CHAPTER 1

RESEARCH DESIGN

1.1 Introduction

The system of local government is found in every nation as part of its administrative structure, whatever may be its economic system and whether its form of government is unitary or federal. In either case, local government is the lowest in the scheme and also the smallest in jurisdiction (Rao N R 1986: 22). Local governments are of two kinds, rural and urban. Both play an important role in the process of economic development.

1.2 Importance of Urban Local Governments in Economic Development

The importance of urban local governments stems from the crucial role of cities in economic development. 'Cities hold tremendous potential as engines of economic and social development, creating jobs and generating wealth through economies of scale. National economic growth and poverty reduction efforts will be increasingly determined by the productivity of cities and towns' (Kochhar and Ramchandran 2010: 47-48). Several authors have shown that economic development starts from, and is concentrated in, urban areas (Hirsch 1973: 4-5; Blakely and Bradshaw 2003: 159; Sreedharan 2001: 303-304).

Economic development can take place only when adequate infrastructure is available. The World Development Report, 1994, whose theme was 'Infrastructure for Development', observed that 'Infrastructure represents, if not the engine, then the "wheels" of economic activity'. This is because infrastructure services - including power, transport, telecommunications, provision of water and sanitation, and safe disposal of wastes - are central to the activities of households and to economic production… improving infrastructure services enhances welfare and fosters economic growth' (The World Bank 1994: 13-14). This Report showed that the role of infrastructure in economic development was more important in urban areas of developing countries, since it contributed to poverty reduction through generation of employment and also to environmental sustainability through provision of clean water and sanitation, non-polluting sources of power, safe disposal of solid waste and better management of heavy urban traffic (ibid: 2-4).
The quantity and quality of infrastructure available determine to a very large extent the growth of a city. The availability of infrastructure is becoming even more crucial because of the current worldwide trend towards globalization. Although theories about the effects of globalization on a local economy are still not fully developed, they do show that there is a considerable impact on cities due to the economic restructuring and movements of labour and capital that are fallout of the globalization process. Consequently there is at present increased competition between cities and city governments for domestic and external investments. Cities in many developing countries are at the centre of globalization and are being called upon to enhance their competitiveness and to respond to the challenge of the opening up of the national economies. Globalization has accelerated the demand for city-based infrastructure and services, and has led the local governments to innovate new financial and other partnership arrangements for meeting the increased infrastructure and service requirements’ (Mathur 1999: 234-235).

A similar argument points out that ‘cities, if they are to become more competitive and capable of providing necessary infrastructure and services in a decentralized environment, will need to become much smarter and more efficient... It will involve city governments partnering with community groups and leveraging capital and resources with the private and international sectors to deliver the services that increasingly urban communities have come to expect’ (Kochhar and Ramachandran 2010: 48).

In the globalized economies of the present, cities in developing countries with superior infrastructure are able to attract not just domestic but even international investment as manufacturing and service industries from developed countries move into developing countries in an attempt to cut costs. Therefore, urban local governments, whose primary function is the provision of infrastructural facilities in urban areas, assume tremendous importance in the whole process of economic development. One of the essential infrastructure services is an efficient urban road system.

1.3 Urban Roads

Roads are one of the vital components of the infrastructure in any urban area. Hardly any economic activity can take place without using the road network at some point. Roads in urban areas are vital for both economic development and social integration since they facilitate the conveyance of both goods and people. Global
competition has made the existence of efficient road transport and logistic systems an absolute imperative in the delivery chain. Easy accessibility, flexibility of operations, door-to-door service and reliability have earned road transport an increasingly higher share of both passenger and freight traffic as compared to other modes of transport (MORTH 2010: i).

As a city grows, the residential, employment, shopping and leisure facilities become increasingly dispersed. This creates the need for mechanical transport for getting from one place to another and hence the necessity of a comprehensive road network that connects all parts of a city to all other parts. An efficient system of roads enables citizens to save time and to travel safely and economically within the area of the city (Walker 1981: 103). If the road network does not keep pace with the needs of the population, it becomes a bottleneck that could slow down the growth of the city and eventually lead to a decline in economic activity.

In India, the provision of roads in a city is the responsibility of the urban local government. The length of roads and the quality of roads provided by the urban local government depend to a large extent on the funds that are made available for this purpose and how these funds are used. Thus expenditure on roads is a crucial factor in the provision of this important service.

This issue of how much expenditure is made on roads and the composition of this expenditure was sought to be studied by taking one urban local body and studying the trends and patterns in its expenditure on roads. The Pune Municipal Corporation was taken up for this study and the trends and patterns in its expenditure on roads during the period 1985-86 to 2008-09 were studied.

Plan of Chapter: The research problem is given in the next section, followed by its significance in Section 1.5. The next two sections (1.6 and 1.7) outline the objectives and hypotheses of this research. Section 1.8 describes the methodology used in this study, including the sources of data and the statistical techniques used to analyse the data. Section 1.9 gives the limitations of this study and Section 1.10 gives a brief outline of the chapter scheme used in this report.

1.4 Statement of the Research Problem

This study seeks to identify the amount of expenditure incurred on building and maintenance of roads by the Pune Municipal Corporation and the trends in that expenditure. Further, the study seeks to break up this expenditure into various activities like building of new roads, repair and maintenance, traffic control, street
lights, etc., to find the priorities assigned to each of these functions by the Corporation and to identify changes in the composition of the total expenditure over the period 1985-86 to 2008-09.

1.5 **Significance of the Study**

The development of Pune City has largely been due to the rapid industrialization in and around the city. If the city is to continue to develop, expansion of industries must continue. Proper transport facilities are a basic need of industry and other commercial activity. Availability of an efficient road system is an important factor in the location decision of firms.

The role of the local government in providing good roads therefore, becomes very important. The Pune Municipal Corporation is required to spend large amounts of funds on building and maintaining the road network in the city in order to ensure its continuing development.

The importance of this study lies in the fact that it analyses the trends in the expenditure on roads made by the Pune Municipal Corporation (PMC) and identifies the reasons for the growth or decline in the various kinds of expenditure made on roads. This research makes a study of the budgets of the Road Department of the PMC to understand what have been the priority functions of the Road Department and how resources have been distributed among the various functions during the period 1985-86 to 2008-09. This study also makes a forecast of the expenditure on roads which the Road Department is likely to make during the period 2009 - 10 to 2014 - 15.

This analysis of the trends in various items of expenditure on roads and the forecast could be useful to the Road Department of the Pune Municipal Corporation in making and implementing its budget in the coming years. The conclusions reached about expenditure on roads can be extended to the other departments of the Corporation as well as to other urban local governments.

1.6 **Objectives of the Study**

The subject of this research is to make a study of various aspects of the expenditure on roads incurred by the Pune Municipal Corporation during the period 1985-86 to 2008-09. The specific objectives of this study are:

1. To study the growth and trends in the budget and actual expenditure on roads made by the Pune Municipal Corporation during the period 1985-86 to 2008-2009.
2. To study the variation in the expenditure incurred on roads by the Pune Municipal Corporation between 1985-86 and 2008-09.

3. To study the budget utilisation (the percentage share of the budget actually spent) for the various types of expenditure on roads incurred by the Pune Municipal Corporation between 1985-86 and 2008-09.

4. To forecast the trend in the budget and actual expenditure on roads by the Pune Municipal Corporation for the period 2009-10 to 2014-15.

5. To study the composition of the budget and actual expenditure on roads made by the Pune Municipal Corporation during the period 1985-86 to 2008-09.

6. To find the priorities assigned to the various functions of the Road Development Department of the Pune Municipal Corporation over the period 1985-86 to 2008-09.

1.7 Hypotheses of the Study

Given the objectives mentioned above, relevant data was collected and analysed. Through this analysis, the study attempted to examine the following hypotheses:

1. The budget allocations for and actual expenditure on roads by the PMC have increased continuously throughout the period 1985-86 to 2008-09.

2. Expenditure on roads by the Pune Municipal Corporation will continue to grow in future.

3. Budget utilization for the expenditure on roads by the Pune Municipal Corporation has been low over the period 1985-86 to 2008-09.

4. The composition of the expenditure on roads by the Pune Municipal Corporation has changed over the period 1985-86 to 2008-09.

1.8 Research Methodology

This section describes the methods and techniques used for collecting and analysing the data for this research, which is a case study of the Pune Municipal Corporation.

1.8.1 Area of the Study

In order to study the expenditure on roads within a city by its local government, the city of Pune was selected purposively. Pune City is part of the Pune Urban Area or urban agglomeration as recognized by the Census of India, which consists of the two Corporations of Pune and Pimpri-Chinchwad, the three cantonments of Pune, Khadki and Dehu Road and a few semi-urban villages on the
periphery which together had an area of about 700 sq. kms and a population of 3.76 million in 2001 (DGCO 2007: 656). For this study, only the area of the Pune Municipal Corporation has been taken which was 243.84 sq. kms in 2010 (PMC 2010: 1). This is because the budget of the Pune Municipal Corporation is made with reference to the roads within this area. The roads in the Pune and Khadki Cantonment Board areas, which are adjacent to the Pune Municipal Corporation area, are built and maintained by those bodies.

The reasons for selecting Pune are as follows:

1. Pune is one of the rapidly growing cities in India and is currently the eighth largest city in the country (PMC 2009:1). The city has shown consistent progress in the cultural, economic, educational and professional areas. Since the city is still growing due to the rapid expansion in the software and information technology industries, it has an urgent and growing need for a better and larger road network. Therefore, providing an adequate network of roads becomes an important function for the Pune Municipal Corporation.

2. Pune can be taken to be representative of a large number of medium-sized cities in India. According to the 2001 Census, there were 35 cities in India with a population over 1 million. Of these, there were 7 cities with population over 4 million and 28 cities with population between 1 million and 4 million. The population of Pune City in 2001 was 2.54 million (censusindia.gov.in 2001) Thus Pune is similar in size to twenty seven other cities in different parts of the country, such as Kanpur, Jaipur, Faridabad, Ludhiana, Surat, Indore, Patna, Asansol, Vishakhapatnam, Kochi, etc. The problems and needs of all these cities are likely to be similar. Thus the conclusions arrived at from a study of the city of Pune could be relevant to these other cities.

3. The local government in Pune, the Pune Municipal Corporation, is a well established urban local government that is functioning as a Corporation since 1950 and before that, as a Municipality since 1858. Thus it has a long experience in the provision of public services.

1.8.2 Scope of the Study

The study is limited to the expenditure on roads by the Pune Municipal Corporation during the period 1985-86 to 2008-09. The Corporation provides various services like water supply, roads, primary and secondary education, conservancy, etc. Provision of all these services is an obligatory function of the Corporation. Of these, only the provision of roads was selected for the study. The Bombay Provincial
Municipal Corporation Act, 1949, lays down that ‘the construction, maintenance, alteration and improvement of public streets, bridges, subways, culverts, causeways and the like’ is an obligatory function of every Corporation in Maharashtra (GOM 1996: 44). Roads as a public service were selected because they are a very basic necessity, used by citizens every day, and therefore affect the quality of life of the people.

This study is limited only to the expenditure on roads. The income side of the budget is not considered.

The time period 1985-86 to 2008-09 was taken because the rapid growth of the city started during the 1980s (PMC 2005:3) hence demand for roads also increased from that time. The last year taken was 2008-09 since this was the last year for which actual expenditure data was available in the budget for 2010-11.

This study is concerned with the expenditure on roads made by the PMC alone. Expenditure on roads in Pune is also made through the Jawaharlal Nehru National Urban Renewal Mission (JNNURM), for which funds are received from the Central Government. This scheme has not been taken for this study as the JNNURM works through a separate cell with its own budget and secondly because this scheme started only in 2005-06.

1.8.3 Sources of Data
(a) **Secondary data** - This study is based primarily on secondary data, which was collected from the following sources.

1. **Budgets of the Pune Municipal Corporation:** The main source of the statistical data regarding the budget and actual expenditure on roads by the PMC was the Budgets of the PMC for the period 1985-86 to 2010-11. Expenditure figures were taken from the Revenue Expenditure and Capital Expenditure sections of the 'A' Budget of the PMC.

2. **Other publications of the PMC:** These included the Environmental Status Reports for various years, the Development Plans of the PMC, etc.


4. **Government of Maharashtra Reports:** The Economic Survey of Maharashtra for various years and the District Socio-Economic Review of Pune District, both

5. Census Reports: The two reports of the Census organization referred were the District Census Handbook of Pune District (Town and Village Directory) of the 2001 Census and the Administrative Atlas of Maharashtra, also of the 2001 Census.

6. Books: Published research in the area of urban local government finance was referred for the review of literature. The theoretical framework was taken from books on Public Economics, Public Choice, Local Government Economics, Urban Transport Systems, etc.

7. Journals: Journal articles were referred to both for the review of literature and theoretical framework. Some of the journals used were the Journal of Political Economy (various volumes), The Quarterly Journal of Economics, Review of Economics and Statistics, Economic and Political Weekly, etc.

8. Ph.D. Theses and M. Phil dissertations: Theses and dissertations on related areas of research such as finances of urban local governments and road transport were referred to for the review of literature.

9. Websites: The website of the Census of India 2011 was referred to for the population data of the 2011 census.

(b) Primary data - Some background information was collected from primary sources. This included information about the organization structure and working of the Road Department, information about the budget making process and the tender issuing process at the Road Department of the PMC. This information was given by the Assistant Engineers and Junior Engineers in the Road Department, the staff of the Accounts Section within the Road Department and the Budget Section in the office of the Chief Accountant of the PMC.

1.8.4 Analysis Techniques

The data about the expenditure on roads by the PMC collected from its budgets was analyzed using the following statistical tools.

1. Annual Growth Rate

The annual growth rate was found for the expenditure on each item of the expenditure on roads. Annual growth rate was found by using the following formula:

\[
\text{Annual Growth Rate} = \frac{T_2 - T_1}{T_1} \times 100
\]
Where $T_2 =$ Expenditure in year 2 \hspace{1em} $T_1 =$ Expenditure in year 1

The annual growth rate shows the growth of expenditure in each year as compared to the expenditure in the previous year. This growth rate clearly shows the increase and decrease in expenditure on a particular item from year to year. It shows the magnitude of the increase or decrease not in absolute terms, but in terms of a percentage. This makes it possible to compare annual growth rates for the same item over a number of years as well as to compare annual growth rates across various items of expenditure (Levin 1984: 662).

2. **Compound annual growth rate (CAGR)**

Annual growth rates showed the growth from one year to the next, but it was also necessary to find the overall growth in the expenditure on various items over the entire period. This overall growth is shown by the compound annual growth rate, which gives just one figure to show the growth in a variable over a period of time. This makes it easy to understand the magnitude of growth in a time series and also makes it possible to compare the growth of two or more variables in the same period of time.

The CAGR is the year-over-year growth rate of any variable over a specified period of time. Thus it is an *average* growth rate over a period of several years. It is a geometric average of annual growth rates. It is given by the formula:

$$CAGR = \left( \frac{\text{Ending Value}}{\text{Starting Value}} \right)^{\frac{1}{n}} - 1$$

The CAGR needs to be used because arithmetic averaging of annual growth rates gives incorrect results. A geometric average gives the correct answer.

The CAGR is also called a smoothed rate of return because it measures the growth in any variable such as sales or an investment *as if* it had grown at a steady rate on an annually compounded basis. The CAGR dampens the effect of fluctuations in the values of a time series that makes arithmetic means irrelevant.

**Strengths:** It is a useful formula to evaluate growth in a time series as it gives a single figure growth rate for the entire period. Therefore, it can be used for comparing growth between two series.

**Limitations:** CAGR assumes that the variable grew at a steady rate. In reality, there is volatility, which is ignored because it takes into account only the starting value and ending value (Levin 1984: 74-75).
Therefore, another measure of growth was required which would be based on each value of the time series. For this, the trend was calculated for the expenditure on each item.

3. Trend

The annual growth rates for most of the items of expenditure showed extreme variation (i.e., increase and decrease) in several years so that it was not clear whether the expenditure on the whole was increasing or decreasing. To find this, a trend line was fitted to the budget and actual expenditure figures, which showed the overall direction in which the budget and actual expenditure were moving.

To find the trend the entire period of the study of 24 years was divided into two equal periods of 12 years each. Thus the first period was from 1985-86 to 1996-97 and the second period was from 1997-98 to 2008-09. This was done because the expenditure figures which were taken at current prices showed a very large disparity between the beginning and end of the study period and hence could not be compared. When divided into two parts, the figures became more consistent and it was possible to fit a trend line which was more accurate. Moreover, as can be seen from the graphs in Chapters 6 and 7, several items presented differing trends in each of the sub-periods, which became clear when the data was divided into two parts.

Method used for finding the trend - Finding the trend of a data set spanning several years is done through the statistical technique known as Time Series Analysis. Any statistical information accumulated at regular intervals over a period of time is known as a time series. Time Series Analysis is the quantitative method used to determine patterns in the data collected over time, such as the data on planned and actual expenditure being studied here.

There are four kinds of changes, or variations, involved in time series, viz. secular trend, cyclical fluctuation, seasonal variation and irregular or erratic variation. Of these four components of a time series, secular trend represents the long term direction of the series. This long term direction in which the data is moving is shown by the trend line (Levin 1984: 662-665).

The technique used to find such a line is the Regression Analysis that enables a straight line to be drawn through the various actual data points which may show a scattered pattern on a graph. Hence it is also called the estimating line because it gives estimated values for every actual value (Gupta 2000: 585).
In regression analysis, there are two variables, an independent variable and a dependent variable. The equation for a straight line where the dependent variable $Y$ is determined by the independent variable $X$ is

$$Y = a + bx$$

Where

- $Y$ = estimated value of the dependent variable
- $X$ = value of the independent variable (time in trend analysis)
- $a$ = the Y intercept (value of $Y$ when $X = 0$)
- $b$ = Slope of the trend line.

This straight line can describe the general trend of a time series. However, the trend line, to be representative of the actual data set, must lie as close as possible to the actual data points when plotted on a graph. Such a line is known as the line of best fit. This line of best fit is given by the Least Squares Method. The line of best fit is a line that minimizes the error (distance) between the estimated points on the trend line and the actual observed points that were used to draw it (ibid: 589).

The estimated points are symbolized by $Y$. Accordingly, the equation for the estimating line (trend line) is

$$Y = a + bx$$

Statisticians have derived two equations to find the slope and the Y - intercept of the best fitting regression line. The slope of the estimating line ($b$) is given by

$$b = \frac{\sum XY - n \bar{X} \bar{Y}}{\sum X^2 - n \bar{X}^2}$$

Where

- $b$ = slope of the best fitting estimating line.
- $X$ = values of the independent variable.
- $Y$ = values of the dependent variable.
- $X$ = mean of the values of the independent variable.
- $Y$ = mean of the values of the dependent variable.
- $n$ = number of data points.

The formula for the Y - intercept of the estimating line is

$$a = Y - bX$$
Where

\[ a = \text{the } Y \text{- intercept} \]

\[ b = \text{slope (as calculated using above formula)} \]

\[ Y = \text{mean of the values of the dependent variable} \]

\[ X = \text{mean of the values of the independent variable (Levin 1984: 504).} \]

With these two equations, the best fitting regression line for any two - variable set of data points can be found. This line does not pass through the actual data points. The distance between the actual data points and the new points on the estimating line is known as the error in the estimate. Since the estimating line arrived at using above formula in a straight line that minimizes the sum of the squares of the errors, this method is known as the Least Squares Method (ibid: 503).

In the present study this method has been used to find the trend lines for both the budget and actual expenditure figures for each item of expenditure. Finding the trend was necessary because very high variation in the annual growth rates was observed for all items of expenditure on roads.

Importance of Trend Analysis -

a) Estimating the secular (long term) trend allows the patterns in the data set to be revealed. Especially when there is a large amount of variation in the data, the direction in which it is moving does not become easily apparent. Fitting a trend line helps in identifying the general direction (up or down) in which the variable is moving, even though its movement is characterized by many ups and downs.

b) Estimating the secular trend makes it possible to project past patterns into the future, i.e., it becomes possible to forecast future values of the variable being studied. Having an accurate forecast is useful in making plans for future periods (ibid: 665).

4. **Forecast**

Once the trend equation was developed, it became possible to make a forecast for the planned and actual expenditure on roads. The same formula used for estimating the trend line was used, only changing the value of X.

\[ Y = a + bX \]

Where

\[ Y = \text{forecast value of variable} \]

\[ X = \text{number of the time period} \]

\[ a = \text{Y intercept} \]
b = slope of the estimating line (ibid: 670).

In the case of time series data, X, the independent variable, is the time. Therefore, for estimating the trend value in the first year (1985-86 for this study), the value of X was taken as 1 and so on up to the last year (2008-09) when the value of X = 24. To make the forecast for the next period, the value of X was taken as 25. The result was the forecast of the budget or actual expenditure for 2009-10. The same procedure was repeated to get the forecast for each item of expenditure up to 2014-15.

In forecasting future values of any variable based on the projection of past trends, it is implicitly assumed that the various factors affecting the data in the past will remain unchanged in the future (Levin 1984: 696).

5. **Standard Error of Estimate and Approximate Prediction Intervals.**

Having constructed a trend line, it becomes necessary to find how accurate it is. The Standard Error of Estimate is used to measure the reliability of the estimating equation. The standard error is symbolized by Se and, like the standard deviation, is a measure of dispersion. The standard error of estimate measures the variability, or scatter, of the observed values around the regression line. It is calculated using the following formula.

\[
Se = \frac{\sum (Y-Y)^2}{n}
\]

Where

- \(Y\) = values of the dependent variable.
- \(Y\) = estimated values from the estimating equation that correspond to each \(Y\) value.
- \(n\) = number of data points used to fit the regression line (Gupta 2000: 592)

Thus the standard error of estimate gives us the average value of all the errors, i.e., the average of the difference between the actual values and estimated values. Obviously, the larger the standard error of estimate, the further the actual points are from the estimated points on the trend line and therefore, the line becomes less accurate. The smaller the error, the more accurate is the estimating or trend line.

This concept is further extended to show the reliability of the trend line by assuming that the observed points are normally distributed around the trend line. Using the rules of the normal distribution, it may be said that 68% of the actual data points can be expected to lie within \(\pm 1\) Se (plus and minus one standard error of estimate), 95.5% of the points within \(\pm 2\) Se and 99.7% of the actual points will lie within \(\pm 3\) Se (Levin 1984: 512).
Taking this concept of the standard error of estimate further, it can also be applied to the forecast which is based on the trend line and therefore has the same standard error of estimate. The forecast is only an estimate, but using the standard error, the range within which the actual value of the variable will lie can be predicted. Since it is assumed that there a 95.5% probability that the actual data point will lie within $\pm 2 \text{Se}$, an upper limit and a lower limit within which the actual value of the variable will lie during the period of the forecast can be predicted. This range is known as the Approximate Prediction Interval. For most practical purposes the approximate prediction interval is calculated using a range of two standard errors of estimate. Thus the two limits are given by the following formula.

Upper limit = $Y + 2 \text{Se}$
Lower Limit = $Y - 2 \text{Se}$

Where $Y$ = the estimate or forecast value

$\text{Se}$ = the value of the standard error of estimate (ibid: 514).

The upper and lower limits for the forecast of the budget and actual expenditure for this study have been calculated using the above method.

6. Average

The average or mean value of a set of data points is the simple arithmetic mean, which is given by the sum of the values of a variable divided by the number of observations.

The arithmetic mean as a single number representing a whole data set has important advantages. Its concept is familiar and easy to understand. But its real importance is that it is useful in comparing different data sets which have different values of a variable (ibid: 62-68).

This simple average has been used at various places in this study. The average amount budgeted and actually spent, the average rate of growth and the average budget utilization have been calculated for each item of expenditure. Further, the 24-year period was broken up into six sub-periods of four years each and the average of the expenditure in these four years was used as a single measure for further analysis.

7. Percentage

Expressing any ratio or fraction as a percentage has several advantages. Firstly, it becomes easier to understand the magnitude of any variable and secondly, percentages make it easier to compare two or more figures than in their absolute amounts.
This study has made use of percentages for finding the relative share of each item of expenditure out of the total expenditure for that year rather than using the actual amount in Rupees. Expressing expenditure in percentage terms made it easy to compare the share of various items in the total expenditure for one particular sub-period and also to compare the share of one item in the total expenditure over several years.

8. Coefficient of Variation

The dispersion or variability in a data set is measured by the coefficient of variation. The variability in a data set is an important characteristic of the data that enables the identification of patterns in the data and also enables comparison between various data sets. In the case of the present study, it was important to understand the variation in the data since this variation is linked to the degree of discretion the Road Department has in allocating resources to different heads of expenditure and in actually spending these funds. For those heads where the Road Department has committed certain expenditure, such as salaries, there is less discretion to vary the expenditure from year to year. Where there is no such compulsion, the Road Department is able to increase or decrease the expenditure according to the need or prevailing circumstances. Therefore, the variability in the expenditure can be linked to the flexibility in making the budget and actual expenditure by the Road Department. Secondly, the variability in the expenditure on a particular head shows the pattern of expenditure on that head. The expenditure may show a rising trend, but whether that growth is smooth or characterised by many ups and downs is shown by its variance.

Variability in a data set can be measured statistically by using the standard deviation, which shows the average deviation of each item of data from the mean or average of the entire data set. But the standard deviation is an absolute measure of dispersion that expresses variation in the same unit as the original data and hence is less useful for comparison of the variability in two or more sets of data. In order to avoid this problem, a relative measure of dispersion is more useful, which gives the magnitude of the deviation relative to the magnitude of the mean (ibid: 113). One such relative measure of dispersion is the coefficient of variation. It relates the standard deviation and the mean of a data set by expressing the standard deviation as a percentage of the mean. The unit of measurement, therefore, is ‘percent’ rather than
the same unit as the original data. The coefficient of variation is arrived at by using the following formula.

\[
\text{Coefficient of Variation} = \frac{\sigma}{\bar{x}}
\]

Where \(\sigma\) = standard deviation of the data set

\(\bar{x}\) = mean of the data set.

The advantage of this measure is that it shows relative variation more accurately than the standard deviation. Whereas the trend shows the direction in which the data is moving, the coefficient of variation shows the extent or magnitude of the ups and downs in the movement of the data. Therefore, the larger the coefficient of variation, the larger is the variation (increase and decrease) in the data (ibid: 126).

9. **Ranking**

A ranking is a relationship between a set of items such that, for any two items, the first is either ranked higher than, ranked lower than or ranked equal to the second.

By reducing detailed measures to a sequence of ordinal numbers, rankings make it possible to evaluate complex information according to certain criteria. Various ranking methods are available in statistics, out of which ordinal ranking has been used here. In ordinal ranking, all items receive distinct ordinal numbers, including items that are equal.

In this research, the various items of expenditure on roads have been clubbed to represent certain basic functions of the Road Department and these functions have been ranked based on their share in the total expenditure during successive four-year periods. The function with the highest share out of the total expenditure has been ranked first; the function with the next largest share has been ranked second and so on.

The purpose of ranking various functions in this way was to ascertain the importance or priority assigned to each function by the Road Department over the period selected for study. It has been assumed that those heads of expenditure, which were important or necessary at a given point of time, were allocated more funds in both the budget and actual expenditure. Thus the rank of each function has been taken to represent the priority accorded to it by the Road Department at a particular point of time (Dillon, Madden and Firtle 1990: 334).

1.9 **Limitations of the study**
1. The main limitation of the study is that the budget and actual expenditure figures have been used at current prices for each of the years 1985-86 to 2008-09. Due to this, there was a huge disparity in the budget and actual expenditure at the beginning and end of the study period. Looking at the budget and expenditure figures at current prices makes the growth in these figures appear much higher than it really was since there is the element of inflation included in the figures. If the inflation component had been removed, i.e., expenditure had been taken at constant prices, the real growth in the budget and actual expenditure could have been seen.

2. This study has only analysed the amount of funds spent on roads by the PMC during the period 1985-86 to 2008-09. To find out the outcome/result of this expenditure, i.e., how many kilometers of roads were built or repaired, etc., the actual length of roads built, repaired, developed, etc., was required. However, this information was not provided by the Road Department of the PMC and hence this exercise could not be carried out.

1.10 Chapter Scheme

The subject matter of this research has been divided into nine chapters as follows:

1. The research design adopted for this study is given in the first chapter. The research problem taken up for study, the specific objectives of the study and hypotheses that are to be verified are given, followed by the methodology used to achieve the objectives. The methodology includes the area and scope of the study, the data collection and analysis techniques used and finally the proposed chapter scheme.

2. The review of literature carried out to understand the kind of studies previously done in related areas is presented in Chapter 2. The literature referred to has been divided into two parts, (a) the studies relating to urban local finance and (b) studies related to roads. In each of these sections, brief reviews of various books, journals, M. Phil and Ph. D theses and reports of certain organizations have been given.

3. The third chapter describes the area of the study, i.e., Pune city. The history of the city, its geographical features, its development over the past several decades and other characteristics are described. The second part of this chapter describes the establishment and growth of the Pune Municipal Corporation, its structure and functions, its income & expenditure, etc. The organization structure and functions of the Road Department, the budget making process and the process of issuing and approving tenders are briefly described.
4. Chapter 4 is the first of the three chapters in which the collected data has been analysed. In this chapter, the revenue expenditure on roads by the PMC has been arranged item wise. For each item, the budget and actual expenditure figures for the period 1985-86 are given, along with their annual growth rates and overall trend. The utilization of the budget and the variation in the budget and actual expenditure has been analyzed and a forecast of the revenue expenditure for the period 2009-10 to 2014-15 has been made.

5. A similar analysis of capital expenditure on roads by the PMC during the period 1985-86 to 2008-09 has been given in this chapter.

6. In Chapter 6, the data on expenditure on roads by PMC is given year-wise, to study the changes in the composition of total expenditure incurred each year from 1985-86 to 2008-09. The composition of the expenditure has been analyzed by finding the percentage share of each item in the total expenditure. In the second part of this chapter, a functional analysis of the expenditure has been presented.

7. The theoretical framework on which this study of expenditure on roads by an urban local government is based is described in Chapter 7. Various theories of public expenditure, theories related to the functioning of local government, decentralization of government functions and theories of public choice are described. The second part of this chapter, the theoretical analysis, relates these theories to the present study.

8. The last chapter presents the findings and conclusions derived from the analysis of data and this is followed by the testing of the hypotheses this study started out with. The report concludes with a few suggestions for improving the budget process for the Road Department of the PMC.

1.11 Conclusion:

The research methods used to collect and analyze the data in order to achieve the objectives of this study have been described in this chapter. An important input for carrying out this research was the insight that came from reviewing earlier studies on related subjects. A survey of this literature is given in the next chapter.
References


