mrp.ase.ro

Management Research and Practice
Volume 5 Issue 3 / September 2013

ESTABLISHING DESIGNED FINANCIAL CONTROL: AN EMPIRICAL STUDY ON URBAN LOCAL BODIES IN INDIA USING FACTOR AND CLUSTER ANALYSIS

[1]Sidhakam BHATTACHARYYA and [2]Gautam BANDYOPADHYAY
[1]National Institute of Technology, Durgapur, West Bengal, India
sidhakam@gmail.com
[2]National Institute of Technology, Durgapur, West Bengal, India
math_ gb@yahoo.co.in

Abstract
We have established in earlier study that our designed financial controls help the Indian ULBs (Urban Local Bodies) to increase recurrent surplus. Our further research, as described in this paper, reveals that the concept of designed controls conforms to the result of statistical techniques used. Nonparametric tests applied on the dataset allow us to proceed for application of multivariate techniques. Factor analysis divides the variables of revenue income and expenditure into two factors which are in conformity with the conceptual framework of the designed financial control. Regression analysis indicates strong association of financial controls (taking factor score as dependent variable) with the constituent variables (independent variables) and also of total revenues and total expenditure (dependent variable) with both the financial controls (taking factor scores as independent variables). We have also used cluster analysis approach to strengthen our views and result of this analysis agrees with the result of factor analysis.
Keywords: Urban Local Bodies, Financial Control, Factor Analysis, Regression Analysis, Cluster Analysis.

1. INTRODUCTION

The burden of financing a community's infrastructure and services primarily falls upon the local governments and the financing of these infrastructure and services requires broad-based revenue sources (Mathur, 2009). Indian ULBs are financially handicapped since their birth as the Constitutional Amendment Act, 1992, through which such bodies have been recognised as the third tier local governments, has created constitutional imbalance by specifying enormous functions without any corresponding list of legitimate source of revenues. Such constitutional imbalance is supposed to be compensated by intergovernmental transfer. All levels of governments in almost all the countries are facing fiscal crisis and therefore, in India also, intergovernmental transfers will never be able to cover all the urban investment needs as a result the local governments have to improve their own financial viability (Ministry of Urban Development, 2011). In such a situation we have recommended that ULBs

ISSN
2067- 2462

mrp.ase.ro

should exercise some sorts of financial controls. "As theory is crucial in providing the needed frame of reference" (Abukhater A, 2009), we have contributed a conceptual framework for such financial controls in our earlier study (Bhattacharyya and Bandyopadhyay, 2011) and it has been established through an empirical study (Bhattacharyya and Bandyopadhyay, 2012) that ULBs can increase the percentage of recurrent surplus if our designed financial controls are adopted:

Control 1: This control covers tied revenue grants received from upper tiers of governments. The grant should only be expended for the intended purpose. However, an ULB should also exercise financial control (1) to ensure that the amount of any tied grant is either equal to or more than the specific expenditures.

Control 2: An ULB should try to meet the administrative, operation and maintenance costs (all expenses other than those covered by tied grants) out of its own source revenue collection. The control is exercised when own source receipt is more than the expenditure.

Whereas the first one is related with revenue from government fund and salary and wages, second control is meant for total revenue from own fund and other expenses so far as the available dataset is concerned. In this paper, using the same set of data of earlier empirical study, we have tried to establish that our designed financial controls conform to the results using statistical techniques.

2. AIM OF THIS STUDY

The purpose of this study is to examine whether results using statistical techniques also support the conceptual framework. For this purpose we have used factor analysis, being the most popular method, at the first instance to examine whether elements (variables) of revenues and expenditure fall under two controls (factors) in accordance with our conceptual framework. Thereafter we have used regression analysis to examine the strength of relationship of (i) each of the financial controls with the constituent variables and (ii) both the controls with total revenues and total expenses. With an attempt to strengthen our views we have used cluster analysis to examine whether the elements of income and expenditure are classified into two clusters matching with the conceptual framework of designed controls. Non-parametric tests have been conducted to examine whether the data are fit for application of these two statistical techniques.

3. LITERATURE REVIEW

We find tremendous increase in the application of multivariate techniques in the area of urban planning as the data sets, usually multivariate in nature, are gathered from real-world complex system and therefore it is appropriate to apply multivariate approaches for analysis. Principal Component Analysis (PCA), Cluster Analysis (CA) and Factor Analysis (FA) are amongst the most prominent techniques used for urban planning (Nosoohi I & Hamdani A N, 2011). An attempt has been made towards application of factor analysis approach in the study of functional ecology of urban centres of Nepal and the large number of variables has been reduced to small manageable number of factors (Mandal, 2005). Factor Analysis has been used, particularly for Tshwane Metropolitan Municipality, to explore employees' experiences and perceptions in the service delivery performance (Molefe and others, 2011). Use of descriptive statistics and factor analysis statistics in the interpretation and analysis of data reveals that both municipality employees and citizens are primarily concerned with the issues of environmental management. Importance of education, awareness and training, as a response to environmental issues, is also established through this study (Skanavis C, 2011). "To develop a fiscal profile for each city, factor analysis was used to develop a grouping method to organize a larger set of fiscal indicators" (Hevesi A G). In cluster analysis proper determination of number of clusters is an important aspect (De A, 2011). Cluster analysis has been used with the objective to classify the wide range of municipal jobs into homogeneous groups according to job demand and to provide better possibilities to study the relationships (Ilmarinen J et all, 1991). Hierarchical cluster analysis has grouped five sampling sites into two clusters of similar sediment quality characteristics in a study of the seasonal fluctuation in the sediments of river Sabarmati and Kharicut canal at Ahmadabad (Kumar R.N et all, 2012). Cziráky D et all (2006) have proposed a multivariate statistical framework for regional development assessment based on structural equation modelling with latent variables. It has been shown how such methods can be combined with non-parametric classification methods such as cluster analysis to obtain development grouping of territorial units. They have applied these methods to regional development classification of Slovenia and Croatia (Cziráky D, 2006).

4. RESEARCH METODOLOGY:

We have used three types of statistical approach in our study.

Factor Analysis: It identifies the latent variables (i.e. factors) inherent in the total set of observed variables and each such factor comprises of different variables which are most similar in terms of correlation with each other. It is an attempt to identify incorrect presence of variables (Dey A et all,

ISSN

2067- 2462

MANAGEMENT RESEARCH AND PRACTICE Vol. 5 Issue 3 (2013) pp: 5-20

2011). There are various types of factor analysis and principal components analysis (PCA) has been mostly used by the researchers. One demerit of factor analysis is that it fails to present a meaningful pattern where observed variables are completely unrelated. Cluster Analysis: It is a statistical method used for partitioning a set of variables into homogeneous groups or classes in order to have an operational objectivity. In our case we have used this approach for partitioning heads of revenues and expenditure (variables) in order to establish financial control (operational objectivity). Multiple Regression Analysis: It explains the relationship between dependent and independent variables at a significant level (through a significance test of R square) and can establish the relative predictive importance of the independent variables (by comparing beta weights) (Ghosh A et all, 2011).

5. RESEARCH APPROACH:

We give below a diagram for better understanding of our research approach:

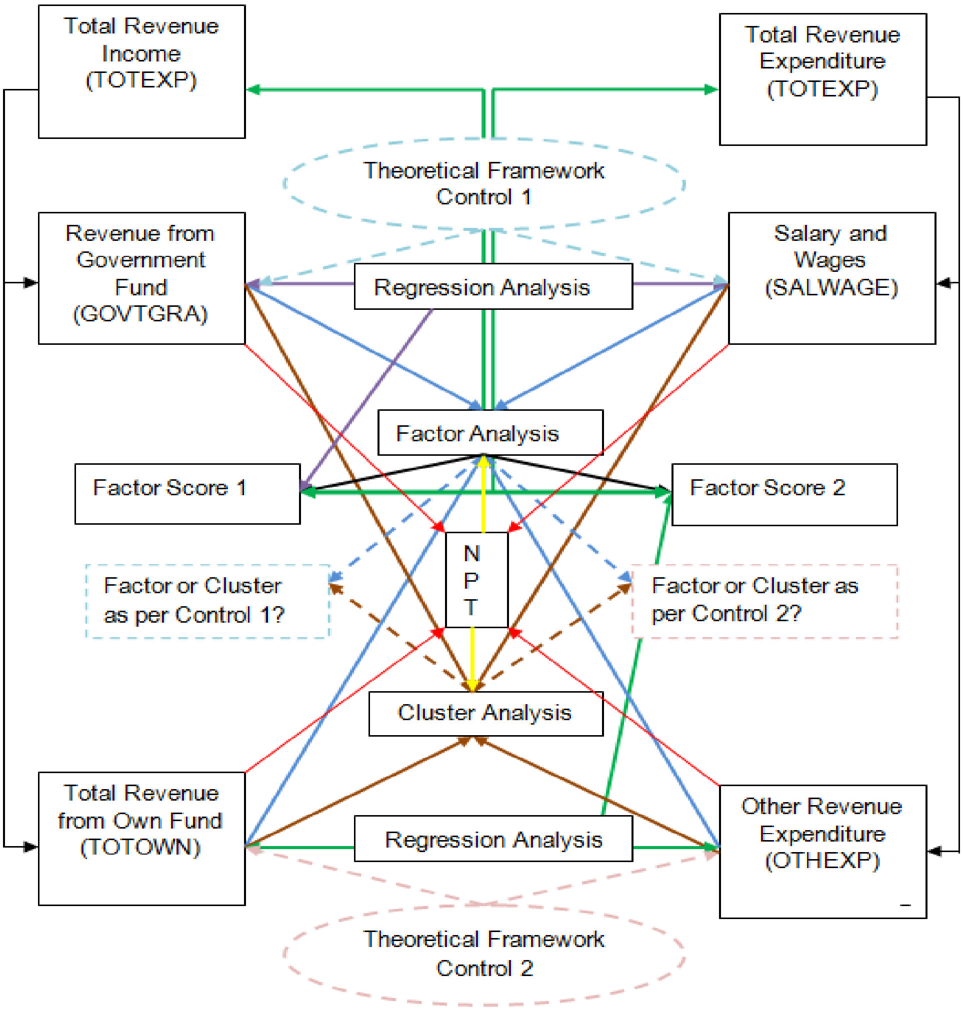

FIGURE 1: DESCRIPTION OF RESEARCH APPROACH

mrp.ase.ro
Management Research and Practice
Volume 5 Issue 3 / September 2013
ISSN 2067- 2462

Red arrows indicate that four variables are primarily tested through nonparametric test to verify whether the dataset is fit for multivariate techniques. If the dataset is fit, we will proceed for factor and cluster analysis after verifying correlation amongst the variables, which is indicated by yellow arrows. Four variables will be analysed through factor analysis (with a request to divide into two factors) indicated by blue arrows. If factor 1 and 2 comprise of variables as per conceptual framework, factor scores will be derived. Green arrows indicate application of regression analysis to see the strength of relationship of each control using respective factor score as dependent variable and again of the controls with total revenue income as well as total revenue expenditure using factor scores as independent variables. At last four variables are analysed through cluster analysis approach to match the result with factor analysis in order to strengthen our views (indicated by brown arrows).

6. AVAILABLE DATA

We have made an empirical study on the the ULBs from West Bengal, a State of Union India. We have used secondary data of considerable number of ULBs for the year 2001-02 to 2005-06 fom the "Administration Report of Municipal Affairs Department 2001-2005, Government of West Bengal" and also from the website of this department. We have used SPSS (15 version) for result and analysis.We give brief description of available data under variables along with encoding in SPSS as follows:

TABLE 1- DESCRIPTION OF VARIABLES

Name of the Variables	Description of the variables	Encoded
Total Revenue from Own Fund	It is the revenues earned by an ULB from the available sources which includes tax and non-tax income	TOTOWN
Revenue from Govt. Fund	Revenue grant from Government mainly to meet salary and wages	GOVTGRA
Total Revenue Income	It is the total of own source revenue and revenue from government.	TOTREV
Salary and Wages	It is the cost of the employees.	SALWAGE
Other Revenue Expenditure	It is administrative, operation and maintenance expenditure.	OTHEXP
Total Revenue Expenditure	It is the total of above two expenditure.	TOTEXP

7. RESULT AND ANALYSIS

We have used SPSS (15) for result and analysis has been made with the help of SPSS Tutorials.

Nonparametric Test

We have conducted nonparametric test in order to ensure whether available data allow us to apply factor and cluster analysis. We give below the results of such tests:

mrp.ase.ro

TABLE 2- DESCRIPTIVE STATISTICS

	N	Percentiles		
		25th	50th (Median)	75th
TOTOWN	585	35.5000	87.0000	210.8400
GOVTGRA	585	69.5850	154.0900	280.0250
SALWAGE	585	53.1600	140.2200	275.1400
OTHEXP	585	29.9750	75.1900	172.8750

This table shows descriptive statistics for variables in the analysis. These statistics offer descriptions of the center, variability, and shape of the distributions of the variables. Percentiles give a numerical representation of the shape of the distribution. It appears that the absolute difference between the 75th and the 50th percentile is much greater than the absolute difference between the 25th percentile and the 50th percentile. This distribution is positively skewed which assumes that a normal distribution should not be applied to these variables.

TABLE 3- ONE-SAMPLE KOLMOGOROV-SMIRNOV TEST

		TOTOWN	GOVTGRA	SALWAGE	OTHEXP
N		585	585	585	585
Normal Parameters(a,b)	Mean	169.19	210.96	195.2	140.23
	Std. Deviation	220.615	189.98	182.46	185.185
Most Extreme Differences	Absolute	0.223	0.148	0.144	0.227
	Positive	0.201	0.12	0.125	0.187
	Negative	-0.223	-0.148	-0.144	-0.227
Kolmogorov-Smirnov Z		5.4	3.57	3.47	5.49
Asymp. Sig. (2-tailed)		0	0	0	0

a Test distribution is Normal.
b Calculated from data.

The Kolmogorov-Smirnov Test compares an observed cumulative distribution function to a theoretical cumulative distribution. The theoretical distribution can be normal, uniform, or Poisson. In this example, the normal distribution is selected. Parameters of the theoretical distribution are estimated from the observed data. Absolute indicates the largest absolute difference between the theoretical cumulative distribution and the observed cumulative distribution function. Large significance values (>.05) indicate that the observed distribution corresponds to the theoretical distribution. Thus the distribution having significant value (>0.05) resembles a normal distribution and procedures which assume normality can be employed for analyzing the data. In contrast, here, the significance values for all the variables are smaller than .05 and therefore the distributions are not normal.

Management Research and Practice
Volume 5 Issue 3 / September 2013
ISSN
2067- 2462

Correlation

As the data are not normal we can apply Factor Analysis provided there is inter-correlation between the variables. We have tried to find out correlation amongst these variables and we have found that such correlations exist (>0.50). The correlation matrix is given along with the tables (Table 4) presented for factor analysis.

Factor Analysis

All the above tests allow us to use factor analysis. In our study we have used factor analysis for a specific purpose to identify the variables falling under two different factors representing the controls. Therefore while executing the commands we have requested for extraction of two factors. We reproduce the results in the form of tables as follows:

TABLE 4- CORRELATION MATRIX(A)

		TOTOWN	GOVTGRA	SALWAGE	OTHEXP
Correlation	TOTOWN	1	0.695	0.594	0.891
	GOVTGRA	0.695	1	0.889	0.767
	SALWAGE	0.594	0.889	1	0.564
	OTHEXP	0.891	0.767	0.564	1
a Determinant = .012					

Above table shows that there is correlation of more than 0.50 as such application of factor analysis is appropriate.

TABLE 5 - KMO AND BARTLETT'S TEST

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.576
Bartlett's Test of Sphericity	Approx. Chi-Square	2550.530
	Df	6
	Sig.	.000

This table shows two tests which indicate the suitability of the data for factor analysis. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy is a statistic which indicates the proportion of variance in the variables which is common variance, i.e. which might be caused by underlying factors. High values (close to 1.0) generally indicate that a factor analysis may be useful with the data. If the value is less than .50, the results of the factor analysis probably won't be very useful. As the value in our case is 0.576, factor analysis is useful in our study. Bartlett's test of sphericity indicates whether correlation matrix is an identity matrix, which would indicate that the variables are unrelated. The significance level gives the result of the test. Very small values (less than .05) indicate that there are probably significant relationships among our variables. A value higher than about .10 or so may indicate that the data are

ISSN 2067- 2462

mrp.ase.ro

not suitable for factor analysis. As this value is "0", there is significant relationship among the variables and data are suitable for factor analysis.

TABLE 6- ANTI-IMAGE MATRICES

		TOTOWN	GOVTGRA	SALWAGE	OTHEXP
Anti-image Covariance	TOTOWN	.172	.043	-.065	-.115
	GOVTGRA	.043	.094	-.103	-.069
	SALWAGE	-.065	-.103	.147	.071
	OTHEXP	-.115	-.069	.071	.116
Anti-image Correlation	TOTOWN	.633(a)	.339	-.408	-.816
	GOVTGRA	.339	.585(a)	-.878	-.659
	SALWAGE	-.408	-.878	.542(a)	.544
	OTHEXP	-.816	-.659	.544	.549(a)

a Measures of Sampling Adequacy(MSA)

Each value on the diagonal of the anti-image correlation matrix shows the Measure of Sampling Adequacy (MSA) for the respective item. Values less than "0.5" may indicate variables that do not seem to fit with the structure of the other variables, consider dropping such variables from your analysis. In our case, no question arises for dropping of any variable.

TABLE 7- COMMUNALITIES

	Initial	Extraction
TOTOWN	1.000	.935
GOVTGRA	1.000	.949
SALWAGE	1.000	.969
OTHEXP	1.000	.953

Extraction Method: Principal Component Analysis.

Communalities indicate the amount of variance in each variable that is accounted for. Initial communalities are estimates of the variance in each variable accounted for by all components or factors. For principal components analysis, this is always equal to 1.0 (for correlation analyses) or the variance of the variable (for covariance analyses).

Extraction communalities are estimates of the variance in each variable accounted for by the factors (or components) in the factor solution. Small values indicate variables that do not fit well with the factor solution, and should possibly be dropped from the analysis. Our result contains high values as such the variables fit with factor solution.

Management Research and Practice
Volume 5 Issue 3 / September 2013

ISSN
2067- 2462

mrp.ase.ro

TABLE 8- TOTAL VARIANCE EXPLAINED

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.204	80.090	80.090	3.204	80.090	80.090	1.974	49.345	49.345
2	.603	15.082	95.172	.603	15.082	95.172	1.833	45.827	95.172
3	.150	3.753	98.925						
4	.043	1.075	100.000						

Extraction Method: Principal Component Analysis.

This table gives eigenvalues, variance explained, and cumulative variance explained for our factor solution. The first panel gives values based on initial eigenvalues. For the initial solution, there are as many components or factors as there are variables. The "Total" column gives the amount of variance in the observed variables accounted for by each component or factor.

The "% of Variance" column gives the percent of variance accounted for by each specific factor or component, relative to the total variance in all the variables.

The "Cumulative %" column gives the percent of variance accounted for by all factors or components up to and including the current one. For instance the Cumulative % for the second factor is the sum of the % of Variance for the first and second factors. In a good factor analysis, there are a few factors that explain a lot of the variance and the rest of the factors explain relatively small amounts of variance. For principal components extraction, these values will be the same as those reported under Initial Eigenvalues.

For other extraction methods, these values will generally be smaller than the initial values, due to errors in measurements. As we have requested a factor rotation, we will have to see the results in the "Rotation Sums of Squared Loadings" group. According to total variance explained matrix in this group the first two components explain 95% , almost equally (49% and 46%) for each of the components.

The variance accounted for by rotated factors or components may be different from those reported for the extraction but the Cumulative % for the set of factors or components will always be the same.

Management Research and Practice
Volume 5 Issue 3 / September 2013
ISSN
2067- 2462

FIGURE 2 - SCREE PLOT

This chart is used to help determine the optimal number of factors or components to retain in the solution. For a good factor analysis, this chart will look roughly like the intersection of two lines. Generally, the factors you want to keep are the ones on the steep slope. The ones on the shallow slope contribute relatively little to the solution, and can be excluded.

TABLE 9 - REPRODUCED CORRELATIONS

		TOTOWN	GOVTGRA	SALWAGE	OTHEXP
Reproduced Correlation	TOTOWN	.935(b)	.732	.565	.944
	GOVTGRA	.732	.949(b)	.929	.746
	SALWAGE	.565	.929	.969(b)	.580
	OTHEXP	.944	.746	.580	.953(b)
Residual(a)	TOTOWN		-.036	.029	-.053
	GOVTGRA	-.036		-.040	.020
	SALWAGE	.029	-.040		-.017
	OTHEXP	-.053	.020	-.017	

Extraction Method: Principal Component Analysis.

a. Residuals are computed between observed and reproduced correlations. There are 1 (16.0%) nonredundant residuals with absolute values greater than 0.05.

b. Reproduced communalities

This table gives reproduced correlations (or covariances) and residuals for the factor analysis solution. This shows the predicted pattern of relationships if factor analysis solution is assumed to be correct. If the solution is a good one, the reproduced correlations (or covariances) will be close to the observed

ISSN
2067- 2462

MANAGEMENT RESEARCH AND PRACTICE Vol. 5 Issue 3 (2013) pp: 5-20

values. Residuals show the difference between the predicted and observed values. For a good factor analysis solution, most of these values will be small. In our case residuals show small values and therefore this is a good factor analysis having a very small variation between the predicted and observed values.

TABLE 10 - ROTATED COMPONENT MATRIX(A)

	Component	
	1	2
OTHEXP	.911	
TOTOWN	.907	
SALWAGE		.946
GOVTGRA		.838

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a Rotation converged in 3 iterations.

We have used varimax rotation with an option of coefficient display format “sorted by size: and “suppress absolute value ;ess than 0.50”. Varimax rotation is considered as the most common rotation option to maximize the variance of the squared loadings of a factor (column) on all the variables (rows) in a factor matrix. It has the useful effect on differentiating the original variables by extracted factor and each of the factors will have either large or small loadings of any particular variable. A varimax solution produces the results for the ease of identifying each variable with a single factor (Ghosh A et all, 2011). In our analysis, after rotation, the corresponding matrix represents two components. Values less than 0.50 have not been diaplayed. According to this matrix, OTHEXP and TOTOWN fall under component 1 and SALWAGE and GOVTGRA fall under component 2.

Naming of the Factors

Naming of the factors is necessary for representing insight meaning. It is observed that variables of Component 1 (“OTHEP” and “TOTOWN”) and Component 2 (“GOVTGRA” and “SALWAGE”) are actually the elements of income and expenditure of Control 2 and Control 1 respectively. Therefore “Component 1” and “Component 2” can be named as “Control 2” and “Control 1”.

We have designed control 1 considering revenue from Government grant and salary and wages expenses whereas control 2 is meant for own source income and operation and maintenance expenses. Factor analysis approach also divides these four variables perfectly under two components. Therefore we can conclude that our empirical study using factor analysis establishes our designed controls.

Management Research and Practice Volume 5 Issue 3 / September 2013

ISSN 2067- 2462

mrp.ase.ro

Regression Analysis

In our study the purpose of using regression analysis is not to develop a model but to find out the strength of relationship. Regression analysis explains the relationship between dependent and independent variables. The model summary table reports the strength of the relationship between the dependent and independent variables. R, the multiple correlation coefficients, is the linear correlation between the observed and model-predicted values of the dependent variables. The values of R, for models produced by the regression procedure, range from 0 to 1. Its large value indicates a strong relationship. R Square, the coefficient of determination, is the squared value of the multiple correlation coefficients. R squared is the proportion of variation in the dependent variable explained by the regression model. The values of R squared also range from 0 to 1. Small values indicate that the model does not fit the data well. The sample R squared tends to optimistically estimate how well the models fit the population. Adjusted R squared attempts to correct R squared to more closely reflect the goodness of fit of the model in the population.

Strength of Relationship

We have tried to find out the relationship in four cases: (i) Control 1 with the constituents variables (case 1) (ii) Control 2 with the constituents variables, (iii) Total expenses with Control 1 and Control 2, (iv) Total income with Control 1 and Control 2. Strong relationship between the dependent and independent variables will be established when R and R square have large values and there is meagre difference between R square and Adjusted R square. Results of the each of the cases, showing dependent and independent variables, are given below:

TABLE 11 - RESULT OF REGRESSION ANALYSIS

Case	Variables			Model Summary			
	Dependent	Independent		R	R Square	Adjusted R Square	Std. Error of the Estimate
1	Control1 (Factor Score 2)	GOVTGRA	SALWAGE	0.946(a)	0.895	0.894	0.32525347
2	Control 2 Factor Score 1)	TOTOWN	OTHEXP	0.935(a)	0.874	0.894	0.35522253
3	TOTEXP	Control1 (Factor Score 2)	Control 2 (Factor Score 1)	0.993(a)	0.986	0.986	39.09822
4	TOTREV	Control1 (Factor Score 2)	Control 2 (Factor Score 1)	0.993(a)	0.986	0.986	44.10963

Management Research and Practice
Volume 5 Issue 3 / September 2013
ISSN 2067- 2462

MANAGEMENT RESEARCH AND PRACTICE Vol. 5 Issue 3 (2013) pp: 5-20

mrp.ase.ro
Management Research and Practice
Volume 5 Issue 3 / September 2013

In all the cases there are large values of R and R squares. There is either no difference or negligible difference between R square and Adjusted R square.

Therefore strong relationship is established in all the cases.

Cluster Analysis

TABLE 12 - AGGLOMERATION SCHEDULE

Stage	**Cluster Combined**		**Coefficients**	**Stage Cluster First Appears**		**Next Stage**
	Cluster 1	Cluster 2	Cluster 1	Cluster 2	Cluster 1	Cluster 2
1	2	3	4671031.397	0	0	3
2	1	4	6439785.392	0	0	3
3	1	2	20342615.501	2	1	0

This table shows how the cases are clustered together at each stage of the cluster analysis. The Coefficients column indicates the distance between the two clusters (or cases) joined at each stage. The values here depend on the proximity measure and linkage method used in the analysis.

Cluster combined column shows that cases 2 and 3 are joined at stage 1. Next combination is for cases 1 and 4 at stage 2. For a good cluster solution, a sudden jump in the distance coefficient (or a sudden drop in the similarity coefficient) is noticed.

The stage before the sudden change in the coefficients indicates the optimal stopping point for merging clusters. There is sudden jump after stage 2 (from 6439785 to 20342615) as such two cluster merge at stage 3 and we should consider using a two clusters solution.

The next part of the table shows the stage at which each cluster first appears. Single cases existed before we started the analysis, so they are indicated by zeroes here. In stage 3, cluster 1 is the cluster that is formed in stage 1 and cluster 2 is the cluster formed in stage 2.

The last column shows the subsequent stage at which the newly merged cluster is combined with yet another cluster. Therefore, according to the table, cluster 1 and 2 are combined at stage 3.

The dendrogram (or "tree diagram") shows relative similarities between cases. It depicts how the "branches" merge together from left to right. Cases or clusters that are joined by lines "further down" the tree (near the left side of the dendrogram) are very similar. Cluster distances are rescaled so that they range from 0 to 25 in this plot. It can help to see different cluster solutions by imagining a vertical line through the dendrogram. For instance, in this case, we can draw a line at about 4 rescaled distance

ISSN
2067- 2462

mrp.ase.ro

units. This would identify 2 clusters, one for each point where a branch intersects our line. A good cluster solution is one with small within-cluster distances, but large between-cluster distances.

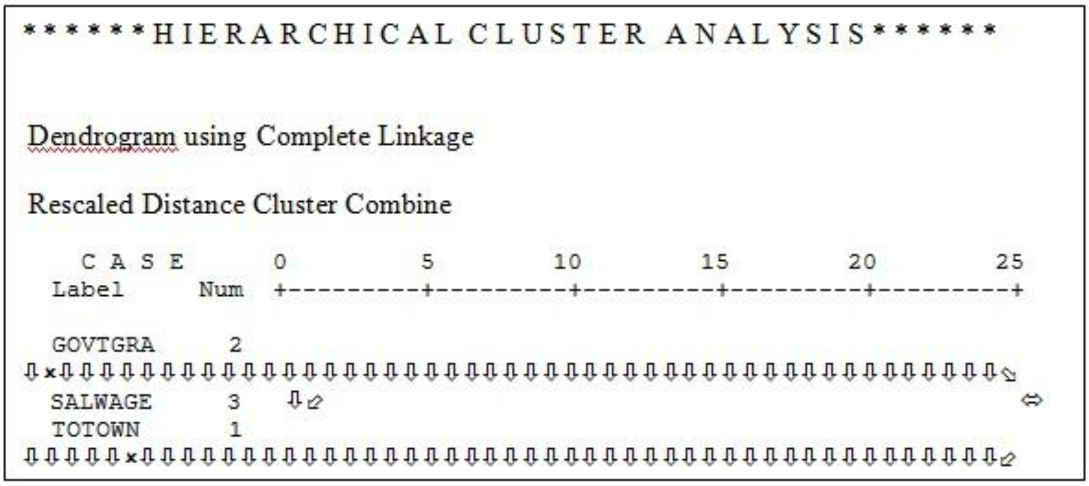

FIGURE 3 - DENDROGRAM

TABLE 13 - CLUSTER MEMBERSHIP

Case	2 Clusters
TOTOWN	1
GOVTGRA	2
SALWAGE	2
OTHEXP	1

There are two cluster as discussed above. Cluster membership shows that cases, "TOTOWN" and "OTHEXP", are grouped together. Remaining two cases, "GOVTGRA" and "SALWAGE" are grouped through another cluster.

It is observed that the cluster analysis also produces a good result classifying four variables into two clusters. Cluster 1 and Cluster 2 contain the variables of Control 2 and Control 1 respectively. We can conclude that the result of cluster analysis also establishes our designed financial controls.

8. CONCLUSIONS

Final result of our empirical study in connection with establishing our designed financial controls through application of factor and cluster analysis is as follows:

TABLE 14 - FINAL RESULT

Financial Control	Conceptual Frame Work	Factor Analysis		Cluster Analysis	
Financial Control 1	Government Grant	2	Government Grant	2	Government Grant
	Salary and Wages		Salary and Wages		Salary and Wages
Financial Control 2	Own Source	1	Own Source	1	Own Source
	Other Expenses		Other Expenses		Other Expenses

Management Research and Practice
Volume 5 Issue 3 / September 2013
ISSN 2067- 2462

The conceptual framework for financial controls specifying the elements of income and expenditure is an outcome of the analysis and improvement of the existing system of the Indian ULBs towards financial sustainability and this paper establishes our views with good result both in factor and cluster analysis where it is found that the constituent elements have possible associations and influence on financial control. It is considered that better financial control leads to better performance (Carvalho and Malaquias, 2012) and this has also been established in our earlier study. Therefore ULBs in India will not only be able to perform better but financial sustainability will also be ensured if our designed financial controls are adopted.

Our designed financial controls need planning for implementation. This empirical study indicates that such financial controls are inherent features of the Indian ULBs in planning and implementation process. Controlling authorities in India may think for adopting our basic concept within the legal framework in order to strengthen the implementation power of the management.

The approach outlined in this paper can also be applied to validate financial control as designed or to be designed by any organisation and this paper can also provide useful insights for officials of an ULB to examine their own finances and expenditure.

Our designed financial control is a conceptual framework in a broader aspect duly supported by empirical study. This research, through an empirical examination of each of the elements of financial control framework, will help the appropriate authorities in the decision making process to device more specific purpose control mechanism after examining wide range of data.

Our research is a combination of theoretical contributions and application of statistical techniques in the area of financial control for financial sustainability. The results of this chapter are supportive to theoretical contributions which may be useful for academics and managers because it enables them to understand the nature of future decisions involving these concepts more clearly (Carvalho and Malaquias, 2012).

REFERENCES

Abukhater A, 2009, Rethinking Planning Theory and Practice: "A Glimmer of Light for Prospects of Integrated Planning to Combat Complex Urban Realities", *Theoretical and Empirical Researches in Urban Management*, Vol. 2(11), May, 2009, pp. 64-79.

Bhattacharyya S and Bandyopadhyay G (2011), "Urban Local Bodies in India- Prudent Financial control Practices", *International Journal of Governmental Financial Management*, Vol XI, No.2, pp.33-49.

Bhattacharyya S and Bandyopadhyay G (2012), „Urban Local Lodies In India- Financial Control For Better Financial Performance" , *Theoretical And Empirical Researches In Urban Management*, Vol. 7, Issue 3, August, 2012, pp.24-37

Carvalho, C. J., Malaquias, R. F.*(2012):* "Internal Logistics, External Communication, Information Processing and Financial Control: An Analysis with Brazilian Micro and Small Industries"' *Journal of Operations and Supply Chain Management*, Volume 5, No.1, January – June, 2012, pp 31 – 44

Cluster Analysis, Chapter 16, downloaded from http://www.norusis.com/pdf/SPC_v13.pdf on 12.01.2012.

Cziráky D, Sambt J, Rovan J, Puljiz J (2006), "Regional development assessment: A structural equation approach"European Journal of Operational Research, Volume 174, Issue 1, Pages 427-442. De A, Bandyopadhyay G, Chakraborty B N (2011): "Application of the Factor Analysis on the Financial Ratios and Validation of the Results by the Cluster Analysis: An Empirical Study on the Indian Cement Industry", *Journal of Business Studies Quarterly 2011, Vol. 2, No. 3, pp. 13-31*

Ghosh A, Bandyopadhyay G, Choudhuri K (2011), "Forecasting BSE Sensex under Optimal Conditions: An Investigation Post Factor Analysis", *Journal of Business Studies Quarterly,* 2011, Vol. 3, No. 2, pp. 57-73

Hevesi A G, "Analysis of Fiscal Stress in New York State's Cities", A Research Series from the Office of the New York State Comptroller, Division of Local Government Services & Economic Development, http://www.osc.state.ny.us/localgov/pubs/research/citiesfiscalstress.pdf downloaded on 24.04.2012

Kumar R.N, Solanki R, Nirmal Kumar J.I (2012), Geochemistry of Sabarmati River and Kharicut Canal, Ahmedabad, Gujarat, *International Journal of Environmental Sciences*, Volume 2, No 4, 2012, pp. 1909- 1919.

Mandal U K (2005), A Functional Ecological Study of Municipal Towns in Nepal: A Factor Analysis Approach", *Tribhuban University Journal*, Vol XXV, No.1, July, 2005, pp. 45-60.

Mathur S (2011). Financing Community Facilities: "A Case Study of the Parks and Recreational General Obligation Bond Measure of San Jose, California", *Theoretical and Empirical Researches in Urban Management*, Vol. 2(11), May, 2009, pp. 34-49.

Molefe G. N, Roodt G and Schurink W.J High performance organisation: "A quantitative inquiry at a specific metropolitan municipality in the Gauteng Province", *African Journal of Business Management* Vol. 5(3), 4 February, 2011, pp. 699-712.

Nosoohi I & Hamdani A N (2011), „Urban Planning with the Aid of Factor Analysis Approach: The Case of Isfahan Municipality", Theoretical and Empirical Researches in Urban Management, Vol 8, Issue 1, February, 2011, pp. 56-69. Conning J. (1999), "Outreach sustainability and leverage in monitored and peer monitored lending", *Journal of Development Economics*, 60(1), pp. 51-77.

Skanavis C, Zacharaki P, Giannoulis C, Petreniti V (2011), "Education on Sustainable Development Based on Local Agenda 21", *Journal of Environmental Protection*, 2011, 2, pp. 371-378

mrp.ase.ro
Management Research and Practice
Volume 5 Issue 3 / September 2013
ISSN
2067- 2462