows to Lao PDR was much smaller as compared to Cambodia and Vietnam, aid per recipient of Lao PDR was highest in all the years (2000 to 2009) among all the four countries.

With regard to the role of foreign aid on economic growth of the selected countries, the study revealed that foreign aid as a share of GDP had significant positive impact on the economic growth of Vietnam, whereas, in case of Myanmar and Lao PDR, foreign aid had a negative impact on the growth of the respective economies and there was no significant impact of foreign aid on the economic growth of Cambodia. Thus, the present study significantly contributes to the empirical debate on the effectiveness of foreign aid on economic growth of CMLV nations of the South-east Asia.

Key Words: Foreign Aid, Economic Growth, CMLV Nations

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1. Introduction

Foreign aid is widely accepted as a flow of financial resources from developed to developing countries on development grounds. Today, foreign aid is widely recognized as an international norm in relations between rich and poor countries. Aid can be in the form money, goods or technical assistance. Further, it may be bilateral assistance (between two countries) or multilateral assistance (many donors). Broadly, foreign aid refers to transfer of real resources from governments or public institutions of the richer countries to governments of developing/ less developed countries with the objective to promote economic development and welfare, usually measured by its impact on economic growth. This is explained in term of concepts, such as “the savings gap” and “the foreign exchange gap”. The overall aim of development aid is not to equalize incomes in different economies in the world, but is however to provide every country with an opportunity to achieve steady growth.

Donors have a variety of motivations for providing aid, only some of which are directly related to economic development. There is little question that foreign policy and political relationships are the most important determinants of aid flows. Many people see the main rationale for aid as fighting poverty, and although this is less important than political considerations in donor allocation decisions, it still plays an important role. Donors generally provide their most concessional aid to the poorest countries, and some aid programs are designed explicitly with this objective in mind.

According to Radelet (2006), most foreign aid is designed to meet one or more of four broad economic and development objectives, such as (i) to stimulate economic growth through building infrastructure, supporting productive sectors, such as agriculture, or bringing new ideas and technology; (ii) to strengthen education, health,

environmental, or political systems; (iii) to support subsistence consumption of food and other commodities, especially during relief operations or humanitarian crises; and (iv) to help stabilize an economy following economic shocks.

Despite these broader objectives for aid, economic growth has always been the main yardstick used to judge aid's effectiveness, with more aid expected to lead to faster growth. However, after decades of capital transfer to the developing countries, the effectiveness of foreign aid in achieving these objectives remains questionable. It is in this context, the present paper attempts to examine the impact of foreign aid on the growth of the economies of the CMLV (Cambodia, Myanmar, Lao PDR and Vietnam) nations of South-east Asia.

2. Review of Literature

The proponents of foreign aid assert that overseas capital inflow is necessary and sufficient for economic growth in the less developed countries. They claim that there exists a positive relationship between aid and economic growth because it complements domestic resources and also supplements domestic savings. Furthermore, foreign aid assists to close the foreign exchange gap, provides access to modern technology and managerial skills, and allows easier access to foreign market (Chenery and Strout, 1966; Papanek, 1973; Gulati, 1975; Gupta, 1975; Over, 1975; Islam, 1992).

In the early literature on aid and growth in less developed countries, foreign aid was perceived only as an exogenous net increment to the capital stock of the recipient country. It was assumed by pro-aid development economists such as Rosenstein-Rodan (1961) that each dollar of foreign resources in the form of aid would result in an increase of one dollar in total savings and investment. Chenery and Strout (1966) argued that all capital inflows represented net additions to an

LDC's productive capabilities.

Papanek (1972) characterized the highly optimistic aid-impact approach embedded in the Harrod-Domar theoretical growth model as “curiously naïve”. Papanek (1973) appeared to overturn the negative results of Griffin (1970) and Griffin and Enos (1970) by disaggregating foreign capital into three components: foreign investment, foreign aid and other foreign inflows. He treated growth rate as a dependent variable with domestic savings, foreign aid, foreign investment and other foreign inflows being independent variables. He found that foreign aid had a substantially greater effect on economic growth than the other variables. Attempts at measuring the impact of both domestic and foreign resources on the actual growth performance of the developing countries have been made by Gupta (1975) and Gupta and Islam (1983). The studies found that the domestic savings as well as foreign capital made a positive contribution to growth and foreign capital had some positive role to play. Levy (1988) found aid to be positively and significantly correlated with investment and economic growth in Africa.

Dowling and Hiemenz (1982) tested the aid-growth relationship for the Asian region on 13 countries using pooled data and found a positive and significant impact of aid on growth. Singh (1985) obtained similar results for a wider sample of 73 countries during 1960-70 and 1970-80 (particularly in the later period). More recently Hadjimichael et al. (1995) found positive evidence for the period 1986 to 1992 using a sample of 41 countries. Their model is more sophisticated than most predecessors by attempting to capture potential side effects of foreign aid and other policy variables that are hypothesised to affect growth.

Murty, Ukpolo and Mbaku (1994) found that per capita real gross domestic product, the saving rate and aid were cointegrated and aid had positive long

run effects in Cameroon during 1970-1990. Using a Autoregressive Distributed Lag (ARDL) model, Gounder (2001) found that aid had a positive and significant effect on growth in Fiji. Gomanee, Girma, and Morrissay (2005) addressed directly the mechanisms via which aid impacts growth. Using a sample of 25 Sub-Saharan African countries over the period 1970 to 1997, the authors determined that foreign aid had a significant positive effect on economic growth. Karras (2006) investigated the correlation between foreign aid and growth in per capita GDP using annual data from 1960 to 1997 for a sample of 71 aid-receiving developing countries. The study concluded that the effect of foreign aid on economic growth was positive, permanent, and statistically significant.

The relationship between foreign aid and economic growth was investigated by Hatemi-J and Irandoust (2005) for a panel of developing countries (Botswana, Ethiopia, India, Kenya, Sri-Lanka, and Tanzania) over the period 1974-1996. The results revealed that the variables contained a panel unit root and they cointegrated in a panel perspective. The long-run elasticities showed that foreign aid had a positive and significant effect on economic activity for each country in the sample.

However, challenging the assumption that foreign capital inflows add to capital formation without disturbing domestic savings and consumption, Griffin (1970), Griffin and Enos (1970), Weisskopf (1972), Areskoug (1976) criticized the simplistic findings of others and emphasised that not all aid was an increment to the capital stock of LDC's, since some aid was diverted for consumption purposes. Griffin and Enos (1970) found that foreign aid had neither accelerated growth nor helped towards faster democratic political regimes. Foreign aid, at least in some countries, might impair rather than promote growth. If anything, aid might have retarded development by leading to lower domestic saving by distorting the

composition of investment and thereby raising the capital-output ratio, by frustrating the emergence of an indigenous entrepreneurial class and by inhibiting institutional reforms. It was further suggested that foreign aid increased consumption, and thus reduced the savings rate. Mosley (1980) found a negative relationship between foreign aid and growth in his 83 LDC case and a positive relationship for growth for the 37 countries by using TSLS.

Mosley, Hudson and Horrell (1987), for 60 LDC's in three periods 1960-70, 1970-80, 1980-83, considered the apparent effectiveness of foreign aid in the light of a model which decomposed the impact of foreign aid into three different component parts. These were "the direct effects of the aid disbursement", "indirect effects on the spending pattern of the public sector of the recipient country", and lastly the effect of foreign aid on the prices of some goods, "raises the prices of some goods, depresses the price of some others and hence has side effects on the private sector of the recipient economy through the price system". Their results again showed a poor performance for aid in generating growth and failed to show that aid had a positive effect on growth.

Boone (1996) for the first time analyzed the macro economic impact of aid in a neoclassical growth model. He looked at fungibility issues in a standard growth model with productive public expenditure as in Barro (1990), and found no effect of aid in the long run because aid was consumed instead of being invested. Pedersen (1996) asserted that it was still not possible to conclude aid affects growth positively. Using game theory, he argued that the problems lied in the build-in incentive of the aid system itself. Knack (2000), in a cross-country analysis, indicated that higher aid levels eroded the quality of governance, as measured by indexes, i.e., bureaucratic quality, corruption and the rule of law. Using the optimal growth model with foreign

aid, foreign borrowing and endogenous leisure-and-consumption choices, Gong and Zou (2001) observed that foreign aid depressed domestic saving, mostly channels into consumption and had no relationship with investment and growth in developing countries. Further, using a simultaneous-equation model, Burke and Ahmadi-Esfahani (2006) did not find sufficient evidence to conclude that aid had a significant effect on the economic growth in Thailand, Indonesia and the Philippines during 1970 to 2000. Mallik (2008) examined the effectiveness of foreign aid for economic growth in the six poorest and highly aid dependent African countries, namely, the Central African Republic, Malawi, Mali, Niger, Sierra Leone and Togo. Using cointegration analysis, the study found that a long run relationship existed between per-capita real GDP, aid as a percentage of GDP, investment as a percentage of GDP and openness. However, the long run effect of aid on growth was found to be negative for most of these countries.

The conditional relationship of aid to economic growth states that aid supports growth in some conditions but not others. The conditional effectiveness of aid depends on the characteristics of the recipient country, the practices and procedures of the donors and the type of activity that the aid supports. Isham, Kaufmann, and Pritchett (1995) opened this line of research by finding that World Bank projects had higher rates of returns in countries with stronger civil liberties. Burnside and Dollar (2000), in a very influential study, concluded that aid stimulated growth in countries with good policies, but not otherwise. According to them, 'good policies' were low inflation, zero or low budget deficits with an open trade regime, a liberalized financial sector and a private sector friendly government. Easterly, Levine, and Roodman (2004) found that the original Burnside and Dollar results did not hold up to modest robustness checks. Aid worked

much better where the reform was initiated or internalized by local government rather than when it was imposed by outsiders. Therefore, aid is normally more effective when it facilitates efficiently and timely by reforms triggered by the local authority (World Bank, 1998).

Thus, the reviews of empirical literature revealed positive, no or negative and conditional evidence pointing to the impact of aid on economic growth. As such, the question on aid effectiveness is still inconclusive. To further support the debate and to understand specifically its contribution to economic growth of CMLV nations of the South-east Asia the present study is an attempt in this direction.

3. Objectives

The main objectives of the study are as follows:

- i. To analyze the foreign aid positions of CMLV nations over the period 2000 to 2009.
- ii. To examine the impact of foreign aid on the economic growth of CMLV nations over the period 2000 to 2009.

4. Data Base and Methodology

The present study is extensively based on secondary data. Several publications of the World Bank, the Organization for Economic Co-operation and Development (OECD), the World Trade Organization (WTO), the International Monetary Fund (IMF), the Asian Development Bank (ADB), and other national and international organizations are referred for necessary information.

To examine the impact of foreign aid on economic growth of Cambodia, Myanmar, Lao PDR and Vietnam (CMLV nations), multiple regression analysis is carried out as per the following regression model:

$$EG = \alpha + \beta_1 FA + \beta_2 FD + \beta_3 EX + \beta_4 GE + \beta_5 LR + \beta_6 AG + U$$

Where,

EG = Economic growth of the selected

country as measured by Gross Domestic Product (GDP) growth rate;

FA = Foreign aid as a share of GDP;

FD = Share of Foreign Direct Investment (FDI) inflows to Gross Fixed Capital Formation (GFCF);

EX = Share of exports to GDP;

GE = Share of government final consumption expenditure to GDP;

LR = Literacy rate;

AG = Share of agriculture to GDP;

α = Intercept term; and

U = Error term.

5. Analysis of Results

5.1 Foreign Aid flows to CMLV Nations

Aid is typically measured in one of three ways: total dollars, as a share of GDP and per capita. Each measure reveals different things. Total dollar amounts though clearly are important, but they do not tell the whole story. Aid measured as a share of GDP indicates its size relative to the entire economy, and is perhaps the most common measure. But it can be misleading since a high ratio can be indicative of low GDP or a large amount of aid. On a per capita basis, the aid flows to some of the largest recipients are fairly small. Thus, to get a clear picture, it is helpful to look at all three measures of the amount of aid at the same time.

The amounts of foreign aid received by the four countries under study (Cambodia, Myanmar, Lao PDR and Vietnam) along with the group of CMLV nations and low as well as lower middle income countries in the world during the period 2000-2009 are presented in Table 1.

**Table 1: Foreign Aid Flows to Low, Lower Middle Income Countries and CMLV Nations
(2000 - 2009)**

Year	Cambodia (17.5)	Myanmar (6.3)	Lao PDR (10.7)	Vietnam (65.5)	Low-Income Countries	Lower Middle Income Countries	Total (CMLV Nations)
2000	395,720,000	105,640,000	280,640,000	1,681,360,000	10,398,750,000	17,456,240,000	2,463,360,000
2001	420,880,000	125,670,000	244,840,000	1,431,950,000	12,135,010,000	19,730,600,000	2,223,340,000
2002	485,240,000	119,030,000	278,480,000	1,280,220,000	15,478,990,000	20,411,230,000	2,162,970,000
2003	518,310,000	125,020,000	301,060,000	1,771,910,000	21,606,200,000	22,639,590,000	2,716,300,000
2004	485,370,000	123,450,000	269,900,000	1,846,310,000	21,364,210,000	27,485,910,000	2,725,030,000
2005	535,600,000	144,830,000	301,940,000	1,913,460,000	21,990,130,000	54,821,300,000	2,895,830,000
2006	529,370,000	145,710,000	363,710,000	1,844,540,000	24,415,760,000	47,127,760,000	2,883,330,000
2007	674,580,000	195,890,000	396,120,000	2,510,940,000	30,093,740,000	38,697,570,000	3,777,530,000
2008	742,840,000	534,430,000	495,590,000	2,551,930,000	34,314,890,000	42,426,100,000	4,324,790,000
2009	721,430,000	355,830,000	418,980,000	3,731,690,000	36,252,490,000	40,509,700,000	5,227,930,000
Total	5,509,340,000	1,975,500,000	3,351,260,000	20,564,310,000	228,050,170,000	331,306,000,000	31,400,410,000 (100.00)

Note: Figures in the parentheses indicate percentage to total (CMLV nations).

Source: World dataBank, World Development Indicators (WDI) & Global Development Finance (GDF) – 2000 to 2009.

Altogether the CMLV nations during the period 2000 to 2009 had received foreign aid amounting to USD 31,400,410,000. Further, in 2009 alone the CMLV nations together had received USD 5,227,930,000 which was the highest during the 10 years period. Among the CMLV nations, in total, the highest aid over the period 2000 to 2009 was received by Vietnam (USD 20,564,310,000), i.e., 65.5 per cent followed by Cambodia (USD 5,509,340,000), i.e., 17.5 per cent. During the 10 years period under study, Vietnam had received the highest amount in 2009 amounting to USD 3,731,690,000, whereas, all the other three countries had received highest amount of foreign aid in 2008. For low income countries around the world, the foreign aid flow in 2009 was USD 36,252,490,000, whereas, for lower middle income economies it was USD 40,509,700,000 in the same year. The percentages of aid received by low income countries, such as Cambodia and Myanmar in 2009 to total low income countries as a whole were respective 1.99 and 0.98, whereas, for lower middle income countries, such as Lao PDR and Vietnam the aid flows to total lower

middle income countries were 1.03 and 9.21 per cent respectively. Taking into account 10 years data under study, aids received by Cambodia and Myanmar as a percentage to total foreign aid to low-income countries were 2.42 and 0.87 respectively. Considering the case of Lao PDR and Vietnam, total aid flows as a percentage to lower middle income countries were 1.01 and 0.0006 respectively. In all the years under study it was found that the lower middle income countries had received larger amount of foreign aid as compared to low-income economies. Among the CMLV nations it was found that in all the years under study, while Vietnam was the largest, Myanmar was the smallest recipient of foreign aid. In total, Myanmar had received 6.3 per cent of foreign aid to total CMLV nations, which was the lowest.

Aid measured as a share of GDP indicates its size relative to the entire economy. Table 2 shows foreign aid as a share of GDP of low as well as lower middle income countries and CMLV nations for the period 2000 to 2009.

**Table 2: Foreign Aid as a Share of GDP of Low, Lower Middle Income Countries and CMLV Nations
(2000 – 2009)**

Year	Cambodia	Myanmar	Lao PDR	Vietnam	Low-Income Countries	LM Income Countries	Total (CMLV Nations)
2000	10.83	1.45	16.17	5.39	6.31	1.39	5.62
2001	10.58	1.65	13.84	4.38	7.29	1.56	4.83
2002	11.33	1.15	15.22	3.65	8.87	1.50	4.20
2003	11.13	1.26	14.01	4.48	11.25	1.45	4.83
2004	9.09	1.20	10.77	4.06	9.91	1.51	4.29
2005	8.51	1.21	11.03	3.62	9.23	2.61	3.92
2006	7.28	1.05	10.40	3.03	9.37	1.88	3.37
2007	7.81	1.07	9.29	3.54	9.83	1.24	3.70
2008	7.18	2.07	9.02	2.80	9.41	1.21	3.26
2009	6.91	1.08	6.89	3.84	9.36	1.13	3.57

Source: Data computed from World dataBank, World Development Indicators (WDI) & Global Development Finance (GDF) – 2000 to 2009.

Generally speaking, aid is one of the largest components of foreign capital flows to low-income countries. Aid flows as a percentage of GDP were 9.36 per cent and 1.13 per cent of GDP in low-income and lower middle income countries respectively in 2009 as against 6.31 per cent and 1.39 per cent of GDP in 2000 for low and lower middle income economies respectively. For the CMLV nations as a whole, foreign aid as a percentage of GDP was 5.62 in 2000 which had fallen to 3.57 in 2009. It was observed that for countries, like Cambodia and Lao PDR, aid as a share of GDP for the last seven years, i.e., 2003 to 2009 had been declining with a few exception. For Vietnam aid as a percentage to GDP had fallen since 2004 with an exception of 2007 and 2009. Thus, it was 3.54 per cent in 2007 and though had fallen in 2008, again had increased in 2009 to 3.84 per cent. It is quite important to note that in case of Myanmar as against 2008, in 2009 there was a fall in the share of aid to GDP to around half of its percentage value. Earlier it was observed

that foreign aid flows to CMLV nations during the period 2000 to 2009 though mostly had increased, but aid as a percentage to GDP of the respective economies had fallen during the same period. This was due to the rise in GDP in those economies during the period under study. Further, it was observed that foreign aid as a share of GDP of lower middle income countries was much less than low-income economies during the period 2000 to 2009.

Foreign aid per capita shows the amount of aid received on average for individual living in the country. A given amount of aid can look like a large share of GDP in a poor country and a small share of GDP in a richer country though the amount per individual might be roughly the same. On a per capita basis, the aid flows to some of the largest recipients were fairly small. Table 3 shows aid per individual among CMLV nations including low-income as well as lower middle income economies as a whole.

Table 3: Foreign Aid Per Capita of Low and Lower Middle Income Countries and CMLV Nations
(2000 - 2009) (in current USD)

Year	Cambodia	Myanmar	Lao PDR	Vietnam	Low-income Countries	Lower Middle Income Countries
2000	31.79	2.35	52.78	21.66	16.15	8.13
2001	33.26	2.77	45.27	18.21	18.43	9.04
2002	37.78	2.61	50.66	16.10	22.99	9.20
2003	39.80	2.73	53.93	22.02	31.40	10.03
2004	36.79	2.68	47.63	22.67	30.39	11.99
2005	40.10	3.13	52.48	23.22	30.62	23.53
2006	39.17	3.13	62.26	22.14	33.29	19.91
2007	49.35	4.18	66.78	29.81	40.20	16.09
2008	53.74	11.31	82.30	29.98	44.91	17.37
2009	51.61	7.48	68.55	43.38	46.48	16.33

Source: World dataBank, World Development Indicators (WDI) & Global Development Finance (GDF) – 2000 to 2009.

As shown in Table 3, for low-income countries around the world, in 2000, aid provided by donors was USD 16.15 which had reached to USD 46.48 per recipient in 2009. However, it was quite small for lower middle income countries. In 2000, foreign aid per capita was USD 8.13 which had raised to USD 16.33 for lower middle income countries. Since the year 2005, there had been a continuous increase of aid per recipient of low-income countries with a few exceptions. Among the CMLV nations, in 2009, aid per capita was highest for Lao PDR (USD 68.55), whereas, it was smallest for Myanmar (USD 7.48). For Cambodia, aid per recipient in 2009 was USD 51.61, whereas, it was USD 31.79 in 2000. Compared to 2008, in 2009 foreign aid per capita of Cambodia, Myanmar, and Lao PDR had fallen. As shown earlier in all the years under study, though the foreign aid flows to Lao PDR was much smaller as compared to Cambodia and Vietnam, but it is revealed that aid per recipient of Lao PDR was highest in all the years (2000 to 2009) among all the four countries. This was due to the small size of population of Lao PDR as compared to other South-east Asian countries under study. Further, in 2009 though foreign aid as a share of GDP for Cambodia and Lao PDR was almost same (6.9 per cent), but on per capita basis the aid flow to Lao PDR was much more than Cambodia for the same period. Moreover, aid flow in terms of dollar to Vietnam though was highest among all the four nations, but on per capita basis the aid flows in terms of dollar to Vietnam were fairly small due to its large population size. Thus, on a per capita basis, the aid flows to Vietnam (though a largest recipient) were fairly small, whereas, aid flows to Lao PDR per recipient were quite large. This indicates that for small countries, a little bit goes a long way.

5.2 Impact of Foreign Aid on Economic Growth of CMLV Nations

The role of foreign aid in the growth process of

developing countries has been a topic of intense debate. Bulk of the literature has so far produced inconsistent and elusive results concerning the potential relationship between foreign aid and economic growth. In order to assess the impact of foreign aid on economic growth of four countries under study (Cambodia, Myanmar, Lao PDR and Vietnam) of South-east Asia, the multiple regression analysis was carried out. On the basis of the secondary data, the following regression results were obtained for CMLV nations.

The regression result in Cambodia context shows that though the regression as a whole was not significant ($F = 4.2314$, $\text{Sig.} = 0.1319$) but 89.43 per cent variation ($R^2 = 0.8943$) in the dependent variable EG (Economic growth of the country as measured by GDP growth rate) was explained by the independent variables. It was revealed that none of the independent variables had significant impact on the dependent variable. Thus, the regression result shows that foreign aid had no significant impact ($\beta_1 = 1.3292$, $t = 0.6787$, $\text{Sig.} = 0.5460$) on economic growth of Cambodia during the study period.

With regard to Myanmar, it is found from the regression result that the overall regression was significant at 5 per cent level of significance ($F = 14.5408$, $\text{Sig.} = 0.0255$). The R^2 value revealed that 96.68 per cent variation in the dependent variable EG (Economic growth of the country as measured by GDP growth rate) was due to the independent variables. The result further shows that the independent variables, i.e., share of exports to GDP (EX), share of Government final consumption expenditure to GDP (GE) and share of agriculture to GDP (AG) had significant impact on the economic growth of the country during the period of study. But foreign aid as a share of GDP had no significant impact on the dependent variable, i.e., economic growth of the country.

In case of Lao PDR, the regression as a whole was found to be significant ($F = 9.9984$, $\text{Sig.} = 0.0429$), and 95.24 per cent variation in economic growth of the country was because of the six independent variables under study. The 't' values and their significance levels of the regression coefficients of the independent variables revealed that none of the independent variables had significant impact on the dependent variable, i.e., economic growth of the country.

Among the four countries under study, the case of Vietnam was altogether different as found in the regression result. The R^2 value indicated that about 97 per cent variation in the dependent variable EG, i.e., economic growth of the country as measured by GDP growth rate was observed. Further, the overall regression was significant at five per cent level of significance. Among the six independent variables, three independent variables, i.e., foreign aid as a share of GDP (FA), share of exports to GDP (EX) and literacy rate (LR) had significant impact on the dependent variable EG. Thus, in the context of Vietnam, foreign aid as a share of GDP had significant impact with five per cent level of significance ($\beta_1 = 1.1401$, $t' = 4.1097$, $\text{Sig.} = 0.0261$).

As revealed, it can be concluded that while in case of Vietnam foreign aid as a share of GDP had significant impact on the economic growth of the country, the case of other three countries were altogether different. It was clearly observed that in case of Myanmar and Lao PDR, foreign aid had a negative impact on the growth of the respective economies, whereas, there was no significant impact of foreign aid on the economic growth of Cambodia. Thus, the present study extends its support to the several empirical researches which had shown mixed results on foreign aid and economic growth.

6. Concluding Remarks

The analysis carried out in the present paper clearly reveals that during the period 2000 to 2009 while Vietnam was the largest, Myanmar was the smallest recipient of foreign aid. However, aid as a percentage to GDP of all the economies had fallen during the same period. Further, though the foreign aid flows to Lao PDR was much smaller as compared to Cambodia and Vietnam, aid per recipient of Lao PDR was highest in all the years (2000 to 2009) among all the four countries. Contrary to that, aid flows in terms of dollar to Vietnam though was highest among all the four nations, but on per capita basis the aid flows in terms of dollar to Vietnam were fairly small due to its large population size. The study further revealed that foreign aid as a share of GDP had significant positive impact on the economic growth of Vietnam. However, in case of Myanmar and Lao PDR, foreign aid had a negative impact on the growth of the respective economies and there was no significant impact of foreign aid on the economic growth of Cambodia. Thus, the present study has shown mixed results on foreign aid and economic growth in view of the CMLV nations.

Foreign aid is a significant source of income to developing countries. In fact, considering the pace of economic growth of a number of Third World economies, foreign aid has a key role in promoting economic growth of such economies. Given the risks associated with large aid inflows to the CMLV nations as well as their potential limits to its impact on development, policymakers in all the four countries must cooperate closely with the donor community in order to enhance the effectiveness of aid funds. In order to ensure a stronger impact of aid on development it is essential that the framework and guidelines should be established and be actually applied in development strategies, programmes and projects. In view of the countries under study, such as Cambodia, Myanmar, Lao PDR and Vietnam, it is necessary to strengthen

their domestic policies and institutions in the ways that can improve the investment and trade climate. As such, this can facilitate in enhancing the effectiveness of aid funds in these economies in future.

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Selecting an Optimal Cropping Pattern through AHP Method - A Multi-Criteria Decision-Making Process

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ABSTRACT

Making a decision for selecting the best cropping pattern is a crucial step in improving efficiency of agriculture as it is influenced by various factors and criteria affecting agricultural productivity. An attempt has been made in this study to select a best possible cropping pattern amidst multi-criteria decision-making problems by using Analytic Hierarchy Process (AHP) Method considering the primary data collected from 474 sample farm households of three different villages (irrigated, tailed-irrigated and non-irrigated) located in three different blocks of Bargarh district of Odisha (India). The rice (paddy) crop is found dominating the cropping pattern in the area under study even though the mixed cropping pattern may be profitable compared to the single dominant crop.

Key Words: *Analytic Hierarchy Process (AHP), Mixed Cropping Pattern*

1. Introduction

Making a decision is generally not only very difficult as it is affected by both qualitative and quantitative factors but also formulating criteria may be a problem because of the conflicting objectives of farms in terms of increasing net return, reducing total cost of agricultural production, improving soil quality, improving usage of human resources and machines, optimizing water allocation, etc. There are various mathematical models, such as linear programming and fuzzy optimization models (Sahoo et al., 2006), multi objective programming model (Wei et al., 2009; Ragkos and Psychoudakis, 2008) and other such optimising models (Haouari and Azaiez, 2000; Mohaddes and Mohayidin, 2008) applied for

making decisions on the optimal cropping patterns subject to certain specific constraints under varied agrarian conditions including irrigation status of different agricultural zones. But most of such studies used limited, well known and established criteria that characterize normal economy conditions (where return maximization is a dominant objective). Still, most of these studies did not mention how these criteria were obtained and how the importance (weights) of these criteria was computed. Therefore, system approach (Process to ensure consistency in the decision-making under multiple criteria through appropriate technique) appears necessary to be applied for choosing a cropping pattern most favoured by the farms for specific situation in the field.

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Selection of the best cropping pattern is itself a multi-criteria decision-making practice. Certain reasons and particularly successful applications of the Analytic Hierarchy Process (Saaty, 1980) indicate that AHP is suitable to support such a practice. It was Alphonse (1997) who suggested that AHP has some potential in resolving certain decision problems in agriculture. Step forward was to recognize that it is an unique mathematical concept of deriving weighting coefficients for elements (criteria and alternatives) in hierarchies. Therefore, AHP was applied to the same problem as before (Holzapfel et al., 1980; Srdjevic, 1995; Srdjevic, 1997), and in this way a set of approaches to decision-making problems in agricultural sector was expanded.

It should be noted that uncertainty arises about what method should be used and whether a particular technique is better suited to certain situations than others (Hajkowicz and Prato, 1998) in assigning ranks to alternatives. Compared with five different models for estimating weight coefficients, AHP was found to produce the most credible results (Shoemaker and Waid, 1982). Pertinent literature also indicates that AHP is flexible decision making tool compared to others (Karlsson, 1998; Alphonse, 1997; Narasimhan, 1983) for solving complex multicriterian problems in diverse areas, particularly because it enables decomposition of given problem into hierarchy and assures that both qualitative and quantitative aspects of a problem are properly incorporated in evaluating process.

Agha et al. (2012) made a study to rank crops to cultivate in the governmental agricultural lands in Gaza Strip using AHP methodology as a Multi Criteria Decision Making (MCDM) tool. Seven main criteria (economical, financial, marketing, environmental, technical, political, and social), thirty one sub-criteria and eight types of crops (vegetables, fruits, citrus, olives, palms, export

crops, field crops and medical and aromatic crops) were considered for the purpose of the study. The results indicated that the economic criteria (representing 0.33 of the total weight) were the most important criteria, while the technical criteria were the least important criteria (representing 0.07 of the total weight). Sub-criteria weights indicated that the contribution to GDP sub-criterion was the most important one with respect to the goal as it had 0.103 of the total weight. Cropping pattern is skewed towards export crops, citrus and vegetables.

Qureshi and Harrison (2003) applied the Analytic Hierarchy Process (AHP), a multicriteria analysis technique to obtain preference weights of environmental, social and economic objectives which were used in ranking riparian revegetation policy options in a small catchment (watershed) in north Queensland, Australia. The preference weights towards environmental, economic and social objectives were obtained for the various stakeholder groups (landholders, representatives of local sugar mill staff, environmentalists, recreational fishers and the local community). The AHP technique had proved useful in eliciting objectives and ranking policy options as well as in checking for consistency of the statements of stakeholder groups.

Montazar and Snyder (2012) made an attempt to develop a comprehensive multi-criteria model for selecting adequate cropping pattern in an irrigation district under water scarcity condition. Eleven and nine attribute decisions were considered in ranking the type of crop and determination of the percentage of crop cultivation area as an optimal irrigated crop planning system respectively. The results indicated that the proposed multi-attribute preference approach could synthesize various sets of criteria in the preference elicitation of the crop type and cultivated area. The predictive validity analysis showed that the preferences acquired by

the proposed model were evidently in reasonable accordance with those of the conjunctive water use model. Consequently, the model may be used to aggregate preferences in order to obtain a group decision, improve understanding of the choice problem, accommodate multiple objectives and increase transparency and credibility in decision making by actively involving relevant criteria in the crop planning.

Montazar and Gaffari (2012) considered a multi-criteria technique, an Analytical Hierarchy Process (AHP) as promising framework while studying for selecting adequate cropping patterns in an irrigation command area. Ten attribute decisions were considered for ranking the type of crop in the cropping system. These criteria assumed nine attributes for determination of the crop cultivation

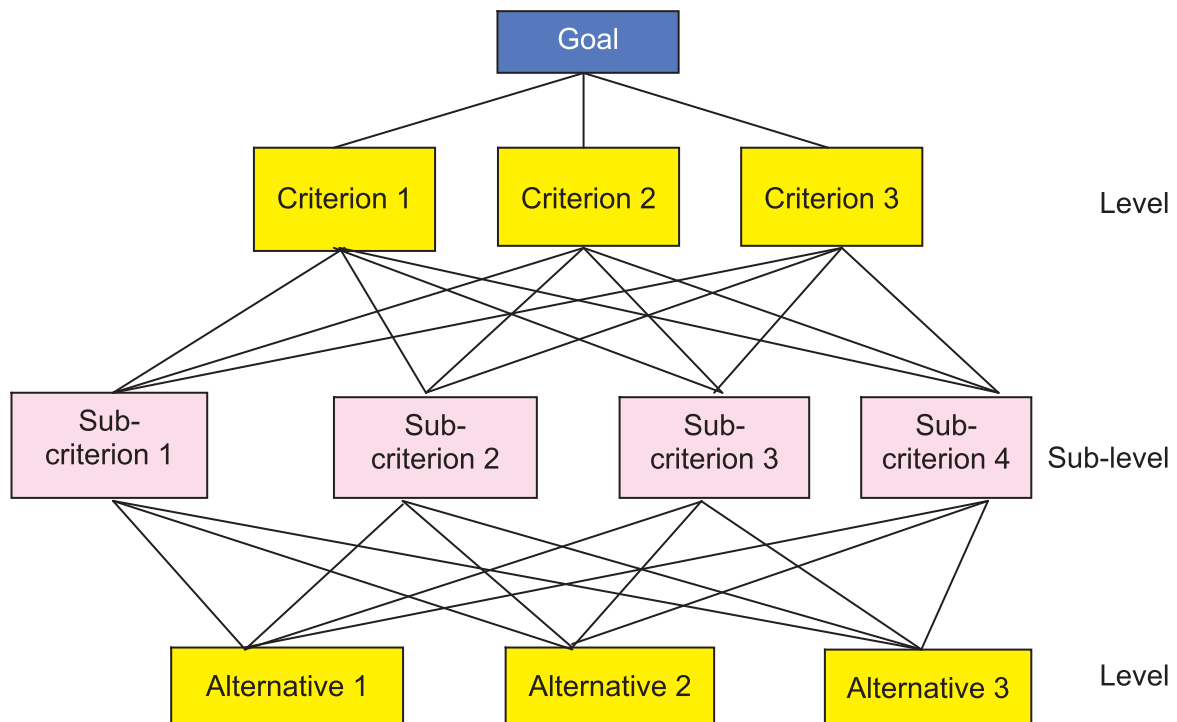
area. The results showed that the AHP could synthesize various sets of criteria in the preferred elicitation of the type and the cultivated area.

Thus, it is concluded that AHP can be used to aggregate preferences in order to obtain a group decision, improve understanding of the choice problem, accommodate multiple objectives and increase transparency and credibility in decision making by actively involving relevant criteria in the crop planning.

Analytic Hierarchy Process (AHP)

AHP (Saaty, 1980) shows the decomposition of a complex problem into a hierarchy with goal (objective) at the top, criteria and sub-criteria at levels and sub-level and decision alternatives at the bottom of the hierarchy as depicted in Figure-1.

Figure 1: Analytical Hierarchy Process



After decomposition, elements at given hierarchy level are compared in pairs to assess their relative preference with respect to each of the elements at the next higher level. The verbal terms of the fundamental Saaty's scale presented in Table 1 are used to assess the intensity of preference between two elements. The ratio of scale and the use of

verbal comparisons facilitate the weighting of quantifiable and non-quantifiable elements. Once the verbal judgments are made, they are translated into numbers by means of the fundamental scale. This procedure is repeated for elements at each level in downward direction.

Table 1: The Fundamental Saaty's Scale for the Comparative Judgments

Num. Values	Verbal Terms	Explanation
1	Equally important	Two elements have equal importance regarding the element in higher level
3	Moderately more important	Experience or judgement slightly favours one element
5	Strongly more important	Experience or judgement strongly favours one element
7	Very strongly more important	Dominance of one element proved in practice
9	Extremely more important	The highest order dominance of one element over another
2, 4, 6, 8	Intermediate values	Compromise is needed.

The AHP is a simple mathematical method based on elementary operations with matrices. It focuses hierarchical relations between different criteria and alternatives which all may be understood as decision variables. By creating appropriate hierarchies, and by performing particular step-by-step procedure while creating comparison matrices at different hierarchical levels, AHP computes and aggregates their eigen vectors in straightforward manner until the composite final vector of weight coefficients for alternatives are computed.

The entries of final weight coefficients vector reflect the relative importance (value) of each alternative with respect to the goal stated at the top of hierarchy and this vector may be used by decision makers pertaining to their particular needs and interests (Saaty, 1980; Alphonse, 1997).

$$A = \begin{pmatrix} a_{11} & a_{12} & - & - & a_{1n} \\ & a_{21} & a_{22} & - & - & a_{2n} \\ - & - & - & - & - \\ - & - & - & - & - \\ a_{n1} & a_{n2} & - & - & a_{nn} \end{pmatrix}$$

To elicit pair-wise comparisons performed at given level, a matrix A , is created in turn by putting the result of pair-wise comparison of element i with element j into the position a_{ji} :

Reciprocal value of the comparison is placed in a position a_{ji} . If, for example, element 3 is strongly favoured if compared with element 2, the entry a_{32} should be set to 5, and a_{23} to as reciprocal value $1/5$.

The result of pair-wise comparisons is weight coefficient for each element at given level with respect to the element of a higher level. The weight coefficient of element is the measure of importance of the element for decision maker.

Weight vector consists of weight coefficients obtained for elements at given level. After obtaining weight vector, it is then multiplied with the weight coefficient of element at higher level (that was used as criterion for pair wise comparisons). Procedure is repeated upward for each level, until the top of the hierarchy is reached.

Overall weight coefficient, with respect to goal, for each decision alternative is then obtained. The alternative with the highest weight coefficient value should be taken as 'the best alternative'.

One of the major advantages of AHP is that it calculates inconsistency index as a ratio of the decision maker's inconsistency and randomly generated index (Saaty, 1980). This index is important for the decision maker to assure him that his judgements were consistent and that final decision is made well. Generally, the value of inconsistency index lower than 0.10 is acceptable (Karlsson, 1998).

Keeping in view the discussion made above, an attempt has been made in this study to apply AHP method for analysing the decision making process

of the farms in selecting the best of the crops suited to them subject to various criteria under study so as to maximize their goal.

2. Objective of the Study

The main objective of the study is to select the most favoured (best) cropping pattern out of the various alternatives and with respect to the different criteria considered for the study with the help of AHP Method.

3. Data Base and Methodology

Primary data on the factors influencing the decision making process for selecting a cropping pattern were collected (based on a pre-designed questionnaire) from 474 sample farm households of three different villages (irrigated, tailed-irrigated and non-irrigated) located in three different blocks of Bargarh district of Odisha (India) during the year 2009-10 besides the views of agriculture specialists and experts in the field of farming. The whole sample has been considered for the study (instead of village-wise) since the cropping pattern found is almost same in the area under study.

Rice (paddy) crop is found dominating the cropping pattern followed by vegetables (i.e., vegetables and other horticultural crops) and other crops despite the mixed cropping pattern [a judicious combination of rice and other (mainly vegetables) crops] is much profitable compared to the single dominant crop. This may be the effect of multiple criteria affecting the selection process of cropping pattern. Thus, Analytical Hierarchy Process (AHP) has been considered (using the software Expert Choice-11) to analyse the decision making process of the farms under study to select the best suited cropping pattern out of the available alternatives under various criteria. The value of criteria weights and inconsistency index, the important components of AHP method have been found out by using the software Expert Choice-11.

The decision alternatives (ALT) considered are:

- ALT -I: Cultivation of Rice crop only (i.e., 100% area under rice crop)
- ALT-II: Cultivation of Rice (in 80% area) and Vegetables (in 20% area)
- ALT-III: Cultivation of Rice (in 50% area) and Vegetables (in 50% area)
- ALT-IV: Cultivation of Rice (in 20% area) and Vegetables (in 80% area)
- ALT -V: Cultivation of Vegetables only (i.e., 100% area under vegetables crop)

Similarly, the various factors affecting the decision variables (as observed from the data collected) are grouped into seven major criteria (CRT) based on the opinions of local agriculture experts and farmers such as:

- CRT-I: Finance, CRT-II: Technology, CRT-III: Market, CRT-IV: Resources, CRT-V: Information, CRT-VI: Attitude and CRT-VII: Government Support.

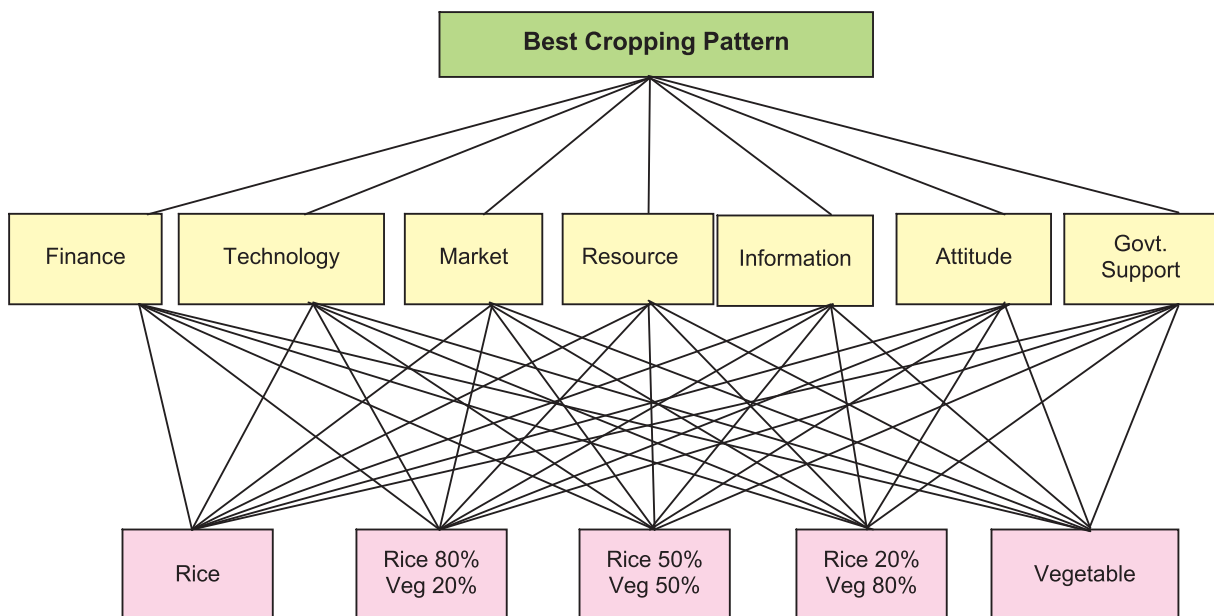
4. Selecting best Cropping Pattern by AHP

The main objective of this analysis is to search a cropping pattern which will yield maximum productivity with respect to the above criteria.

On the basis of the above said survey and expert choices, assignment of weights to each alternatives and criteria relating to the goal of choosing the best cropping pattern was done. Following the initial step of AHP that consists of making a hierarchy, comparisons in pairs of all criteria with respect to goal using Table 1 is done, and the results are put into the matrix of criteria. Proceeding further, $(7 \times 6)/2 = 21$ pair-wise comparisons are made. The resulting matrix is shown below.

Figure 2 shows hierarchy for the farmer's decision problem. At the top of the hierarchy is goal - the best cropping pattern. Criteria make the first level of a hierarchy, and the alternatives make second level.

Figure 2: Hierarchy for the Farmer's Decision Problem



For choosing among different cropping patterns, farmer must weight and prioritize different criteria. It means he/she has not only to assign weights to each alternative, but also to assign weights to criteria related to the goal.

If a farmer, for example, believes that finance is moderately more important than government

support, he/she will put number 3 in the position where row finance crosses column government support, and number 1/3 in the position symmetrical with respect to main diagonal. Proceeding in the same manner he should make $(7 \times 6) / 2 = 21$ pair wise comparisons. Resulting matrix could look like Table 2.

Table 2: Matrix of Criteria

	Finance	Technology	Market	Resource	Information	Attitude	Govt. Support
Finance	1	5	2	3	5	9	3
Technology	1/5	1	3	1	2	1	1
Market	1/2	1/3	1	2	1	3	2
Resource	1/3	1	1/2	1	3	3	2
Information	1/5	1/2	1	1/3	1	1	1
Attitude	1/9	1	1/3	1/3	1	1	1
Govt. Support	1/3	1	1/2	1/2	1	1	1

The corresponding set of criteria weights (Saaty, 1980) found from the matrix shown in Table 2 is: 0.378, 0.136, 0.138, 0.134, 0.070, 0.063, and 0.080 for CRT-I to CRT-VII respectively. It can be noted that sum of all weights is equal to 1. The computed corresponding inconsistency index has the value of 0.08.

The next step of AHP is to compare alternatives with respect to each criterion. For example, with respect to finance (CRT-I), farmer could create the matrix of pair-wise comparisons of alternatives as represented in Table 3.

Table 3: Matrix for Pair-wise Comparisons of Alternatives with respect to Finance Criterion

	ALT-I	ALT-II	ALT-III	ALT-IV	ALT-V
ALT-I	1	2	1	2	1
ALT-II	1/2	1	1	1	1
ALT-III	1	1	1	2	4
ALT-IV	1/2	1	1/2	1	3
ALT-V	1	1	1/4	1/3	1

The corresponding set of weights found from the matrix shown in Table 3 is: 0.248, 0.162, 0.286, 0.181, and 0.123 for alternatives ALT-I to ALT-V respectively. The sum of the weights found is equal to 1 and the value of inconsistency index

is 0.09.

Similarly with respect to other criteria the alternatives are compared and shown respectively in Table 4, 5, 6, 7, 8 and 9.

Table 4: Matrix for Pair-wise Comparisons of Alternatives with respect to Technology Criterion

	ALT-I	ALT-II	ALT-III	ALT-IV	ALT-V
ALT-I	1	2	1	2	1
ALT-II	1/2	1	2	1	2
ALT-III	1	1/2	1	2	2
ALT-IV	1/2	1	1/2	1	2
ALT-V	1	1/2	1/2	1/2	1

Based on the above matrix depicted in Table 4, the weights found is 1 and inconsistency index is the corresponding set of weights found is: 0.259, 0.08, 0.227, 0.220, 0.165, and 0.129 respectively for alternatives ALT-I to ALT-V. Further, the sum of

Table 5: Matrix for Pair-wise Comparisons of Alternatives with respect to Market Criterion

	ALT-I	ALT-II	ALT-III	ALT-IV	ALT-V
ALT-I	1	2	3	2	1
ALT-II	1/2	1	3	2	1
ALT-III	1/3	1/3	1	2	1
ALT-IV	1/2	1/2	1/2	1	1
ALT-V	1	1	1	1	1

Based on the matrix shown in Table 5, the ALT-I to ALT-V respectively. The sum of the corresponding set of weights found is : 0.310, weights found is 1 and inconsistency index is 0.236, 0.143, 0.123, and 0.188 for alternatives 0.07.

Table 6: Matrix for Pair-wise Comparisons of Alternatives with respect to Resource Criterion

	ALT-I	ALT-II	ALT-III	ALT-IV	ALT-V
ALT-I	1	1	2	2	1
ALT-II	1	1	3	2	3
ALT-III	1/2	1/3	1	2	3
ALT-IV	1/2	1/2	1/2	1	2
ALT-V	1	1/3	1/3	1/2	1

The corresponding set of weights found from the matrix represented in Table 6 is: 0.245, 0.321, ALT-V respectively. The sum of these weights is 1 and inconsistency index is 0.09. 0.159, 0.136, and 0.110 for alternatives ALT-I to

Table 7: Matrix for Pair-wise Comparisons of Alternatives with respect to Information Criteria

	ALT-I	ALT-II	ALT-III	ALT-IV	ALT-V
ALT-I	1	1	2	3	1
ALT-II	1	1	1	2	3
ALT-III	1/2	1	1	1	2
ALT-IV	1/3	1/2	1	1	2
ALT-V	1	1/3	1/2	1/2	1

The corresponding set of weights found from the matrix depicted in Table 7 is: 0.279, 0.262, 0.185, 0.151, and 0.123 for alternatives ALT-I to ALT-V respectively. The sum of these weights is 1 and inconsistency index is 0.07.

Table 8: Matrix for Pair-wise Comparisons of Alternatives with respect to Attitude Criterion

	ALT-I	ALT-II	ALT-III	ALT-IV	ALT-V
ALT-I	1	3	1	2	1
ALT-II	1/3	1	1	1	2
ALT-III	1	1	1	1	3
ALT-IV	1/2	1	1	1	2
ALT-V	1	1/2	1/3	1/2	1

The corresponding set of weights found from the matrix shown in Table 8 is: 0.286, 0.174, 0.233, 0.183, and 0.124 for alternatives ALT-I to ALT-V respectively. The sum of these weights is 1 and inconsistency index is 0.08.

Table 9: Matrix for Pair-wise Comparisons of Alternatives with respect to Government Support Criterion

	ALT-I	ALT-II	ALT-III	ALT-IV	ALT-V
ALT-I	1	1	1	2	1
ALT-II	1	1	1	1	3
ALT-III	1	1	1	2	2
ALT-IV	1/2	1	1/2	1	2
ALT-V	1	1/3	1/2	1/2	1

The corresponding set of weights found from the matrix shown in Table 9 for alternatives ALT-I to ALT-V are 0.224, 0.238, 0.247, 0.170, and 0.121 respectively and again sum of weights is 1. Inconsistency index is 0.05.

After similar comparisons of all alternatives with respect to all criteria are completed, a matrix is created as depicted in Table 10. The final step consists of creating a linear combination of products of criteria weights and corresponding

columns (Table 11) and computing so-called composite weight vector for alternatives (Table 12).

Table 10: Matrix for Comparisons of Alternatives with respect to Criteria

	CRT-I	CRT-II	CRT-III	CRT-IV	CRT-V	CRT-VI	CRT-VII
ALT-I	.248	.249	.310	.245	.279	.286	.224
ALT-II	.162	.227	.236	.321	.262	.174	.238
ALT-III	.286	.220	.143	.159	.185	.233	.247
ALT-IV	.181	.165	.123	.136	.151	.183	.170
ALT-V	.123	.129	.188	.110	.123	.124	.121

Table 11: Products of Criteria Weights and Corresponding Columns

	cw	CRT-I	cw	CRT-II	cw	CRT-III	cw	CRT-IV	cw	CRT-V	cw	CRT-VI	cw	CRT-VII
ALT-I	.378	.248	.136	.249	.138	.310	.134	.245	.070	.279	.063	.286	.080	.224
ALT-II		.162		.227		.236		.321		.262		.174		.238
ALT-III		.286		.220		.143		.159		.185		.233		.247
ALT-IV		.181		.165		.123		.136		.151		.183		.170
ALT-V		.123		.129		.188		.110		.123		.124		.121

Note: **c.w.-** Criteria Weights

Table 12: Composite Weight Vector for Alternatives

Cropping Pattern	Composite Weight	Rank
ALT-I	.260046	1
ALT-II	.216032	3
ALT-III	.226457	2
ALT-IV	.161755	4
ALT-V	.130824	5

Note: The highest composite weight coefficient is the best chosen alternative given the said criteria.

It is observed from Table 12 that rice is the highest preferred cropping pattern out of all the said alternative cropping patterns. Many reasons are there to support this outcome. This may be because of the fact that rice is the staple food item or it is easier to market it as compared to vegetables due to the inherent nature of the product. Apart from these, there are many constraints, like marketing, infrastructure, attitude and resource which pose

challenges for mixed and multi cropping pattern. AHP analysis also supports the result by giving highest composite weight (0.260) to Rice (ALT-I) only followed by ALT-III (Rice 50% Vegetable 50%), ALT-II (Rice 80% Vegetable 20%), ALT-IV (Rice 20% Vegetable 80%) and ALT-V (Vegetable) only with composite weight 0.226, 0.216, 0.161, and 0.130 respectively.

Since computed overall inconsistency index was equal to 0.08 (lower than 0.10), selection of the best cropping pattern by AHP could be accepted.

5. Conclusion

The decision alternative with the highest composite weight coefficient found is 0.260 for Rice crop given the criteria as explained above, which is further substantiated by the result of overall inconsistency index computed as 0.08 (i.e., lower than 0.10) indicating the fact that the selection of the rice (paddy) cultivation is the best cropping pattern in the area under study as found out by AHP method.

It can be inferred from the above findings of the AHP method that amidst the multiple criteria, rice (paddy) cultivation is ultimately chosen as the major source of cropping pattern adopted by the farms of all categories in the area under study irrespective of the irrigation status even though the adoption of mixed cropping pattern may be highly productive and profitable. Thus a single crop based (rice crop) cropping pattern is still not only the dominant crop but also the most preferred crop in the area under study. It indicates lower pace of crop diversification and less intensity of commercialization of agriculture in the area under study which may be due to several reasons and constraints, such as the accessibility and availability of modern inputs, technology, formal credit, infrastructure (viz., cold storage, road and transportation facilities, etc.), processing units, extension service, irrigation and market facilities, etc. which must in turn be ensured through appropriate policy measures for encouraging the farms for crop diversification. In particular, strengthening the role of State Marketing Board and Regulated Market Committee (RMC) for enabling the farms to market their diversified crops (viz., vegetables, other horticultural produces and cash crops) along with rice (paddy) must be ensured through effective measures.

The Primary Agricultural Cooperative Societies and other such rural institutions must be actively involved for providing credit (cash and kind), processing and marketing facilities for such diversified cash crops along with the paddy. The possibilities of alternative marketing channels for better remuneration and price dissemination should be explored and implemented for making farms commercially viable. As such, production orientation of commercial crops is more credit and market linked compared to other supporting mechanisms. Above all, the attitude of the farmers should be made inclined for crop diversification through symmetrical distribution of information, extension and awareness. To conclude, the adoption of mixed cropping pattern through crop diversification is not only an impetus for increasing the income and employment of the farms, but also an incentive for substantially supplementing and supplanting the production and income of the staple and subsistence crop for the future and further improvement of the farms and farmers.

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Effects of Asset and Liability on the Banking Operations of ACLEDA Bank Plc., Cambodia

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ABSTRACT

Asset and Liability Management (ALM) is recognized as an important tool for banking businesses. Almost all banking regulations are involved in ALM for banking operations. ACLEDA Bank Plc. is one of the banks working under the rules, laws and regulations of the National Bank of Cambodia (NBC). It is one of the leading banks in Cambodia which has strong management of asset and liability, and healthy financial position in banking businesses. The study found that ACLEDA Bank Plc. managed its asset and liability properly during 2003 to 2009. Due to this, the bank was able to raise its financial position and shareholders' equity. There was good collaboration between ALCO and ALM/Treasury department of the bank. But the bank had no MIS department under ALM unit to collect the data independently. The fund structure price and customer prices of the bank was found almost fixed for a long time. The policies in relation to internal limitations of the bank were found to be not widely defined for easy banking operations. At the beginning of every year, the bank very often faced the problem of shortage of funds due to cyclical effects. The hedging funds of the bank were not very much active in the services of the bank. In spite of these limitations, the bank could manage its assets and liabilities properly due to the hard work of all the stakeholders and the leading roles of ALCO and ALM/Treasury Department.

Key Words: : *Asset and Liability Management, Banking Operation, ALCO*

1. Introduction

The financial development is a never-ending stream for all over the world, even though the economists, businessmen and politicians warn about the evolutions or impending crisis in the global banking and financial activities. Without real improvement in this sector, there cannot be improvement in the country's economic development. Banking, being a part of the financial service industries, has been playing very important

role in promoting the economic development and improvement of a country. There is a rapidly growing consensus about the critical problems in banking businesses. However, there is no enough unanimity about the operational banking policy prescribed from country to country and/or bank to bank including banks in Cambodia and ACLEDA Bank Plc. Asset and Liability Management (ALM) is one of the most important tools for managing banking business to gain competitive advantages

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in operations. It is a kind of prudential measure for banking operations that covers almost 100 per cent over funding activities to participate in minimizing input value for a unit value of output or the Return-on-Investment (RoI). Therefore, the management of ACLEDA Bank Plc. focuses on the use of strategic ALM to analyze and improve the banking business operations to enhance the bank's profitability and growth.

ACLEDA Bank Plc. is a public limited company formed under the LBFI of the Kingdom of Cambodia. It was established in January 1993 as a national NGO for micro and small enterprises' development and credit. ACLEDA started to act on a three-year program of transformation commenced in 1998. It became a specialized bank on 7th October 2000, and was fully licensed as a commercial bank on 1st December 2003. The bank had seven shareholders who participated in banking business in Cambodia. By late 2009, the bank had 68,150,000 shares amounting US\$ 68,150,000 (US\$1/Share). The ACLEDA NGO and ASA Inc. were the major Cambodian shareholders holding 51 per cent of the bank's total number of shares, and the rest 49 per cent were owned by five foreign partners, namely, DEG: 12.25 per cent, FMO: 12.25 per cent, IFC: 12.25 per cent, Triodos Doen: 6.14 per cent and Triodos Fair Share Fund: 6.11 per cent. In late 2009, the bank had 232 operating offices throughout the country. The bank's market share of lending was 22 per cent, deposit 21 per cent, and assets 18 per cent (ACLEDA Bank Plc., 2009).

2. Literature Review

ALM is a risk management technique designed to earn an adequate return while maintaining a comfortable surplus of assets beyond liabilities by taking into consideration on interest rates, earning power and degree of willingness to acquire on debt (http://www.investorwords.com/285/asset_liability_management.html). It is the basis of

thought about business strategies and operations that affect day-to-day decision-making process in the banks. In banking, it is a key financial and risk management discipline, which is concerned with management of the bank's on-off balance sheet positions, in a way that the bank is able to offer competitive priced products and services to customers whilst maintaining an appropriate risk and/or reward profile that creates shareholder value (<http://www.simarch.com/simsportal>). Wilson (1988) viewed that ALM is the management of the structure of a bank's balance sheet in such a way that interest related earnings are maximized within the overall risk tolerance of the bank's management. Hudson (1998) mentioned that ALM is a key management tool to maximize the profitability of the banks. The primary purpose of ALM is to meet regulatory requirements or actively manage the balance sheet. It is the function of groups or unit supervision departments involved in actions, which have to make sure and ascertain that the whole operating activities of the bank are getting good results through maximizing the risk-adjusted returns to shareholders over the long-term growth. As mentioned in Wikipedia, ALM is the practice of managing risks that arise due to mismatches between the assets and liabilities of the bank. It is a strategic management tool to manage interest rate risk and liquidity risk for banks and financial service companies and corporations (http://en.wikipedia.org/wiki/Asset_liability_management). In 1996, Bank of Jamaica viewed that ALM is the key management and control, within set parameters, of the impact of changes in the volume, mix, maturity, quality, interest and exchange rate sensitivity of assets and liabilities of an institution or a bank. Christine (1997) expressed that ALM is the act of planning, acquiring and directing the flow of funds through a financial organization to generate adequate and stable earnings, maintain adequate liquidity and steadily building capital, while taking reasonable and measured business risks. It is the sum total of financial risk management of any

financial institution. The study done by Susanne (2000) mentioned that ALM is the financial risk management of any financial institution at the total bank level. The traditional focus of ALM is on interest rate risk because traditionally most of the balance sheet positions are interest rate instruments. ALM is the process of actively managing the risk inherent in the bank's balance sheet, primarily the bank's interest-earning assets and interest-bearing liabilities in a manner consistent with the bank's goals for long-term growth and profitability (Canada Bank Plc., 2009). Cheam (2009) defined ALM of a commercial bank as the management of the bank's on-off balance sheet in such a way that the bank can offer priced products and services to its customers competitively while maintaining a cost and risk that create long term value for the shareholders.

The empirical analysis on the profitability of the banking sector in Hong Kong found that both bank-specific as well as macroeconomic factors were important determinants in the profitability of banks. With regard to macroeconomic factors, real GDP growth, inflation and real interest rates had a positive impact on the profitability. Among bank-specific variables, operational efficiency and business diversification contributed to higher returns on assets, after controlling for differences in the credit quality of loans (Jiang et al., 2003).

By linking profits to asset-liability management of domestic and foreign banks in the UK, Kosmidou et al. (2004) found that high profit banks experienced considerably lower cost of liabilities for most sources of funding, which could cover any losses from the lower rate of return on assets that they experienced compared to their lower profit competitors. The operating profit that domestic banks experienced appeared to be generated by the loans that they held on their earning assets portfolio and their fixed assets while the operating profit of foreign banks was generated by all the

assets that comprised their portfolios. With regard to liabilities, in both cases customer and short-term funding were found to be more costly than other sources of funding.

The study on assets-liabilities management in banks in Kuwait was conducted by taking all Kuwaiti listed Banks and the relevant data over the period 1980-1997 to find out the asset-liability relationship by using Statistical Cost Accounting (SCA) method. The study found that asset, mainly loans, were the key variable in generating profits, whereas, liabilities were reducing profit. It was proved that a bank's profits were positively related to risk. In managing asset-liability, the results highlighted a significant difference between small and large banks and between before and after the Gulf war (Asiri, 2007).

The goal of asset/liability management (ALM) is to properly manage the risk related to changes in interest rates, the mix of balance sheet assets and liabilities, the holding of foreign currencies, and the use of derivatives. These risks should be managed in a manner that contributes adequately to earnings and limits risk to the financial margin and member equity. The forum on Asset and Liability and Risk Management held at the Asian Development Bank, Thailand came out with the conclusion that because of the crisis that began with the subprime mortgages, banks and other institutions should leave no doubt that effective risk management and ALM in banks is not an optional function. All banks irrespective of size need to develop a strategy and implementation plan for both areas that is properly aligned to the individual banks strategy. Banks need to assess the fundamentals of their own operations and environment to do this – there is no one solution or size that fits all (ADB, 2008).

It is very important for commercial banks to choose the strategy that would reduce the credit, liquidity,

interest-rate related risk and would balance the risk, profitability, liquidity and security. The core problem in asset and liability management is the fact that the main asset of commercial bank - credits – not always can be liquid, especially if the country's economy is in deep recession. Having faced rapidly fluctuating interest rate and intense competition in fund formation, the banks started paying more attention to fund formation and monitoring of deposit value and structure, as well as the situation of non-deposit liabilities. Traditional asset and liability management is directly related to assessment of interest rate risk, monitoring and control of bank performance and the policy for stabilization and increase of net interest income and capital market (Lileikienė, 2008).

The study on risk management practices of commercial banks in Bangladesh based on five commercial banks operating in Bangladesh revealed that credit risk, market risk and operational risk were the major risks to the bankers which were managed through three layers of management system. The Board of Directors performed the responsibility of the main risk oversight, the Executive Committee monitored risk and the Audit Committee oversaw all the activities of banking operations. It was found that internal rating system and risk adjusted rate of return on capital were relatively more important techniques used by banks (Alam and Aman, 2011).

The studies on the determinants of bank's performance in the United States found that little cost saving can be achieved by increasing the size of the banking firm and others report significant scale economies for banks whose asset size extends well into the billion range, such as those investigated herein. In addition to being extremely difficult to measure on an international level, determinants of profitability may be skewed by an inability to obtain accurate and timely data and by an unbalanced competitive environment in which a

given bank may be forced to compete with smaller players that can market high profit products more efficiently (Scott and Arias, 2011).

According to Sreekala (2011), the importance of Asset and Liability Management in every business operation is inevitable and needs due care attention during the course of operation. The attention would help the firm get into liquidation and can survive in the long run successfully. It can also make the stakeholders feel little happy if they could witness the business help them in maximizing their wealth. She suggested that the bank should improve its customer service and technology so that it could come up with the standard level.

The study conducted in Bangladesh on the impact of asset and liability management on the profitability of commercial banks showed that high earning banks experienced higher returns from their assets and lower returns from their liabilities than the low earning banks. But results were inconclusive with regard to private banks' and public banks' returns. The assets management of large commercial banks was found to be better than those of small banks, but they were not better than small banks in respect of liability management (Sayeed, Edirisuriya and Hoque, 2012).

The model used to optimize the investment and risk management practices of sovereign wealth funds suggested that the investment strategy of a sovereign wealth fund should involve a state-dependent allocation to three main building blocks: a performance seeking portfolio, an endowment-hedging portfolio, and a liability-hedging portfolio. The industry reactions offered a strong rebuttal of these perceptions in that a large majority of the sovereign investment practitioners surveyed managed short-term constraints and implicit liabilities and they believed that the ALM framework provided a better understanding of optimal investment policy and risk management

practices (Ducoulombier et al., 2012).

Thus, the reviews of the empirical studies of ALM reveal that ALM plays a very important role in sound banking operations.

3. Objectives

The study has the following objectives:

- i. To examine the effects of asset and liability on the banking operations of ACLEDA Bank Plc.
- ii. To provide recommendations for better management of asset and liability of ACLEDA Bank Plc. leading to improvement in its banking operations.

4. Methodology

Both descriptive and quantitative analysis have been used in the study. Relevant secondary data relating to ALM and its effects on banking operations of ACLEDA Bank Plc., Cambodia, have been collected from departments of Legal and Compliance, Treasury, Credit, Operation, and Finance of ACLEDA Bank Plc. The primary data for the study have been collected from 134 staff of five categories, such as 10 staff of treasury department, 17 staff of internal audit department, 40 staff of operation department, 41 staff of finance department and 26 persons of middle management level of ACLEDA Bank Plc. who were mainly involved in asset and liability in operations. Out of 268 staff, 134 respondents have been selected on the basis of proportional stratified random sampling method.

5. Data Analysis

Four major issues on ALM of ACLEDA Bank Plc. such as: legal and regulatory issues, the achievements of the bank due to ALM, the impacts of ALM on financial performance and

shareholder's value of the bank and the roles of the ALCO and ALM department in connection with the risks and benefits of the bank have been discussed in the present section.

5.1 Legal and Regulatory Issues

The legal and regulatory policies of banking in Cambodia are order of the National Bank of Cambodia(NBC)to banks and financial institutions, which are in operation in the country, to strictly follow from the date of official announcement of their operations. ACLEDA Bank Plc. had done well by following the legal and regulatory policies of the NBC more particularly, prudential regulations in relation to the ALM, which enabled the bank to contribute to the development of financial service industry in the country. During 2003 to 2009, the bank had complied with all the prudential standard requirements of the NBC. The bank had liquidity ratio of 76.72 per cent, registered capital USD 68.15 mil, net worth USD 138.415 mil, solvency ratio 24 per cent, loans to related parties five per cent, and fixed assets 16.23 per cent during the above period. The classification and provision for bad and doubtful debts of the bank were well followed; and large credit exposures and net open position in foreign currency were well managed by the bank.

5.2 Achievements of the Bank

Since 2003, the operations of ACLEDA Bank Plc. had been strengthened and improved due to good management of assets and liabilities. The average annual growth rate of assets of the bank was 63.9 per cent during 2003 to 2009 as compared to 34 per cent for the banking sector as a whole in the country. The portfolio assets of the bank increased from USD 48.2 mil in 2003 to USD 906 mil in 2009 (Table 1). In 2009, the market share of assets of the bank was 18.2 per cent.

Table 1: Growth of Assets of Banking Sector and ACLEDA Bank Plc. (2003 to 2009)

Year	Assets (in US\$ million)				
	Bank Sector's Assets		ACLEDA Bank Plc.		Share of Assets, ACLEDA Bank to Whole Bank's Sector
	in US\$ million		Assets	Growth	
2003	974.3	14%	48.2	55.6%*	4.9%
2004	1,168.7	20%	84.1	74.5%	7.2%
2005	1,356.8	39%	123.6	47.0%	9.2%
2006	1,962.8	45%	222.0	79.6%	11.8%
2007	3,383.1	72%	474.4	113.7%	14.3%
2008	4,241.1	25%	690.5	45.6%	16.6%
2009	5,119.6	21%	906.0	31.2%	18.2%
Avg. Growth Rate		34%		63.9%	11.7%
*(Banks' sector assets in 2002 was US\$854,500,000 or KHR3,878,688 mil, and the ACLEDA Bank assets in 2002 was US\$30,900,000)					

Source: ACLEDA Bank Plc.'s Market Share Report 31st Dec. 2009, Marketing Division and the National Bank of Cambodia.

The bank's loan assets grew from USD 40.5 mil in 2003 to USD 544 mil in 2009, and the deposit liabilities from USD 13.2 mil in 2003 to USD 692.2 mil in 2009 respectively. This shows that there were increases in the loan asset values and deposit liabilities of the bank during 2003 to 2009 (Table 2).

Table 2: Growth of Market Shares, Loans and Deposits of the Banking Sector and ACLEDA Bank Plc. (2003-2009)

Year	Loans / Credits (in US\$ million)					
	Bank Sector		ACLEDA Bank		ACLEDA Bank's Market Share	
	Outst.	No. Client	Outst.	No. Client	Outst. (%)	Client (%)
2003	361.2	N/A	40.5	98,905	11.2	N/A
2004	472.8	N/A	65.9	122,173	13.9	N/A
2005	549.1	145,161	99.9	140,920	18.2	97.1
2006	894.2	164,931	158.5	159,930	17.7	96.9
2007	1,594.8	197,337	318.5	185,492	20.0	93.9
2008	2,424.0	230,114	468.4	214,337	19.3	93.1
2009	2,525.8	266,299	544.0	247,987	21.5	93.1

Year	Deposits (in US\$ million)					
	Bank Sector		ACLEDA Bank		ACLEDA Bank's Market Share	
	Amount	No. A/C	Amount	No. A/C	Amount (%)	No. A/C
2003	606.1	N/A	13.2	35,054	2.2	N/A
2004	797.0	49,422	31.6	57,091	4.0	38.2
2005	934.5	206,357	61.9	92,413	6.6	44.5
2006	1,358.1	285,639	122.8	141,368	9.0	44.7
2007	2,568.5	456,026	342.5	247,927	13.3	54.3
2008	2,490.4	699,987	492.5	421,523	19.8	60.2
2009	3,267.6	968,472	692.2	603,224	21.2	62.2

Source: ACLEDA Bank's Market Share Report 31st Dec. 2003-2009, Marketing Division.

5.3 Impact of ALM on Financial Performance and Shareholder's Value

During 2003 to 2009, there was considerable improvement in the financial performance and shareholder's value of ACLEDA Bank Plc. due to good management of the bank's assets and liabilities. This can be seen from Table 3, which shows the growths of the components of assets, liabilities, shareholder equities and other financial

items of ACLEDA Bank Plc. during 2003 to 2009. The net income of the bank increased from USD 1,974 mil in 2003 to USD 21,187 mil in 2008 and USD 9,713 mil in 2009. Because of the increase in net income along with reserve of the bank over the period of time, the bank's shareholders value increased from USD 24,657,698 in 2003 to USD 106,654,748 in 2009.

Table 3: Growth of Asset, Liability and Shareholders' Equity of ACLEDA Bank Plc. (2003-2009)
(in '000 US\$ "except EPS and Dividend")

Year Ended of 31 st Dec.	2009	2008	2007	2006	2005	2004	2003
Units in '000 US\$ (except EPS and Dividend)							
Assets	903,981	687,507	473,053	223,202	123,871	84,109	48,240
Growth of Assets (%)	31.5	45.3	111.9	80.2	47.3	74.4	55.8
Loans (Net of Provision)	528,034	456,309	310,681	156,571	98,460	64,932	39,908
Growth of Loans (%)	15.7	46.9	98.4	59.0	51.6	62.7	48.0
Liabilities	797,326	600,565	423,401	180,622	91,917	58,174	23,583
Liabilities to Total Assets (%)	88.2	86.8	89.5	80.9	74.2	69.2	48.9
Deposits	687,699	487,032	344,533	123,150	61,901	31,640	13,161
Deposits to Total Liabilities (%)	86.3	87.4	81.4	68.2	67.3	54.4	55.8
Issued and Paid-Up Capital	68,150	50,000	30,000	30,000	13,000	13,000	13,000
Shareholders' Equity*	106,655	86,942	49,652	42,580	31,955	25,935	24,658
Equity to Total Assets	11.8	12.6	10.5	19.1	25.8	30.8	51.1
Gross Income	110,379	100,618	59,583	37,204	25,679	17,128	11,758

Profit Before Tax	12,116	26,622	12,278	8,361	5,275	2,558	2,461
Net Profit After Tax	9,713	21,187	9,739	6,668	4,205	2,063	1,974
Earnings Per Share	\$0.1425	\$0.4237	\$0.3246	\$0.2223	\$0.3235	\$0.1587	\$0.1518
Dividend	\$0.0540	\$0.1630	\$0.1299	\$0.0889	\$0.1294	\$0.0630	\$0.0607

*From 31/12/2006 excludes subordinated debt (prior to 2006 subordinated debt was included to conform to local accounting conventions).

Source: ACLEDA Bank Plc.'s Annual Report 2003-2009; http://www.acledabank.com.kh/EN/FS_financialHighlights.asp

Table 4 presents the growth rate of the bank's assets, liabilities and shareholders' equities during 2003 to 2009. The average annual growth rates of the bank's assets, liabilities and equities during the above period were 64, 84 and 33 per cents respectively. The above growths were possible because of the right management of asset and liability of the bank.

Table 4: Growth Rates of ACLEDA Bank's Assets, Liabilities and Equities (2003-2009)

Year	Growth of Assets	Growth of Liabilities	Growth of Equities
2003	56%	73%	42%
2004	74%	147%	5%
2005	47%	58%	23%
2006	80%	91%	49%
2007	112%	141%	4%
2008	46%	42%	84%
2009	32%	33%	23%
Avg. Growth	64%	84%	33%

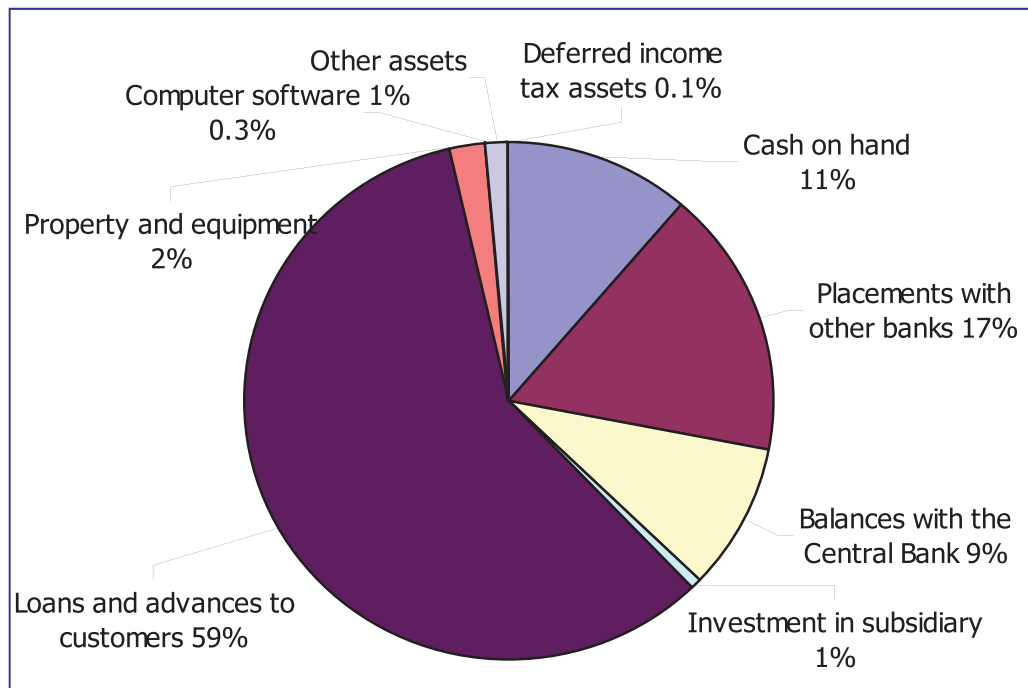
Source: ACLEDA Bank Plc.

As shown in Table 5, among the different components of the bank's assets, the loan assets constituted larger share than the other asset items. The volume of net outstanding of loan asset was USD 528,034,076 (58.41%) among the bank's total assets of USD 903,981,000.

Table 5: Components of Assets of ACLEDA Bank Plc., 2009

Type of Assets	In USD
Cash on hand	102,239,397
Balances with other banks	-
Placements with other banks	152,270,606
Balances with the Central Bank	83,022,448
Investment in treasury bill	-
Investment in subsidiary	4,601,014
Loans and advances to customers	528,034,076
Property and equipment	20,078,218
Computer software	2,383,952
Other assets	10,393,477
Deferred income tax assets	957,812
Property foreclosed	-
Total Assets	903,981,000

Source: ACLEDA Bank Plc.'s Annual Report, 2009.

Figure 1: Components of Assets of ACLEDA Bank Plc., 2009

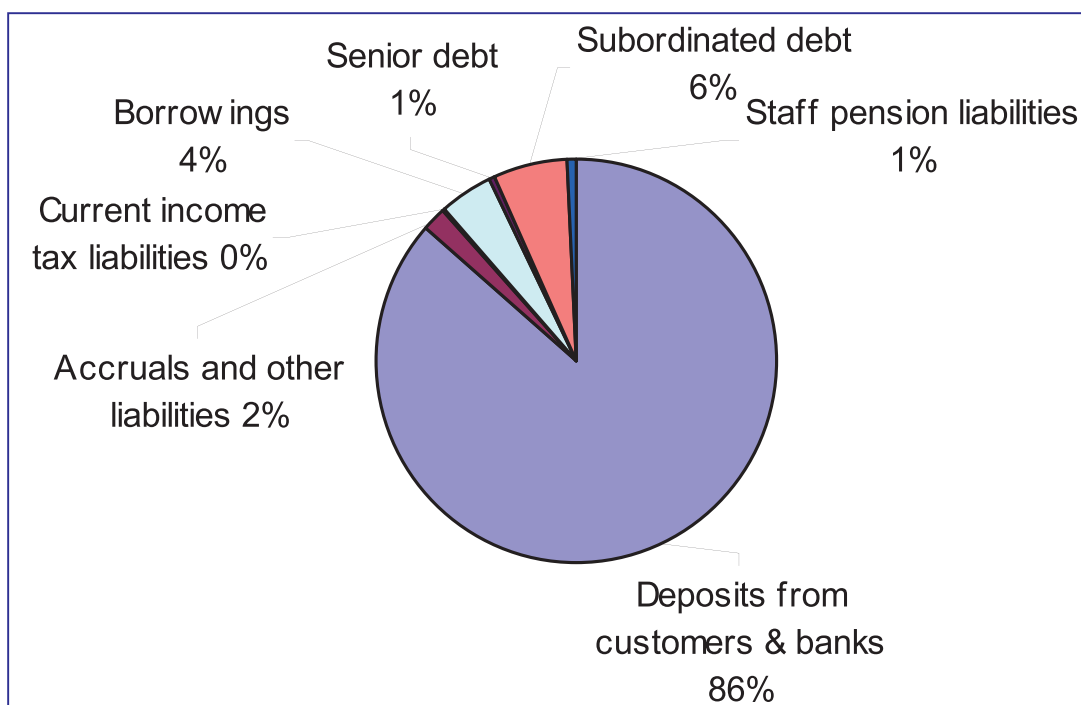
With regard to components of liabilities of ACLEDA Bank Plc., the deposit liabilities constituted larger volume than the other items.

The outstanding volume of deposit liability was USD 687,698,796 (86.25 per cent) among the total bank's liabilities of USD 797,326,252 in 2009.

Table 6: Components of Liabilities of ACLEDA Bank Plc., 2009

Type of Liabilities	In USD
Deposits from customers & banks	687,698,796
Accruals and other liabilities	16,272,070
Deferred income tax liabilities	-
Current income tax liabilities	2,253,070
Borrowings	33,556,069
Senior debt	5,006,718
Subordinated debt	45,074,485
Staff pension liabilities	7,465,044
Provision for health insurance	-
Total Liabilities	797,326,252

Source: ACLEDA Bank Plc.'s Annual Report 2009.

Figure 2: Components of Liabilities of ACLEDA Bank Plc., 2009

The shareholder's equity was another interesting issue of ALM of ACLEDA Bank Plc. Table 7 presents all items of equities of ACLEDA Bank Plc. from 2003 to 2009. During this period, the shareholder's equity of the bank was maximized

over invested share capital. The percentages of shareholders' equity to share capital of the bank in 2003, 2004, 2005, 2006, 2007, 2008 and 2009 were 190, 199, 246, 159, 166, 174 and 156 respectively.

Table 7: ACLEDA Bank's Shareholders' Equities (2003-2009)

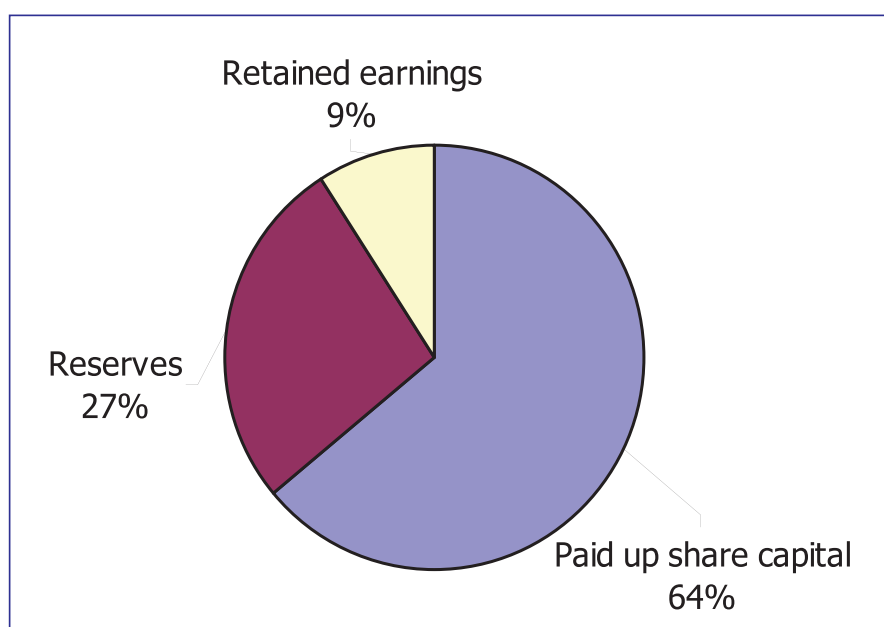
(in US\$)

Year Ended 31 st December	2009	2008	2007	2006	2005	2004	2003
SHAREHOLDERS' EQUITY (In US\$)							
Paid up share capital	68,150,000	50,000,000	30,000,000	30,000,000	13,000,000	13,000,000	13,000,000
Subordinated debt	-	-	-	5,152,156	11,360,303	8,726,412	8,723,125
Reserves	28,792,204	15,755,379	9,913,461	5,912,017	3,389,544	2,145,473	960,693
Retained earnings (a)	9,712,544	21,186,825	9,738,918	6,668,443	4,204,673	2,063,073	1,973,880
Growth rate of retained earning	-54%	118%	46%	59%	104%	5%	235%
Total shareholders' equity*	106,654,748	86,942,204	49,652,379	47,732,616	31,954,520	25,934,958	24,657,698
Shareholders' equity to Share capital (%)	156	174	166	159	246	199	190
Average growth rate of return of the Shareholders' equity to Share capital (%)	84%						
Less Subordinated Debt	-	-	-	(5,152,156)	(11,360,303)	(8,726,412)	(8,723,125)
Less Minority interest of subsidiary	-	-	-	-	-	-	-
Net Equity Capital (b)	106,654,748	86,942,204	49,652,379	42,580,460	20,594,217	17,208,546	15,934,573
Return on Equity (a)/(b)	9.1%	24.4%	19.6%	15.7%	20.4%	12.0%	12.4%

Source: ACLEDA Bank Plc.'s Annual Report 2003-2009.

Figure 3 indicates the different components of the bank shareholders' equities in 2009, and the percentage of paid up share capital was 64 per cent. The good financial performances of the bank had contributed to create the shareholders' equities

positively. The main key that made shareholders' equity of the bank to move forward was the retained earnings and reserves. They contributed for the increase of 36 per cent over the originated capital registration.

Figure 3: Shareholders' Equities Components of ACLEDA Bank Plc., 2009

5.4 Roles of ALCO and ALM Department

ALCO of ACLEDA Bank Plc. is an independent board of the bank, and has the responsibility for good risk management and corporate governance. The main focal point of ALCO is to maintain healthy balance sheet of the bank. Similarly, ALM department of ACLEDA Bank Plc. makes the continual rearrangement of both sides of the bank's balance sheet in an attempt to maintain reasonable profitability, minimize interest rate risk, and provide adequate liquidity. The main goal of ALCO and ALM department of the bank is to manage assets and liabilities by incorporating interest rate risk and liquidity considerations into the bank's operating model to ensure adequate liquidity while managing the spread between the interest income and interest expense fairly.

5.4.1 Balance Sheet

Balance sheet of a bank is a basic document of account containing data information of the assets used by the bank and the sources of funds that are related to those assets. Healthy balance sheet is assessed through the changes of three main items, i.e., assets, liabilities and equities. In 2009, ACLEDA Bank Plc.'s balance sheet revealed that its assets grew by USD 216.47 mil in 2009 over the previous year (USD 687.51 mil in 2008 to USD 903.98 mil in 2009). This increase was mainly due to the growth of net loans by USD 71.72 mil (USD 456.4 mil in 2008 to USD 528.03 mil 2009), net treasury and inter-bank transactions by USD 110 mil (USD 144.49 mil in 2008 to USD 254.51 mil in

2009) in 2009, where the placement with the NBC was 48 per cent, with other banks 12 per cent, cash on hand 32 per cent and current accounts eight per cent (Figure 4). The public deposit liabilities of the bank increased by USD 200.66 mil (USD 487.03 mil in 2008 to USD 687.70 mil in 2009), and the increase in net income by USD 9.7 mil in 2009. The above analysis revealed that the ACLEDA Bank Plc.'s balance sheet became healthier from year to year. All the components of the bank's investment assets including net treasury and loans increased significantly during 2003 to 2009.

5.4.2 Investment Portfolio

There were two main types of investment portfolio of ACLEDA Bank Plc.: (1) the lending to customers and (2) the placements with other banks. Such investments were as per the business plan, which was approved by the bank's Board of Directors. The approved business plan was forwarded to the ACLEDA Bank Plc.'s ALCO for redefining and proceeding for suitable operations. Moreover, the ALCO of the bank fixed the internal limits of the bank's investment portfolios for one industry, group of industries, geographical areas and/or characteristics meeting offsetting fluctuations. The internal limitation on lending was also decided by ALCO of the bank in cooperation with the bank's board credit committee to authorize to the relevant committee, such as management credit committee and other involved departments to implement the lending activities (Table 8).

Table 8: Internal Portfolio's Limitation Vs. Actual, 31st Dec. 2009

Description	Internal Limitation	% of Actual	Actual 2009 (in '000 US\$)
Balloon Loans Consolidation / Total loan portfolio	5.00%	0.43%	538,237.41
Personal Loans / Total loan portfolio	10.00%	1.92%	
Overdraft Facilities / Total loan portfolio	5.00%	1.34%	
Revolving Credit Line / Total loan portfolio	5.00%	3.24%	
Staff Loan / Total loan portfolio	5.00%	2.84%	
Staff Housing Loan / Total loan portfolio	5.00%	1.99%	
Housing Loan / Total loan portfolio	15.00%	6.79%	
Total exposure to a single client / Total bank net-worth	5.00%	n/a	
Loans exposure ratio Less than (aggregate amount of loan assets in arrears >30days-loan loss reserves / net worth)	25.00%	n/a	
Loans to related party / Total bank net-worth	10.00%	4.57%	

Source: In Siphann, SVP & Head of Credit Division, Result 31st Dec. 2009.

Apart from portfolio investment in loans, the money market businesses, such as placements or deposits were also limited and diversified by the bank to different selected local and international banks.

Table 9 provides in detail the investment balance of money market in late 2009 by currencies and by banks where there were monies being placed with by ACLEDA Bank Plc.

Table 9: ACLEDA Bank's Money Market Report as on 31st Dec., 2009

EUR Currencies (in EUR million)

Item	Bank's Name	Amount	Period	Int. Earning
1	SCB, Singapore	-	1 Week	0.07%
2	OCBC	-	1 Week	0.00%
3	ING Bank (Current)	0.08	-	0.00%
4	SCB, Frankfurt	0.11	-	0.00%
5	SCB, London	0.17	-	0.00%
6	SCB, Paris-EUR	0.13	-	0.00%
	Sub-total	0.49	-	-

US Dollar Currencies (in US\$ million)

Item	Bank's Name	Amount	Period	Int. Earning
1	NBC	122.00	1month	0.12%
2	NBC	0.48	3 months	1.00%
3	NBC – Current	20.34	-	0.00%
4	Other-Banks, fixed	8.06	1 month	2.03%
5	Other-Banks, current	0.21	-	0.00%
6	HSBC (For Visa Card)	0.18	1 year	0.45%

7	HSBC, NY	3.14	-	0.00%
8	American Express, NY	-	-	0.00%
9	JP MORGAN CHASE Bank, NY	2.74	-	0.10%
10	Mashreqe Bank (current)	0.09	-	0.12%
11	Citi Bank, NY	1.79	-	0.05%
12	Citi Bank, NY (fixed)	-	1 W	0.00%
13	Wachovia Bank (DDA)	1.91	-	0.05%
14	Wachovia Bank (HPMM)	2.10	-	0.33%
15	SCB, NY (current)	3.34	-	0.00%
16	Vietnam Bank for Agriculture	0.82	-	0.20%
17	Bank of Nova Scotia, Singa. (fixed)	-	1 W	0.15%
18	Bank of America	3.76	-	0.00%
	Sub-total	170.96	-	-

Source: Rath You Meng, SVP & Head of Treasury Division, ACLEDA Bank Plc., ALCO Analysis Report December 2009.

5.4.3 Funds Transfer Pricing (FTP)

Pricing is the most concerning point by ALM/Treasury department of ACLEDA Bank Plc. It is divided into main two parts: the pricing of products and individual transactions, and internal transfer pricing or interest inter-branch. There were two levels within transfer pricing or inter-branch, and the interest inter-branch of ACLEDA Bank Plc. The interest inter-branch was from head office to provincial/district branch offices and the interest inter-branch was from branch offices to district offices. Table 10 points out the ACLEDA Bank Plc.'s individual pricing or interest rate by loan's products. The table shows that the interest rates

offered by ACLEDA Bank Plc. to its individuals and corporate customers by currency and product of the loans. During 2003 to 2009, the interest rates on loans of all currencies of the bank were varied. The interest rates on loans in KHR and THB were also varied from 24 to 60 per cent between 2003 and 2008 and then dropped by 21.6 to 33 per cent in 2009, while the USD remained slightly changed between 14.4 to 30 per cent. However, the interest rate of some main loan products of the bank was changed from 16.39 per cent in 2003 to 10 to 32.4 per cent in 2009. In case of interest rate on loan to the internal staff of the bank, the rate was dropped from 12 per cent in 2003 to 8 to 10 per cent in 2009.

Table 10: Individual and Corporate Interest Rate Offers of ACLEDA Bank Plc. (2003-2009)

Description	2009	2008	2007	2006	2005	2004	2003
Loans in Riel	21.6-33%	24-33%	24-36%	24-48%	24-48%	18-60%	24-48%
Loans in USD	14.4-30%	18-33%	12-36%	14.4-36%	14.4-36%	18-36%	14.4-36%
Loans in THB	21.6-33%	24-33%	24-36%	24-48%	24-48%	24.60%	24-60%
Overdrafts	10-24%	12-24%	12-30%	16.39%	-	-	-
Staff Housing Loans	10.8-13%	10.48%	9.94%	9.94%	-	-	-
Staff Loans	8-10%	10-12%	10.52-12%	12.21%	11.27%	12.81%	12.21%
Public Housing Loans	11.52-13%	11.52-13%	11.52%	11.50%	-	-	-
Other Loans	10-32.4%	12.33%	12-36%	-	-	-	-

Sources: ACLEDA Bank Plc.'s Annual Report, 2003-2009 and Credit Operating Manual.

Table 11 shows the inter-branch interest rate of ACLEDA Bank Plc. The interest rates on all currencies of the bank remained stable during 2003 to 2007, but during 2008 to 2009 the rates decreased by 0.5 per cent on each currency. The inter-branch interest rates on currencies of the Khmer Riel “KHR” and Thai Bhat “THB” of the bank remained steady by 13 per cent during 2003

to 2007, and decreased by 12.50 per cent between 2008 to 2009. The inter-branch interest rate on currencies of United States Dollar “USD” and European Euro “EUR” of the bank also remained steady during 2003 to 2007; the rate was 11 per cent and then dropped down to 10.50 per cent in 2008 and 2009.

**Table 11: ACLEDA Bank Plc.’s Rate of Interest Transfer Price (HQ to Branch)
(2003-2009)**

Description	2009	2008	2007	2006	2005	2004	2003
Rate of Interest Transfer Price							
Khmer Riels “KHR”	12.50%	12.50%	13.00%	13.00%	13.00%	13.00%	13.00%
Thai Bhat “THB”	12.50%	12.50%	13.00%	13.00%	13.00%	13.00%	13.00%
United States Dollars “USD”	10.50%	10.50%	11.00%	11.00%	11.00%	11.00%	11.00%
European Euro “EUR”	10.50%	10.50%	11.00%	11.00%	11.00%	11.00%	-

Sources: ACLEDA Bank Plc.’s Business Plan 2003-2009.

5.4.4 Liquidity Risk Management

Liquidity risk is referred to the current or prospective risk to earnings and capital arising from a bank’s inability to meet its liabilities when they become due, as well as from opportunity losses due to over-liquidity relative to its liabilities. The key solution is to have sufficient quick financial sources to support the operations and maintain the liquidity with appropriate level to ensure the banking business moving forward normally and smoothly. There are some critical points for consideration of both individual economic transaction and whole activities of businesses.

The key liquidity providers, contingency liquidity buffer, and contingency liquidity plan are taken into account for ACLEDA Bank Plc.

Key Liquidity Providers:

The key liquidity providers refers to the key creditors or lenders who can provide quick financial assistance when the bank’s client faces liquidity shortage eventually. Table 12 shows the names of financial providers and balance outstanding debts that ACLEDA Bank Plc. owed to those financial institutions/banks.

Table 12: Financial Providers and Outstanding of Borrowing Funds of ACLEDA Bank Plc., 2009

Financial Providers	In USD
Related parties:	
IFC	1,285,716
KfW	3,215,833
Total	4,501,549
Non-related parties:	
Blue Orchard MFS	15,000,000
Micro Finance Securities	4,000,000

Responds Ability SICAV	3,000,000
CSMFMC	7,000,000
Total	29,054,520
Grand Total	33,556,069
Senior Debt, ACLEDA NGO	5,006,718
Subordinated Debt	45,074,485
FMO	20,000,000
DEG	20,000,000
Triodos IFM	5,000,000
ACLEDA NGO	74,485

Sources: ACLEDA Bank Plc.'s Annual Report, 2003-2009.

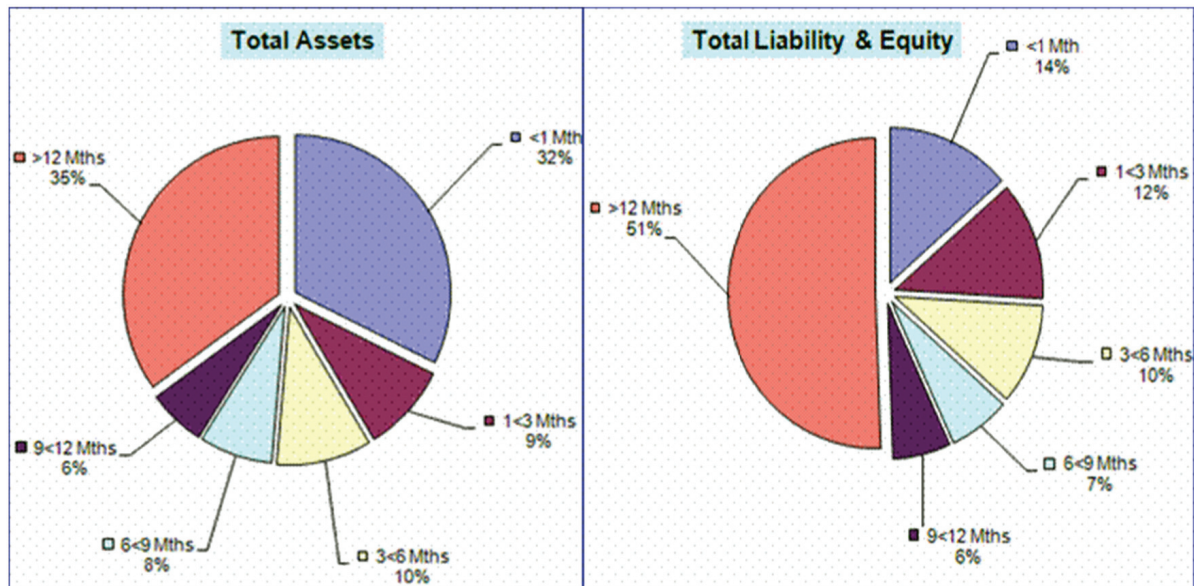
Contingency Liquidity Buffer:

Contingency liquidity buffer refers to the managing technique of liquidity ratio and position in order to protect the bank being free from liquidity risk or liquidity crisis (Liquidity Crisis = Low probability/high impact event). This is required by the bank's ALM group and ALCO to make sure that the daily liquidity management ratio is maintained with appropriate level in order to meet a stable operation and compliance. ACLEDA Bank Plc.'s liquidity position and ratio at the year end 2009 was properly managed. Moreover, the liquidity position was driven from the actual referential data of the daily operational activities normally positioning for next 12-month period of banking business from 31st Dec. 2009.

Contingency Liquidity Plan:

Contingency liquidity plan is the bank management practice for sustainable banking businesses undertaken by ALM/Treasury department of a bank. The stand-by lines which a bank negotiates with other banks to ensure for some comfort as last resort facilities are accounted. ACLEDA Bank Plc. set up contingency liquidity plan properly by signed agreements for facilities with local and international banks to guarantee for quick financial assistances in case of shortage of cash flow or liquidity. Figure 4 shows the percentages of the maturity of the assets and liabilities that ACLEDA Bank Plc. held by the 31st December 2009. The figure reveals that the bank assets were matured or re-priced more than its liabilities in short term bands. This indicates that the bank was fully able to offset its debt.

Figure 4: Liquidity Analysis of ACLEDA Bank Plc., 31st Dec. 2009



Source: ALCO Papers: Liquidity Analysis- All Currencies, 31/12/2009.

5.4.5 Interest Rate Risk Management

One of the toughest and most potentially damaging forms of risk that all banks and financial institutions must face is an interest rate risk. The interest rate risk is the risk that the bank earnings and/or net worth will be influenced adversely by unanticipated changes in interest rates of the financial market. ACLEDA Bank Plc. always considered the degree of interest rate risks on its portfolio's assets and liabilities. The bank carried out its business as a retail banking business; its products had interest rates, which were not very sensitive if compared to the market rates. Majority of its deposits, borrowed funds, and loans were almost fixed rates. The interest rate risk management undertaken by

ACLEDA Bank Plc.'s ALCO and ALM/Treasury department is mentioned below:

Characteristics of Portfolios:

The portfolios of assets and liabilities including off-balance sheet (OBS) commitments of ACLEDA Bank Plc. were in maturity (fixed rate) and re-pricing (floating rate) differently. Part (a) of Table 13 presents the characteristics of investment's loan assets of the bank in 2009, and the loan assets were found to be matured/re-priced from time to time. The maturing/re-pricing characteristics of deposit liabilities and borrowing funds with different amounts and times of the bank are presented in part (b) of Table 13.

Table 13: Characteristics of Maturing / Re-pricing of ACLEDA Bank's Portfolios' Assets and Liabilities (Report of 31st Dec. 2009)**a/ Maturing / Re-pricing of Investment Assets**

(in USD)

Age to Maturity	Loans and Advances	Deposits & Placements	Total
Within 1 month	38,401,831	150,601,734	189,003,565
>1 to 3 months	80,312,109	1,488,872	81,800,981
>3 to 6 months	89,114,108	-	89,114,108
>6 to 12 mnths	122,892,926	180,000	123,072,926
>1 to 3 years	148,745,527	-	148,745,527
>3 to 5 years	30,239,772	-	30,239,772
> 5 years	28,531,134	-	28,531,134
Total	538,237,407	152,270,606	690,508,013

b/ Maturing / Re-pricing of Financial Liabilities

(in '000 USD)

Liabilities	≤ 1 month	>1-3 months	>3-12 months	>1-5 Ys	>5 Ys	Total
Customers Deposits	435,072	85,018	148,403	1,767	-	670,260
Deposits by banks	17,288	-	150	-	-	17,438
Borrowings	1,250	323	2,375	29,072	536	33,556
Senior-debt	-	-	-	5,007	-	5,007
Subordinated-debt	-	-	-	17,500	27,574	45,074
Others	8,087	2,157	5,996	32	-	16,272
Total	461,697	87,498	156,924	53,378	28,110	787,607

Source: ACLEDA Bank's Annual Report, 2009.

Degree of the Bank's Assets and Liabilities Vs. Interest-Sensitive:

ACLEDA Bank Plc. was very much concerned with the strong partial degree of the interest-sensitive of its assets and liabilities. The variable rate consumer loans, variable rate demand loans, and adjustable rate mortgages were classified into degree of the bank interest sensitive assets, which was being permanently controlled by the bank. The factors mentioned below provide clearly the bank's interest rate risk management with deep insight into part of changes, which was interrelated to the degree of the bank's assets and liabilities that were interest-sensitive.

(i) Interest Rate Outlook

The interest rate outlook is a brief discussion of the factors currently affecting interest rate changes in the global financial businesses. The outlook is updated as new significant information comes to light and forecasts are adjusted. Table 14 is an analytical document made by ALM/Treasury department of ACLEDA Bank Plc. It was a part of discussions of the bank's ALCO in December 2009, which focused on interest rate outlook locally and internationally. The figure indicates the changes of interest rate during ending three months in late 2009. The trends of the international market interest rate declined from day to day and month to month (daily change for one, three, six and 12 months) to all currencies during a period of time.

Table 14: Interest Rate Outlooks of ACLEDA Bank Plc.**Interest Rate Outlook:**

Financial market conditions seem become more supportive to economic growth, though economic activity is likely to remain weak for a time. However, most central banks in the world still keep their central banking funding rates at the lowest levels. The Federal Open Market Committee still maintains the target range for the federal funds rate at 0 to 1/4 percent (since April 29, 2009).

The USD SIBOR (excepted 1month) and EUR LIBOR decreased slightly (with positive yield curves), as compared to the previous month while THB BIBOR were more or less the same (with positive yield curve). Similar to the previous month, the interest rates on both deposits and Loans in Cambodian market were fairly stable.

Periods	USD SIBOR (end of month)			THB BIBOR (end of month)		
	October-09	November-09	December-09	October-09	November-09	December-09
1 month	0.24875	0.24000	0.24267	1.27750	1.27875	1.27500
3 month	0.29000	0.26575	0.26100	1.36313	1.35750	1.35125
6 month	0.58250	0.48500	0.45833	1.50000	1.50000	1.50000
12 month	1.21375	1.02250	1.00000	1.69125	1.70781	1.68750

Periods	EUR LIBOR (end of month)			AUD LIBOR (end of month)		
	October-09	November-09	December-09	October-09	November-09	December-09
1 month	0.38875	0.44250	0.41375	3.61500	3.74750	3.95000
3 month	0.67188	0.68000	0.65500	3.92250	3.94750	4.09500
6 month	0.98938	0.98000	0.97313	4.46000	4.41000	4.46750
12 month	1.23000	1.22000	1.21750	5.46500	5.27000	5.23750

Source: Cheam Teang, ALM Report, 31st December, 2009.

(ii) Deposit Interest Rates

The average cost of ACLEDA Bank Plc. depository interest rate is a combination of the costs of each type of the bearing interest rates' accounts, such as saving, fixed, demand, and so on. Table 15 reveals that the interest rate on deposit of ACLEDA Bank Plc. decreased by 0.18 per cent during October, 2009 to December, 2009. This indicates that the bank had changed its currency policy in order to attract more stable sources of funds from depositors

with lower cost, and to prevent the expenses of high interest rates in order to support the stable and survival banking business operations at difficult time. After the change of currency policy, it is found that the deposit amounts of the bank in USD, KHR, EUR, etc. increased to a large extent. Thus, ACLEDA Bank Plc.'s ALCO and ALM/Treasury department worked well to manage the deposit position of the bank.

Table 15: Interest Rate on Deposit of ACLEDA Bank Plc.

Interest Rates Deposits:				
For December 2009, the average blended rate on deposits decreased by 0.18%, 0.09%, and 0.21% for USD, KHR, and THB respectively. This was mainly due to action taken by the management and IPSC to reduce interest rates on deposits.				
<u>Average Blended Costs of Deposits:</u>				
Currencies	October-09	November-09	December-09	Inc/Dec.
USD	2.98%	2.81%	2.63%	-0.18%
KHR	3.23%	3.04%	2.95%	-0.09%
THB	2.98%	2.59%	2.37%	-0.21%
EUR	0.00%	0.00%	0.00%	0.00%
<u>Deposits Progress Reports : (in thousand USD in equivalent)</u>				
Currencies	October-09	November-09	December-09	Inc/Dec.
USD	575,638.09	590,005.51	596,356.72	6,351.21
KHR	74,254.95	72,215.58	72,737.82	522.24
THB	17,308.33	19,267.65	17,031.08	(2,236.58)
EUR	1,836.59	1,582.23	1,895.94	313.70
Total:	669,037.96	683,070.98	688,021.55	4,950.58
Note: The increase in total deposits of USD4.95m, consisted of the increase of customer deposits by USD7.01m offset with the decrease in other banks and MFIs by USD2.06.				

Source: Cheam Teang, ALM Report, 31st December, 2009.

(iii) Loan Interest Rates

Loan / lending rate is the bank rate that usually meets the short and medium-term financing needs of the customers. Lending rate is normally differentiated according to creditworthiness of borrowers and objectives of financing. Loan interest rates are structured differently by loan product categories, operating currencies, and especially cost of funds and risk associations. ACLEDA Bank Plc. had its loan interest rates differently by currencies, and the average cost of each currency was varied depending on the

individual cases. Table 16 shows the changes on interest rates of loans on different currencies of ACLEDA Bank Plc. during September 2009 to December 2009. During the above period, the overall actual effective interest rate on loan assets of the bank was around 20 per cent, and the actual cost of funds was around five per cent. The interest margin was around 15 per cent during the same period. The changes of interest rates on loan assets and costs of funds were -0.35 per cent and -0.47 per cent respectively.

Table 16: Interest Margins of ACLEDA Bank Plc.

Currencies	Description	Sep-09	Oct-09	Nov-09	Dec-09	Inc/Dec
USD	Actual Effective int. Rate	18.34%	18.27%	17.98%	17.66%	-0.32%
	Actual Cost of funds	5.84%	5.94%	5.39%	4.92%	-0.47%
	Interest Margin	12.50%	12.33%	12.60%	12.74%	0.15%
KHR	Actual Effective int. Rate	33.39%	32.89%	32.48%	32.11%	-0.37%
	Actual Cost of funds	6.61%	5.63%	5.12%	4.60%	-0.51%
	Interest Margin	26.78%	27.26%	27.36%	27.51%	0.14%
THB	Actual Effective int. Rate	32.44%	32.69%	31.78%	31.45%	-0.34%
	Actual Cost of funds	7.14%	5.24%	4.79%	4.52%	-0.27%
	Interest Margin	25.30%	27.45%	26.99%	26.92%	-0.06%
Aggregate	Actual Effective int. Rate	20.13%	20.04%	19.72%	19.37%	-0.35%
	Actual Cost of funds	5.94%	5.90%	5.35%	4.88%	-0.47%
	Interest Margin	14.19%	14.14%	14.38%	14.49%	0.12%

The bar chart displays the Aggregate Actual Effective interest Rate (blue bars), Aggregate Actual Cost of funds (red bars), and Aggregate Interest Margin (green bars) for the periods Sep-09, Oct-09, Nov-09, Dec-09, and Inc/Dec. The Y-axis represents percentages from -5.00% to 25.00%. The Interest Margin generally shows a slight upward trend from Sep-09 to Dec-09, while the Actual Effective interest Rate and Actual Cost of funds show a general downward trend over the same period.

Period	Aggregate Actual Effective interest Rate (%)	Aggregate Actual Cost of funds (%)	Aggregate Interest Margin (%)
Sep-09	20.13%	5.94%	14.19%
Oct-09	20.04%	5.90%	14.14%
Nov-09	19.72%	5.35%	14.38%
Dec-09	19.37%	4.88%	14.49%
Inc/Dec	-0.35%	-0.47%	0.12%

Source: Cheam Teang, ALM Report for ACLEDA's ALCO Analysis, December, 2009.

(iv) Interest Rate Mismatch

The mismatched levels between rate sensitive assets and rate sensitive liabilities are the imbalance between amount of assets and liabilities. It is the main focal point in relation to the interest rate risk management. ACLEDA Bank Plc.'s ALM/Treasury department had reviewed and characterized its assets and liabilities, which were interest-sensitive permanently. Table 17 provides the bank's exposures to USD currency. It revealed the accumulation of over-borrowing of the bank by USD 119.57 mil for the period of only less than one-month, and over-borrowing of USD 106.6 mil for the period of less than 12 months. The total net mismatch clearly indicated that the bank was over-lent for the short time period, i.e., less than one-month, by USD 105.88 mil; then, for the long time period, i.e., less than 12 months, by USD 1.27

mil. In the time period of one to three months, the bank was over-borrowed by USD 15.26 mil. Thus, it revealed that the bank had more maturing or re-pricing assets in a given period than liabilities. This was the reason for the fall in interest rates of the bank, which caused reduction in the bank's profitability.

5.4.6 Regulatory Compliance

The capital requirement is a regulation, which sets as a framework for banks and depository institutions. The ALCO with the support of ALM group of ACLEDA Bank Plc. had regularly monitored the compliances and requirement of the bank regulators to ensure that the internal and external latest development issues were fully complied, and all related impacts were technically and properly resolved (Table 18).

Table 17: USD, Interest Rates Mismatch of ACLEDA Bank Plc

ACLEDA Bank Plc.		ALCO Papers : Interest Rate Risk - Foreign Currency										USD Currency Unit in million USD	
REGION: P P		DATE: December 31, 2009											
COUNTRY: Cambodia		Exchange Rate: 1 USD = Riels 4,169.00											
Interest Rate Risk Profile													
CATEGORY	TOTAL	Variable	Less than 1M	> 1m-3months	> 3m-6months	> 6m-9months	> 9m-1y	> 1y-2ys	> 2ys-5ys	> 5 years	Zero		
TOTAL ASSETS	805.38	90.51	162.64	66.19	70.07	57.00	46.75	110.52	64.67	28.49	108.55		
TOTAL LIABILITIES	(605.82)	(268.27)	(56.76)	(81.45)	(63.06)	(37.04)	(45.49)	(28.28)	(17.93)	(17.50)	(190.04)		
B/S NET MISMATCH	(0.44)	(177.76)	105.88	(15.26)	7.02	19.96	1.27	82.24	46.74	10.99	(81.50)		
OFF-B/S MISMATCH	(61.94)	(47.69)	-	-	-	-	-	-	-	-	(14.25)		
TOTAL NET MISMATCH	(62.38)	(225.46)	105.88	(15.26)	7.02	19.96	1.27	82.24	46.74	10.99	(95.74)		
CUMULATIVE MISMATCH		(225.46)	(119.57)	(134.84)	(127.82)	(107.86)	(106.60)	(24.36)	22.38	33.36	(62.38)		
1. Ratio Of Int. Sensitive Asset To Int. Sensitive Liability:	99.95%	33.74%	286.53%	81.26%	111.13%	153.89%	102.78%	390.80%	360.64%	162.79%	57.12%		
2. The Bank's	Liabilities Sens.	Liabilities Sens.	Asset Sens.	Liabilities Sens.	Asset Sens.	Asset Sens.	Asset Sens.	Asset Sens.	Asset Sens.	Asset Sens.	Liabilities Sens.		
3. The Bank's Net Int. Margin Will Be Squeezed If:	Int. rate rise	Int. rate rise	Int. rate fall	Int. rate rise	Int. rate fall	Int. rate fall	Int. rate fall	Int. rate fall	Int. rate fall	Int. rate fall	Int. rate rise		

In Million US Dollar

Legend: B/S NET MISMATCH (Blue bar), TOTAL NET MISMATCH (Green bar), CUMULATIVE MISMATCH (Line graph)

Source: Cheam Teang, ACLEDA Bank's ALCO Analysis Report, December 2009.

Table 18: ACLEDA Bank's Summary Compliance Report, 31st Dec. 2009

1	Capital		(Amounts in US Dollar)	
-	Total Paid Up Capital:			\$68,150,000
-	Regulation: (10% of US\$ 50,000,000)			\$ 6,815,000
-	Implementation 10%			\$ 6,815,000
-	Compliance			Yes
2	Reserve requirements (NBC's regulation):		Compliance	
-	Reserve required (KHRCCY): 8% (min.) of Customer's Deposit and Loan from Commercial Bank			Yes
-	Reserve required (FCCY): 12% (min.) of Customer's Deposit and Loan from Commercial Bank			Yes
3	Solvency ratio :		(Amounts in US Dollar)	
-	Regulation (NBC) : $\geq$ or = 15% (Ref. Prakas N° B7-04-206 Prokor, dated 29-12-2004)			
-	Implementation (NBC formula)	Implemented	Compliance	
	+ Bank's net worth	US\$128,669,661.89*	Yes	
	+ Assets at risk	\$577,893,915.20		
	+ Solvency ratio	22.27%		
-	Regulation (BIS) : $\geq$ or = 8%			
-	Implementation (BIS formula)	Implemented	Compliance	
	+ Bank's net worth	\$133,151,236.10*	Yes	
	+ Assets at risk	\$577,893,915.20		
	+ Solvency ratio	23.04%		
4	Liquidity Ratio :		(Amounts in Million Riels)	
-	Regulation: $\geq$ or = 50% (Ref. Prakas N° B7-04-207 Prokor, dated 29-12-2004)			
-	Implementation (NBC formula)	Implemented	Compliance	
	+ Total Numerator	1,162,926.77	Yes	
	* Lender position:	1,029,462.27		
	* Portion of lending with maturity <1mth	133,464.50		
	* Treasury Bill with maturity <1mth	0.00		
	+ Total Denominator	1,529,190.49		
	* Depositor position:	1,529,190.49		
	+ Liquidity Ratio	76.05%		
5	Foreign Exchange Position :		(Amounts in Million Riels)	
-	Regulation:	+ NBC regulation $\leq$ or=20%	Implementation	
		+ ALCO Limit $\leq$ or = 5%	In Figures	In Percentage
			NBC	ALCO

-	Implementation	+	Net Position of USD (-)	1,830.79	0.34%	Yes	Yes
		+	Net Position of THB (-)	712.18	0.13%	Yes	Yes
		+	Net Position of EUR (+)	285.32	0.05%	Yes	Yes
		+	Net Position of AUD (+)	429.24	0.08%	Yes	Yes
		+	Net Position of VND (+)	187.61	0.03%	Yes	Yes
		+	Net Position of CAD (+)	385.18	0.07%	Yes	Yes
		+	Net Position of LAK (+)	28.76	0.01%	Yes	Yes
		+	Net Position of JPY (+)	347.54	0.06%	Yes	Yes
		+	Net Position of GBP (+)	301.66	0.06%	Yes	Yes
		+	Net worth	536,511.37			
* The bank's net worth in this Table is excluded retained earning for the year.							

Source: Than Sarun, ACLEDA Bank's ALCO's Summary Report, 31st Dec. 2009.

5.5 Results of Primary Survey

The surveyed 134 staff of ACLEDA Bank Plc. expressed that the legal and regulatory framework related to the ALM was enabling ACLEDA Bank Plc. in participation and development of financial service industry in Cambodia. They also viewed that the ALM of ACLEDA Bank Plc. had significantly contributed in creating shareholder value of the bank. Further, the ALCO and ALM departments were found to be closely connected with the result of the risks and benefits of ACLEDA Bank Plc. The achievements of the bank during 2003 to 2009 were due to the hard work of all stakeholders, and the leading roles of ALCO and ALM/Treasury departments.

6. Conclusion

ALM is a key risk management dealing with strategic direction and decisions for banking and financing business in competitive market. It is an analytical tool of the adherence to the risks and rewards in banking business operations. The right management of asset and liability of ACLEDA Bank Plc. helped the bank to raise its value and shareholders' equities. The ALM/Treasury department of the bank was under ALCO. ACLEDA Bank Plc. achieved its operational goals because of the good collaboration between ALCO and ALM/Treasury department. The study found

that ALM was considerably affecting the banking operations of ACLEDA Bank Plc.

7. Recommendations

On the basis of the findings of the study, the following recommendations are suggested for better management of Asset and Liability of ACLEDA Bank Plc.:

1. ALM unit of ACLEDA Bank Plc. was under the direct supervision of the bank's Treasury division. It had a limited activity, i.e., receiving the financial data from related departments to analyze the movement of A/L in banking operations. The ALM unit of ACLEDA Bank Plc. had no MIS to gather the data independently. So, the bank should create MIS section and give responsibility to the MIS section of ALM unit to collect the updated data of the bank's A/L including its market price.
2. The fund transfer price and customer price of ACLEDA Bank Plc. was almost fixed for a period of time. The pricing in some of the loan products was not so flexible to the changed market rates. The bank's ALCO should price the bank's loan products as per policy, and the bank base rate should be properly defined, and then forwarded the same to the pricing committee to work

out on minimum or maximum marginal rate for efficient and effective operational banking business. The bank's ALCO with supports from ALM/Treasury department should review the operations of the daily banking business, market competitions, compliances, etc. to make adjustment to the pricings to meet market variations or fluctuations timely.

3. ACLEDA Bank Plc's strategies or policies in relation to internal limitations were not widely defined to provide ease in banking operations. Hence, the bank's ALCO should improve and develop the strategies and/or master policies.
4. The ACLEDA Bank Plc. had very often encountered the cyclical effects of the shortage funds almost at the beginning of every year. This had reverse effects on the real market needs on loans and other banking facilities that needed funds for businesses growth. The bank's ALM/Treasury department should look to the matter and make sure that the bank maintains sufficient liquidity to handle normal savings and loan needs.
5. The kind of hedging funds were not so active and wide yet in the services of ACLEDA Bank Plc. In this regard, the bank should target how much percentage of short term funds to be transformed to medium or long term funds, and appropriate actions should be taken immediately.
6. The treasury products/services, such as option, forward and future transactions, etc. were not so active in ACLEDA Bank's businesses. Therefore, the bank should take into consideration to transact the foreign exchange and derivative products with selected local and international financial institutions to find the extra income for offsetting the interest expenses on deposited

/ borrowed funds, etc.

7. The bank was depending on a few potential partners or shareholders to get quick capital support for meeting compliances and ongoing banking businesses. So, the bank should seek to build more relationship with large domestic or international bank partners and financial institutions to increase capital amount in order to meet the needs of investment diversifications.

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Building an Effective Team – A Conceptual Discussion

Srey Vuth¹

ABSTRACT

Team has existed in organizational settings for a long time and has been defined in numerous ways in the management literature. A team consists of individuals coming together with varying skills and experiences to perform work and solve problems. Teams have produced more innovative ideas, made better-evaluated decisions and have been more successful in implementing those decisions than individuals working alone. The team leader usually functions as a general manager, and focuses on how to build an effective team in order to achieve better results. She or he acts to clarify purpose and goals, builds commitment and self-confidence, strengthens the team's collective skills and approach, removes externally imposed obstacles, and creates opportunities for others. The present paper attempts to explore the various definitions of team developed by early researchers/scholars, provides the conceptual definitions of team elements, suggests a more appropriate model of understanding teamwork, roles and characteristics of team leader, and raises some reasons for the failure of team.

Key Words: *Team, Team Leader, Accountability, Model, Competency, Commitment, Problem-solving, Team Failure*

1. Introduction

The business environment has become increasingly competitive in the global market. Changes in the country economy, societies, government policy and regulation, markets, customers, competition, and technology around the globe are forcing organizations to clarify their values, develop new strategies, and learn new ways of operation.

Many companies have responded to the threats on their survival in a variety of ways. These include: re-engineering or re-structuring, business firm transformation, culture change, total quality management and so forth. The ability to do this effectively, profitably and in an environmentally

friendly way depends on the qualities of management itself and on the effectiveness of the existing organizational arrangements through the commitment of senior managers, effective leadership and teamwork.

The experience of organizations using teamwork has shown that effective use of teams can bring significant improvements in productivity, creativity and employee satisfaction (Colenso, 2000). Using teamwork for the improvement of organizational performance is proposed in a number of the quality literature papers (Bamber and Sharp, 2001).

As a team, individuals come together with

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varying skills and experiences to perform work and solve problems. Teams have produced more innovative ideas, made better-evaluated decisions and have been more successful in implementing those decisions than individuals working alone. Therefore, team is one of the most important assets of an organization. Nonaka (1995) even suggests “the hypertext hierarchy” of an organization, which is based on teams. In addition, he on the knowledge creating company describes that Nissan recognized that in order to carry out a full-scale offensive in Europe, it had to acquire tacit and explicit knowledge about the European automobile market, culture, and road conditions. The obvious solution was to build a team around people who had already had some experience there.

2. Defining Team

Team has existed in organizational settings for many years and has been defined in numerous ways in the management literature. Conceptually, in the organization, team relies on a small number of key players that has to make critical decisions in the face of considerable uncertainty and under pressure to move quickly. Ruth (2006) argues that “the way a team plays as a whole determines its success. One may have the greatest bunch of individual stars in the world, but if they don’t play together, the club won’t be worth a dime”. According to Barnard (1938), “team is individuals coming together with varying skills and experiences to perform work and solve problems”. Francis and Young (1979) define a team as “an energetic group of people who are committed to achieving common objectives, who work well together and enjoy doing so, and who produce high-quality results”. Adair (1986) understands a team as “a group in which the individuals share a common aim and in which the jobs and skills of each member fit in with those of the others”. Johnson and Johnson (1991) also argue that “a team is a set of interpersonal relationships structured to achieve established goals”. Katzenbach and Smith (1993) states “a team is

a small number of people with complementary skills who are committed to a common purpose, performance goals, and approach for which they hold themselves mutually accountable”. Kur (1996) sees a team as “a purposeful, open, sociotechnical system in a state of tension between change and stability”. Scholtes et al. (1996) argue that a team outperforms individuals when: the task is complex; creativity is needed; the path forward is unclear; more efficient use of resources is required; fast learning is necessary; high commitment is desirable; the implementation of a plan requires the co-operation of others; and the task of process is cross-functional.

Therefore, it could be defined in a general term that a team is a gathering of individuals with a mixture of skills and knowledge that combine when working together with high commitment and confidence to achieve the defined objectives and goals. A team consists of people who are not only eligible to achieve the task but must also consist of people who are suitable in terms of their compatibility with the other team members. For some organizations, team is formed as cross functional. Cross-functional teams are formed to monitor, standardize, and improve work processes that cut across different parts of the organization, to develop products, or to address issues.

Clearly, team-management skills are increasingly critical. Team members may adopt many roles. Task oriented roles that need to get the job done consisting of activities, like initiating tasks, gathering information, offering suggestions, and helping to motivate team members. Relations-oriented roles that need to keep the team healthy and its members satisfied which involve such behaviors as keeping the group harmonious, helping members resolve disputes, and encouraging members as they face barriers and team members may also play a role as self-serving roles.

3. Critical Components of an Effective Team

Early researchers have developed various models exposing the elements of effective teamwork or high performing teamwork. In his team competencies model, Margerison (2001) defines team as the linking among (1) motivation, (2) developing, (3) organizing, (4) producing, (5) inspecting, (6) maintaining, (7) advising and (8) innovating. Morris and Mountfort (1997) determine winning team profile as combination of philosophy (direction, beliefs and values), resources (roles, leadership and expertise), drive (ambition, attitude and focus) and interaction (integrity, communication and fun).

This article suggests another more appropriate model (Figure 1) which is a combinations of the elements of team as illustrated below:

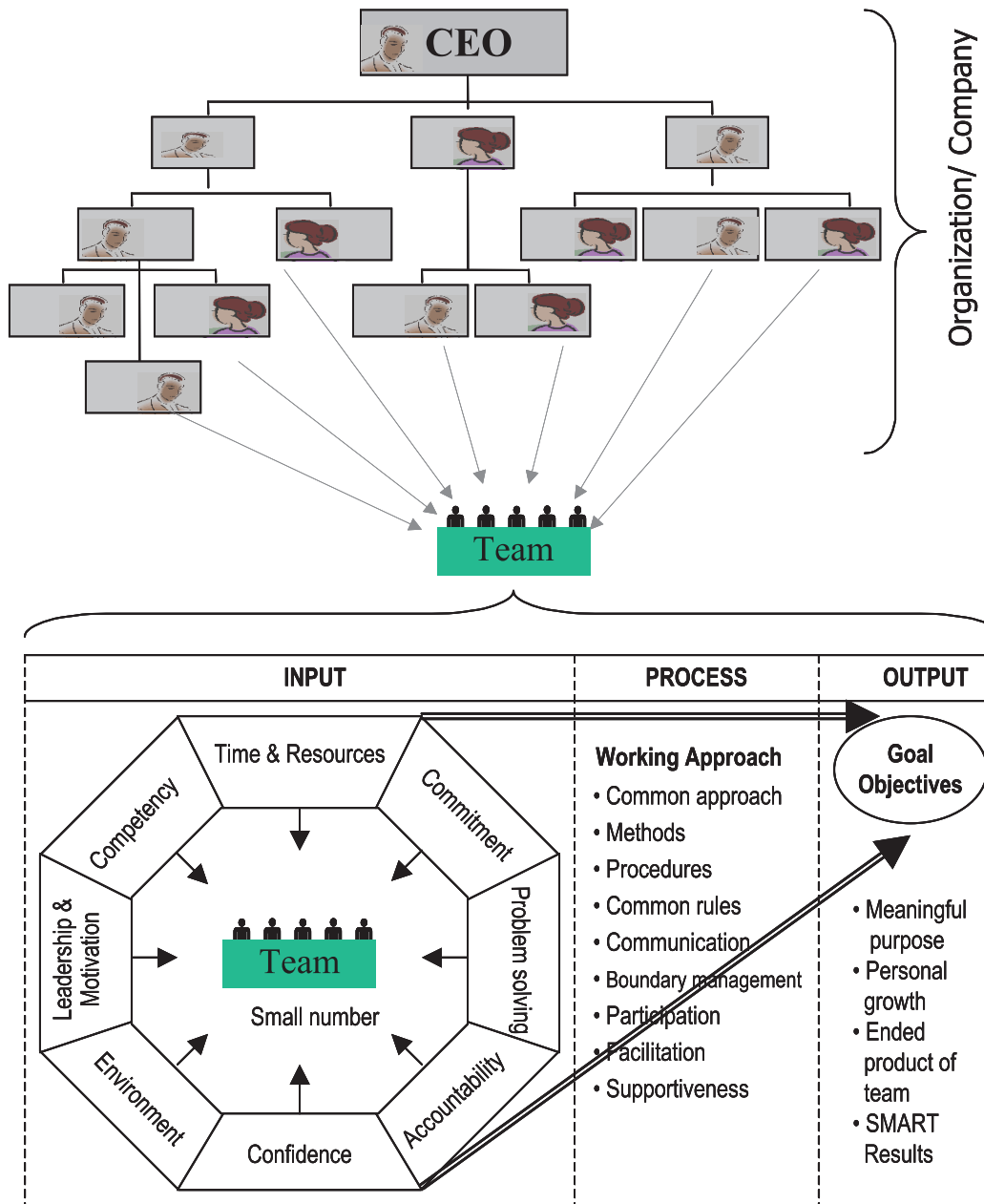
Team Members: Team should be small enough in number. How small is it? There is no common rule to set the exact members of team; it varies from organization to organization according to the workload or task orientation. However, team members should be formed to some extent with a purpose that provides each member to perform the task well. An effective team should consist of between two to fifteen members.

With the appropriate number, team could gain a number of benefits, such as individual member is able to interact, communicate with all members easily and frequently. Moreover, team could build a constructive and fruitful discussion because each member is active and has the opportunities to share opinions, understand the others' roles and skills and also easier in reaching consensus. In addition, the team could make better arrangement in terms of setting meeting appointment, scheduling and meeting place.

Team Competency: Competency of a team may consist of potential skills and skill performance. Individual members should have adequate levels of complementary skills. The team leader should carefully select members, which are based on their skills and skill potential, not personalities. His or her advanced skill performed has to be suitable with the team's purpose and goals. A common practice is in project management, whereby team members are selected from each functional organization or through application. She or he should have a specialized skill area in order to contribute effectively to the project. Another indication is that whether individual members are willing to spend their time to help themselves and others learn and develop new skills. In general, team should consist of people having technical or functional, problem-solving, and interpersonal skills. The key issue for potential teams is striking the right balance between members who already posses the needed skill levels versus developing the skill levels after the team gets started.

Setting Objectives, Goal and Working Approach: Setting a clear objective and goal is very important for the team to understand what they are going to do and what to achieve. Individuals must be committed to the team objectives rather than to their own objectives.

Team has to identify from the beginning of the project work on what kind of achievements or results to be obtained. Unlike organizational purpose which has much broader purpose, team's goal is more clear, simple, and measurable and all members articulate the goals in the same way. Team should have in mind that its performance results in end-product orientation. Team should focus on SMART oriented result. This means that teamwork must be (1) Specific, which defines exactly what the project is attempting to accomplish, (2) Measurable, which identifies

Figure 1: Team Structure

exactly how team members will know the project has been successful, (3) Action-oriented, which involves an activity that produces behaviors and results, (4) Realistic, which involves an activity that is realistically challenging (neither overly ambitious nor too easy) and (5) Time-phased, which lays out a target timely for the activity. Hence, by focusing on the SMART oriented result,

members would have a concrete, clear, and a better and agreeable understanding in achieving the common objectives and goals.

All effective teams develop rules, methods and procedures of conduct to help them achieve their purpose and performance goals. They pertain to attendance discussion and keep confidentiality.

The best team charters are clear enough to indicate performance expectations, but flexible enough to allow teams to shape their own purpose, goals, and approach.

Accountability: Team should have a sense of mutual accountability. Team should understand that end product is the product of the team, not individual member. Every team member is individually and jointly accountable for the team's purpose, goals, approach, and work-products. She or he is able to measure progress against specific goals, all members feel responsible for all measures, and the members are clear on what they are individually responsible for and what they are jointly responsible for. The result must be the product of the team. Therefore, they have to be accountable for the failure and the success of their work.

Building Commitment and Confidence to Timing, Meeting and Actions: Common sense tells us that team must spend a lot of time together formally and informally. The time spent together must be both scheduled and unscheduled, especially at the beginning. The time need not always be face-to-face.

Meeting may be formal and informal. New information emerged during the meeting causes a potential team to redefine and enrich its understanding of the performance challenge, thereby helping the team shape with a common purpose, set clear goals, and improve on its common approach. One way for increasing collaboration in a team is to stimulate interaction between its members. Team should post some questions before holding meeting. What is this meeting intended to achieve? What would be the likely consequences of not holding it? When it is over, how shall team judge whether it was a success or a failure? There are some rules that should be followed, such as: the team should follow the structure of the

discussion that focuses on the objective; makes sure all members understand the issue and why, opinions and comments must be supported by facts; encourages the exchange of ideas of both junior and senior members but discourages the conflicts in personalities, cross-flow of discussion and debate; watches out for the suggestion, close on a note of achievement, meeting minute that everyone is clear about what has been agreed and what they are required to do; and fixes the next meeting. In some cases, a second meeting should be held before a final decision is being made so that the team has time to reflect rationally and come back to discuss other issues. This avoids the danger of making rash decisions that were carried more by enthusiasm or time pressure than sound judgment.

Problem-solving Techniques-Brainstorming:

Brainstorming is one of the problem solving techniques, which is probably the most well-known and a widely used technique for teamwork in both creative problem solving and idea generation. Brainstorming is a group method for obtaining new ideas and solutions (Porter, 1998). It is an unstructured process for generating all possible ideas about a problem or issue within a limited time frame through the spontaneous contributions of team members. The brainstorming method for generating new innovative ideas is based on the fact that people can be stimulated to greater creativity by meeting with others and participating in organized group experiences. Brainstorming should follow some basic rules, such as during the brainstorming session, no criticism is allowed by anyone in the team which reflect negative comments, all emerging ideas are encouraged, i.e., the wider the idea the better, combinations and improvements of ideas are encouraged; that is ideas of others can still be used to generate another new idea. Moreover, the brainstorming session should be fun, with no one dominating or inhibiting the discussion.

Organizational Environment, Management Support and Resources: All teams work within an organizational environment, especially the internal environment. Traditional management structures and organizational cultures and sub-cultures may impose certain constraints or provide opportunities on the team operations. Participatory styles of management, devolved decision making or delegation of authority, reduced hierarchies and employee initiatives schemes are features of structures that are associated with environmental excellence.

Organizational support and resources are needed to ensure team success. Such support encompasses many aspects, including offering work time or release time for members to work on teams, holding immediate supervisors accountable for the active participation of their direct reports, identifying sponsors from the upper management ranks who are committed to teams, communicating in the same languages and providing budgetary and other support to the teams.

4. Team Leaders

Teamwork in companies is usually structured. Teams normally have a leader. The team leader should be given special care and attention by management. Similarly, the selection and training of team leaders are essential to ensure the success of the team in accomplishing its objectives and goals.

The leaders have a vital role in the groups and a deliberate attempt should be made to identify skilled and committed leaders to train them in group leadership skills and to acknowledge and reward them for their commitment. Team leaders should provide a clear direction that every member understands clearly about why the team exists or what their individual roles are.

A team leader functions as a general manager.

She or he acts to clarify purpose and goals, builds commitment and self-confidence, strengthens the team's collective skills and approach, removes externally imposed obstacles, and creates opportunities for others. Like all members of the team, team leaders plan their work carefully and know or discover when their actions can hinder the team. Team performance almost always depends on how well a team leader strikes a critical balance between doing things himself or herself and letting other people do them. Team leaders genuinely believe that they do not have all the answers and cannot succeed without the combined contributions of all the other members of the team to a common end and so they avoid any actions that might constraint inputs by anyone on the team. Team performance is not possible if the leader grabs all the best opportunities, assignments, and takes credits for himself or herself.

Vaill (2004) found that three characteristics always present in the behavior and attitudes of leaders. He calls them time, feeling, and focus. First, leaders devote extraordinary amount of time to the task. They work at home, in the office, in taxi-caps and anywhere. They fully commit themselves for the duration of the project. Second, they have very strong feelings about the attainment of the goal. They care deeply about the team's purpose, structure, history, future, and the people in it. Third, they focus on key issues; they have a clear list of priorities in mind. Hence, in a strong team, time, feeling, and focus are always present.

However, there are two critical things that effective team leaders never do: they do not blame or allow specific individuals to fail, and they never make any excuses for any shortfalls in the team performance.

5. Team Failure

Not all teams produce high performing results. In some cases, teams may be in trouble. The

following contributory factors are the main causes for team failure:

- The team does not know their goals clearly, what need to be done and therefore will not be fully committed to them. Many teams never know what their purpose is, hence, they never achieve their goals.
- Most teams are so driven by pressure to meet the assignment deadlines and get on with performing the tasks as quickly as possible, even to the extent of deliberately ignoring the team dynamics and relationship issues. Team members often are more concerned with getting the tasks done than with doing it right.
- Failures in projects or activities often can be traced to the inability of a team to make the right decisions or perform the right tasks. These failures often stem from the maladies that teams suffer, such as internal conflict, member anxiety and frustration; time wasted on irrelevant issues; and decisions made haphazardly by senior people, by coalitions, or by default.
- In projects with multiple teams, each one might have different attitudes, orientation, and goals. Some teams might be physically isolated and maintain separate offices, creating and reinforcing separate boundaries. Teams might develop an “us versus them” attitude leading to intergroup competition, resentment, and conflict (Nicholas, 2002). Some team members may gain a sense of power by dominating others or blocking others’ attempts to get things done. These roles often hamper team performance and cohesiveness.
- Team meetings frequently become a forum to play games, a chance to assert individual superiority and put other people down.
- Katzenbach and Smith (1993) described that there are three primary sources for

the reluctance about teams (1) lack of conviction that team or teams can work better than the alternatives; (2) personal styles, capabilities and preferences that can make teams risky or uncomfortable; and (3) weak organizational performance ethics that discourage the conditions in which teams flourish.

- Confusion about the team’s authority, complexity of the team leader’s role.
- Difficulty in communicating with key stakeholders.
- Lack of rewards and recognition, troublesome interpersonal dynamics among members, lack of “credits” for team participation on performance appraisal.
- Unwieldy size of team.
- Lack of management support.
- Teamwork conflict. There are two kinds of conflicts including relationship and task conflict. Jehn (1997) found that, while relationship conflicts based on personality clashes and interpersonal dislikes are detrimental to group functioning, task conflicts based on disagreements regarding the specific task content are beneficial in many situations.

6. Conclusion

One can conclude that standard team building tools can be used to enhance collaboration, trust in a team, productivity, profitability and quality of management. As with all team buildings, there is no quick fix for teams. Although specific terms and definitions vary somewhat, the factors most frequently mentioned for building an effective team include the following: team climate, regular team communications, action learning and personal growth of team members through structured team building interventions to create shared understanding and mutual trust, continuing to be focus-oriented and place priority on team building, clear goals and objectives which are understood

by all members; participative leadership where members are encouraged to share leadership functions; effective communication with a high level of trust, honesty and respect for others; willingness to deal with conflict and comfortable with challenges and disagreements; and good coordination.

A wise team leader will recognize this and use a variety of processes and techniques to enhance team development over time.

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Growth of Education in Cambodia - A Study

In Viracheat¹

ABSTRACT

For the development of an economy, there is a need for significant growth in both school and higher education. The present paper examines the growth of school and higher education in Cambodia over the period 1999-2000 to 2008-2009. On the basis of the availability of data, several indicators of educational development were taken into account and the average annual compound growth rate was calculated to understand the growth of education over the study period. The study found that, over the period 1999-2000 to 2008-2009, tremendous growth had taken place in both school as well as higher education in the country. During the period under study, the Cambodian education in general and higher education in particular has made significant progress.

Key Words: : Growth, School Education, Higher Education

1. Introduction

Today, knowledge is widely considered as the key driving force. Emergence of knowledge as driving factor results in both challenges and opportunities as the benefits of globalization accrue to the countries having highly skilled human capital. The global competitiveness of an economy as well as its potentiality to generate employment is dependent on the availability of skilled and trained manpower. It is therefore in the global knowledge-based economy, education in general and higher education in particular plays a very critical role as it is considered an investment with economic return both for individuals as well as society. Thus, education has universally been regarded as an important contributing factor in the creation of human capital. It contributes to the socio-economic development by endowing individuals with the means to improving their knowledge, skills and

capability for productive work. Education further contributes to the household economy by changing the value perception of human beings. For the overall development of a less developed economy, significant growth in school and higher education is very much necessary.

Cambodia is one of the least developed countries of the world. It has had a turbulent past, which has included many dramatic transitions. Several of these transitions have implications on education, including its finance. In Cambodia, household and community financing of education has long roots but different eras have brought various emphases. Household and community resources were major inputs during both the colonial and initial post-colonial eras. During 1960s, government budgets supported education much more fully than was the case in the 1990s. The Pol Pot regime of 1975-79

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brought household and community financing of education practically to a stop; but activities were revived during 1980s, and took a new directions from the early 1990s (Bray, 1999). Since the early 1990s, Cambodia has received considerable resources from international aid. These external resources have been especially important to Cambodia for the growth of its economy more specifically, for the growth of the education sector as Government of Cambodia does not have enough budgets for developmental activities in the country.

Considering the importance of education and Cambodia's economic situation, the present study has made an attempt to examine the growth of education in Cambodia over a period of time.

2. Objectives

- i. To analyze the growth of school education in the country.
- ii. To analyze the growth of higher education in the country.

3. Methodology

The analysis on the growth of school and higher education in Cambodia has been carried out through both descriptive and quantitative analysis on the basis of relevant secondary data collected for the purpose. Secondary data relating to several indicators of educational development of the Kingdom of Cambodia, such as number of institutions, total enrollment, gross enrollment ratio, number of teachers and pupil-teacher ratio at different types and levels of education over the period 1999-2000 to 2008-2009 have been collected from both published and unpublished sources, such as Cambodia Inter-Censal Population Survey 2004, Population Projections for Cambodia 1998-2020, Analysis of the Census Results – Literacy and Educational Attainment, and Statistical Yearbook 2008. Besides, the other sources of secondary data are the Ministry of Education, Youth and Sports, Royal Government

of Cambodia, Asian Development Bank, United Nations Children's Fund (UNICEF) and World Bank.

To assess the growth of education in Cambodia in terms of number of institutions, number of enrollment, number of teachers, gross enrolment ratio, pupil-teacher ratio, etc. the following model has been used:

$$y = ab^t$$

Where,

y = The variable for which the growth rate of education/higher education is estimated;

t = Time period under study; and

a and b = constants, where,

b = $1 + r$, and r = the rate of growth of the concerned variable under study.

4. Data Analysis

The paper is divided into two sections. The first section has discussed the growth of school education in the country over the period of study. In the second section, the growth of higher education in the country in general and at provincial level in particular has been analyzed.

4.1 Growth of School Education

In the present section, to analyze the growth of school education over the period under study, different types and levels of school education, such as pre-school, primary school, college, lycee as well as lower secondary and upper secondary levels are taken into account. In the Kingdom, pre-school refers to schools for children aged 3-5 years old, whereas primary school refers to schools that are providing at least one grade of primary education - one to six. College, commonly known as Junior high school, refers to lower secondary schools with grades seven through nine. However, in the country some lower secondary schools do not have all the three grades. Lycee, commonly known as Senior high school, refers to upper secondary

schools with grades 10 through 12. However, it is also found that some lycee schools have lower secondary grades. Thus, the total number of schools in the Kingdom arrives at considering the pre-schools, primary schools, colleges and lycees in a particular year.

In order to analyze the growth of school education in the country over the period under study, based on the selected indicators, the present section is divided into five sub-sections. The first sub-section discusses the growth of institutions at different types and levels of education over the study period, whereas, in the second sub-section the growth of enrollment is considered. The third, fourth and fifth sub-sections analyze the growth of teaching staff, gross enrollment ratio and pupil teacher ratio respectively by different types and levels of school education.

4.1.1 Growth of Institutions

Table 1 shows the growth of institutions by different types and levels in the country over the period 1999-2000 to 2008-09. In all cases (pre-school, primary school, college, lycee, lower secondary and upper secondary level), the number of institutions in the country had gone up from year to year basis. In the year 1999-2000, while the number of pre-schools in the country was 874, it had increased to 1,798 in the year 2008-09, indicating thereby an average annual compound growth rate of 8.41 per cent. Contrary to that, though the number of primary schools had risen up from 5,274 in 1999-2000 to 6,565 in 2008-09, but the average annual compound growth rate was found to be 2.37 per cent, lower than the growth rate of the pre-school. In comparing the growth

rates between the college and lycee, it is revealed from the table that, for college the average annual compound growth rate was 14.87 per cent, much higher than the average annual compound growth rate of lycee which was 10.97 per cent. Similarly, at the lower secondary level the average annual compound growth rate was 13.81 per cent which was higher than 10.97 per cent being the average annual compound growth rate of upper secondary level.

In total, in the Kingdom of Cambodia it is found that there had been a continuous increase of the number of educational institutions at school level over the period 1999-2000 to 2008-09 (Figure 1). As revealed in Table 1, the total number of schools was 6,651 in 1999-2000 which rose to 9,834 in 2008-09, representing thereby an average annual compound growth rate of 4.44 per cent. Thus, except the primary school level, in all other cases, the average annual compound growth rate was found to be higher than the case of total, i.e., 4.44 per cent.

4.1.2 Growth of Enrollment

The growth of enrollment by different types and levels of school education in the country over the study period is presented in Table 2. It is revealed from the table that though the total enrollment had increased from 2,603,826 in 1999-2000 to 3,251,000 in 2008-09, but since the year 2005-06 the absolute number of total enrollment had started to fall on year to year basis (Figure 2). This is largely due to the fall of absolute enrollment at the primary school level during that period. However, in total, the average annual compound growth rate of enrollment was 2.02 per cent.

**Table 1: Growth of Institutions by Type and Level in Cambodia
(1999-2000 to 2008-2009)**

Sl. No.	Year	Schools - Type and Level						Total
		Pre-School	Primary School	College (Grade 7-9)	Lycee	Lower Secondary	Upper Secondary	
1	1999-2000	874	5,274	363	140	497	140	6,651
2	2000-01	915	5,468	367	151	511	151	6,901
3	2001-02	1,015	5,741	379	163	534	163	7,298
4	2002-03	1,145	5,915	411	183	586	183	7,654
5	2003-04	1,238	6,063	486	212	688	212	7,999
6	2004-05	1,345	6,180	578	232	800	232	8,335
7	2005-06	1,429	6,277	670	252	911	252	8,628
8	2006-07	1,524	6,365	846	283	1,112	283	9,018
9	2007-08	1,634	6,476	1,006	315	1,303	315	9,431
10	2008-09	1,798	6,565	1,122	349	1,451	349	9,834
Average Annual Compound Growth Rate (Per Cent)		8.41	2.37	14.87	10.97	13.81	10.97	4.44

Note: i. Pre-school refers to schools for children aged 3-5 years old.

ii. Primary school refers to schools that are providing at least one grade of primary education 1 to 6.

iii. College/Junior high school refers to lower secondary schools with grades 7 through 9. However, some lower secondary schools may not have all three grades.

iv. Lycee/Senior high school refers to upper secondary schools with grades 10 through 12. However, some lycee schools have lower secondary grades.

v. Lower secondary level relates to all colleges and lycee schools with lower secondary level.

vi. Total number of schools = (Pre-school + Primary school + College + Lycee).

Source: i. Education Statistics and Indicators, 1999-2000 to 2008-09, Ministry of Education, Youth and Sports, Royal Government of Cambodia.

ii. Own Computation.

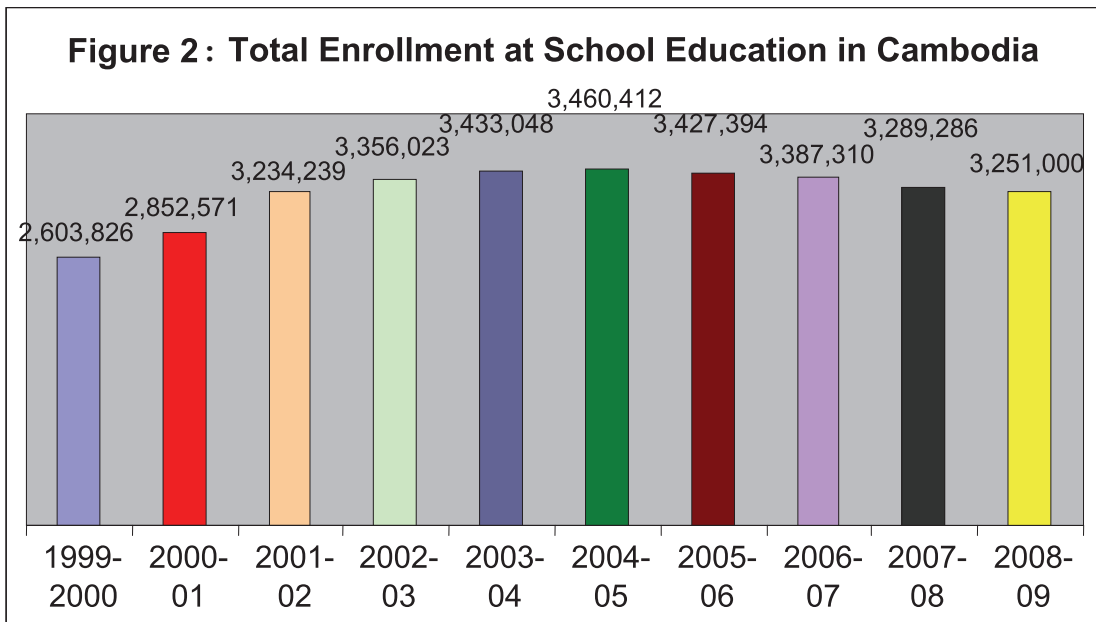
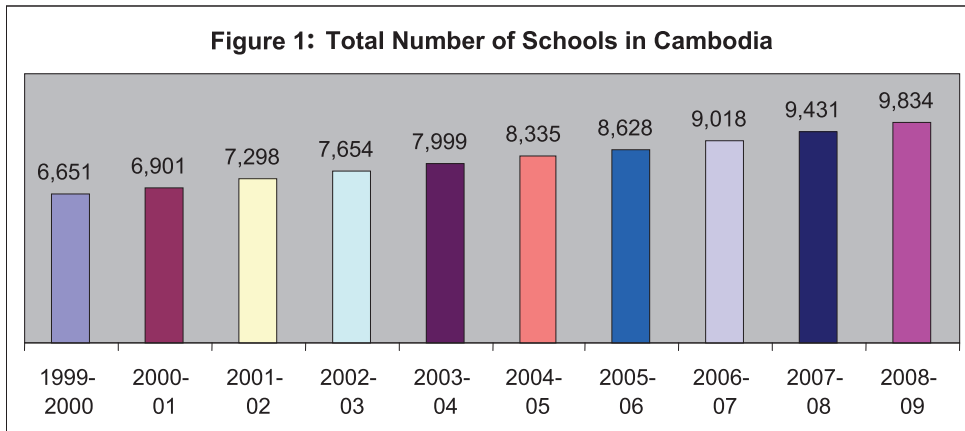


Table 2: Growth of Enrollment by Type and Educational Level in Cambodia

(1999-2000 to 2008-2009)							
Sl. No.	Year	Enrollment - Type and Level					Total
		Pre-School	Primary School	College (Grade 7-9)	Lycee	Lower Secondary	Upper Secondary
1	1999-2000	50,597	2,211,738	129,441	212,050	233,278	108,213
2	2000-01	55,798	2,408,109	154,171	234,493	283,578	105,086
3	2001-02	63,747	2,705,453	188,820	276,219	351,635	113,404
4	2002-03	64,727	2,747,411	214,236	329,649	415,703	128,182
5	2003-04	72,224	2,747,080	229,225	384,519	459,986	153,758
6	2004-05	72,214	2,682,129	271,245	434,824	528,940	177,129
7	2005-06	75,669	2,558,467	310,176	483,082	588,333	204,925
8	2006-07	77,899	2,461,135	340,756	507,520	626,005	222,271
9	2007-08	79,585	2,311,107	354,479	544,115	637,629	260,965
10	2008-09	90,036	2,262,834	345,030	553,100	605,707	292,423
Average Annual Compound Growth Rate (Per Cent)		5.70	-0.48	12.12	12.09	11.75	13.04
							2.02

Note: i. As mentioned in Table 1.

ii. Total enrollment includes enrollment of pre-school, primary school, college and lycee.

Source: i. Education Statistics and Indicators, 1999-2000 to 2008-09, Ministry of Education, Youth and Sports, Royal Government of Cambodia.

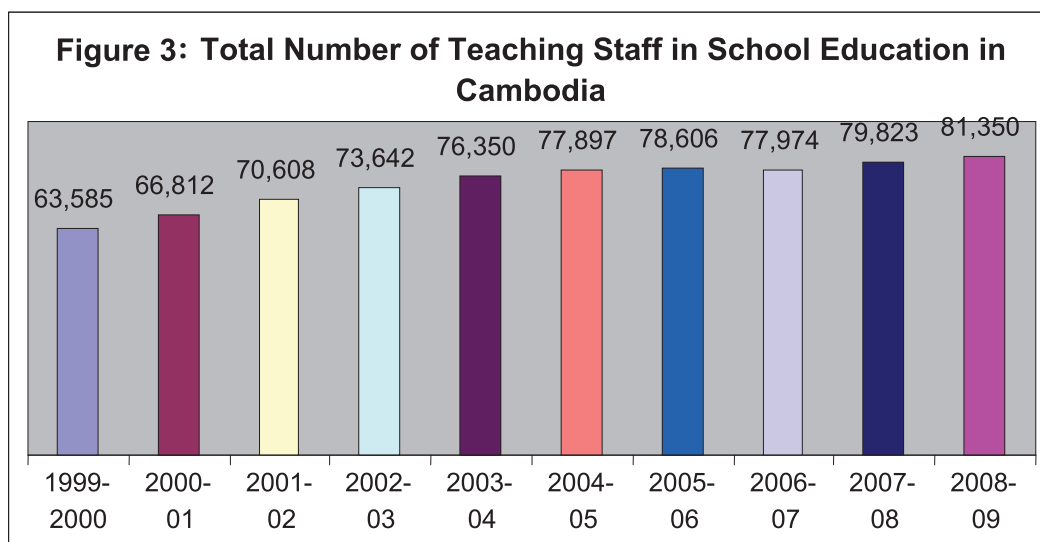
ii. Own Computation.

The enrollment at pre-school level had increased on year to year basis with an exception of 2004-05 as compared to the previous year 2003-04. In 1999-2000, the pre-school enrollment was 50,597 which rose to 90,036 in the year 2008-09, representing thereby an average annual compound growth rate of 5.70 per cent. The enrollment at primary school level since the year 2003-04 had started to fall continuously and reached at 2,262,834 in the year 2008-09. However, taking absolutely the enrollment figures of 1999-2000 and 2008-09, it is seen that at primary level a small increase in enrollment had taken place over the period of time. As seen in Table 2, the average annual compound growth rate at primary level was found to be -0.48 per cent. Further, as revealed from the table, the average annual compound growth rates of enrollment at college and lycee level were 12.12 per cent and 12.09 per cent respectively. It is seen that in both the levels of education, the enrollment since the year 1999-2000 over the period of study, i.e., up to 2008-09 had increased continuously. Considering the case of lower secondary level education, except the year 2008-09, in all the years under study there had been a continuous increase in the number of enrollment. In the year 1999-2000, while the number of enrollment was 233,278, it had reached to 605,707 in the year

2008-09 and as such the average annual compound growth rate was found to be 11.75 per cent. At the upper secondary level education, except the year 2000-01 as compared to before, in all the years under study there had been a continuous increase in the number of enrollment. Comparing to all the levels of education, it is revealed that the average annual compound growth rate of upper secondary level was the highest, i.e., 13.04 per cent.

4.1.3 Growth of Teaching Staff

The growth of teaching staff by different types and levels of school education in Cambodia over the period 1999-2000 to 2008-09 is presented in Table 3. It is revealed from the table that the total number of teaching staff at all levels was 63,585 in 1999-2000 which had increased to 81,350 in 2008-09. The total number of teaching staff had increased continuously over the study period, only with an exception of the year 2006-07 (Figure 3). As compared to 2005-06, in the year 2006-07 there was a fall in the number of teaching staff. This fall in the total teaching staff in the year 2006-07 was the result of a sudden fall in the teaching staff at primary level in that year. However, as revealed, the average annual compound growth rate of teaching staff was 2.56 per cent considering the period under study.



**Table 3: Growth of Teaching Staff by Type and Educational Level in Cambodia
(1999-2000 to 2008-2009)**

Sl. No.	Year	Teaching Staff - Type and Level						Total
		Pre-School	Primary School	College (Grade 7-9)	Lycee	Lower Secondary	Upper Secondary	
1	1999-2000	1,925	43,751	7,959	9,950	13,969	3,940	63,585
2	2000-01	1,992	45,152	8,348	11,320	15,518	4,150	66,812
3	2001-02	2,148	47,654	8,625	12,181	16,405	4,401	70,608
4	2002-03	2,379	48,433	9,132	13,698	17,423	5,407	73,642
5	2003-04	2,528	49,603	9,404	14,815	18,589	5,630	76,350
6	2004-05	2,650	50,140	9,799	15,308	19,082	6,025	77,897
7	2005-06	2,708	50,378	9,860	15,660	18,579	6,941	78,606
8	2006-07	2,810	47,991	10,782	16,391	20,485	6,688	77,974
9	2007-08	2,960	46,921	12,577	17,365	23,158	6,784	79,823
10	2008-09	3,092	45,511	14,022	18,725	23,576	9,171	81,350
Average Annual Compound Growth Rate (Per Cent)		5.49	0.48	5.83	6.64	5.51	8.82	2.56

Note: i. As mentioned in Table 1.

ii. Total number of teaching staff includes teaching staff in pre-school, primary school, college and lycee.

Source: i. Education Statistics and Indicators, 1999-2000 to 2008-09, Ministry of Education, Youth and Sports, Royal Government of Cambodia.

ii. Own Computation.

Taking into account the pre-school level of education, it is found that there had been a continuous increase in the number of teaching staff on year to year basis. In the year 2008-09, the number of teaching staff had reached at 3,092 which was 1,925 in the year 1999-2000. Thus the average annual compound growth rate was found to be 5.49 per cent. At the primary level of education, since the year 2006-07, the number of teaching staff had started to fall which reached at 45,511 in 2008-09 as compared to 50,378 in 2005-06. However, for the period from 1999-2000 to 2005-06, there had been a continuous increase in the number of teaching staff at primary level of education in the country. Therefore, as compared to the pre-school level education, the average annual compound growth rate of teaching staff at primary level of education was found to be much less, i.e., 0.48 per cent. At both college and lycee level of education, the number of teaching staff had increased on year to year basis over the period under study. The average annual compound growth rate at college level was found to be 5.38 per cent, whereas it was 6.64 per cent at lycee

level. At the lower secondary level education, except in 2005-06, in all the other years there had been a continuous increase in the teaching staff on year to year basis. In the year 2008-09, the number of teaching staff had risen up to 23,576 from 13,969 of 1999-2000, and the average annual compound growth rate was found to be 5.51 per cent. Considering the upper secondary level of education, the number of teaching staff was 3,940 which rose up to 9,171 representing thereby an average annual compound growth rate of 8.82 per cent. Further, except the year 2006-07, in all the other years there had been a continuous increase in the number of teaching staff at upper secondary level of education.

4.1.4 Growth of Gross Enrollment Ratio

The growth of gross enrollment ratio at different types and levels of school education, such as primary, lower secondary and upper secondary is presented in Table 4. The gross enrollment ratio at different levels of school education is calculated by dividing the total enrollment of that educational level with population of that specific age-group.

**Table 4: Gross Enrollment Ratio by Type and Educational Level in Cambodia
(1999-2000 to 2008-2009)**

Sl. No.	Year	Gross Enrollment Ratio - Type and Level		
		Primary	Lower Secondary	Upper Secondary
1	1999-2000	100.3	22.9	11.6
2	2000-01	109.8	27.0	10.9
3	2001-02	125.1	32.7	11.5
4	2002-03	118.0	36.5	11.9
5	2003-04	119.9	39.3	13.9
6	2004-05	119.7	45.8	15.6
7	2005-06	124.0	55.3	19.3
8	2006-07	122.7	60.0	21.2

9	2007-08	121.9	63.6	25.7
10	2008-09	120.2	61.6	28.2
Average Annual Compound Growth Rate (Per Cent)		1.47	12.43	11.95

Note: As mentioned in Table 1.

Source: i. Education Statistics and Indicators, 1999-2000 to 2008-09, Ministry of Education, Youth and Sports, Royal Government of Cambodia.
ii. Own Computation.

At primary level of education, the gross enrollment ratio in 2008-09 was 120.2 which was higher than 100.3 of the year 1999-2000, but was less than the gross enrollment ratios of years 2001-02, 2005-06, 2006-07 and 2007-08. The average annual compound growth rate of gross enrollment ratio of primary level of education was 1.47 per cent which was much lower than the growth rates of lower secondary and upper secondary level of education. In case of lower secondary level education, there had been a continuous increase of gross enrollment ratio up to the year 2007-08 from the year 1999-2000. However, the gross enrollment ratio had fallen to 61.6 in 2008-09 from 63.6 in 2007-08. The average annual compound growth rate of gross enrollment ratio of lower secondary level education was 12.43 per cent which was higher than both primary and upper secondary level of education. Considering the upper secondary level of education it is revealed that since the year 2001-02 there had been a continuous increase in the gross enrollment ratio up to the year 2008-09. In the year 2000-01, there was a fall in the gross enrollment ratio as compared to the previous year. The average annual compound growth rate of gross enrollment ratio was found to be 11.95 per

cent for upper secondary level of education in the country.

4.1.5 Growth of Pupil Teacher Ratio

Table 5 reveals the growth of pupil teacher ratio at different types and levels of school education, such as pre-school, primary, college, lycee as well as lower and upper secondary level in the country over the period 1999-2000 to 2008-09. The pupil teacher ratio at each level of school education is calculated by dividing the number of enrollment with number of teachers at that level of education.

As seen in Table 5, in total, the average annual compound growth rate of pupil teacher ratio was -0.54 per cent. Since the year 2001-02, there had been a continuous fall in the pupil teacher ratio which reached at 40.0 in 2008-09 (it was 45.8 in 2001-02). The average annual compound growth rates of pupil teacher ratio at pre-school, primary, college and lycee were 0.19, -0.95, 5.92 and 5.10 respectively. Further, comparing the lower with upper secondary level education, it is found that the average annual compound growth rate of lower secondary level was 5.91 which was more than 3.87 of upper secondary level.

Table 5: Pupil Teacher Ratio by Type and Educational Level in Cambodia
(1999-2000 to 2008-2009)

Sl. No.	Year	Pupil Teacher Ratio - Type and Level						Total
		Pre-School	Primary	College (Grade 7-9)	Lycee	Lower Secondary	Upper Secondary	
1	1999-2000	26.3	50.6	16.3	21.3	16.7	27.5	41.0
2	2000-01	28.0	53.3	18.5	20.7	18.3	25.3	42.7
3	2001-02	29.7	56.8	21.9	22.7	21.4	25.8	45.8
4	2002-03	27.2	56.7	23.5	24.1	23.9	23.7	45.6
5	2003-04	28.6	55.4	24.4	26.0	24.7	27.3	45.0
6	2004-05	27.3	53.5	27.7	28.4	27.7	29.4	44.4
7	2005-06	27.9	50.8	31.5	30.8	31.7	29.5	43.6
8	2006-07	27.7	51.3	31.6	31.0	30.6	33.2	43.4
9	2007-08	26.9	49.3	28.2	31.3	27.5	38.5	41.2
10	2008-09	29.1	49.7	24.6	29.5	25.7	31.9	40.0
Average Annual Compound Growth Rate (Per Cent)		0.19	-0.95	5.92	5.10	5.91	3.87	-0.54

Note: As mentioned in Table 1.

Source: i. Education Statistics and Indicators, 1999-2000 to 2008-09, Ministry of Education, Youth and Sports, Royal Government of Cambodia.
ii. Own Computation.

4.2 Growth of Higher Education

The present section attempts to analyze the growth of higher education in the country at all levels and types over the period 1999-2000 to 2008-09. For this purpose, on the basis of availability of data, the indicators taken into account are number of University/Higher Education Institution (HEI), total enrollment, number of teachers and pupil teacher ratio. The present section is further divided into five sub-sections. The first sub-section discusses the growth of higher education in the country considering the selected indicators over the study period. In the second sub-section while province-wise growth of higher education

institutions is considered, the third, fourth and fifth sub-sections present the province-wise growth of number of enrollment, number of teachers and pupil teacher ratio over the period of study.

4.2.1 Growth of Higher Education in Cambodia

To analyze the growth of higher education in Cambodia, the indicators taken into account are number of higher education institutions, enrollment, number of teachers and pupil teacher ratio. For each of the selected indicators, the average annual compound growth rate has been calculated which is presented in Table 6.

**Table 6: Growth of Higher Education in Cambodia
(1999-2000 to 2008-09)**

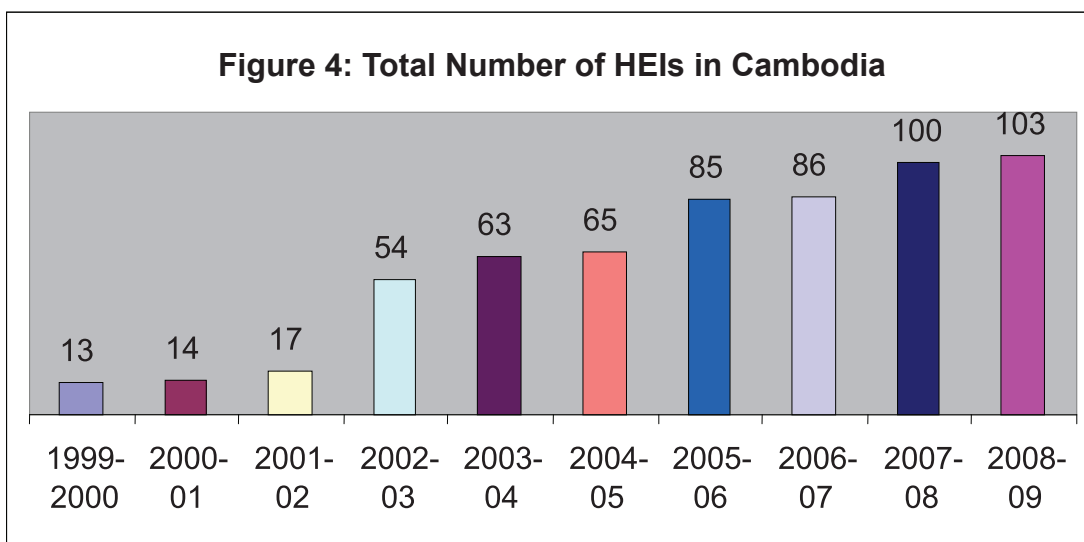
Sl. No.	Year	Number of Universities/HEIs	Number of Enrollment	Number of Teachers	Pupil Teacher Ratio
1	1999-2000	13	23,192	2,574	9.01
2	2000-01	14	31,896	2,925	10.90
3	2001-02	17	38,938	3,251	11.98
4	2002-03	54	49,575	3,661	13.54
5	2003-04	63	57,024	4,121	13.84
6	2004-05	65	70,094	4,598	15.24
7	2005-06	85	91,941	5,231	17.58
8	2006-07	86	108,620	5,930	18.32
9	2007-08	100	125,645	6,140	20.46
10	2008-09	103	137,253	6,598	20.80
Average Annual Compound Growth Rate (Per cent)		28.90	21.98	11.41	9.29

Note: Data on higher education include all types and levels of higher education in the country.

Source: i. Ministry of Education, Youth and Sports, Royal Government of Cambodia.
ii. Own Computation.

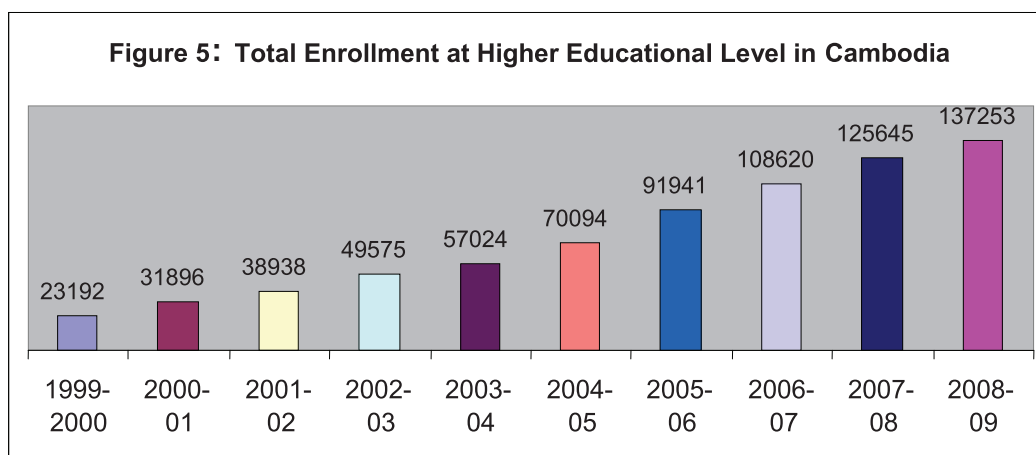
As revealed from Table 6, over the last one decade, there had been a tremendous increase in the number of higher education institutions in the country as a whole. In the year 2008-09 it had reached 103, which was only 13 in 1999-2000 (Figure 4).

Thus the rapid increase in the number of higher education institutions, particularly from 2001-02 led to an average annual compound growth rate of 28.90 per cent.



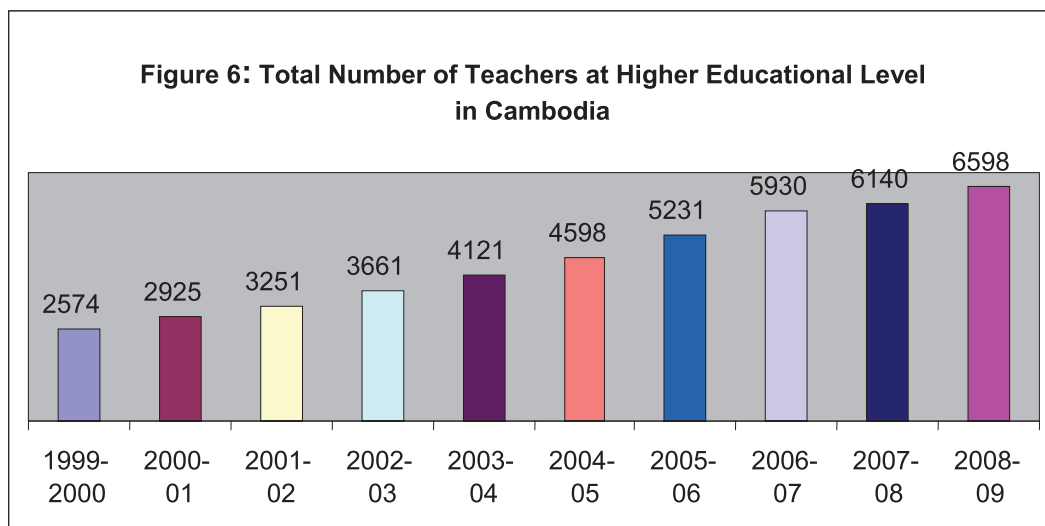
A similar growth in total enrollment at higher education level was observed during the same period, i.e., 1999-2000 to 2008-09. Corresponding to the increase in number of institutions, enrollment at all levels and types of higher education had

reached 137,253 in 2008-09 from 23,192 in 1999-2000, representing thereby an average annual compound growth rate of 21.98 per cent. The year-wise total enrollment at higher education level is shown in Figure 5.



Since the year 1999-2000 there had been a continuous increase in the number of teachers in higher education institutions in the whole Kingdom. This corresponds to the increase in number of institutions as well as total enrollment of students.

In 2008-09, the total number of teachers reached at 6,598, whereas, it was only 2,574 in 1999-2000 (Figure 6). The average annual compound growth rate of teachers at higher educational level was found to be 11.41 per cent over the study period.



As revealed over the period of study, the average annual compound growth rate of pupil teacher ratio was found to be 9.29 per cent. In certain years, such as 2002-03 and 2003-04 as well as 2007-08 and 2008-09, the ratio did not show any significant change. However, the pupil teacher ratio which was 9.01 in 1999-2000 had reached 20.80 in 2008-09.

Thus, the higher education in Cambodia had shown a tremendous growth in terms of number of institutions, total enrollment and number of teachers over the last one decade, i.e., from 1999-2000 to 2008-09.

4.2.2 Province-wise Growth of University/HEI

The province-wise growth of universities/higher education institutions over the period of study is shown in Table 7. As is revealed, near about 50 per cent of the institutions were found in the capital

city of the country during the period 2005-06 to 2008-09. However, this percentage had been fallen from near about 85 per cent in 1999-2000. Next to Phnom Penh, Battambang represents around 10 per cent of the total institutions followed by Banteay Meanchey and Siem Reap provinces each having around six per cent of total institutions. In several provinces, such as Koh Kong, Kratie and Ratanakiri only the presence of single institution was found. Similarly, in some other provinces the number of institutions over a period of last four to five years did not represent any change. These provinces are Kampong Cham, Kampot, Pursat, Siem Reap and Preah Sihanouk. Like some other provinces, in Phnom Penh the number of institutions did not show any change for the last two years, i.e., 2007-08 and 2008-09. Thus as revealed, many provinces in the country had either negligible or no presence of higher education institutions.

**Table 7: Province-wise Universities/Higher Education Institutions in Cambodia
(1999-2000 to 2008-09)**

Sl. No.	Province	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009
1	Banteay Meanchey	-	-	-	1 (1.85)	3 (4.76)	3 (4.62)	3 (3.53)	4 (4.65)	5 (5.00)	5 (4.85)
2	Battambang	1 (7.69)	2 (14.29)	1 (5.88)	3 (5.56)	3 (4.76)	4 (6.15)	7 (8.24)	7 (8.14)	10 (10.00)	10 (9.71)
3	Kampong Cham	-	-	1 (5.88)	4 (7.41)	4 (6.35)	4 (6.15)	6 (7.06)	6 (6.98)	6 (6.00)	6 (5.83)
4	Kampong Chhnang	-	-	-	-	-	-	-	-	3 (3.00)	3 (2.91)
5	Kampong Speu	-	-	-	-	-	1 (1.54)	2 (2.35)	2 (2.33)	2 (2.00)	3 (2.91)
6	Kampong Thom	-	-	-	2 (3.70)	2 (3.17)	2 (3.08)	2 (2.35)	2 (2.33)	1 (1.00)	2 (1.94)
7	Kampot	-	-	-	2 (3.70)	2 (3.17)	2 (3.08)	2 (2.35)	2 (2.33)	2 (2.00)	2 (1.94)
8	Koh Kong	-	-	-	-	-	-	-	-	1 (1.00)	1 (0.97)
9	Kratie	-	-	-	-	-	-	-	-	1 (1.00)	1 (0.97)
10	Phnom Penh	11 (84.62)	11 (78.57)	12 (70.59)	32 (59.26)	38 (60.32)	37 (56.92)	45 (52.94)	45 (52.33)	47 (47.00)	47 (45.63)
11	Prey Veng	1 (7.69)	1 (7.14)	1 (5.88)	1 (1.85)	2 (3.17)	2 (3.08)	3 (3.53)	3 (3.49)	4 (4.00)	4 (3.88)
12	Pursat	-	-	-	1 (1.85)	1 (1.59)	1 (1.54)	3 (3.53)	3 (3.49)	3 (3.00)	3 (2.91)
13	Ratanak Kiri	-	-	-	1 (1.85)	1 (1.59)	1 (1.54)	1 (1.18)	1 (1.16)	1 (1.00)	1 (0.97)
14	Siemreap	-	-	1 (5.88)	4 (7.41)	4 (6.35)	5 (7.69)	5 (5.88)	5 (5.81)	5 (5.00)	5 (4.85)
15	Preah Sihanouk	-	-	1 (5.88)	3 (5.56)	3 (4.76)	3 (4.62)	3 (3.53)	3 (3.49)	3 (3.00)	3 (2.91)
16	Stung Treng	-	-	-	-	-	-	-	-	-	1 (0.97)
17	Svay Rieng	-	-	-	-	-	-	1 (1.18)	1 (1.16)	3 (3.00)	3 (2.91)
18	Takeo	-	-	-	-	-	-	2 (2.35)	2 (2.33)	3 (3.00)	3 (2.91)
Whole Kingdom		13 (100.00)	14 (100.00)	17 (100.00)	54 (100.00)	63 (100.00)	65 (100.00)	85 (100.00)	86 (100.00)	100 (100.00)	103 (100.00)

Note:

- Some provinces, such as Kandal, Kep, Mondulakiri, Otdar Meanchey, Pailin and Preah Vihear do not have any University/HEI and therefore not given in the list.
- The number of University/HEI includes all types and levels of higher education institutions.
- '-' represents non-existence of University/HEI in that particular year.
- Figures in the parentheses represent percentage to total of the given year.

Source:

- Ministry of Education, Youth and Sports, Royal Government of Cambodia.
- Own Computation.

4.2.3 Province-wise Growth of Enrollment in Higher Education

Total enrollment at higher educational institutions for all types and levels over the study period, i.e., 1999-2000 to 2008-09 for all provinces is presented in Table 8. Similar to the number of institutions, highest percentage of enrollment had been reported in Phnom Penh over all the years under the study. As found out, around 85 per cent of the total enrollment in 2008-09 had been reported in Phnom Penh, which was around 80 per cent and 79 per cent in the years 2006-07 and 2007-08 respectively. Over the period of study, as higher educational institutions had been established in several provinces, the percentage of enrollment to total in Phnom Penh had fallen from around 98 per cent in 1999-2000 to around 85 per cent in 2008-09. Next to Phnom Penh, in 2008-09, around 6 per cent enrollment to total had been reported in Siem Reap province followed by around 5 per cent in Battambang province. The lowest percentage of enrollment in 2008-09 was found in Kampong Chhnang province (0.11 per cent). Several provinces, such as Kampong Chhnang, Koh Kong, Kratie, Ratanakiri, Kampong Speu, Kampong Thom and Kampot had been reported to have less than one per cent of the total enrollment in 2008-09. Further, irrespective of the years of enrollment, several provinces, such as Kampong Chhnang, Kampong Speu, Kampong Thom, Kampot (except 2002-03), Koh Kong, Kratie, Pursat (except 2008-09) and Ratanakiri had reported less than one per cent of total enrollment. Thus, while Phnom Penh had attracted the highest number of enrollment over the study period, wide disparities was found among the provinces so far enrollment at higher educational level is concerned.

4.2.4 Province-wise Growth of Teachers in Higher Education

The province-wise growth of teachers in higher education at all types and levels over the period 1999-2000 to 2008-09 is presented in Table 9. The total number of teachers year to year basis had increased which reached 6,598 in 2008-09 as compared to 2,574 in 1999-2000. Further, compared to the previous year, i.e., 2007-08, there had been an increase of 7.5 per cent in number of teachers in total in 2008-09. As seen in the table, in all the years under study, the number of teachers in Phnom Penh to total number of teachers in the country was more than 70 per cent. In 1999-2000, it was around 99 per cent which had fallen to around 78 per cent in 2008-09. In both the years, i.e., 2007-08 and 2008-09, next to Phnom Penh, Banteay Meanchey represented the second highest percentage of teachers to total followed by Siem Reap. Several provinces, such as Kampong Chhnang, Kampong Thom, Koh Kong, Ratanakiri and Svay Rieng had reported to have less than one per cent of teachers to total in 2008-09. Further, except Svay Rieng province, in all the other cases, such as Kampong Chhnang, Kampong Thom, Koh Kong and Ratanakiri the number of teachers to total number of teachers in the country was less than one per cent for all the years irrespective of the years of introduction of higher education in those provinces. Thus as revealed from Table 9, wide variations in the number of teachers were found among the provinces over the period of study, which led to inter-province differences in the growth of higher education in the country.

**Table 8: Province-wise Growth of Enrollment in Higher Education
(1999-2000 to 2008-09)**

Sl No.	Province	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009
1	Banteay Meanchey	-	-	-	-	119 (0.21)	672 (0.96)	1387 (1.51)	1465 (1.35)	2124 (1.69)	3262 (2.38)
2	Battambang	-	604 (1.89)	376 (0.97)	1068 (2.15)	1803 (3.16)	2900 (4.14)	3628 (3.95)	4878 (4.49)	5722 (4.55)	7426 (5.41)
3	Kampong Cham	-	-	390 (1.00)	645 (1.30)	1056 (1.85)	954 (1.36)	2147 (2.34)	2309 (2.13)	2878 (2.29)	3292 (2.40)
4	Kampong Chhnang	-	-	-	-	-	-	-	-	102 (0.08)	157 (0.11)
5	Kampong Speu	-	-	-	-	-	479 (0.68)	586 (0.64)	274 (0.25)	491 (0.39)	656 (0.48)
6	Kampong Thom	-	-	-	123 (0.25)	134 (0.23)	206 (0.29)	299 (0.33)	366 (0.34)	499 (0.40)	870 (0.63)
7	Kampot	-	-	-	520 (1.05)	499 (0.88)	591 (0.84)	553 (0.60)	740 (0.68)	265 (0.21)	602 (0.44)
8	Koh Kong	-	-	-	-	-	-	-	-	154 (0.12)	213 (0.16)
9	Kratie	-	-	-	-	-	-	-	-	141 (0.11)	201 (0.15)
10	Phnom Penh	22718 (97.96)	30755 (96.42)	37081 (95.23)	44078 (88.91)	49325 (86.50)	58584 (83.58)	74927 (81.49)	87371 (80.44)	99131 (78.90)	116854 (85.14)
11	Prey Veng	474 (2.04)	537 (1.68)	761 (1.95)	1055 (2.13)	1235 (2.17)	1675 (2.39)	1417 (1.54)	1670 (1.54)	2080 (1.66)	2157 (1.57)
12	Pursat	-	-	-	286 (0.58)	390 (0.68)	358 (0.51)	726 (0.79)	540 (0.50)	924 (0.74)	1417 (1.03)
13	Ratanak Kiri	-	-	-	46 (0.09)	63 (0.11)	117 (0.17)	290 (0.32)	233 (0.21)	302 (0.24)	277 (0.20)
14	Siemreap	-	-	88 (0.23)	1192 (2.40)	1714 (3.01)	2399 (3.42)	3001 (3.26)	4620 (4.25)	5793 (4.61)	7686 (5.60)
15	Preah Shanouk	-	-	242 (0.62)	562 (1.13)	686 (1.20)	1159 (1.65)	959 (1.04)	1386 (1.28)	1971 (1.57)	2275 (1.66)
16	Svay Rieng	-	-	-	-	-	-	1012 (1.10)	1376 (1.27)	1910 (1.52)	2201 (1.60)
17	Takeo	-	-	-	-	-	-	1009 (1.10)	1392 (1.28)	1158 (0.92)	4386 (3.20)
Whole Kingdom		23192 (100.00)	31896 (100.00)	38938 (100.00)	49575 (100.00)	57024 (100.00)	70094 (100.00)	91941 (100.00)	108620 (100.00)	125645 (100.00)	137253 (100.00)

Note: i. Province-wise enrollment in higher education represents total enrollment of different types and levels of enrollment in higher education.

ii. Figures in the parentheses represent percentage to total of the given year.

Source: i. Ministry of Education, Youth and Sports, Royal Government of Cambodia.

ii. Own Computation.

**Table 9: Province-wise Growth of Teachers in Higher Education
(1999-2000 to 2008-09)**

Sl. No.	Province	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009
1	Banteay Meanchey	-	-	-	-	27 (0.66)	63 (1.37)	74 (1.41)	90 (1.52)	154 (2.51)	220 (3.33)
2	Battambang	-	61 (2.09)	67 (2.06)	86 (2.35)	118 (2.86)	182 (3.96)	225 (4.30)	220 (3.71)	353 (5.75)	523 (7.93)
3	Kampong Cham	-	-	79 (2.43)	113 (3.09)	208 (5.05)	212 (4.61)	273 (5.22)	267 (4.50)	198 (3.22)	358 (5.43)
4	Kampong Chhnang	-	-	-	-	-	-	-	-	21 (0.34)	45 (0.68)
5	Kampong Speu	-	-	-	-	-	40 (0.87)	86 (1.64)	90 (1.52)	51 (0.83)	
6	Kampong Thom	-	-	-	-	16 (0.39)	26 (0.57)	28 (0.54)	12 (0.20)	41 (0.67)	62 (0.94)
7	Kampot	-	-	-	-	38 (0.92)	54 (1.17)	53 (1.01)	37 (0.62)	59 (0.96)	111 (1.68)
8	Koh Kong	-	-	-	-	-	-	-	-	26 (0.42)	32 (0.48)
9	Kratie	-	-	-	-	-	-	-	-	16 (0.26)	67 (1.02)
10	Phnom Penh	2545 (98.87)	2831 (96.79)	3016 (92.77)	3259 (89.02)	3468 (84.15)	3693 (80.32)	3931 (75.15)	4561 (76.91)	4375 (71.25)	5114 (77.51)
11	Prey Veng	29 (1.13)	33 (1.13)	35 (1.08)	48 (1.31)	56 (1.36)	79 (1.72)	123 (2.35)	107 (1.80)	112 (1.82)	136 (2.06)
12	Pursat	-	-	-	26 (0.71)	30 (0.73)	31 (0.67)	72 (1.38)	53 (0.89)	115 (1.87)	232 (3.52)
13	Ratanak Kiri	-	-	-	8 (0.22)	8 (0.19)	9 (0.20)	11 (0.21)	18 (0.30)	14 (0.23)	18 (0.27)
14	Siemreap	-	-	25 (0.77)	69 (1.88)	88 (2.14)	131 (2.85)	155 (2.96)	227 (3.83)	240 (3.91)	363 (5.50)
15	Preah Sihanouk	-	-	29 (0.89)	52 (1.42)	64 (1.55)	78 (1.70)	81 (1.55)	104 (1.75)	125 (2.04)	215 (3.26)
16	Svay Rieng	-	-	-	-	-	-	21 (0.40)	34 (0.57)	79 (1.29)	47 (0.71)
17	Takeo	-	-	-	-	-	-	98 (1.87)	110 (1.85)	161 (2.62)	201 (3.05)
Whole Kingdom		2574 (100.00)	2925 (100.00)	3251 (100.00)	3661 (100.00)	4121 (100.00)	4598 (100.00)	5231 (100.00)	5930 (100.00)	6140 (100.00)	6598 (100.00)

Note: i. Province-wise teachers in higher education include teachers in all types and levels of higher education.

ii. Figures in the parentheses represent percentage to total of the given year.

iii. Data on number of teachers in Kampong Speu province was not available in 2008-09.

Source: i. Ministry of Education, Youth and Sports, Royal Government of Cambodia.

ii. Own Computation.

4.2.5 Province-wise Growth of Pupil-Teacher Ratio in Higher Education

As revealed from Table 10, there had been a continuous increase in the pupil teacher ratio in the whole country over the period of study, which finally reached to 20.80 in the year 2008-09 from 9.01 in 1999-2000. Further, as seen in table, in case of Svay Rieng province the ratio was the highest from the period 2005-06 which reached 46.83 in 2008-09. Pupil teacher ratio was the lowest (3.00) in case of Kratie province in 2008-09. Next to Kratie, Kampong Chhnang had represented lowest ratio (3.49) in the same year. Except Phnom Penh, Siem Reap, Svay Rieng and Takeo provinces, in all other cases the pupil teacher ratio was found to be less than the national figure, i.e., 20.80 in 2008-09. In case of Phnom Penh, the ratio which was 8.93 in 1999-2000 had increased to 22.85 in 2008-09. However, comparing the years 2007-08 and 2008-09, in case of Phnom Penh the ratio did not show any significant difference. Thus wide differences were found in pupil teacher ratio at higher education among the provinces in the country.

5. Conclusion

The analysis carried out in this study throws significant light on the growth of school and higher

education in Cambodia. In the country, over the period under study, tremendous growth had taken place in both school as well as higher education in the country. The inter-province analysis had shown disparities in the development of higher education in the country over the study period. Thus to conclude, it can be said that the Cambodian education in general and higher education in particular has made significant progress during 1999-2000 to 2008-2009.

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**Table 10: Province-wise Growth of Pupil Teacher Ratio in Higher Education
(1999-2000 to 2008-09)**

Sl. No.	Province	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009
1	Banteay Meanchey	-	-	-	-	4.41	10.67	18.74	16.28	13.79	14.83
2	Battambang	-	9.90	5.61	12.42	15.28	15.93	16.12	22.17	16.21	14.20
3	Kampong Cham	-	-	4.94	5.71	5.08	4.50	7.86	8.65	14.54	9.20
4	Kampong Chhnang	-	-	-	-	-	-	-	-	4.86	3.49
5	Kampong Speu	-	-	-	-	-	11.98	6.81	3.04	9.63	-
6	Kampong Thom	-	-	-	-	8.38	7.92	10.68	30.50	12.17	14.03
7	Kampot	-	-	-	-	13.13	10.94	10.43	20.00	4.49	5.42
8	Koh Kong	-	-	-	-	-	-	-	-	5.92	6.66
9	Kratie	-	-	-	-	-	-	-	-	8.81	3.00
10	Phnom Penh	8.93	10.86	12.29	13.53	14.22	15.86	19.06	19.16	22.66	22.85
11	Prey Veng	16.34	16.27	21.74	21.98	22.05	21.20	11.52	15.61	18.57	15.86
12	Pursat	-	-	-	11.00	13.00	11.55	10.08	10.19	8.03	6.11
13	Ratanak Kiri	-	-	-	5.75	7.88	13.00	26.36	12.94	21.57	15.39
14	Siem Reap	-	-	3.52	17.28	19.48	18.31	19.36	20.35	24.14	21.17
15	Preah Sihanouk	-	-	8.34	10.81	10.72	14.86	11.84	13.33	15.77	10.58
16	Svay Rieng	-	-	-	-	-	-	48.19	40.47	24.18	46.83
17	Takeo	-	-	-	-	-	-	10.30	12.65	7.19	21.82
Whole Kingdom		9.01	10.90	11.98	13.54	13.84	15.24	17.58	18.32	20.46	20.80

Note: Province-wise pupil teacher ratio in higher education includes all types and levels of higher education.

Source: i. Ministry of Education, Youth and Sports, Royal Government of Cambodia.

ii. Own Computation.

A Comparative Analysis of Sales Strategies between Small and Medium Enterprises: A Case Study of Phnom Penh City, Cambodia

Kao Kveng Hong¹

RESEARCH ABSTRACT

Title	A Comparative Analysis of Sales Strategies between Small and Medium Enterprises: A Case Study of Phnom Penh City, Cambodia
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Small and medium enterprises (SMEs) play an important role for the socio-economic development of a nation. In Cambodia, the SMEs including micro enterprises accounted for 99 per cent of total firms. They employed around 45 per cent of labor force in 2006. But the SMEs in the country have been confronting with the sales problems, like competition with imported products, smuggled products flowing from the countries, like Thailand and Vietnam, dominance of wholesalers, fluctuation of exchange rates

of Thai Bhat and Vietnamese Dong in terms of Cambodian Riel, poor quality products due to the use of outdated technology and unskilled labor, high cost of production, expensive advertising cost, etc. The above sales problems were found to be more among the small enterprises compared to medium enterprises in the country. The SMEs in Cambodia, more particularly in Phnom Penh, compete with each other, and use different sales strategies to increase their sales.

The study has five objectives as mentioned below:

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- i. To review the literatures on concepts, status of small and medium enterprises in different countries, sales strategies and factors affecting sales strategies of SMEs, and other related literatures.
- ii. To identify and compare the sales strategies used by the small and medium enterprises in the study area.
- iii. To examine and compare the factors influencing the sales performance of small and medium enterprises in the study area.
- iv. To find out the sales problems faced by the small and medium enterprises, and the strategies used by them to solve the sales problems in the study area.
- v. To provide recommendations to solve the sales problems of small and medium enterprises in the study area.

Both descriptive and quantitative approaches have been used to meet the objectives of the study. In descriptive approach, the study has depended on relevant literatures, whereas, in quantitative approach, necessary tables, graphs and statistical models have been used. Secondary data have been collected from the National Institute of Statistics, Ministry of Planning, Government of Cambodia; Ministry of Industry, Mines and Energy, Government of Cambodia; International Labor Organization; Mekong Project Development Facility; and SMEs Association. For the purpose of the study, 32 each small and medium enterprises producing consumer products (food and beverages) have been taken into account. The above sample sizes of small and medium enterprises have been determined on the basis of the scientific sample size formula, and systematic random sampling method has been used for the selection of both small and medium enterprises. The data have been processed through the use of SPSS and Excel Programs.

The study has found that both small and medium enterprises used different kinds of sales strategies

during the special sales periods, such as Seven January Day, Chinese New Year, Valentine Day, Khmer New Year, Pchum Ben Day, Independence Day, Water Festival, Christmas Day and Universal New Year, and their sales expectations remained more or less same. Around 80 per cent small and medium enterprises benefitted in increasing their sales due to the promotion activities during the special sales periods. The most important periods during which the consumers in the study area spent a lot were Khmer New year, Chinese New Year, Pchum Ben Day, Water Festival Day, Christmas Day and International New Year.

Though both small and medium enterprises used different sales strategies to promote their sales during the special sales periods but there were dissimilarities in their sales strategies during the special sales periods. The sales strategies in which there were significant differences on sales expectations between small and medium enterprises during the special periods were ranges 10 to 50 percent discounts, buy one and get one free, and buy one and get the second one in half price. However, medium enterprises were found to be benefitted from the sales strategies compared to small enterprises during the special periods.

Both small and medium enterprises were found to be using push and pull sales tactics, such as sponsoring the equipment for product display, trading off the old products before launching the new products, providing advertising support, providing added value to intermediary, providing sample sales materials or tools, making intermediary meeting, distributing discounted coupon, giving special discount, providing incentive prize, providing sample product, providing compound products and making lucky draw in the study area. But, the percentage of medium enterprises using push and pull sales tactics was more compared to small enterprises. The sales strategies, such as participating in trade fairs, distributing leaflets,

advertorial and press release through mass media, conducting advertising campaign, making direct marketing, selling through agent or distributor, providing product warranty, satisfying customers by word of mouth advertisement and facilitating field visit for customers on creation of activities and participation in events were used by both small and medium enterprises. In order to motivate the sales staff, the SMEs in the study area provided the incentives like giving bonus, promoting the staff in his/her job, giving commission, providing tour package, providing training, giving certificate of excellence, increasing the salary, giving gift/prize and providing health care/health insurance services to the staff. But, the percentage of medium enterprises providing these services to the staff was more than that of small enterprises.

The factors such as name, image and logo of the company, quality production, competitors, employee training, customer satisfaction, maintenance of good relationship of sales persons with customers and leadership skill of managers had strong or very strong influence on the sales performance of small and medium enterprises in the study area. The important factors having moderate influence on the sales performance of small and medium enterprises in the study area were location, exterior and interior building, attractive price, advertisement, technology version, transport and communication facility, growth of population, income of the people, arrival of tourists, political stability, social factor, management style of the organization and organizational behavior. There were significant differences between small and medium enterprises on the factors, i.e., name, image and logo of the company and packaging, location, exterior and interior building, attractive price, quality product, social factor, advertisement in the magazine, and advertisement in the radio, television, outdoor, calendar, carry bag, pen or hat, influencing sales performance. The factors influencing sales performance of SMEs with no

significant difference between small and medium enterprises were technology version, transport and communication facility, growth of population, competitors, income of the people, arrival of the tourists, political stability, employee training, customer satisfaction, maintenance of good relationship of sales persons with customers, management style of the organization, leadership skill of manager, and organizational behavior.

The major sales problems faced by the small and medium enterprises in the study area were strong competition with imported products, high cost of advertisement, fluctuation of exchange rate, high production cost due to high cost of water, electricity and gasoline, high cost of marketing operation, sales of smuggled products, low quality products and price competition. On the whole, the problems of small enterprises were found to be more as compared to medium enterprises. Differences between the percentages of small and medium enterprises using different sales tactics to solve the problems of sales were found in the study area. The sales tactics like minimizing the factors creating the sales problems, providing training to the employees to improve working skills, using the new technology, joining with or creating an association, solving the problems through government help and taking the assistance of NGOs to minimize the sales problems, were used by the SMEs. But the percentage of medium enterprises was found to be more as compared to small enterprises in solving the sales problems in the study area.

Thus, both small and medium enterprises in the study area used different kinds of sales strategies in order to increase their sales during the special sales periods. But, there were considerable differences between small and medium enterprises with regard to their uses of sales strategies, and the sales performances of medium enterprises were more compared to small enterprises. Though

small and medium enterprises in the study area had the sales problems, but the sales problems of small enterprises were more than the medium enterprises.

In order to solve the sales problems of the SMEs, a number of recommendations are given.

- i. The small enterprises should develop and implement a professional sales system for their sales by picking up the strategies, which have already been successfully implemented by the medium enterprises.
- ii. Both small and medium enterprises should select the special periods of sales, such as Chinese New Year, Khmer New Year, Pchum Ben Day and Water Festival Day for sales promotions for enhancing sales.
- iii. The small enterprises should create the sales promotion campaign, such as discount on any period to compete with the medium enterprises.
- iv. The small enterprises should apply discount tactics to boost up the sales expectation or sales volume as well as to narrow the gaps of sales between the small and medium enterprises.
- v. The small and medium enterprises should provide intensive training course to their employees in relation to selling skill and other knowledge in order to meet customers' satisfaction and also to enhance sales performance.
- vi. The small enterprises should upgrade the provision of incentives to their employees in order to increase their sales performances. Similarly, the medium enterprises should use the sales tactics to compete with the large enterprises.
- vii. The small enterprises should find out niche media or marketing event, which requires less cost, and are effectively implemented to boost up the sales. In the same way, the medium enterprises should also compete with the large enterprises.
- viii. To compete with the medium and large enterprises more effectively, the small enterprises should seek the consultancy services from the SMEs' Associations, NGOs, private and government organizations for creating the professional sale strategies to compete with the medium and large enterprises.
- ix. As marketing, advertising, and sales incurred a lot of budget, the small and medium enterprises should get the supporting fund from the microfinance institutions and banks. In this regard, the microfinance institutions and banks should provide adequate financial support to the SMEs, so that they can do their business successfully with appropriate sales strategy.
- x. The small enterprises should find the agencies having expertise on event management to help them in setting up the marketing event. Moreover, the small enterprises should find any niche tactic or media, which is cheap to create the interactive program to compete with the medium enterprises.
- xi. Both small and medium enterprises should build up good relations with customers and get the feedbacks and comments from customers whether they are satisfied with the products or not, as well as find the Unique Selling Proposition (USP) in order to make it easy in preparing a marketing plan to stay ahead of competitors.
- xii. The government should prevent the smuggling products as well as informal money payment by the manufacturers, because these were creating a lot of problems for the SMEs and had adverse effect on the economic growth of the country.
- xiii. SMEs' Associations should provide consultancy to the SMEs' owners or managers and solve the problems on

sales as well as control the dominance of wholesalers in influencing the prices of the products produced by the SMEs.

- xiv. The government should facilitate the SMEs in finding out the market for their products.

To conclude, both small and medium enterprises used different kinds of sales strategies in order to enhance their sales. Considerable differences were found between the sales strategies of SMEs. The sales performances of medium enterprises were found to be better compared to small enterprises.

Even though different kinds of sales problems were encountered by the SMEs, but the sales problems of small enterprises were found to be higher. So, the sales performances of medium enterprises were better off, and the extent of their sales problems was less compared to small enterprises. In order to remove the sales problems, both small and medium enterprises should take necessary steps by looking to their individual sales problems, so that, the sales performances of the SMEs in the study area can be improved.

An Effective School Leadership and Student Learning in Selected High Schools in Prey Veng and Svay Rieng Provinces in Cambodia

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RESEARCH ABSTRACT

Title	An Effective School Leadership and Student Learning in Selected High Schools in Prey Veng and Svay Rieng Provinces in Cambodia
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Education is widely known for its contribution towards economic and social development. The drastic growth of an economy depends on human resource development for which the role of education is very important. The objective of human resource development is to train and equip people with adequate knowledge and skills. This has been the goals of educational institutions, such as schools and universities. The roles, duties, functions and qualities of the school principals are

crucial to achieving school goals. In this context, effective school leadership shapes the direction and policies, sets acceptable standard for achievement and behaviors, establishes the school climate and influences the commitment of staffs, teachers, parents and community members.

School principals have the responsibility of making certain that specific tasks are completed by teachers. Principals coordinate, direct, and support

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the work of teachers to build positive climate and foster positive school community relations. The study on “An Effective School Leadership and Student Learning in Selected High Schools in Prey Veng and Svay Rieng Provinces in Cambodia” has been carried out with the following objectives:

- (i) To analyze the school principals’ leadership knowledge and skills in Prey Veng and Svay Rieng provinces as perceived by the teachers in terms of the following:
 - A. Innovative ideas in instruction,
 - B. Involvement of teachers in developing goals and in making some decisions.
- (ii) To find out how Provincial Education Department (PED) Officials and selected School Supporting Committee Members perceive the leadership knowledge and skills of the principals.
- (iii) To analyze the trend of the results of the Grade 9 and Grade 12 National Examinations in the two provinces under study during 2002 to 2006 and to relate this trend to the perceptions of the teachers on the leadership knowledge and skills of the principals.
- (iv) To propose practical suggestions for improving leadership knowledge, skills and style of school principals in relation to innovative ideas and instructional strategies.

Both descriptive and quantitative analysis have been carried out in the study. The respondents in this study are the Provincial Education Department (PEDs) Officials, teachers, and School Supporting Committee Members (SSCMs) in Prey Veng and Svay Rieng Provinces of Cambodia. High schools that have been selected are those which have complete levels. This means they have grades from seven to 12. Based on this basic criterion, 19 high schools in Prey Veng province and eight high schools in Svay Rieng province have been

selected in the study. From these high schools, out of 285 grade 12 teachers in Prey Veng, 30 per cent equivalent to 85 teachers were randomly selected. Similarly 30 per cent of 330 grade 9 teachers, i.e., 99 teachers have been selected from the same province. In Svay Rieng province also 30 per cent of 165 grade 12 teachers equivalent to 49 teachers, and 30 per cent of 137 grade 9 teachers equivalent to 41 teachers have been selected randomly for the survey. For the selection of Provincial Education Department Officials, census method has been used. A total of eight Provincial Education Department Officials, four from each of the selected province, have been interviewed. Similarly, census method has also been used to select the School Supporting Committee Members. A total of 108 School Supporting Committee Members, four members from each of the 27 selected schools, have been taken into consideration for the study purpose.

The study has used both primary and secondary data. The primary data have been gathered through structured questionnaires from the respondents, i.e., teachers, PEDs Officials and School Supporting Committee Members. The secondary data on the results of the National Examinations at Grades 9 and 12 have been taken from the records of the Department of General Secondary Education of the Ministry of Education, Youth and Sport.

The findings revealed that the principals were not ready for their jobs as perceived by the PEDs Officials. However, the PEDs Officials acknowledged that they were energetic and interested in their works. Further, according to them, the principals lacked creativity. They were just carrying out their normal works on a daily routine basis. On the art of communication, the principals did not have this skill; hence, they could not motivate the teachers. However, it should be noted that there were two areas that the PEDs Officials had positive perceptions about the principals and

these were their ability to resolve conflicts and the respect they got from the school community. The principals were good in conflict resolution and were respected by the school community. As perceived by the teachers, the principals were supportive to the teachers in their academic works. They focused in leading the teachers in their instructional works but neglected the human relation aspect; hence they could not inspire the teachers. As perceived by the School Supporting Committee Members, they were satisfied with the way the principals communicated with them. They were often informed by the principals about the school activities and the children's participation in school activities.

The trend in the results of Grade 9 and Grade 12 National Examinations over the period 2002 to 2006 showed that the overall trend in the result was good. However, in some school years there were slight decreases. In fact, in Prey Veng province, the result of Grade 12 National Examination showed consistent positive increases from 2002 to 2006. In the province, the result of Grade 9 National Examination from 2002 to 2006 showed slight decrease in some years but had a significant increase in 2004–2005. In the province of Svay Rieng, the result of Grade 12 National Examination showed a decrease in 2002–2003 but there was a consistent increase in the next three years. In the same province, the trend of the result in Grade 9 National Examination showed slight decreases in 2002–2003 and 2005–2006. The poor trends in the Grades 9 and 12 National Examination results for 2002–2006 relate to the findings of the study that the principals lacked knowledge and new teaching strategies and could not help the technical group teachers in their teaching. These technical group teachers were the teachers teaching the subjects, which were tested at grade 9 and grade 12 and they looked up to their principals for innovative ideas and new teaching strategies to help them in

their teaching but the principals could not share concepts. Further, as perceived by the Provincial Education Department Officials, the principals did not have the professional knowledge, and they were not prepared for the job. Based on the findings in this study, the following recommendations are suggested:

- i. As perceived by the Provincial Education Departments (PEDs) Officials, the school principals had the energy and interest in their works but they were not prepared professionally. It is, therefore, recommended that more trainings should be conducted, especially for the new principals who will be in the service in the coming years. There should be academic and management development training program, which needs to be conducted regularly. These trainings could be conducted once in every semester at provincial and regional levels.
- ii. The selection process for the position of principals should be based on academic qualifications, experiences, personality and merit. There should be a committee to carry out the selection in a professional manner.
- iii. The principals did not show creativity and innovativeness. This could be because of lack of expertise. Creativity is the result of expertise and experience and if the principals do not possess these qualities, they cannot be creative. It is recommended that the selection of principals be based on expertise and experience. The selection should be an open process. There should be announcements and then teachers (TGLs) can apply and the committee will hold the selection process based on specified policies and criteria.
- iv. It was found that the principals did not have good skills in communication. It is recommended that training in communication and transformational skills

be conducted on how to communicate professionally. Principals should be trained more so that they will develop self-confidence.

- v. The principals did not involve the PEDs Officials in school activities, and they were not invited to attend in the meetings. It is recommended that the principals should prepare structured schedule of activities in the schools and the PEDs Officials should be involved. There should be policies as to how many times in a year the PEDs Officials meet with the school principals to discuss and share concerns on school developments. It is suggested that at the beginning of every school year, the school principals should plan which school activities should be attended by the PEDs Officials. There should be planning so that proper communication could be sent in advance to the PEDs Officials.
- vi. As observed by the PEDs Officials, the principals did not support and inspire the teachers. Therefore, it is recommended that in the selection of candidates for principals, personality be considered. The principal should have good interpersonal skills. While transactional leadership is important, teachers may also need personal support from the principals. Principals are also expected to demonstrate some charisma by way of communication. It is highly recommended that the ability to communicate be considered as a priority in the selection of principals. This ability is important because principals are in the middle of the hierarchy and they will have to communicate at the upper level with the PEDs Officials and at the lower level with the teachers.
- vii. Considering that the roles and duties of school principals are crucial to improve leadership knowledge, skills and style

of teachers and student performances, the principal of a school must provide instructional leadership in the school to ensure that the instruction provided by the teachers who work in the school is consistent with the course of study and education programs. Principals should provide the evaluation of programs offered in the school to ensure that students in the school have the opportunity to meet the standards of education set by the MoEYS.

- viii. Considering that an effective school leadership of principal develops and sustains a focus on instructional improvement and student learning, a school principal should bring to their schools innovative ideas and instructional strategies that can improve teaching while maintaining a coherent reform agenda. They should also engage teachers, parents, and community members as collaborators and leaders in school improvement efforts.
- ix. The term of the school principal should be limited to two terms only in order to get new people to be involved in the school management to bring in fresh ideas and new innovative style of working. The term should be limited to only three years.
- x. Considering appointment of female teachers to be vice-principals and principals to follow gender mainstreaming in school level according to Prime Minister and also statement in the 4 mandate, Rectangular Strategy Phase II, female teachers should be appointed as vice principals and eventually appointed as principals for gender mainstreaming.
- xi. The MoEYS should set up strategies and policies to encourage female teachers to get higher position in schools and train them to become active leaders in future.
- xii. The National Institute of Education (NIE) should establish policies and strategies to

provide a pre-service program to train those who aspire to become school principals.

Thus, the school principals were enthusiastic and hardworking despite they lacked innovative ideas and skills of new teaching strategies. They involved the teachers in school planning and in discussions about the academic performance of students. According to the views of the Provincial Education Department Officials, the principals had lack of

professional knowledge, and were not interested for the job. But the School Supporting Committee Members had the view that the principals were respected and looked up by the community well. However, necessary steps need to be undertaken for the selection and the improvement of the skills of the school principals to achieve the desired result.

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