DATA SOURCES AND METHODOLOGY FOR MEASUREMENT

This chapter is devoted to discuss the sources of data, selected variables, time period, and techniques of data analysis and limitations of this study.

3.1 NEED FOR THE STUDY
From the brief review of literature, it is clear that there were several studies conducted by different aspects of small scale industries at International, National and State level but this empirical work is different from previous studies because most of studies are confined to growth of small scale industries only. Most of the important aspects like productivity, employment elasticity, output elasticity, effect of domestic inflation on export performance, impact of labour productivity on state Per capita income and role of Small Scale Industries in State Gross Domestic Product have been ignored by researchers. This study is somewhat unique in the sense that so far no study has been conducted on selected aspects of small scale industries at state level during the selected reference period.

3.2 OBJECTIVES OF THE STUDY
The main objective of the present study is to empirically examine how small scale industries during the selected period of our study have contributed to economic development of Punjab by contributing towards Employment Generation, Export Promotion and role in raising State Gross Domestic Product and explore the relationship between Small Scale Industries and Economic Development during the period 1990 to 2010 in selected state Punjab. In this Endeavour, our objectives in the present study can be classified as follows:

1. To analyze the growth and performance of Small Scale Industries in Punjab in terms of Number of SSI units, fixed Investment, Employment and Production
2. To examine the Partial Productivity, Total Factor Productivity and Production Function of Small Scale Industries in Punjab.
3. To analyze the Impact of Domestic Inflation and Domestic Demand on Export Performance of Small Scale Industries of Punjab.
4. To observe the role of Small Scale Industries in Industrial Development of Punjab.
5. To study the Impact of Labour Productivity of Small scale Industries on State Per Capita Income of Punjab.
6. To investigate the causality between Small Scale Industries growth and Economic Development of Punjab.

3.3 HYPOTHESES
The present study is guided by testing of the following hypotheses:

1. There is significant Growth of Small Scale Industries in Punjab in terms of Production, Employment, fixed Investment, Number of Units and Export
2. There is significant growth of Partial and Total Factor Productivity of Small Scale Industries.
3. There is significant negative Impact of Domestic Inflation and Domestic Demand on Export Performance of Small Scale Industries.
4. There is Unidirectional Causal relationship between SSI (Small Scale Industries) Growth and Economic development in Punjab.
5. There is significant role of Small Scale Industries in Economic Development of Punjab.

3.4 SOURCES OF DATA
This study focuses on descriptive approach. This is the research work about, how SSI plays an important role in the Economic Development of Punjab State. This study depends on quantitative research design, because quantitative research is an excellent way of finalizing results and proving or disproving the hypothesis. The study is based on time series data. To access different aspects and characteristics of small scale industries in Punjab, this study utilized secondary data, published by various Government Agencies. Especially secondary data is collected from various reports and publication of development commissioner (MSME), Ministry of Micro, Small and Medium Enterprises, New Delhi, annual survey of industries, Directorate of industries of Punjab, Statistical abstract of Punjab and various issue of Economic survey of Punjab. The data for price Index is taken from office of Economic Adviser, Ministry of Industry.
3.5 Variables of Study
The different variables of this study are Number of SSI units, Production, Employment, fixed Investment, SSI Export, Total Industrial- Production, Employment, Fixed Investment, Units, Per-capita Income and Gross State Domestic Product at constant prices by using suitable deflator. The wholesale price index of manufactured product is used for deflating output and whole sale price index of machinery and machine tools for deflating capital stock.

3.6 Reference Period
The reference period of this study is restricted to 1990 to 2010. The study is based on the data collected for only 21 years. The time span of Twenty one year is considered long enough to record structural changes and growth of the industry. This study covers almost post reform period.

3.7 Methods of Analysis of Data
3.7.1 Growth Rate
Compound annual growth Rates (CAGRs) is estimated by fitting an exponential function of the following form:

\[ Y_t = \beta_0 + \beta_1 e^{Ut} \]  

Where \( Y_t \) is the dependent variable, \( \beta_0 \) and \( \beta_1 \) are the unknown parameters, and \( Ut \) is the disturbance term. Equation (1) could be written in the logarithmic form as follows:

\[ \log Y_t = \log \beta_0 + t \log \beta_1 + Ut \]  

Above equation was estimated by applying Ordinary Least Square Method and Compound Rate of growth (grc) was obtained by taking antilog of the estimated Regression Coefficient, subtracting 1 from it and multiplying the difference by 100, as follows:

\[ \text{grc} = (\text{anti log } b_1 - 1) \times 100 \]  

Where \( b_1 \) is an estimate for \( \beta_1 \). The significance of growth rates was tested by applying \( t \)-test, given as follows.

\[ t = \frac{b_1}{s(b_1)} \sim t(n-2) \text{ d f} \]  

Where \( b_1 \) is the regression estimate and \( s(b_1) \) is the respective standard error.
3.7.2 Measurement of Partial and Total Factor Productivity

Partial Capital Productivity is obtained by dividing the Index of output by Index of Capital
Partial Labour Productivity is calculated by dividing the Index of Output by Index of Labour.
Total Factor Productivity is estimated by dividing the index of output by Index of combined input.

Capital Intensity is measured as the ratio of gross fixed capital to labour input. Higher the value of capital intensity shows improvement in mechanization and lower value of capital intensity indicates lower level of technological inputs used in production process.

Parametric production function approach is also used for productivity measurement. The Cobb Douglas and CES (Constant Elasticity of Substitution) production function are selected for this purpose.

3.7.3 Causal Relation
The Granger Causality test is used to check the causal relationship among different selected Parameters.

To check the impact of Small Scale Industries development on Economic Development of Punjab, this study also used two variable and Multi-variable regression models.

3.8 Limitation of the Study
The main limitations of the study are:

1. This study used employment as labour input.
2. Due to the lack of firm level data, present study covered only aggregate data at industry level.
3. Due to non availability of the data on working capital and invested capital, this study used only capital stock as a measure of capital input.
4. This study covered only post reform period.

3.9 Organization of the Study
The entire study has been divided into nine chapters. First chapter introduces the study by stating the significance and importance of the small scale industries in the national and state level, the chapter also provides a brief profile of Punjab Economy.
**Chapter Second** makes attempt to review the existing theoretical and empirical studies made by various researchers.

**Chapter Third** is devoted to the methodological foundation of the various statistical measures adopted in analyzing different aspects of the Industry.

**Chapter Four** presents the growth and performance of selected parameters of small scale industries.

Economic efficiency of Industry in terms of Partial labour productivity, Partial capital productivity and total factor productivity, return to scale and technological progress of small scale industries have been examined in **Chapter Five**.

**Chapter Six** is devoted to an assessment of Performance of the export sector of Industry and Impact of Domestic Inflation and Domestic Demand on Export Performance of Small Scale Industries.

**Chapter Seven** is related with role of Small Scale Industries in Industrial development of Punjab.

**Chapter Eight** comprises of the empirical analysis of Impact of small scale industries on economic development of Punjab.

Concluding observation and policy recommendation are presented in **Chapter Nine**.