REPORT

"Survey On Performance Appraisal Training and Development in Small Scale Industries"

(Sponsored by Dept. of Science and Technology, Govt. of India)

January 2005

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Abbreviations

BEL	Bharath Electronics Limited
BEML	Bharath Earth Movers Limited
BHEL	Bharath Heavy Electricals Limited
CII	Confederation of Indian Industry
CSIC	Council for Scientific and Industrial Consultancy
CSIR	Council for Scientific and Industrial Research
DCSSI	Development Commission for Small Scale Industries
DIC	Directorate of Industries and Commerce
DST	Department of Science and Technology
EDII	The Entrepreneurship Development Institute of India
EOU	Export Oriented Unit
FKCCI	Federation of Karnataka Chambers of Commerce and Industry
FTI	Foreman Training Institute
GDP	Gross Domestic Product
GOI	Government of India
GOK	Government of Karnataka
GTTC	Government Tool Room and Training Center
HUDCO	Housing and Urban Development Corporation Limited
IISc	Indian Institute of Science
ILO	International Labour Organisation
ISO	International Organisation for Standardization
KASSIA	Karnataka Small Scale Industries Association
KCTU	Karnataka Council for Technology Up gradation
KSCST	Karnataka State Council for Technology Up gradation
KSFC	Karnataka State Finance Corporation
KSSIDC	Karnataka Small Scale Industries Development Corporation
NABARD	National Bank for Agriculture and Rural Development
NIESBUD	The National Institute for Entrepreneurship and Small Business Development
NIQR	National Institute for Quality and Reliability
NISIET	The National Institute for Small Industry Extension and Training
NSIC	National Small Industries Corporation
NTTF	Nettur Technical Training Foundation
OECD	Organization for Economic Co-operation and Development
RTCs	Regional Testing Centers
SIDBI	Small Industries Development Bank of India
SIDO	Small Industries Development Organization
SISI	Small Industries Service Institute

SMEs	Small and Medium Enterprises
SSI	Small Scale Industry
SSIs	Small Scale Industries
SSIDCs	State Small Industries Development Corporations
STEP	Science and Technology Entrepreneurship Park
TBSE	Technology Bureau for Small Enterprises
TCOs	Technical Consultancy Organizations
WTO	World Trade Organization

PREFACE

Small Scale Industries (SSIs) play a major role in the economic development of a country owing to their significant contributions made to National Income, Employment, Export, Innovation and Developmental activities. Traditionally, they produce certain specialised items for which they enjoy virtual monopoly of skill and expertise developed over the years. Despite the lack of universal quantitative norms, the SSIs as a class are clearly distinguishable in any country, developing or developed.

Globalization has thrown many challenges to SSIs. On one hand, the individual SSIs are fiercely competing with each other within the nation and beyond, and on the other, they are pushed to collaborate and work together than ever before to safeguard their own interests to survive. The threat has been one of the most important aspects of the larger competitive challenges posed to the SSIs by accelerated technological change, globalisation and liberalisation. The pace of change is so rapid, and its scope so wide, that some analysts see the emergence of a new technological paradigm.

The SSI sector plays an important role particularly in India's socio-economic development. It contributes significantly to the overall growth of Indian economy in terms of Gross Domestic Product (GDP), employment generation and exports. The SSI is a key to India's growth and alleviation of poverty and unemployment in the country. Therefore, promotion of such enterprises in developing economies like India is of paramount importance since it brings about entrepreneurial development, employment and a host of other positive, economic uplifting factors.

The SSIs in the country are facing a host of problems, including technological obsolescence and inferior quality of products. A majority of these firms need to

undertake technology up-gradation and modernization programmes for their units in order to remain competitive. All these imply that the future performance of SSI will depend on its own competitiveness in terms of price and quality more than anything else. Thus, competitiveness of SSIs has reached the central focus of attention, having implications for its own future as well as for the future economic development of the country. One of the most important factors in capacity building for improved competitiveness of SSIs is through technology upgradation.

The Government of India has recognized the technology gap existing in Indian small-scale industries and has launched a number of technology up-gradation and modernization programmes to bridge this gap. The need to apply modern efficient and relevant technology in order to survive in an increasingly competitive environment has never been so urgent. It is often stated that globalization and liberalization have opened new opportunities for firms in developing countries to acquire technology from abroad and that increased competitiveness in technology markets has made technologies cheaper and more accessible.

Most of the researchers are of the opinion that technological changes are accompanied by changes in skill requirements. This is particularly true of the changes associated with the adoption of the new advanced technologies that are being implemented in the manufacturing sector. Firms that adopt advanced manufacturing technologies require a skilled workforce. When existing skill sets are not adequate, firms can either hire more qualified workers or they can increase the skill levels of existing employees through training. While hiring skilled workers is essential in many situations, training is clearly an important complement, even for those who have already acquired skills earlier.

It becomes very important to assess the level of technology adoption and its implications in SSIs and other related factor like human resource management

practices in Indian context. It is precisely with these objectives that the current study has been undertaken with reference to small mechanical manufacturing industries in Karnataka state with the support of Department of Science and Technology, Government of India under its NSTMIS Scheme.

From the study, it is very heartening to note that Small mechanical manufacturing firms are aware of the benefits of advanced manufacturing technologies and majority of them are of the opinion that it can be adopted in the small scale sector in Indian scenario to compete in global market. Another significant observation from the study is, a key activity like training in general has been seen as one of the very important factors. Majority of the firms are using training need assessment methods. An overwhelming number of firms have reaped the benefits of training and feel that training is a continuous process.

I would like to place it on record my humble gratitude to the Department of Science and Technology, Govt.of India, New Delhi and Dr.Lakshman Prasad, Advisor and Head, NSTMIS for the financial support as also occasional suggestions extended to this research project. I would also like to thank Sri.Parveen Arora, Scientist-F, Department of Science and Technology, Govt.of India, New Delhi who has been kind enough to make all the qualitative suggestions throughout the duration of the Project.

The role played by Dr.A.N.N Murthy, CEO, JSSATE-STEP has been of greater significance. In fact, Dr.Murthy has been a great source of support who provided immense encouragement to me throughout the execution of the Project.

The Project was undertaken through Department of Industrial Engineering and Management, JSS Academy of Technical Education, Bangalore. Prof.B.T.Nijaguna, former Principal, Dr.A.N.N Murthy, Principal and all other staff members of JSS

Academy of Technical Education have been very co-operative and cordial at every stage of my project work. I am indeed grateful to all of them.

The Project got full co-operation and support from Department of Science and Technology, Govt.of India, Karnataka small-scale industries association (Kassia), Directorate of Industries and Commerce (DIC), Govt.of Karnataka, Bangalore. This has facilitated smooth progress and completion of the research project.

I express my deep gratitude to Sri.M.Vishwanath, Additional Director (Small Scale Industries), Department of Industries and Commerce, Govt.of Karnataka, for his invaluable suggestions and supportive contributions throughout the implementation of the project.

Dr.K.V.A Balaji, Asst.Professor, SJCE, Mysore, helped me whenever I approached him for discussion of certain important issues related to the Project. His views and suggestions have greatly helped in strengthening the project work.

The role-played by Dr.H.M.Marulasiddaiah, Social Scientist, Bangalore, in the evaluation of the draft report and his contribution to its improvement through comments and suggestions was significant.

The contributions of Dr.M.H.Balasubrahmanya, Associate Professor, Dept.of Management studies, IIsc, Bangalore, Sri.I.S.Mruthyunjaya, Ex-President. Kassia, Sri.K.N Jayalingappa, Ex-President, FKCCI, Dr. M.Shiva murthy, Hon.Director, APPSTAR CENTRE, Bangalore, have been extremely helpful in the smooth progress of the Project.

I would also like to acknowledge the co-operation from the HOD and all other Staff members of the Department of Industrial Engineering and Management, JSSATE particularly Sri.Jagadish Babu, Sri.B.D.Madan Kumar, Sri. A.J.Shiva Kumar, Sri.T.J.Jithendra throughout the duration of the research project.

I am also indebted to Sri.Prasad.P, Documentation Specialist who has contributed qualitatively for the layout and Design of the Project Report. Ms.Chaitra, Dept.of CSE, has contributed immensely for the design and development of the database, by giving a highly noteworthy support and in fact, she has really toiled hard to map out the different and complex requirements to strengthen the Project in a commendable way.

I would also like to acknowledge the efforts put forth by Sri.Anantha Padbhanabha, Cranes Software Ltd., on the Statistical analysis aspects of the data.

The process of literature searching and survey, collection of data and its tabulation is a highly tedious one. My Research assistant Sri.Pradeep.N has done this job very sincerely and meticulously. He has contributed wholeheartedly and has given an in-depth dimension to this research project. His efforts have been really commendable. I am indeed highly indebted to him.

Finally, but most importantly, I am indebted to all the small-scale industry entrepreneurs/owners and managers who have taken their precious time to provide us with the invaluable data. But for their generous support, this research project could not have been completed.

I express my deep sense of gratitude to all those who have helped me directly and indirectly in carrying out this research work.

Sri.D.R.Swamy

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Chapter 1

Introduction

1.1 Background

Small Scale Industries are a vibrant and important sector of the Indian economy. It makes significant contributions to the annual GDP, exports and employment. The small-scale sector in India has, over the years, recorded an impressive performance in terms of range of items produced, contribution to Value Added in the industrial sector, contribution to exports and contribution to employment. Performance of the small-scale sector, which forms a part of total industrial sector, therefore, has direct impact on the growth of the national economy.

The Small Scale Industry (SSI) today constitutes a very important segment of the Indian economy. Small Scale Sector has emerged as a dynamic and vibrant sector of the economy. Today, it accounts for nearly 35% of the gross value of output in the manufacturing sector and over 40% of the total exports from the country. In terms of value added this sector accounts for about 40% of the value added in the manufacturing sector. (Sebastian et.al 2001). The sector's contribution to employment is next only to agriculture in India.

The significance of the small-scale sector to the Indian economy can be seen from the following:

- Of all the manufacturing units in India 92% are in the SSI sector.
- The investment in fixed assets in the sector is about 7% of that of the entire industrial sector, but it accounts for about 25% of gross output, 20% of value added, 40% of employment, and 30% of exports.
- 94% of SSI exports are in non-traditional items with low import content. The sector is responsible for 92% of marine products exports, 90% of garment

exports, 80% of semi-finished leather exports and 30% of engineering goods exports (all non-traditional, low import-intensive, high value added items).

- 62% are established in areas declared as industrially backward by the Government of India.
- An investment of Rs. 1 million provides employment to about 173 persons in this sector; to create the same employment in the large-scale sector requires approx. Rs. 5 million. (Prita D. Mallya & Lira Menezes Gama 2001)

The contribution of the SSI sector in generating employment and in export performance is well recognized in the literature. The sector is often termed as the engine of growth for the national economy for this century. In a labour abundant and capital scarce country like India, SSIs have come to occupy a significant position in the planned industrialization of economy.

Some of the typical characteristics of Small-scale industries in India have been:

- Dependence on traditional processes (capacity and financial).
- More people-dependent than process-dependent.
- Resistance to change and short-term perspective.
- Disorganized and dispersed nature.
- High transaction costs and low negotiating power.

In the present scenario of dynamic and fast changing markets, SSIs are more successful because of their flexibility and sustainability. Besides, one can notice that their success is because of comparatively lesser investment in their machineries, which are at the same time, can be put to multipurpose uses. One can go one step further to attribute their success to their structural adaptability and their ability to respond more rapidly and quickly to changes and new development in market conditions. Because of this structural adaptability, smallest firms take advantage of rapid technological advances and new competitive processes, such as those evinced by growth-oriented business operating in the new global economy.

Intensifying global competition and rapid advancement of manufacturing technology are two realities in today's small business environment. These have combined to shift the small business strategic priorities toward quality, cost effectiveness and responsiveness to marketplace changes. Increasingly, manufacturers have recognized that timely positioning of Advanced Manufacturing Technology (AMT) and improvements in the management of human resources are the key elements in competing favorably in the world market.

Globalisation, Liberalisation and deregulation of the Indian economy since 1991 has exposed small-scale industries to increased competitive pressures. The small-scale industry in the country is facing a host of problems, including technological obsolescence, sickness and inferior quality of products. A majority of these firms need to undertake technology upgradation and modernization programmes for their units in order to survive and remain competitive. Thus, competitiveness of SSIs has come to the central focus of attention, having implications for its own future as well as for the future economic development of the country.

The need for improving the competitive strength of SSI through technology improvement and modernization in India was recognized as early as in the 1950s by Government of India and accordingly, institutions were setup and policy measures were introduced.

Some of the Institutions lending technology related support to SSI in India are shown below:

Institutions	Services Provided
1.Development Commission for Small scale Industry (DCSSI) with Small Industries Service Institutes, branches, Extension counters, field-testing centers, production centers and footwear training centers.	Technical services which include training, design and engineering services, information, advice, etc.

2.National Small Industries Corporation (NSIC)	Technology Information and Servicing; Training Programmes, common facilities such as workshop facility, testing, machinery and product development; plant and machinery on hire purchase and equipment lending, etc.
3.National Research Development Corporation (NRDC)	Promoting development of marketable technologies in close association with industry and national R&D institutions; technology forecasting; design and engineering of manufacturing plants of commercial scale; dissemination of information on technology and its transfer to industries, etc.
4.National Institute of Small Industries Extension Training (NISIET)	Facilitates technology transfer and information dissemination through training, seminars and workshops, etc.
5.Technology Bureau for Small Enterprises (TBSE)	Technology information, match making for technology transfer and joint ventures, arrangement for consulting services, etc.
6.Karnataka Council for Technology Upgradation (KCTU)	Facilitates acquisition, adoption and upgradation of technology; conducts seminars and training programmes for the dissemination of technology related information; assists SMEs in their modernization and diversification; provides information and assistance for obtaining patents.
7. Small Industries Development Bank of India (SIDBI)	Direct and Indirect financial assistance for technology upgradation and modernization, etc.

Table 1.4 Institutions lending technology related support to SSI in India

Training has been recognized as an indispensable part of employee development. Training is one of the important functions of Human Resource Management. Training encompasses both formal & informal learning to acquire skills required for the work. The skills of the workforce and their ability to adapt to the rapidly changing economic environment are a key source of competitive advantage. Training of the employees is a key to achieving a flexible work force. However, the positive correlation between training provision and better SMEs performance remains debatable. In view of the importance and usefulness of advanced technology, training and skill upgradation activities for the Small scale industries, this is one such study, which has been undertaken to identify the various aspects pertaining to training in Indian small scale mechanical manufacturing industries.

Some of the Prominent Training Agencies/Institutes, which lend Government support to Entrepreneurship, training and developmental activities to SSI in the country, are as follows:

Sl.No	Name of the Agency/Institute
1	Indian Institute of Entrepreneurship, (IIE), Guwahati
2	National Institute of Small Industry Extension Training (NISIET)
3	National Institute for Entrepreneurship and Small Business Development (NIESBUD)

Table 1.5 Institutions lending Entrepreneurship and Training related support to SSI in India

1.2 Analytical Framework

This study mainly aimed at exploring the implications of advanced manufacturing technologies on skill level, investment in human capital, training needs and to critically evaluate the existing training and HR practices in SSIs in manufacturing sectors in Karnataka. Therefore, the study has the following specific objectives.

(i) To asses and evaluate critically the existing training practices in order to identify the shortcomings in the Training Programme and in other skill development activities of SSIs in manufacturing sectors in Karnataka.

(ii) To Asses the effect of Technology on skill level, investment in human capital, training needs, sources of Training, types of training etc.

(iii) To identify the recruitment and/or training needs in order to fill the gap noticed.

In addition, the study has also made an attempt to analyze the factors that act as barriers to providing training, existing training agencies utilized to train their personnel, perceptions of owners/managers with respect to various aspects of training etc. Thus, this study is an attempt made to understand the advanced manufacturing technology preparedness and critical existing training practices in use in SSIs in India.

The study is confined to mechanical manufacturing small-scale industries in the state of Karnataka. The table 1.6 shows that Karnataka is one of the six top-ranking states in the SSI sector in terms of number of registered SSI units. A research survey methodology was used for the study. The relevant data on some of the advanced technology adopted, reasons for technology adoption, discouraging factors for technology adoption, training needs assessment methods used, existing training methods practiced, areas in which training is given, benefits of training, barriers to training, training agencies utilized and HR practices followed etc have been collected through a well designed close ended questionnaire.

The entire questionnaire is computerized, which facilitated data tabulation and subsequent analysis. To start with, the demographic characteristics of the firms surveyed are described in terms of level of education of founders, investment range of firms in terms of project cost, average employment range, nature of activities in

which the firms have been engaged, year of their establishment etc. Then, a comparative analysis has been made with the firms that have adopted advanced technology and the firms, which have not, first on their demographical characteristics then on various other factors such as training needs assessment used, areas in which training is provided, agencies utilized to train employees, human resource management practices followed etc. To ascertain the significance of certain parameters like level of education of founders, impact of project cost (In terms of investment in Plant and machinery), size of the firm etc., on the adoption of technology, statistical analysis has been made.

State-Wise Estimates of Registered SSI Units

Sl.No	Name of the State	Number of Registered SSI Units
1	Tamil Nadu	3,09,162(1)
2	Uttar Pradesh	2,89,569(2)
3	Kerala	2,24,524(3)
4	Gujarat	1,78,261(4)
5	Madhya Pradesh	1,71,376(5)
6	**Karnataka**	**1,65,341(6)**
7	Punjab	1,54,686(7)
8	Maharastra	1,37,819(8)
9	Andhra Pradesh	1,02,761(9)
10	Rajasthan	84,256(10)

Table 1.6 Source: Third All-India Census 2002-03

1.3 An Over view of the Study

The study has been structured and organized into 5 major chapters.

After Chapter One, which introduces the subject, the second Chapter deals with the review of existing literature, particularly with reference to the importance of Small-scale industries, their contribution, impact of globalisation, technological changes and its implications on the skill level. An effort has also been made to describe the importance of training and other related activities, importance of human resource management practices and its relevance in small-scale industries.

The third chapter describes the objectives of the study, scope and methodology followed in detail. Here, Advanced manufacturing technologies, which were grouped, into six functional groups and training needs assessment methods and areas in which training is given along with the human resource management practices have been presented.

The fourth chapter presents a detailed analysis of the data. The results and major findings of the study have been discussed here. The fifth chapter presents the conclusions of the study as well as some policy recommendations/suggestions for the gap noticed.

Chapter 2

Small Scale Industries and Review of Literature

2.1 Introduction

Small and Medium Enterprises (SMEs), both in size and shape, are not uniform across the globe. The way they are defined depends on the stage of national economic development and the broad policy purposes for which the definition is used. The Small Scale Industry (SSI) sector in India is different from the SME sector in other countries. There is no typology of medium scale industry in India and the Indian definition of SSI is investment specific, while in the rest of the world it is in terms of employment, assets or sales or combination of these factors (KVSM Krishna 2004).

In India, SSIs are identified on the basis of the value of the unit's plant and machinery. If the value of the plant and machinery is lesser than Rs.10 Million, then such units are categorized as SSIs. Despite the lack of universal quantitative norms, the SSIs as a class are clearly distinguishable in any country, developing or developed.

Some of the different definitions of SMEs across the world have been presented below:

Countries	Definition of SMEs in Asia and other Countries
Australia	Less than 100 employees
Germany	Less than 500 employees
India	Plant and machinery or fixed assets less than 10 million
Indonesia	Less than 100 employees
Italy	Less than 200 employees
Japan	Less than 300 employees, or less than 100 million Yen assets
Korea	Less than 300 employees
Philippines	Less than 200 employees, P 40 million (Assets)
Singapore	Less than S$12 million fixed assets (Manufacturing)

Table 2.1: Source: Confederation of Indian Industries [CII]

2.2 Definition of SSI in India since 1950s

In India, Small Scale Industries (SSIs) were given due importance in the process of industrialization as far back as 1951 when post-independence economic planning was initiated. The Industries Development and Regulation Act legislated by the Centre in that year, became the framework for the small-scale industrial sector's development. The Act determined licensing policies for the sector and the reservation of products, among several other important provisions. The definition of small-scale industries is mainly in terms of investment ceilings, which have changed over the years to keep pace with economic development. Though employment and turnover are also used to define small industries, as these indicators are implicit in the requirement for registration under the Factories Act, the core definition of SSIs in India remains based on investment limits - "historical costs of plant and machinery".

The definition of Small-Scale Industries has undergone changes over the years in terms of investment limits in the following manner:

Year	Investment Limits
1950	Up to Rs 0.5 Million in fixed assets
1960	Up to Rs 0.5 Million in fixed assets
1966	Up to Rs 0.75 Million in plant & machinery
1975	Up to Rs. 1 Million in plant & machinery
1980	Up to Rs 2 Million in plant & machinery
1985	Up to Rs 3.5 Million in plant & machinery
1991	Up to Rs 6 Million in plant & machinery
1997	Up to Rs 30 Million in plant & machinery
1999	Up to Rs 10 Million in plant & machinery
2001	Up to Rs 10 Million in plant & machinery
2002-03	Up to Rs 10 Million in plant & machinery

Table 2.2 Source: Annual Report 2002-03, Ministry of Small of Scale industries

SMEs occupy a place of strategic importance in the economy of many countries owing to their significant contribution made to national income, employment, export, Innovation and Developmental activities. Traditionally, they produce certain specialised items for which they enjoy virtual monopoly of skill and expertise developed over the years. The Contribution of SMEs to the World economy is well documented in the literature.

SMEs all over the world have played a fundamental role in promoting economic and industrial production. In particular, SMEs provide the necessary foundations for sustained growth and rising incomes in the less developed and transitional economies. In general, SMEs provide the bulk of the entrepreneurs and employment in those economies and they are mostly in the private sector. (Bhavani P.Dunganna 2004)

There is growing worldwide recognition that SMEs have an important role to play in the present context given their greater resource use efficiency, capacity for employment generation, technological innovation, promoting inter sectoral linkages, raising exports and developing entrepreneurial skills. The SME sector provides a wide range of self-employment opportunities, thus empowering large segments of the population, in particular the unemployed, underemployed and the other marginal groups, utilizing local raw materials to take advantage of niche markets.

In most less developed economies and economies in transition in the Asian and Pacific region, the bulk of the industrial labour force is engaged in small- and medium-scale enterprises. (Bhavani P.Dunganna 2004)

2.3 Contribution of Small Scale Industries in India

Indian policy makers had duly recognized the multi dimensional merits of small-scale industries, immediately after independence. Accordingly, SSIs were assigned a major role in India's economic development strategy by the Industrial policy

resolutions of 1948 and 1956. Thereafter, India pursued a dual strategy for SSI promotion through institutional network on the one hand and incentives and benefits for the protection on the other hand. But in the 1990's along with the economic reforms, there has been an implicit shift in the emphasis of India's small industry policy from protection towards competitiveness. The formation of World Trade Organization (WTO) in 1995 and India's obligation, as member of WTO, to scale down tariff barriers and phase out quantitative restrictions has given another dimension to the engineering competitive environment for SSIs. All these imply that the future performance of SSI will depend on its own competitiveness in terms of price and quality more than anything else. Thus, competitiveness of SSIs has come to the central focus of attention, having implications for its own future as well as for the future economic development of the country. (M.H.Balasubrahmanya et.al 2002)

SSIs play a vital role in the industrialization of a developing country. This is because they provide immediate large-scale employment and have a comparatively higher labour capital ratio; they need a shorter gestation period and relatively smaller markets to be economically viable. They need lower investments, offer a fairly efficient method of ensuring a more equitable distribution of rational income and facilitate an effective mobilization of resources of capital and skill, which might other wise, remain unutilized. They stimulate the growth of industrial entrepreneurship and promote a more diffused pattern of ownership and location.

A rewarding feature of economic development in India has been the impressive growth of modern SSIs. The small enterprises have by now established their competence to manufacture a wide variety of sophisticated goods in different product lines requiring high degree of skill and precision. They have made a notable contribution in realizing the principle objectives of expanded employment opportunities, adoption of modern techniques and dispersal of industries in small towns and rural areas. This has been possible as a result of the successful

implementation of the program for assistance of SSIs. The diversified, rapid growth of SSIs is a significant feature of India's economic development in recent years.

SSIs contribute significantly to social and economic development objectives such as labour absorption, income distribution, rural development, poverty eradication, regional balance and promotion of entrepreneurship. In fact, they play an important role in the process of a country's industrial development. In developing countries, small labour intensive industries have been favoured basically to create employment opportunities in an economy with abundant unskilled labour even though such industries may not always be supported on grounds of economic efficiency. Apart from the technological and research and development factors, competitiveness of SSIs depends on key factors like competent human resource. In order to achieve this, it is essential that any industry should have a systematic training and development program.

Majority of SSIs have a low capital intensity and high potential for employment generation. SSIs also possess locational flexibility that serves as an effective instrument for achieving a wide dispersal of industries. SSIs also serve as an instrument in achieving wide dispersal of industries. Further, SSIs serve as a means of bringing entrepreneurship particularly in semi urban and rural areas. SSIs have a high potential for employment, growth of industries, promoting entrepreneurship and earning foreign exchange to the country.

The performance of the SSIs in terms of parameters like number of units (both registered and unregistered), production, employment and exports is given in table 2.3.

Year	No. Of Units (In Million)	Production (At Current Prices) (in Rs.Billion)	Employment (No.s in Million)	Exports (Rs. Billion)
1993-94	2.39 (6.2)	2,41,648 (15.5)	13.94 (4.0)	253.07
1994-95	2.57 (7.5)	2,98,886 (23.7)	14.66 (5.2)	290.68
1995-96	2.66 (3.5)	3,62,656 (21.3)	15.26 (4.1)	364.70
1996-97	2.08 (5.3)	4,11,858 (13.6)	16.00 (4.8)	392.48
1997-98	2.94 (5.0)	4,62,641 (12.3)	16.72 (4.5)	444.42
1998-99	3.08 (4.8)	5,20,650 (12.5)	17.16 (2.6)	489.79
1999-00	3.21 (4.2)	5,72,887 (10.0)	17.85 (4.0)	542.00
2000-01	3.37 (5.0)	6,45,496 (12.7)	18.56 (4.0)	697.97
2001-02	3.37 (5.0)	6,45,496 (12.7)	18.56 (4.0)	712.44
2002-03	3.572	7,42,021	19.96	860.12

Table 2.3 Source: Third all India Census 2002-03 & Development Commissioner (SSI), Ministry of Small Scale Industries

During the one year period i.e., 2002-03, number of SSIs is estimated to have increased by 2,88,700 production at current prices by Rs 7,42,021 crores, Employment increased by 16,76,660 persons, while exports were higher by 6,778 Crores as per the economic survey 2002-03.

According to projections made by the ministry of small-scale industries during 2002-03, the SSI sector recorded growth in production of 9.09 percent over the previous year. The small-scale industries sector has recorded higher growth rate than the industrial sector as a whole (4.9 percent during 2002-03). It contributed about 40 percent towards the industrial production as a whole and 35 percent of direct exports from the country.

The government has been taking various measures from time to time in order to enhance the productivity, efficiency and competitiveness of SSI sector. Hence, one may conclude that small-scale industries are significant value adders to the growth of the global economy in general and the Indian economy in particular. Their unique characteristics ensure that they need to adopt strategies depending on their size and the sector in which they operate. The prevalence of flourishing small-scale industries indicates a dynamic and progressive economy. Therefore it is imperative for SSIs to adopt the latest cutting edge advanced technologies and appropriate HR practices that are relevant to them in their business environments.

The crucial role that SSI sector could play in Indian economy was appropriately recognised by the policy makers soon after independence. Since independence, India has evolved innovative policies and programmes to protect and promote SSI, apart from institutions at the national, regional and sub-regional levels (Bala Subrahmanya 1997). In the 1990s, the emphasis of India's small industry policy shifted, at least, implicitly from protection towards competitiveness (Bala Subrahmanya 1998), which is very essential in view of globalisation to survive in the global competitive market.

2.4 Importance of Manufacturing Sector

Small enterprises have been in vogue in manufacturing endeavor even before the dawn of Industrial Revolution (Sanjay Lall 2000). In any industrialized country, the manufacturing sector is the backbone of the national economy, because it is mainly through its activities that real wealth is created.

In developed economies, SMEs tend to be in 'modern' manufacturing and services, often in cutting edge technology based activities. It is generally the case, in all economies but particularly the more industrialized ones, that SMEs learn most from each other and from larger enterprises (Levy 1994). They have also been able to reap scale economies in functions like marketing, information diffusion, training and

designing and so on by cooperating with each other or "Clustering" together (Sanjay Lall 2000).

India's manufacturing sector is as diverse as the country itself. India's real economic development depends heavily on the growth of its manufacturing sector. (Sudarshan Choudhury 2004). In India, the manufacturing sector employs 30 percent of Non-agricultural workforce for industrial output valued at US $ 65 billion and further it contributes one- fourth of the Country's total GDP. This clearly highlights the potential of the manufacturing sector to power greater growth of the Indian economy. (Web: National Accounts 2004).

Indian manufacturing industries are small in size when compared with global benchmarks, because of which, perhaps they lack the ability to provide all the customer requirements under one roof. This has forced them to remain tier two or tier three suppliers. Their small size also makes it difficult for them to enter international supply chains thus effectively disqualifying them from serving certain valuable markets. In addition to their small size, Indian SSIs are characterized by the usage of technologically outdated process and machinery. This, in turn, prevents them from producing high quality products and reducing overall rejection rate. It also implies a lower productivity and inefficient capital utilisation in these firms.

Indian manufacturing industries have been suffering from comparative disadvantages: high manufacturing and transaction costs, lack of infrastructure facilities, lack of R&D facilities, a technological gap, and historical problems such as excess labour. Therefore, Technology upgradation and good Human Resource management practices could be the crucial factors for SSIs to enhance their competitiveness.

2.5 Impact of Globalisation

Globalization is the extraordinary explosion of both technology and information, in ways that have considerably reduced the implications of twin concepts of time and space. It refers to global economic integration of many formerly national economies into one global economy, mainly by free trade and free capital mobility propelled by Information and Communication Technology. Globalization has thrown many challenges to SMEs. One of the greatest conceptual challenges is, on one hand, that the individual SMEs would be fiercely competing with each other within the nation and beyond, and on the other hand at the same time, they would be forced to collaborate and work together than ever before to safeguard their own mutual interests to survive (Anil Bhardwaj 2003).

Over the past few years, it has become increasingly difficult to discuss the development of SSIs without making a link to the globalization of markets and thus of the economy. The question may even arise as to whether this globalization, a significant portion of which appears to be linked to the strengthening and expansion of multinationals, will constrain small businesses, which are nevertheless at the origin of most job creation in most industrialized countries and of the industrial restructuring of a number of their regions over the past 15 or 20 years.

But globalization poses new challenges for SSIs by leading them to at least partially integrate the consequent idea of global change in their strategy. The expansion of markets does not mean that only large businesses will be able to profit fully from this trend. There is no correlation between large market and large business.

The recently completed OECD study (1996) on market globalization and SSIs shows, on the one hand, that the major factors sustaining or accelerating SSI globalization are as much a result of the internal dynamics of small businesses as of

environmental support. In the first instance, searching for diversified growth, specific innovation-based production, and open-minded management capable of engaging the appropriate specialized resources, go a long way toward explaining the behaviour of internationally open SMEs. The case of the environment presumes effective regional consulting, funding and logistical resources to support exports.

On the other hand, the internal factors constraining the globalization of SSIs are lack of experience on their part, insufficient resources and an excessive perception of risk. The major external factors are national information networks that are inadequate or poorly connected internationally, deficient complementary regional resources and assistance programs that are maladapted to SSI requirements. In a number of countries, the positive factors appear to be gaining ascendance over the negative.

Globalization can offer as many opportunities for dynamic SSIs as obstacles for those that lag behind in modernizing their production processes or developing these niches which can give them at least temporary shelter from the pressures of new competition. (Pierre-André Julien 1996)

Globalization and liberalization of economies around the world have brought about competitive pressures on enterprises of all sizes. The survival and success of SSIs have come to depend on improving innovativeness and productivity in the face of intense competition. The requirements of information and resources for such improvements have become greater and far more complicated. (ILO 2000)

According to most of the researchers, SMEs have got a number of strategic advantages, particularly in terms of flexibility, informality and adaptability compared to larger ones. They also agree that SMEs have been more successful because of their structural adaptability and sustainability. This also allows them to take advantage of rapid technological advances for their survival and competitiveness in the present context of global economy and enables them to cope up with the higher

levels of environmental uncertainty (Martin and Matlay 2001; Matlay 2000c; Storey 1994; Hill and Stewart 1999; Gibb 1997; Hendrickson and Psarouthakis 1998; Marlow and Patton 1993; Pferer 1994; Whittington 1993). In view of the above observations, it becomes imperative to study the impact of technological changes and its implications on the SSI sector.

2.6 SSIs and Technological Changes

Technology is generally defined as know-how and usually referred to product and process technology (Capon and Glazer 1987). In today's highly competitive environment, technology ranks as one of the principal driving forces of competition within industries and across national boundaries (Klas Soderquist and J.J. Chanaron 1997). The explosion in technology use has fostered a concern about its impact on workers (Betcherman.G 1995). Technological advances have eroded and at times erased Physical, Cultural, Economic and Political borders. These advances have revolutionized the nature of production, transportation and communication systems and consequently the nature of work and the kind of workers (Baldwin, Gray and Johnson 1995).

One of the most important factors in capacity-building for improved competitiveness of SMEs is through technological upgrading. The need to apply modern efficient and relevant technology in order to survive in an increasingly competitive environment has never been so urgent. It is often stated that globalization and liberalization have opened new opportunities for firms in developing countries to acquire technology from abroad and that increased competitiveness in technology markets has made technologies cheaper and more accessible.

Empirical research in less developed countries shows that SMEs are poorly placed to deal with technological changes and upgradation. If one examines the ongoing changes in business environment and the possible ways of improving the competitive strength and commercial viability of Indian Small-Scale Units, in the changing

scenario, analysis indicates that liberalization has exposed all industrial units, including small units, to market more competitively. In order to withstand the competition, Indian counterparts especially the smaller ones, need to improve their productivity and quality, reduce costs and go in for higher performance products and better services. This means, substantial improvements in various dimensions of technology namely, Transformation (Mechanization), Organization and Information. (Bhavani T.A 2002)

The small-scale industry in the country is facing a host of problems, including technological obsolescence and inferior quality of products. Others are sickness, poor integration between large and small enterprises and uneven dispersion, widening the already prevailing disparities in regional development. Competitiveness of SSIs has come to the central focus of attention, having implications for its own future as well as for the future economic development of the country.

The need for improving the competitive strength of SSIs through technology improvement and modernization in India was recognized as early as in the 1950s by Government of India and accordingly, institutions were setup and policy measures were introduced.

2.7 Skill Issues

During periods of rapid technological change, shortages of particular types of skilled workers would emerge. Many forms of technological change are accompanied by changes in skill requirements. This is particularly true of the changes associated with the adoption of the new advanced technologies that are being implemented in the manufacturing sector (Doms, Dunne and Troske 1997). The studies conducted by Baldwin, Diverty and Sabourin (1995) reveal that advanced technology adoption is associated with an increase or decrease in workers' skill. Their analysis confirms that technology adoption creates a need for higher skill level and stimulates firms to train them. However, a growing debate has emerged centering on whether technology

adoption increases or decreases workers' skills by the so- called " upskilling-deskilling" debate. Some have argued that new technologies permit segmentation of tasks into repetitive, mundane, skill lacking tasks (Keefe 1991).Increased skill requirements have resulted from the introduction of advanced manufacturing technology in Canada (Baldwin, Gray and Johnson 1996).

Firms that adopt advanced manufacturing technologies (AMTs) require a skilled workforce. When existing skill sets are not adequate, firms can either hire more qualified workers or they can increase the skill levels of existing employees through training. While hiring is essential in many situations, training is clearly an important complement. Previous studies (Baldwin, Gray and Johnson 1996) have shown that AMT users invest more in training than do non-users. (David Sabourin 2001)

Baldwin and Da Pont (1996) present evidence that, as firms introduce new technology, their skill requirements increase. Because technology is complementary to skills, acceleration in the rate of technological change increases the demand for skilled labour; yet it is also true that an increase in the supply of skills induces faster technological change. (Greiner et al 2001).

Recent studies by (Aghion and Howitt 1998; Muysken and Ter Wheel 1998) in their research found that technical change does benefit high skilled labour, whereas it deteriorates the position of low skilled ones. Thus, Technology increases a firm's productivity and consequently its profits. Skilled employees receive significantly more benefits than unskilled employees. Technology is biased toward the use of highly skilled workers. This implies that technology is skill using for highly skilled workers but skill-replacing for semi- skilled and unskilled workers. (Lopez-Acevedo 2002).

From the review of literature, skill shortages are associated with the adoption of advanced technology. But, this aspect needs to be explored in the Indian SSIs, which is one of the objectives of the study.

2.8 SSIs and Training

Training is one of the important functions of Human Resource Management. All training activity can be viewed as both investment and cost: an investment in that it should enhance the stock of human capital available in the enterprise, thereby enabling increases in productivity; and a cost in that valuable resources are consumed, or opportunities foregone, to undertake training. Defining training broadly could encompass all experiences through which employers and workers increase their job-related knowledge and skills. (John Kitching and Robert Blackburn 2002)

Training has been recognized as an indispensable part of employee development. It is one of the primary ways to increase employee skills and productivity. Employees need to be well trained in current job-skills and learn new skills on a continuing basis in order to remain competitive in the small business environment. (Llyod W.Fernald and G.T.Solomon 1997). The biggest issue in the work-based training arena is the skills-productivity gap. Organisations are increasingly viewing this as a major issue within their business-development needs.

Training programmes are now an essential feature of organizational life. Training encompasses both formal & informal learning to acquire skills required for the work. It is an attempt to improve current or future employee performance by increasing an employee's ability to perform through learning, usually by changing the employee's attitude or his/her skills & knowledge. (Nadler 1980). Training initiatives are widely acknowledged to be a salient feature of the competitive organization's corporate strategy. (Sandi Mann & Ivan T.Robertson 1996).

Small businesses need to identify training methods that are affordable for their organizations, as well as those that meet their training needs to increase skills and productivity. (Llyod W.Fernald & G.T.Solomon 1997). A firm with a strong commitment to training may have a workforce that is better equipped to successfully

implement alternative workplace practices. (Harley Frazis, Maury Gittleman & Mary Joyce, 1998).

Most employers believe that training is beneficial to their firms and that training creates a more productive work force. (Green 1999b, 1997). SME owners and managers play a pivotal role in making decisions relating to the provision of formal, job-related training. (Matlay 1996)

In general, a firm that has conducted needs assessment, devised training objectives, submitted training results to management, and coordinated training activities with other HRM practices is more likely to achieve success in training than those firms that have not made such efforts. (Dr.Tung-Chun Huang 1999)

SMEs traditionally have a preference for practical training as opposed to theoretical, desk-based methods. Many studies propose a positive impact of training on employees' wage growth and productivity (Bishop, 1994, Groot, 1999a, 1999b, Barron et al). However, the positive correlation between training provision and better SMEs performance remains debatable. Patton and Marlow (2000) question the unilinear causal relationship between training provision and SME performance. (Nottingham shire Research Observatory Ltd 2002)

In their review of literature on barriers to training take-up by SMEs, West head and Storey (1997) highlight two main reasons for barriers to exist. These are 'market forces' and 'ignorance' explanations. The market forces explanations refer to the different factors that influence the supply and demand for training. Ignorance explanations refer to the lack of awareness of small business owners of the importance of training for skills development. (Nottingham shire Research Observatory Ltd 2002).

The costs of training, actual or perceived, may act as barriers constraining the provision of training as mentioned in some of the research studies. It is clear that

technologically oriented firms are more committed to training (Baldwin 1999; Baldwin and Johnson, 1995, 1997). In Indian context, this aspect has to be probed thoroughly. The skills of the workforce and their ability to adapt to the rapidly changing economic environment is a key source of competitive advantage. Training of the employees is a key to achieving a flexible work force.

Training has internationally emerged as an important mechanism for upgrading skills and competencies of the managers as well as workers. However, it seems that the concept of training has not percolated down to the SSIs in India. In view of the importance and usefulness of training for the SSIs, this is one such study, which has been undertaken to identify the various aspects pertaining to training in Indian SSIs.

2.9 Human Resource Management in SSIs

Human Resource Management [HRM] has been defined as the " Process of attracting, developing, and maintaining a talented and energetic workforce to support organisational mission, objectives and strategies" (Schemerhorn 2001).

Audretsch & Thurik (2000,2001) argue that effective HRM practices are becoming increasingly important in the new "Knowledge – based" economy, as companies face the double challenge of the need for more highly trained employees coupled with a shortage of qualified labour. These challenges, towards smaller firms in general, reinforce the need for effective HRM practices in the small firm. It is therefore not surprising that research on HRM practices in small and medium-sized enterprises has captured increased attention in recent years.

Gilbert and Jones (2000) found that HRM practices in small business are undoubtedly quantitatively and qualitatively different from those in larger organizations. The growing small businesses need to develop their HRM practices, as increasing size inevitably brings in increased complexity, necessitating a more professional approach towards managing the personnel. They also report that HR Practices in small

businesses are predominantly informal, ad-hoc and opportunistic, nevertheless, they are effective in small business, yet relatively little research addressed the nature and significance of these differences. Firm size is positively associated with the adoption of Human Resource Management practice and there was a difference in practices between small and large firms (Wager 1998;Winterton and Winterton 1996)

Emphasis on HRM by SMEs is influenced by growth – oriented strategies. (De Kok and Uhalaner, 2001; Lengnick-Hall and Lengnick-Hall 1998). Smaller organizations are more likely to operate in an informal and flexible manner than larger ones. (Gibb 1997; Hendrickson and Psarouthakis 1998; Lee 1995; Marlow and Patton 1993; Pferer 1994; Storey 1994; Whittington 1993).

Most studies on HRM within SMEs are based on qualitative studies. The available empirical information on HRM within SMEs suggests that smaller firms make less use of high performance HRM practices than larger organizations do (Barron et al., 1987; Hornsby and Kuratko 1990). Some of the researchers argue that HRM Practices may be a leading cause of small business failures. (McEvoy 1984). Inadequate and inefficient HRM in SMEs may result in low productivity and high dissatisfaction and turnover amongst the staff. (Mathis and Jackson 1991) More importantly, HRM strategies do not pay off immediately. (Welbourne & Andrews 1996). A substantial amount of unexplained variation remains across small firms: although company size appears to be a strong factor in predicting HRM practices, it is clearly not the only factor. There is no consensus amongst researchers regarding the role of HRM in small firm success. (Deshpande and Golhar 1994)

The general impression that research on HRM within SMEs is still in an explorative stage does not apply to all fields of HRM practices. In spite of the above-mentioned studies, growing evidence, largely derived from case studies and small pilot studies, suggests that HRM practices can be more sophisticated than expected in a typical small firm (Arthur and Hendry 1990; Bacon et al., 1996;Curran et al., 1993;

Deshpande and Golhar 1994; Hendry et al., 1991; Hornsby and Kuratko 1990; Marlow and Patton 1993).

Another dimension of this research is, an effort has been made to explore some of the existing HR Practices followed in Indian Small scale manufacturing sector.

2.10 SSI Sector In Karnataka

The State of Karnataka has always been at the forefront of industrial growth in India.

It has been the base for many central enterprises in the heavy industries like, BEML, BHEL, HAL, Wheel & Axle plant, and electronic giants such as BEL & ITI etc., for more than three decades now.

The SSI sector has always been a vibrant and dynamic component of the State's economy. It covers a wide cross section of industries including machine tools and automobiles, general engineering, textiles and garments, food processing, pharmaceuticals, chemicals, electronics etc., and provides an employment to about 18 lakh people (approx.). The SSI sector in Karnataka is dominated by a few industries such as Food products, rubber and plastic products followed by other manufacturing industries in metal and machinery equipment segments. The manufacturing sector in Karnataka has been contributing significantly to state's economy.

The following table provides an overview of the SSI sector in Karnataka in terms of Number of registered SSI Units, Investment, Employment up to June 2002.

Sl. No	Period	No.of Registered SSI Units	Investment (Rs.in Crores)	Employment	Average Employment per unit	Average Employment per crore of Investment	Average Investment per unit (In Lakhs)
1	Up to 2002	2,88,700	5834.52	16,76,660	5.807	287.36	2.02

(Source: Department of Industries of Commerce, Govt.of Karnataka)

- Average employment per SSI unit: 5.8 persons
- Average Employment for a crore of investment on SSI is: 287 to 289 persons
- Average investment per unit: Rs. 2.02 lakhs

In the post-independence era, SSIs have grown impressively in terms of number of units, employment, investment, output and exports. Due to internal economic liberalization, and external trade and investment promotion oriented globalisation, SSIs have been exposed to intensive local as well as global competition since the beginning of the 1990s. Even modern SSIs face very difficult competitive challenges in the emerging setting. The threat is one aspect of the larger competitive challenges posed by accelerating technical change, globalisation and liberalisation. It is a well-known fact that SSIs cannot compete in a traditional style alone in the global market. SSIs form, by number, the majority of manufacturing enterprises at all levels of development. Our Study concentrates on the mechanical manufacturing sector, where the competitive threat is felt most directly at this time and where there is enormous export potential.

It is with the above backdrop, the study of the advanced technology adoption and its consequences on the SSI sector, particularly on the manufacturing industries, has assumed paramount importance. It is also imperative to asses the effects of technology on skill level, investment in human capital, existing training and development practices followed and to identify the gap noticed in the training needs if any.

Chapter 3

Objectives, Scope and Methodology of the Study

Based on the detailed review of literature and identification of research gaps, research objectives have been formulated and its scope determined, a survey methodology has been used to collect the data.

3.1 Objectives

The main goal of this study was to probe the impact of advanced technology on training and development and also critically assess the existing training practices followed in Small manufacturing industries in Karnataka. The Specific objectives of the study are as follows:

1) A strategic appraisal of the implications of Advanced Manufacturing focusing on specific functional groups namely Fabrication and Assembly, Design and Engineering, Management Information System, Integration and Control, Automated Material Handling Systems, etc.

2) To asses and evaluate critically the existing training practices in order to identify the shortcomings in the Training Programme and in other skill development activities of SSIs in manufacturing sectors in Karnataka.

3) To Asses the effect of Technology on skill level, investment in human capital, training needs, sources of Training, types of training etc. and to identify additional competencies.

4) To identify the recruitment and/or training needs in order to fill the gap noticed.

5) To Identify training resources in relation to their expertise with reference to technologies mentioned in the objective of the proposal.

6) To propose an appropriate policy to support and promote training and other skill development initiatives in SSIs.

3.2 Scope of the Study

The study is confined to mechanical manufacturing small-scale industries in the state of Karnataka. The State has long been recognized as one of the major industrialized states in our country with a large number of diversified industries having their presence and base here. Bangalore, the capital of Karnataka has been recognized as a major industrial hub of our country with huge number of both private and public sector industries operating successfully. It is with this backdrop, that Karnataka in general, and Bangalore in particular, was chosen to conduct this study.

3.3 Methodology

3.3.1 Research sample

In this study, the unit of analysis is the firm and the population is small manufacturing firms within the state of Karnataka, India.

The data was collected through face-to-face interaction with the owners/managers of about 657 small manufacturing firms. Of the 657 firms surveyed, 233 firms responded. 217 firms' data were found to be valid and appropriate was considered for the final analysis. The responses of remaining 16 firms were rejected because of illegible and inappropriate data.

3.3.2 Questionnaire Development

Based on the detailed literature review and after discussing with various officials/agencies like Kassia, KCTU, SISI etc, a sample questionnaire was developed keeping the objectives in mind and a preliminary pilot survey was done for a sample size of 25 firms to get the feedback from the respondents and to fine tune the questionnaire.The sample questionnaire, which was used for pilot survey, was fine tuned keeping the objectives in mind & a final structured questionnaire was prepared

and selected for the main and final survey incorporating some qualitative modifications based on the feedback of the LPAC Members as well as firms' owners/proprietors and concerned industry officials.

A Project team of two members was formulated to do the data collection by having a direct face-to-face interaction of owners/managers to gather authentic and valuable data. The data collection exercise was started with the target of covering at least 200 small mechanical manufacturing industries. All the major industrial areas of Bangalore urban & rural, Mysore urban & rural districts were covered under the study.

The structured final questionnaire designed for the study was 'close ended' by nature. The final questionnaire consisted of mainly four important sections namely, 1) Firms' General Demographic Information, 2) Firms' Level of Technology Adoption and Awareness, 3) Firms' Training Needs Analysis and 4) Firms' HRM practices. Each section had multiple questions to cover several important parameters. The Questionnaire consisted of 31 close-ended questions.

The advanced technologies considered for the study were

- Design and Engineering
- Processing Fabrication and Assembly
- Automated Material Handling
- Inspection
- Integration and Control
- Network Communication

Training Needs Assessment Methods Considered for the study were

- Performance appraisal
- Work Sampling
- Interview
- Attitude Survey

- Questionnaire
- Quality Circle and customer survey

The HR Practices Considered for the study were

- Human Resource Planning
- Systematic Recruitment and Selection
- Training and Development Programs
- Written Job Description
- Regular Performance Appraisal
- Growth Plans and Strategies
- Management Techniques (For Example: Continuous improvement including TQM, Benchmarking etc.,)

3.3.3 Tabulation of Survey Data

Simultaneously, based on the lines of the final questionnaire, a Database Management System (DBMS) was developed to incorporate and analyse the survey data. The database was designed with Visual basic as a front-end graphical user interface and MS-Access as the backend tool. The final questionnaire was exactly replicated into Forms of DBMS to facilitate easy data entry and retrieval. Then, the data/responses of the final questionnaire were fed into the designed database for the purpose of analysis and report generation.

3.3.4 Need for the Study

Small Scale Industries in India are currently facing the challenges of increased competition as a result of new Global marketisation. In such a context, the ability to export is becoming a critical factor in the development and long-term survival of many small and medium sized firms. However, when we look at present scenario of SSIs we note that educational qualification of small entrepreneurs is very low and are rarely exposed to formal managerial and technical training. Consequently, they

lack the capability to understand and articulate their needs and rarely scan for sources of new technological opportunities.

Strong management and technical skills are critical to Small-scale Industry's success. In fact, some of the studies show that the cause of small business failure is not lack of financing alone, but also the lack management and technical skills. Training and life long learning are key to positive long term change for human resource development, economic diversification, and community sustainability. The free economy will usher in accessibility to bigger market, greater linkages for SSIs with larger companies and marketing outfit, improved manufacturing techniques and processes. Thus, efficiency of SSIs depends on how it updates its human resources along with the Technological changes.

Indian economy is shifting towards a highly competitive market. Indian industries, especially small manufacturing industries have been forced to seriously examine international opportunities and face competition, where they have no solid technological base. As a result, SSIs have to deal with two urgent but pertinent challenges. The first is to improve their competitive position by reducing cost and second is to learn how to manage the impact of technological development. This reality has magnified the importance of successful training and development programme with measurable results.

Training and educating their employees provides an insight into a number of business issues. Training is a key component in the manner by which firms manage their human resources and link the human resource management with business operation. Training practices followed by a firm provides an insight into a firm's competitive strategy.

In the above context, the development of human resource remains the fundamental pre-requisite for Indian SSIs sustained growth through industrial and technological upgrading. Higher levels of formal education and training combined with employment

or enterprise based training, are essential to cope with the rapidly advancing production technology and increasingly competitive trading environment.

The present study aims in identifying the gaps in human resource development in Indian industries especially focusing on mechanical manufacturing small firms.

3.4 Advanced Manufacturing Technologies considered for the study:

Advanced manufacturing technologies involve the application of computers to various facets of the production process. For the purpose of the study, the manufacturing technologies are grouped into six functional categories, each capturing a different aspect of the manufacturing process and development.

The six major functional groups considered for the study are as follows:

- Design and Engineering.
- Processing Fabrication and Assembly.
- Automated Materials Handling Systems.
- Inspection.
- Integration and Control
- Network Communication.

The following section presents the description of each of the functional groups:

Advanced Manufacturing Technology Functional Groups

Advanced Manufacturing Technology Functional Groups
Design & Engineering
Computer Aided Design/Engineering (CAD/CAE)
Computer Aided Design/Manufacturing (CAD/CAM)
Modeling or Simulation Technologies
Processing Fabrication & Assembly
Flexible Manufacturing Cells or Systems (FMC/FMS)
Programmable Logic Control (PLC) machine/s or process/es
Lasers used in Materials Processing (including Surface Modification)
Robot/s with sensing capabilities
Robot/s without sensing capabilities
High Speed Machining
Automated Material Handling
Part identification for Manufacturing automation, like Bar coding
Automated Storage and Retrieval System (AS/RS)
Inspection
Automated vision-based systems used for inspection/testing of inputs and/or final products
Other automated Sensor based systems used for inspection/testing of inputs and/or final products
Integration & Control
Manufacturing Resource Planning (MRP II/Enterprise Resource Planning (ERP)
Computer/s used for control on the factory floor
Computer Integrated Manufacturing (CIM)
Supervisory Control and Data Acquisition (SCADA)
Use of Inspection data in Manufacturing Control
Digital remote controlled Process plant control, like Field bus
Knowledge based software
Network Communications
Local Area Network (LAN) for Engineering/Production
Company-wide computer Networks (including Intranet and WAN)
Inter-company computer Networks (including Extranet and EDI)

Following section presents a brief description of some of the advanced technologies considered within the functional groups.

The **Design and engineering group** consists of three technologies which are described as follows:

- Computer-aided design (CAD) and Engineering (CAE) uses the computers to design and test parts or products.
- Computer-aided manufacturing (CAM) utilizes CAD output to control machines used in the manufacturing of the part or product.
- Modelling or simulation technologies.

The **fabrication and assembly** group consists of six technologies. They are as follows:

- Flexible manufacturing systems/cells (FMS/FMC) are machines controlled by computers or programmable controllers, which have fully integrated material handling capabilities able to accept raw materials and deliver finished products.
- Computer numerically controlled (CNC) machines are controlled by a computer embedded in the machine.
- Pick and place robots transfer items by means of point-to-point moves. "Other" robots are used to perform repetitive tasks like cutting, welding, drilling, or painting through specific, programmed motions.
- High speed machining.
- Programmable logic control (PLC) machine/s or process/es.

The **Automated materials handling systems** group consists

- Automated storage and retrieval systems (AS/RS). AS/RS use computer-operated equipment for the handling and storage of parts, materials, goods-in-progress, and finished goods.
- Part identification for manufacturing automation (ex: Bar Coding)

The Inspection group includes

- Automated sensor-based equipment, able to test both incoming materials and outgoing final goods to ensure they meet specifications.
- Automated vision-based systems used for the inspection/testing of inputs and/or final products.

The Integration and Control group includes

Sophisticated technologies designed to integrate the various production materials requirements planning (MRP), and manufacturing resource planning (MRP II).

MRP uses the computer to keep track of orders, inventories, and finished goods. MRP II uses the computer to manage the loading and use of machines, as well as inventory control and material handling. It also consists of sophisticated technologies designed to integrate the various stages through the computer production. Included in this group are computer integrated manufacturing (CIM), a totally automated factory where all processes are integrated and controlled by a central computer, supervisory control and data acquisition (SCADA), which involves "real-time" monitoring and control of production processes, and artificial intelligence, which is the ability of machines to learn from experience and perform tasks usually attributed to human intelligence, manufacturing parts or products.

In order to assess the training need assessment methods practiced by small manufacturing firms, some of the common training need assessment methods were considered for the study, which are as follows:

- Performance Appraisal
- Work Sampling
- Interview
- Rating Scale
- Attitude Survey
- Questionnaire
- Quality Circle
- Customer Survey

In order to identify the areas in which training is provided to the employees, some of the major training areas were selected which are as shown below.

- Basic Literacy/ Numeracy
- Computer Literacy
- Technical Skills
- Orientation for new employees
- Safety Skills
- Management Training
- Maintenance Training
- Skill Upgradation Training
- Group Morale
- Quality Control Skills
- Managerial / Supervisory Training
- Sales & Marketing Training
- Export Related Training
- Others, if any

The HR Practices Considered for the study were

- Human Resource Planning
- Systematic Recruitment and Selection
- Training and Development Programs
- Written Job Description
- Regular Performance Appraisal
- Growth Plans and Strategies
- Management Techniques (for Example: Continuous Improvement including TQM, Benchmarking etc)

Chapter 4

Results and Discussions

This section presents the findings of the study conducted. The collected data was analyzed to examine the level of advanced technology adoption and its implications on training and development activities in small mechanical manufacturing firms both qualitatively and quantitatively. An analysis was also carried out to bring out the differences between small manufacturing firms on various factors like advanced technology adoption, training related activities and HRM practices.

This entire section is divided into 3 sub-sections. The first section (4.1) describes about the Demographical particulars/profile of the firms surveyed. The second section (4.2) throws light on the comparisons between the small firms, which have adopted advanced technology with the firms, which have not. Also, some of the factors related to advanced technology adoption like reasons for adoption, benefits and discouraging factors of technology adoption, skill shortages experienced when technology was adopted, steps taken to bridge skill shortages etc., have also been discussed in this section.

Finally, the third and final section (4.3) discusses in detail about training and development related aspects. It describes the various training needs assessment methods conducted, various methods of training and the areas in which training is given, the existing training agencies utilized to train the personnel, average duration of training and whether a separate budget provision is made annually for training the employees, as also, major benefits and discouraging factors of training have been discussed.

This section also provides an insight into some of the human resource management practices the firms have followed like Regular performance appraisal, Systematic recruitment and selection, Written job description etc.

The Presence of a qualified HR Manager and the perceptions of owners/managers with respect to some of the factors such as age, qualification, technical skills, experience etc., which they feel absolutely essential for a candidate to be selected for various levels in the organization, has also been discussed.

Statistical Analysis

The analysis of data in the main body of this report was carried out mainly using cross-tabulations. Two-Way tables cross-tabulate one or more categorical row variables with a categorical column variable. **Pearson**'s **Chi-square** test has been used for independence of attributes applied in this report including the Yates correction.For example, to test whether attributes Technology status (ATA and ATNA) and Education level of founder (Technical and Non-Technical) are independent or dependent.

Z-test (Proportion test) has been conducted to test for equality of two sample proportions. The analysis was undertaken using SYSTAT version 11 (SYSTAT Software Inc.). The level of statistical significance was set at 2-sided P=0.05.

4.1 Demographic Characteristics of the SSIs Surveyed

The study has followed a survey approach for collection of data from the small mechanical manufacturing industries in Karnataka. The study has covered a total of 217 small-scale units as the sample for the study. It would be appropriate here to describe the basic demographical features of the units surveyed. Some of the major demographical characteristics, which have been covered, are as follows:

- Educational background of the entrepreneurs
- Cost of Project (In terms of investment in plant and machinery)
- Size of the firm (In terms of Employment)
- Gender-wise distribution of owners
- Age of the Firm
- Nature of activities
- Impact of Information Technology

A descriptive analysis of the surveyed firms has been done based on above characteristics and they are as follows:

Tables 4.1.1 to 4.1.7 show the Demographic Profile of firms surveyed.

Educational background of the Entrepreneurs

The educational background of the Entrepreneurs of the surveyed units were broadly classified into two groups namely Technical and Non-Technical. The Technical group comprised of Post – Graduates, Graduates, Diploma, and ITI holders in technical education.

Table 4.1.1: Level of Education of Founders/Owners across surveyed sample

Variable	Number	Percentage
Technical	155	71.42%
Non-Technical	62	28.58%
Total	**217**	**100%**

The Different Educational Qualification levels of Founders/Owners across Surveyed Firms are tabulated above. From the sample of 217 firms surveyed, 155 firms accounting for 71.42 percent have their founders who are from a technical background when compared to only 62 firms (28.58 percent) who have their founders from a non-technical background. (Table4.1.1). Overall, The educational qualification of founders/owners across the surveyed firms is quite impressive, with majority of them are from the technical background.

Table 4.1.1a: Distribution of Founders/Owners Education level across surveyed firms

Qualification	Number	Percentage
Post Graduates	14	6.45%
Graduates	129	59.44%
Under Graduates	13	5.99%
Diploma	52	23.96%
ITI	07	3.22%
Others	02	0.92%
Total	**217**	**100%**

A further analysis of the above information shows that an overwhelming number of firms (142) accounting for 65.43 percent are either Graduates or Post Graduates. Also, 52 firms (23.96 percent) have Diploma holders as their founders/owners. Only 12 firms (5.52 percent) have founders who are undergraduates while only 8 firms (3.68 percent) have ITI holders as their founders/owners. (Table 4.1.1a)

It is clear from the above illustration that 194 firms (89.40 percent) have their founders/owners who are either graduates or diploma holders. Since, the educational qualification levels of founders/owners of the surveyed firms is fairly high, it can be presumed that they might be in better position to appreciate the merits and demerits of advanced technology adoption, training and development and HRM practices in their own firms.

From the Surveyed sample, the educational qualifications of founders who have technical background are **statistically** significant by **Z-Test** (Proportion test).

Cost of Project (In terms of investment in plant and machinery in Indian Rupees)

The amount of Capital Investment is categorized into five groups in order to accommodate the various definitions of SSIs that prevailed at different points of time in the country. There is no distinction made between tiny and non-tiny units in this study.

Table 4.1.2: Cost of Project (Investment in Plant & Machinery in Rupees.) across surveyed sample

Cost of Project	Number	Percentage
Up to 1 million	67	30.87%
1.1 to 2.5 million	62	28.57%
2.6 to 5.0 million	37	17.05%
5.1 to 10 million	38	17.51%
More than 10 million	13	5.99%
Total	**217**	**100%**

The distribution of the Cost of Project (in terms of current investment in terms in Plant and Machinery) is shown in Table 2.1. An overwhelming number of firms (204) accounting for 94 percent have their investment level up to 10 million while only 13 firms (5.99 percent) have their Project cost in terms of current value of Plant and Machinery more than 10 million. 129 firms which are tiny units accounting for 59.44 percent have their investment level up to 2.5 million and the remaining 86 firms (40.60 percent) are non-tiny units.

Size of the Firm (In terms of Employment)

Table 4.1.3: Distribution of firm size across the surveyed sample

Employment Range	Number	Percentage
Less than 10	81	36.86%
11-25	84	38.70%
26-50	35	16.12%
51-100	10	05.06%
More than 100	07	03.22%
Total	**217**	**100%**

The distribution of firms in terms of employment across the surveyed firms is shown in Table 4.1.3. The percentage of units employing on an average, not more than 100 employees is more than 96. Only 7 firms accounting for less than 4 percent of the

sample have employed more than 100 employees. About 165 firms (76 percent) have employed on an average not more than 25 employees. This observation clearly shows that majority of the firms have employed less than 25 employees.

Gender wise distribution of Owners

Table 4.1.4: Gender-wise distributions of Owners/Proprietors across surveyed firms

Gender	Number	Percentage
Male	213	98.15%
Female	04	1.85%
Total	**217**	**100%**

From the sample of 217 firms Surveyed, an overwhelming number of firms (213) accounting for 98.15 percent have their owners/proprietors as males when compared to only 4 firms (1.85 percent), which have females as their owners/proprietors. This clearly illustrates that Male owners have dominated the small mechanical manufacturing sector when compared to female owners/proprietors. (Table 4.1.4). The result may be different for other sectors like food, textile, electronics and service sectors.

Age of the Firm

Table 4.1.5: Year of Establishment of firms across surveyed firms

Year of Establishment	Number	Percentage
Before 1980	41	18.89%
Between 1981-1990	68	31.33%
Between 1991-2000	85	39.17%
Beyond 2000	23	10.56%
Total	**217**	**100%**

The distribution of age of the firms surveyed is shown in Table 4.1.5. 109 firms accounting for 50.23 percent have their year of establishment before 1990 when compared to 108 firms (49.77 percent) have been established after 1990. From the above, it can be concluded that the year of establishment of firms surveyed have been very evenly spread.

Nature of activities

Table 4.1.6: Distribution of Nature of activities across surveyed firms

Type of Activity	Number	Percentage
Production	89	41.01%
Job works	37	17.05%
Production & Job works	88	40.55%
Others	03	1.38%

From the surveyed sample, 89 firms accounting for 41.01 percent are engaged exclusively in Production activities compared to only 37 firms (17.05 percent) which have been involved in Job works. 88 firms (40.55 percent) are involved in both Production and Job works. (Table 4.1.6)

Impact of Information Technology

Table 4.1.7: Impact of Information technology across the surveyed sample

Type of Activity	Number	Percentage
Only E-mail	82	37.78%
Only Web Page	-	-
Both	23	10.6%
Not used	112	51.6%

Among 217 surveyed firms, 82 firms (37.78 percent) have only e-mail. 23 firms (10.6 percent) have both e-mail and Web Page. 112 firms (51.6 percent) do not have either e-mail or web page. The above information also provides an insight into the way the information technology has been used in small firms. Almost half of the firms surveyed (48.4 percent) have been reaping the advantage of the information technology.

4.2 Comparison of ATA and ATNA firms

This section presents comparisons made between the firms, which have adopted advanced technology, and the firms, which have not adopted advanced technology across the sample. Here also, first the demographic characteristics of both Advanced Technology Adopted (ATA) and Advanced Technology Not Adopted (ATNA) firms have been presented. A detailed analysis has been carried out to bring the various important parameters, which clearly distinguishes the two.

Some of the major demographical characteristics and other important factors, which have been discussed, to distinguish between firms, which have adopted advanced technology and the firms, which have not, are as follows:

- Educational background of the entrepreneurs/founders
- Cost of Project (In terms of investment in plant and machinery)
- Size of the firm (In terms of Employment)
- Age of the Firm
- Impact of Information Technology
- Nature of activities

Status of advanced technology adoption across the sample:

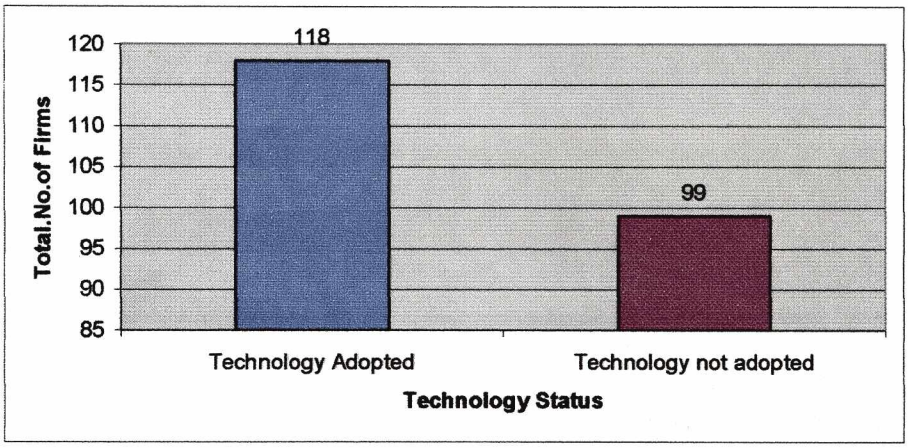

Figure 4.2.1: Status of Advanced Technology Adoption across the surveyed sample

From the sample of 217 firms surveyed, a good number of firms (118) accounting for 54.37 percent of the sample have adopted advanced technology while 99 firms (45.63 percent) have not adopted advanced technology. Overall, 23 technologies were grouped into six main functional groups. Even if one technology is adopted in any of the functional groups, then the firm is considered to have adopted advanced technology. (Figure 4.2.1)

Advanced technology adoption and Educational background of Founders:

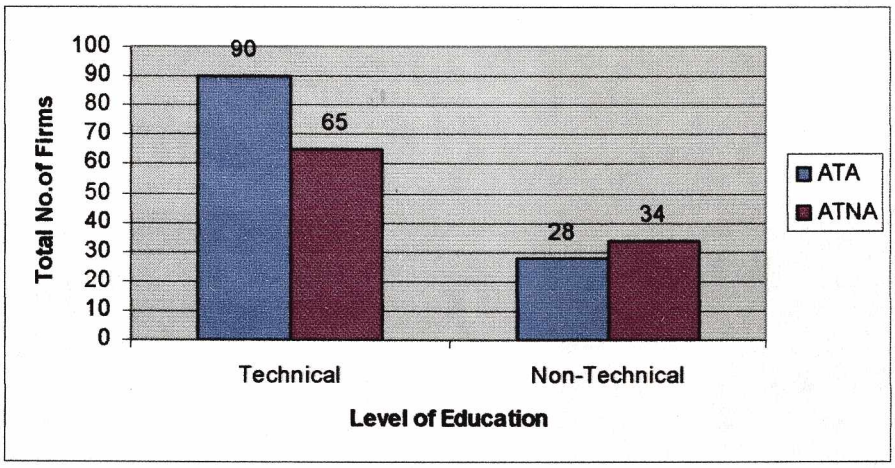

Figure 4.2.2: Educational Background of Founders across the surveyed sample

Among 118 advanced technology adopted firms, 90 firms (76.27 percent) have their founders from a technical background when compared to 28 firms (23.72 percent), which have their founders from a non-technical background.

Among 99 firms that have not adopted advanced technology, 65 firms (65.65 percent) have their founders from a technical background when compared to 34 firms (34.35 percent), which have their founders from a non-technical background.

In order to asses the relationship between technology adoption and educational background of the founder, the following analysis has been made which is as shown below:

Population	Trials	Successes	Proportion
ATA	118	90	0.763
ATNA	99	65	0657

Large sample test:

Difference between sample proportions	=	0.106
95.00% CI	=	-0.015 to 0.227
z	=	1.724
p-value	=	**0.08**

From the above analysis, there is no difference between ATA and ATNA firms in terms of educational qualifications of their founders.

Advanced Technology adoption and Cost of Project:

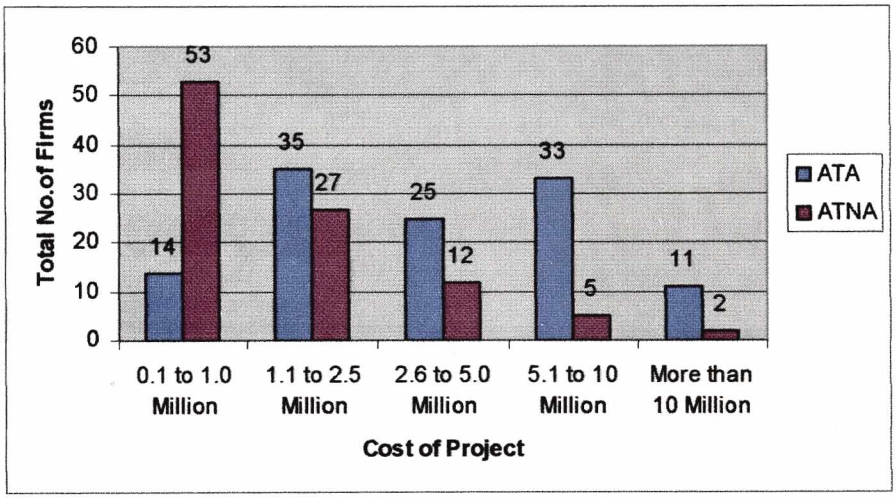

Figure 4.2.3: Cost of Project (in terms of Investment in Plant & Machinery) across the surveyed sample

Among 118 advanced technology adopted firms, 107 firms accounting for 90.67 percent have their investment level in terms of investment in plant and machinery up to 10 Million where as only 11 firms (9.33 percent) have their investment in terms of Project cost more than 10.0 Million. (Figure 4.2.3).

Among 99 firms that have not adopted advanced technology, 97 firms accounting for 97.97 percent have their investment level in terms of investment in plant and machinery up to 10 Million where as only 2 firms (2.03 percent) have their investment in terms of Project cost more than 10.0 Million.

Overall, 13 firms (5.99 percent) have their investment level in terms of plant and machinery more than 10 million which have been established between year 1997 and 1999 when the upper ceiling limit for SSI had been fixed at Rs.30 Million.

In order to asses the relationship between technology adoption and cost of Project, the following analysis has been made which is as shown below:

Cost of Project Vs Technology Adoption (Chi-Square method)

Cost of Project Range	ATA	ATNA	Total
0.1 to 1.0 Million	14	53	67
1.1 to 2.5 Million	35	27	62
2.6 to 5.0 Million	25	12	37
5.1 to 10.0 Million	33	05	38
More than 10 Million	11	02	13
Total	**118**	**99**	**217**

Test Statistic	Value	df	Prob
Pearson Chi-Square	53.913	4.00000000	0.000000000

From the above analysis, Cost of Project of a firm and its adoption of technology are dependent. Notice that the Pearson Chi-Square value is highly significant. ('P' value=0.000000000)

Advanced Technology adoption and Firm Size:

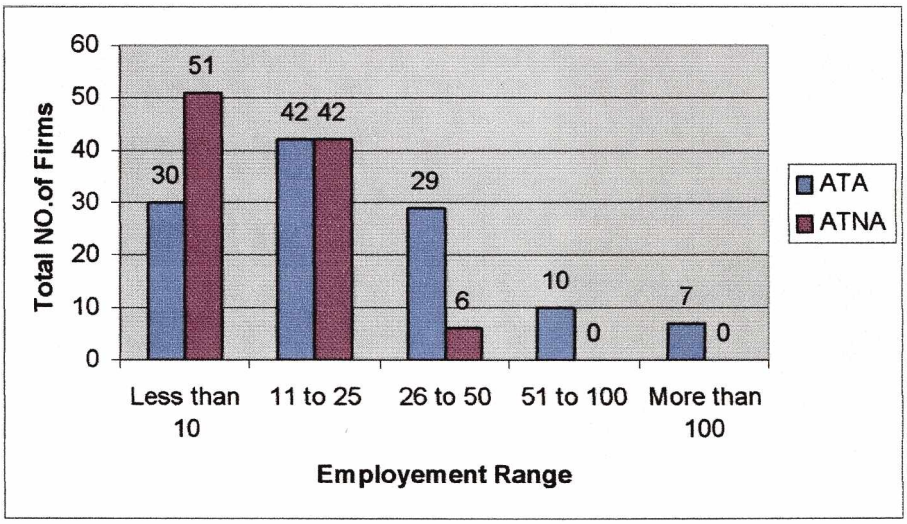

Figure 4.2.4: Firm Size (In terms of number of employees across the surveyed sample)

Among 118 advanced technology adopted firms, 72 firms accounting for 61.10 percent have employed up to 25 employees while only 39 firms (33.05 percent) have more than 25 employees but less than 100. Only 7 firms (5.93 percent) have employed more than 100 employees.

All the 99 firms accounting for (100 percent) which have not adopted advanced technology have employed not more than 50 employees. Not even a single firm was found having employed more than 50 employees and not adopted advanced technology. (Figure 4.2.4)

In order to asses the relationship between technology adoption and cost of Project, the following analysis has been made which is as shown below:

Advanced Technology adoption vs. Firm size

Firm size - Range	ATA	ATNA	Total
Less than 10	30	51	81
11 to 25	42	42	84
26 to 50	29	06	35
51 to 100	10	0	10
More than 100	07	0	07
Total	**118**	**99**	**217**

Test Statistic	Value	df	Prob
Pearson Chi-Square	36.172	4.000000000	0.000000267

From the above analysis, Firm size and its adoption of technology are dependent. Notice that the Pearson Chi-Square value is highly significant. ('P' value=0.000000267)

Advanced Technology adoption and Age of the firms:

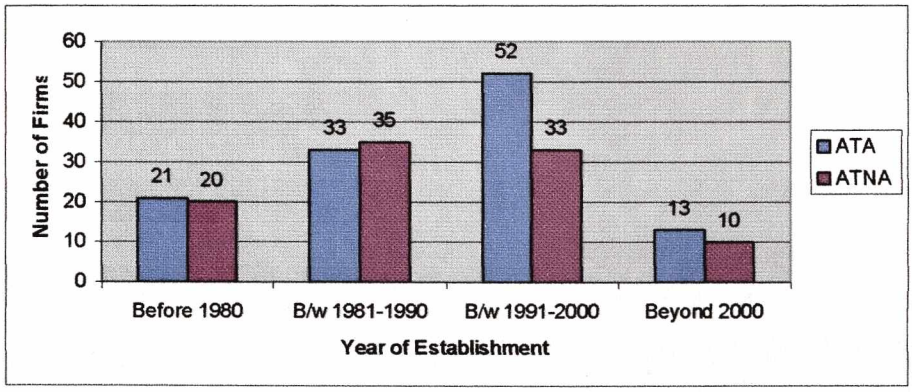

Figure 4.2.5: Year of Establishment of Firms across the surveyed firms

65 firms accounting for 55.08 percent among advanced technology adopted firms, which have been established after 1991 have adopted advanced technology. This could be an indication that SSIs have realized the need to adopt advanced

technology so as to remain competitive globally since the liberalization of the economy started from 1991 onwards while the rest were established before 1990.

Among 99 firms that have not adopted technology, almost 55 firms (56.12 percent) were established before 1990 where as 43 firms (43.87 percent) have been established after 1991 (Figure 4.2.5).

In order to asses the relationship between technology adoption and age of the firm, the following analysis has been made which is as shown below:

Advanced Technology adoption and Usage of Information Technology:

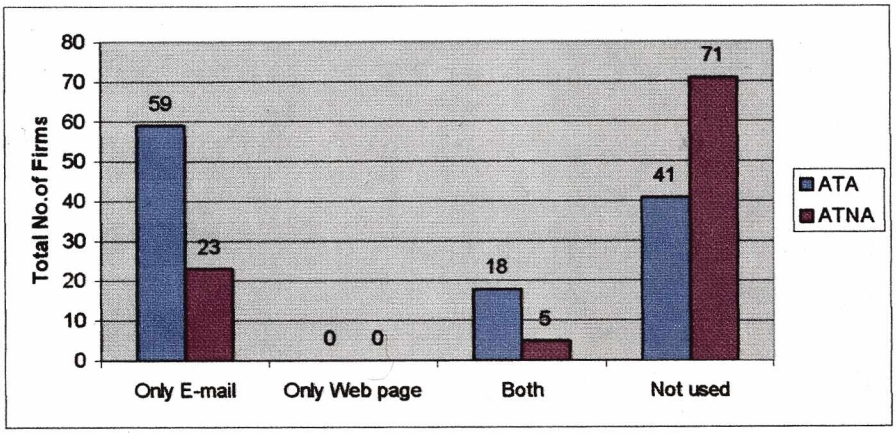

Figure 4.2.6: Influence of Information Technology on Firms across the surveyed firms

Among 118 advanced technology-adopted firms, 59 firms (49.57 percent) have only e-mail. 18 firms (15.12 percent) have both e-mail and Web Page. 41 firms (34.74 percent) do not have either e-mail or web page.

Among 99 firms that have not adopted technology, 23 firms (23.46 percent) have only e-mail. 5 firms (5.10 percent) have both e-mail and Web Page. A Majority of firms (71) accounting for 71.71 percent do not have e-mail or web page. This factor indicates that the firms, which have not adopted advanced technology, have not embraced information technology revolution and are lagging behind technology adopted firms to compete globally. (Figure 4.2.6)

Advanced Technology adoption, ISO certification and Export Units:

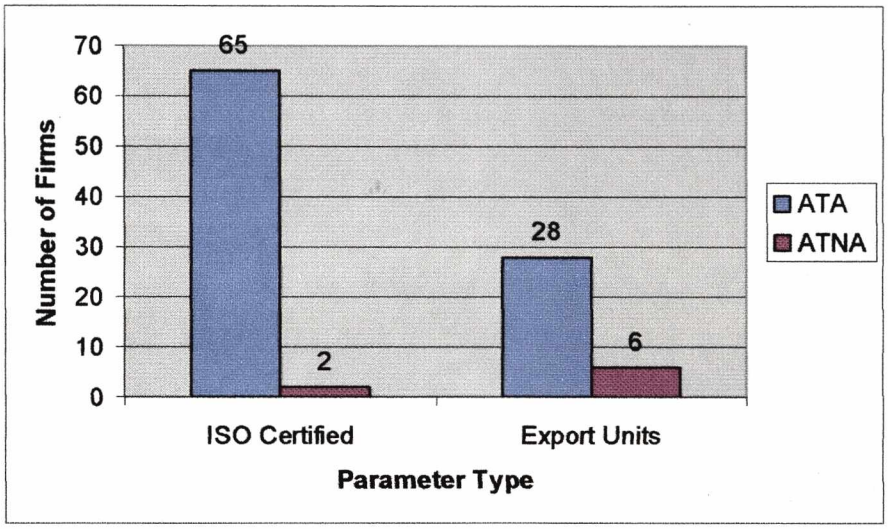

Figure 4.2.7: ISO Certification and Export Units across the surveyed firms

Among 118 advanced technology-adopted firms, an overwhelming number (65 firms) accounting for 55.08 percent are ISO Certified while 28 firms (23.72 percent) are Export Oriented Units.

Among 99 firms that have not adopted technology, only 2 firms (2.02 percent) are ISO Certified while 6 firms (6.06 percent) are Export-Oriented. It is very clear from the above observation that small firms which have adopted some of the advanced technologies have placed more emphasis on ISO certification and are Export units to remain competitive globally where as small firms which have not adopted technology are clearly lagging behind and needs some catching up to remain competitive and sustain themselves in the global economy. (Fig 4.2.7)

Relevance of Adoption of Advanced Technology in Indian Context:

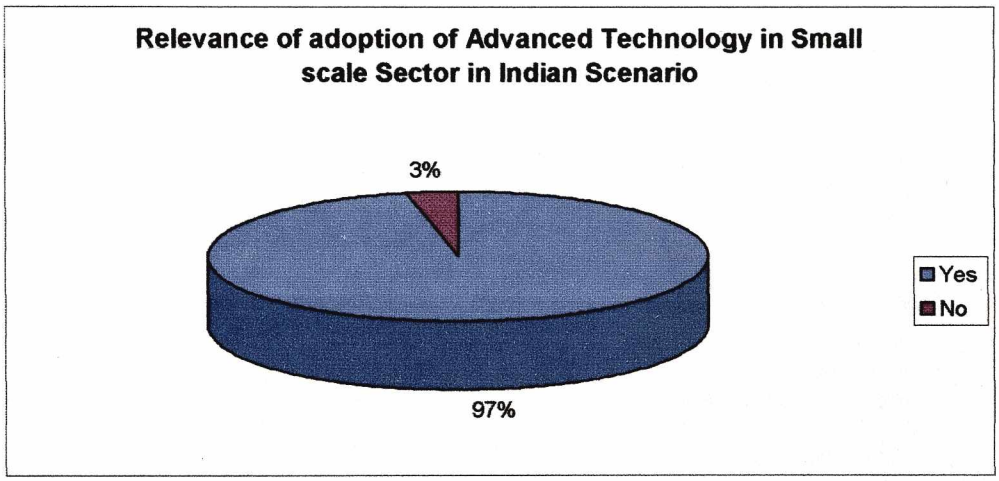

Figure 4.2.8: Relevance of Adoption of Advanced Technology in Indian Context according to Owners/Proprietors of the surveyed sample

An overwhelming number of firms (210) accounting for a staggering 97 percent of the sample size are of the opinion that Advanced Technology could be adopted in the small-scale sector emphasizing its relevance to Indian context. Only seven firms (3 percent) have responded negatively.

Level of Advanced Technology Adoption:

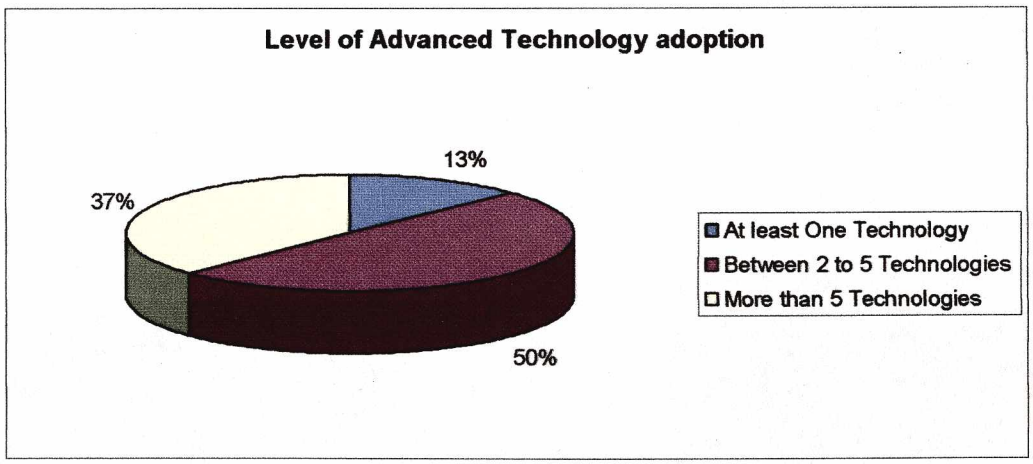

Figure 4.2.9: Level of advanced technology adoption among ATA firms

Among 118 advanced technology-adopted firms, 59 firms accounting for 50 percent have adopted between 2 to 5 technologies followed by 44 firms (37 percent). 15

firms accounting for only 13 percent have adopted at least one technology. It is very clear from the above observation that 93 firms accounting for 87% have adopted more than one Technology.

Table 4.2.1: Adoption of advanced technology among the Functional groups

Functional Groups	Number of firms
Design and Engineering	95
Processing Fabrication and Assembly	7
Automated Material Handling	14
Inspection	7
Integration and Control	13
Network Communications	62

Among 118 advanced technology-adopted firms, Design and Engineering Group (95 firms) Network communications (62 firms) followed by Automated material Handling (14 firms) have emerged as the major advanced technology functional groups among which the firms have adopted advanced technology. Same is depicted as shown below.

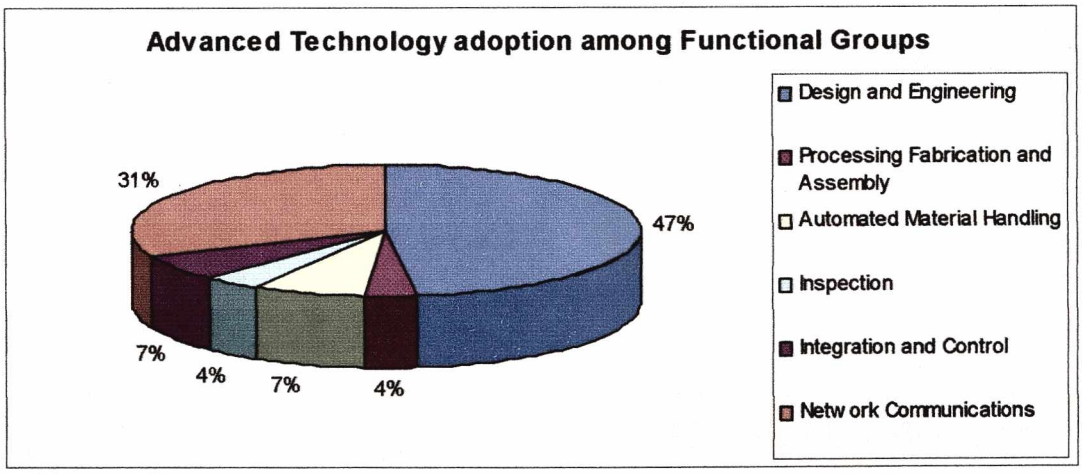

Figure 4.2.10: Advanced technology adoption among functional groups

Reasons for adopting advanced technology in future across ATNA firms:

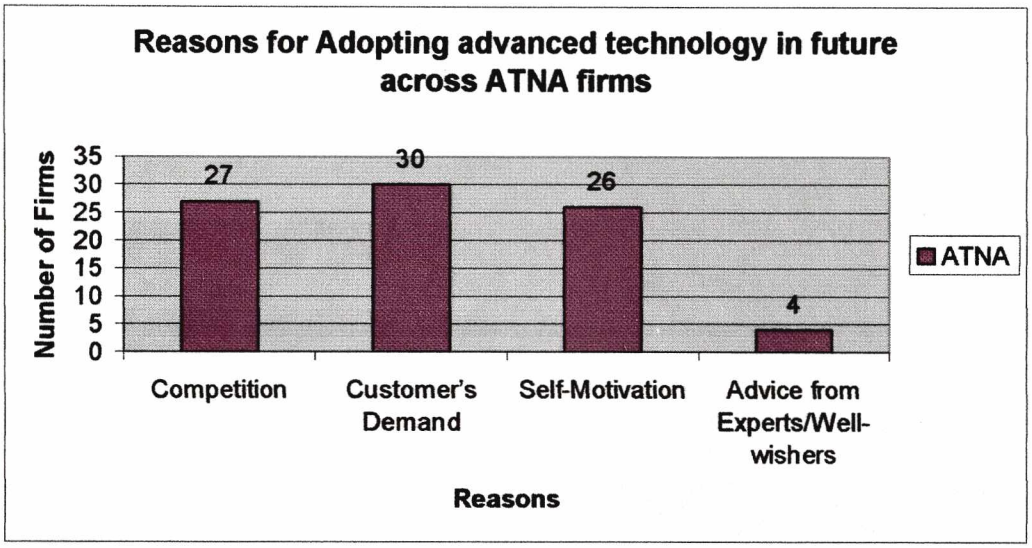

Figure 4.2.11: Reasons for Adopting advanced technology in Future

Among 99 firms that have not adopted technology, Customer's demand (31 firms), competition (28 firms), Self-Motivation (27 firms) & advice from Experts/Well-wishers (01 firms) have been major reasons for having plans to adopt advanced technology in the future.

Reasons for adopting few more advanced technologies in future across ATA firms:

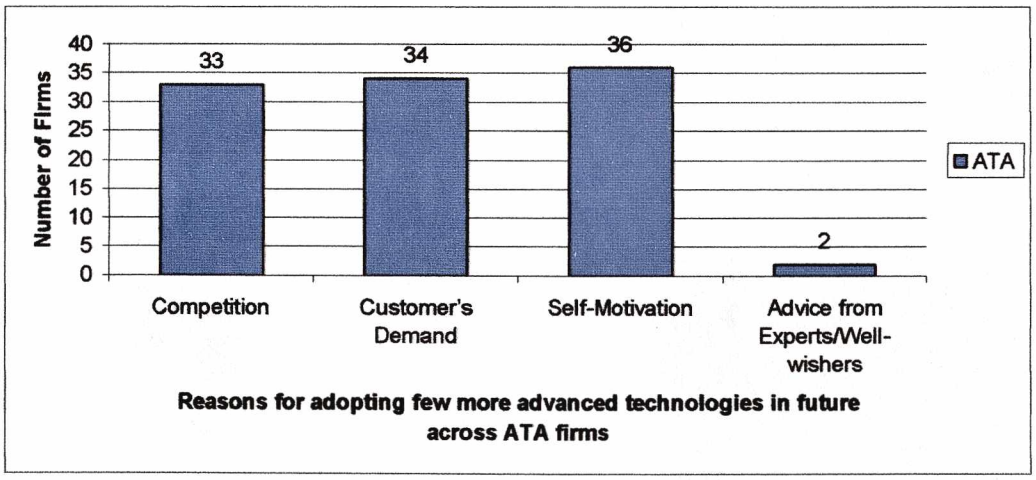

Figure 4.2.12: Reasons for adopting few more advanced technologies in future

Among 118 advanced technology adopted firms, Self-Motivation (36 firms), Customer's demand (34 firms), competition (33 firms) have been the major reasons for adoption of few more advanced technologies. Advice from Experts/Well-wishers (02 firms) has been the least cited reason for adoption.

Advanced Technology – Major Benefits:

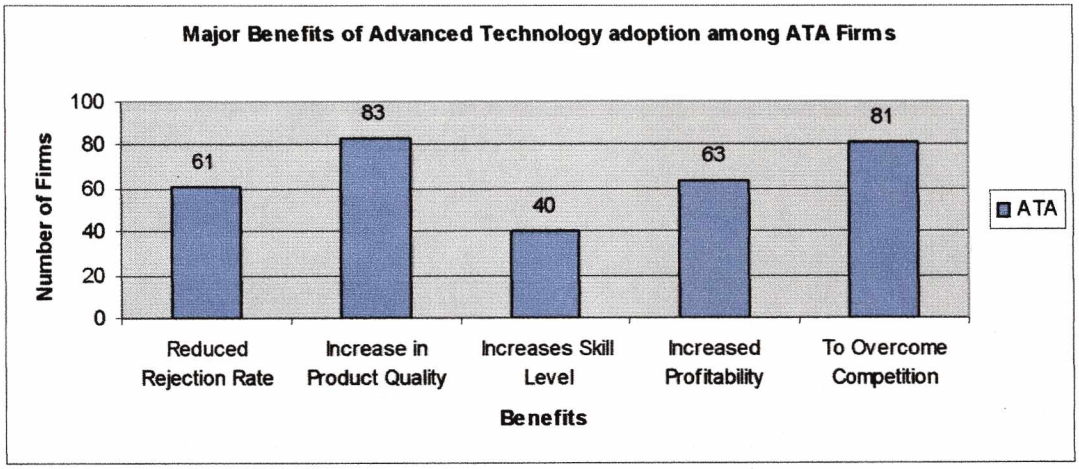

Figure 4.2.13: Major Benefits of Advanced technology adoption among ATA firms

Among 118 advanced technology-adopted firms, Increase in Product Quality (83 firms), to overcome Competition (81 firms), Increased Profitability (63 firms), Reduced Rejection Rate (61 firms), & Increase in Skill level of Employees (40 firms) have emerged as the major benefits of advanced technology adoption.

Advanced Technology adoption – Major Discouraging Factors:

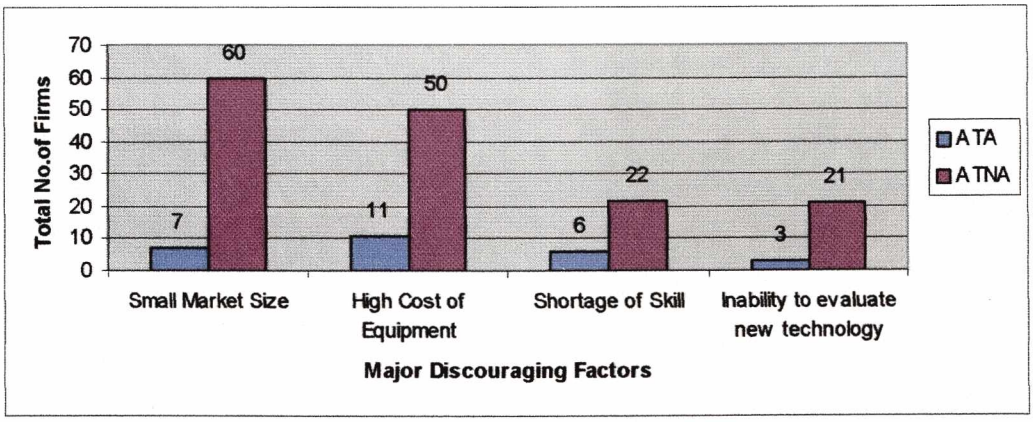

Figure 4.2.14: Major Discouraging Factors for Advanced technology adoption across the surveyed sample

Among 118 advanced technology adopted firms, high cost of Equipment (12 firms), Small market size (08 firms) and Shortage of Skill (07 firms) have emerged as the major discouraging factors for adopting some of the advanced technologies which they did not have at the time of the study in their firms.

Among 99 firms that have not adopted advanced technology, Small market size (60 firms), High cost of Equipment (50 firms), Shortage of Skill (22 firms) & Inability to evaluate new technology (21 firms) have been the major discouraging factors for adopting advanced technologies.

Advanced technology adoption – Skill shortages:

Table 4.2.2: Total Number of Firms that have reported shortages in Skill after Advanced Technology Adoption

Experienced Skill shortages	Numbers
Yes	47
No	71
Total	**118**

Among 118 advanced technology-adopted firms, Only 47 firms accounting for (40 percent) have reported skill shortages when the advanced technology was adopted in their firms when compared to 71 firms (60 percent), which have not reported skill shortages. This could be an indication that advanced technology adoption is **not** always associated with skill shortages in small firms. The same is shown in Fig.4.2.15.

Skill shortages are **not** associated significantly with the adoption of advanced technology among the firms, which have adopted advanced technology according to Z-test. ('P' value = 0.002).

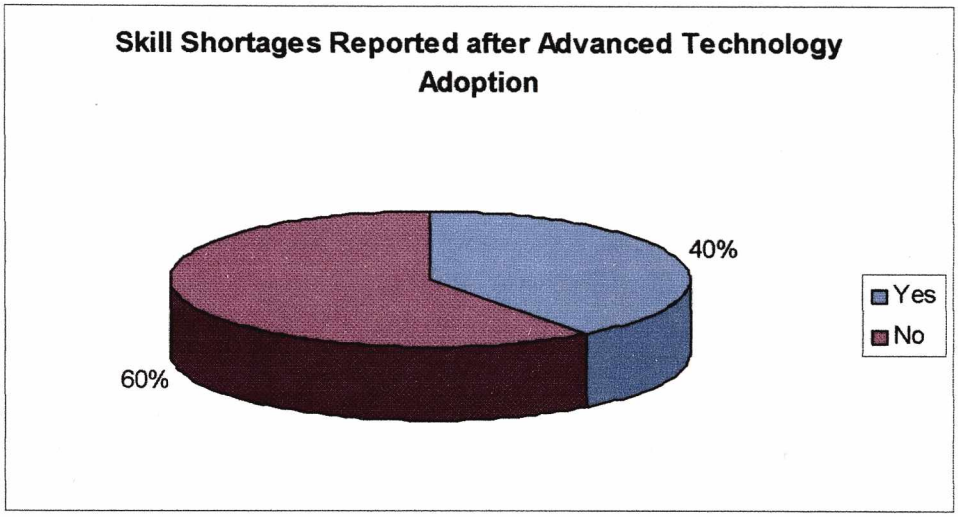

Figure 4.2.15: Skill Shortages reported after advanced technology adoption

In firms that have reported skill shortages when technology is adopted, the other issue, which was needed to be addressed, was at what different levels in the organization they have experienced skill shortages. The following table describes the above issue.

Table 4.2.3: Skill Shortages reported when Technology was adopted at Different Levels

Organizational Level	Numbers
Manager	17
Supervisor	30
Operator/Helper	44
Others	03

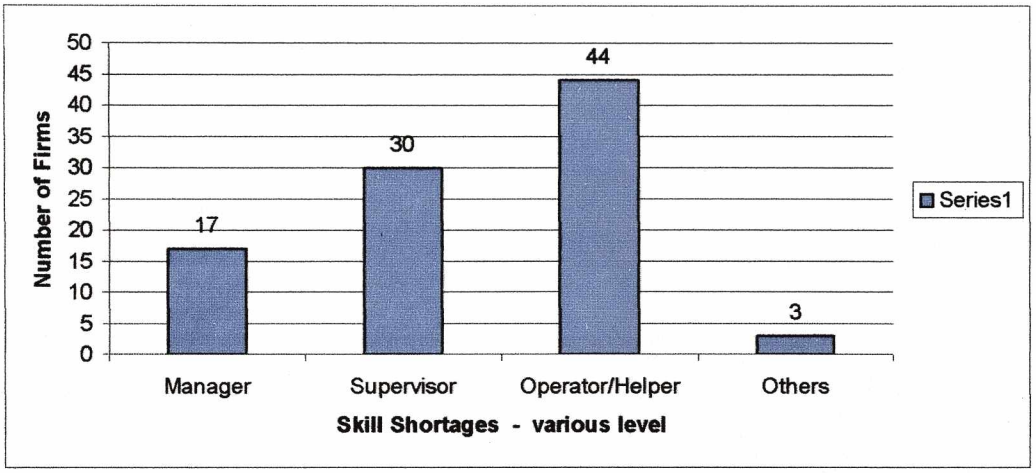

Figure 4.2.16: Skill shortages experienced at different levels when technology is adopted

Skill shortages have been reported when technology is adopted mainly in operator/helper level (29.41 percent) followed by at supervisor (21.0 percent) and Manager (12.6 percent). Others include Quality Control Inspectors, Metallurgists etc. (Table 4.2.16)

It was also imperative to address what steps have been taken to bridge those skill shortages occurred due to adoption of advanced technology. The following table presents some relevant information on the above topic.

Table 4.2.4: Steps Taken to Bridge Skill Shortages

Variable	Numbers
Providing Training for Skill Upgradation	34
Established Stronger links with Educational Institutions	12
Improved Wages and benefits to attract Skilled Persons	08
Recruited the Skilled Person	13
Others	01

Figure 4.2.17:Steps taken to bridge skill shortages experienced when advanced technology is adopted

Providing Training for Skill Upgradation (34 firms), Recruited the skilled person (13 firms) Established Stronger links with Educational Institutes (12 firms), Improved Wages and Benefits to attract the Skilled Persons (8 firms) have emerged as the major steps taken to bridge skill shortages when technology is adopted among the advanced technology adopted firms.

4.3 Training related activities across the sample firms

Use of Training needs assessment methods:

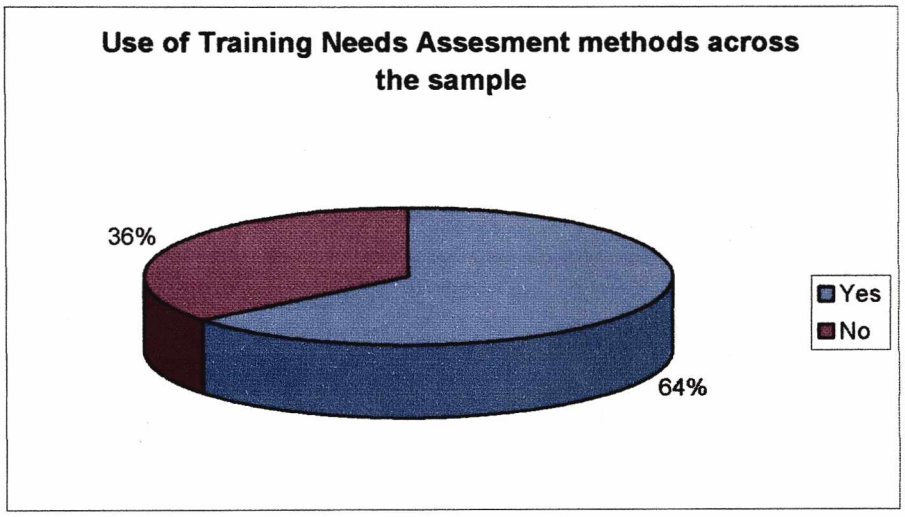

Figure 4.3.1: Use of Training Needs Assessment Methods

From the sample of 217 firms surveyed, 139 firms (64percent) have been using Training Needs assessment methods when compared to 78 firms (36 percent), which have not used any Training Needs Assessment Methods. From the above observation it is very clear that the usage of Training needs assessment methods is significantly high among the surveyed firms. (Fig 4.3.1)

Use of training needs assessment methods among ATA and ATNA:

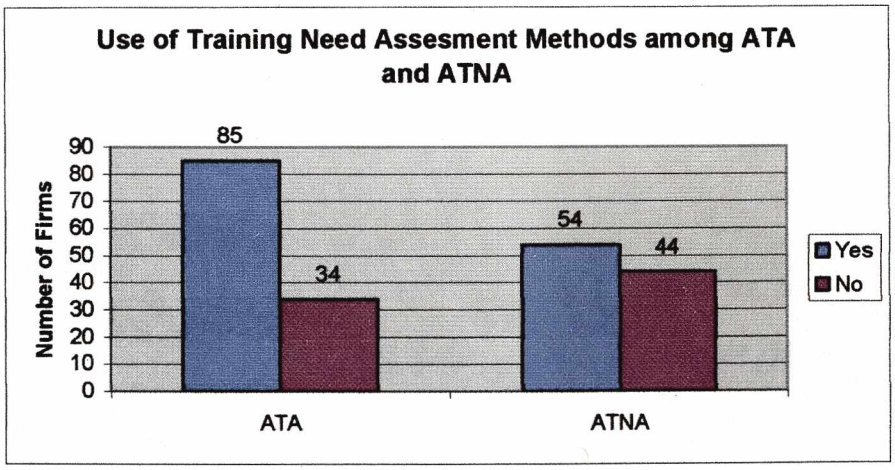

Figure 4.3.2: Usage of Training Needs Assessment Methods

Among 118 advanced technology-adopted firms, a significant number of firms (85) accounting for 72.03 percent have used Training needs assessment methods when compared to 54 firms (54.54 percent) among firms, which have not adopted advanced technology. This clearly illustrates that usage of Training Needs Assessment Methods in general is higher overall among both advanced technology adopted and non-technology adopted firms. But, its use is significantly higher in the case of Advanced Technology Adopted firms when compared to firms, which have not adopted advanced technology.(Fig 4.3.2)

Use of Training Needs assessment methods among the surveyed sample is significantly higher according to Pearson chi-square test. (p value = 0.007).

Types of Training needs assessment methods used:

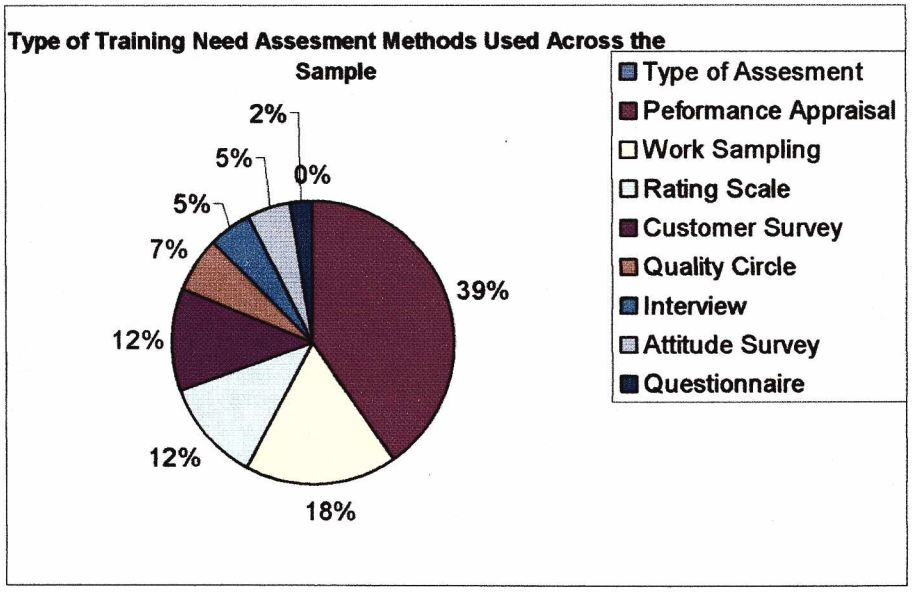

Figure 4.3.3: Type of Training Needs Assessment Methods Used

Performance Appraisal (117 firms), Work Sampling (51 firms), Rating Scale (34 firms) and Customer Survey (34 firms) have been observed as the major training needs assessment methods used. (Fig. 4.3.3)

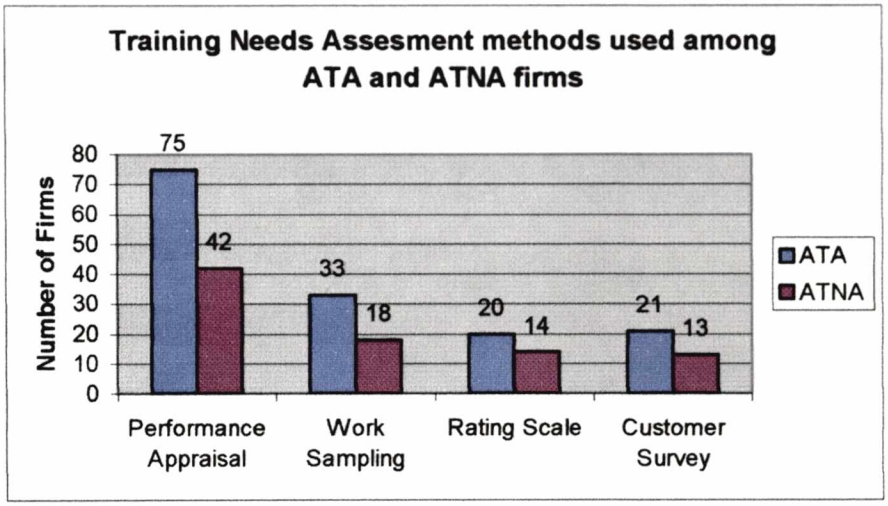

Figure 4.3.4: Training needs assessment methods used among ATA and ATNA firms

Among 118 advanced technology-adopted firms, a significant number of firms (75) accounting for 63.55 percent have used Performance Appraisal as the most training needs assessment method when compared to 42 firms (42.42 percent) among firms, which have not adopted advanced technology. It is clear from the above observation that Performance appraisal is the most used training need assessment methods among the surveyed sample.

Training Methods Used across the Sample:

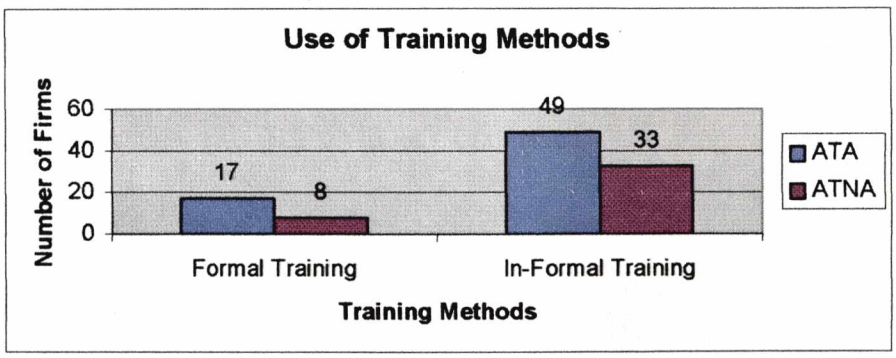

Figure 4.3.5: Use of Training methods

Among 118 advanced technology adopted firms, 17 firms (14.04 percent) have given formal training when compared to 49 firms (41.25 percent). From this observation, it is clear that they have focused on informal mode of training than a conventional

formal training. The observation holds true even in the case of firms, which have not adopted advanced technology.

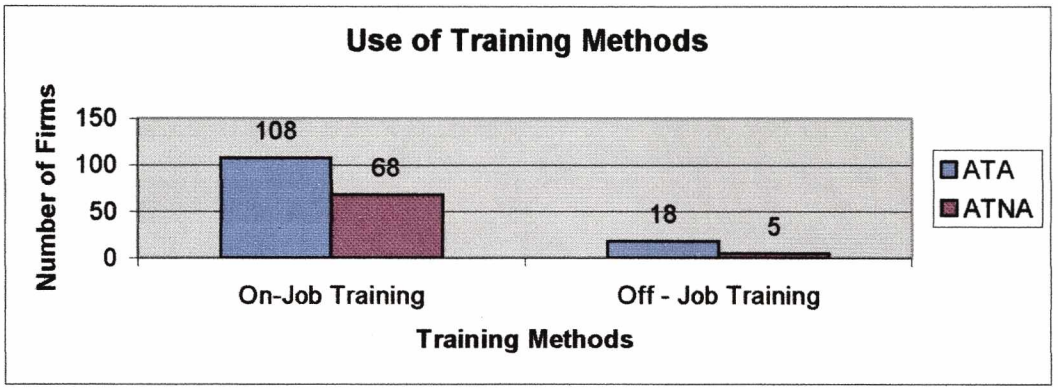

Figure 4.3.6: Use of Training methods

Among 118 advanced technology adopted firms, an overwhelming number of firms (108 firms) accounting for 91.52 percent have given on-job training when compared to only 10 firms (8.48) which have given off-job training. It is very clear from the above observation that advanced technology adopted firms have placed greater importance on on-job training than off-job training.

Among 99 firms that have not adopted advanced technology, 68 firms (68.68 percent) have given on-job training when compared to only 5 firms (5.05%), which have given off-job training. The remaining firms have not provided training at all.

Major Training methods used across the sample:

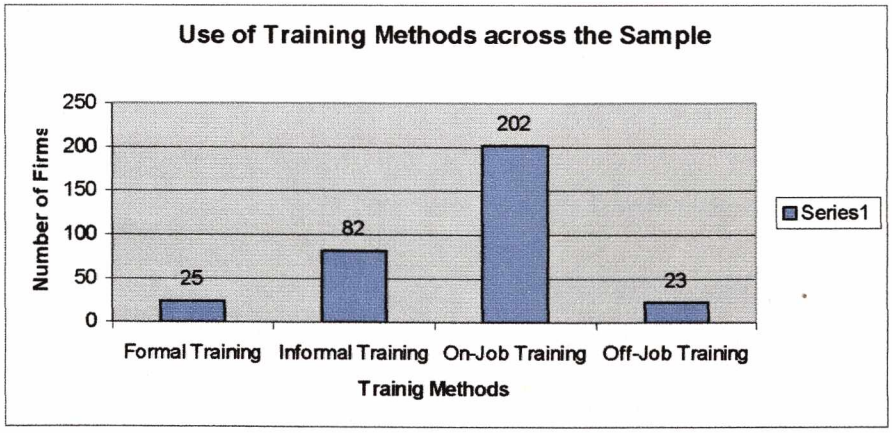

Figure 4.3.7: Training Methods Used across the surveyed sample

Formal Training (25 firms), Informal Training (82 firms), On-Job Training (202 firms) and Off-Job Training (23 firms) have been observed as the major training methods used. It is clear from the above observation that On-Job Training is the most preferred training method used by firms. (Fig 4.3.7)

Training methods adopted - On-Job Training:

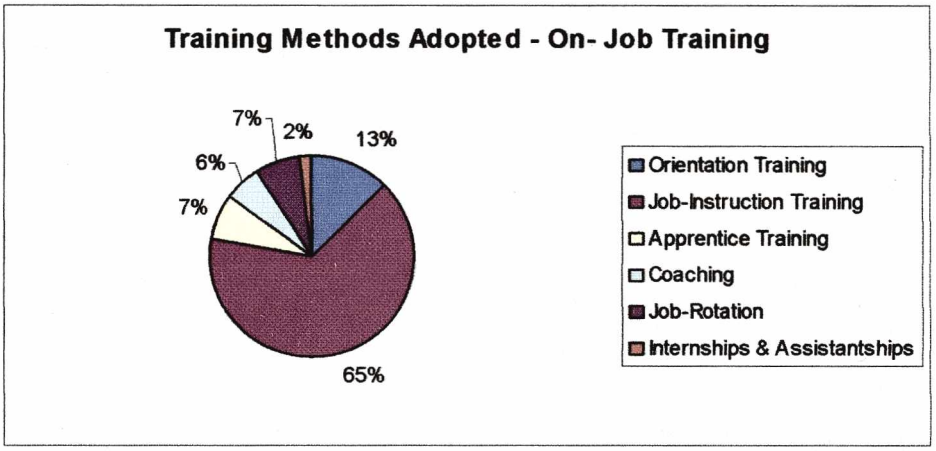

Figure 4.3.8: Training Methods Adopted – On-Job Training

Job-Instruction Training (176 firms), Orientation Training (35 firms) followed by Apprentice Training (20 firms) and Job-Rotation (19 firms) have been observed as the major training methods adopted within On-Job Training. It is clear from the above observation that Job-Instruction Training is the most preferred Training method used while giving On-Job Training by Employers. (Fig 4.3.8)

Training methods adopted - Off -Job Training:

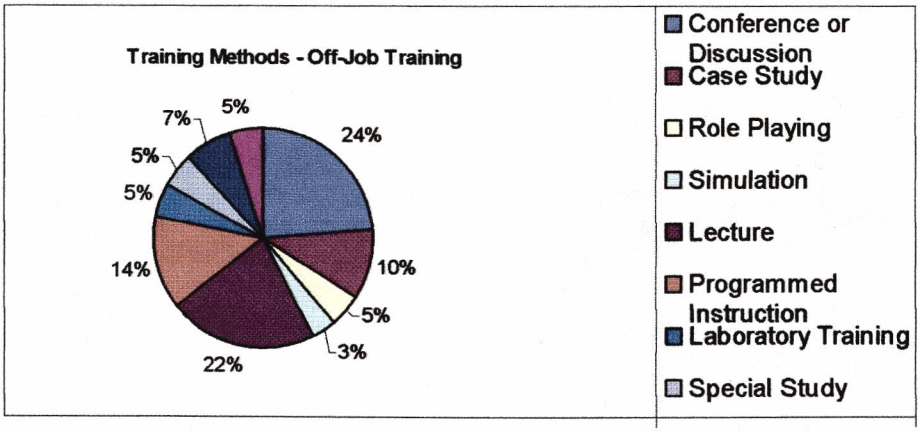

Figure 4.3.9: Training Methods Adopted – Off-Job Training

Conference or Discussion (14 firms) and Lecture (13 firms) have emerged as the major training methods adopted within Off-Job Training. It is clear from the above observation that On-Job Training is the most used method of Training when compared to Off-Job Training method used while providing Training to their employees by firms. (Fig 4.3.9)

Major Training areas in which training is given across the Sample:

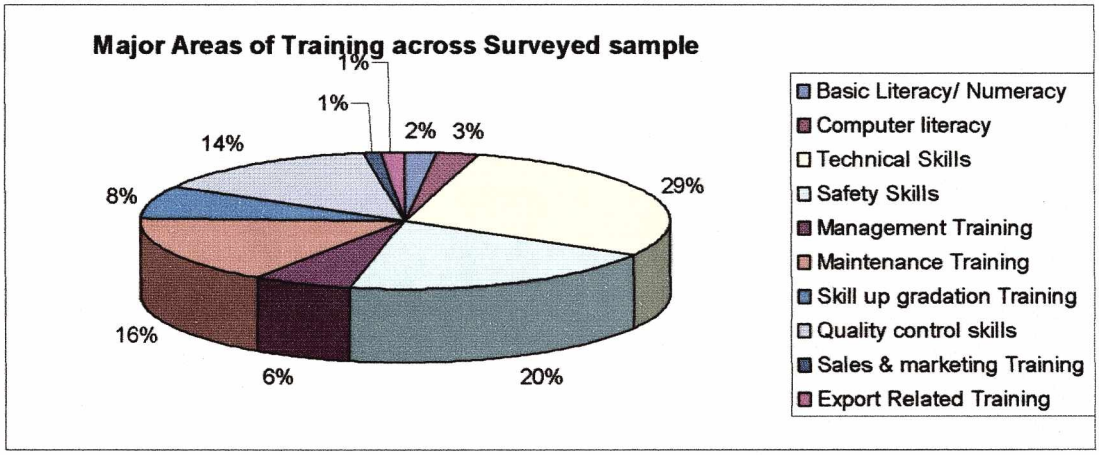

Figure 4.3.10: Major Training Areas across surveyed sample

Technical Skills (183 firms), Safety Skills (127 firms) followed by Maintenance Training (102 firms) and Quality Control Skills (89 firms) have emerged as the major areas in which training is given to their employees by surveyed firms. (Fig 4.3.10)

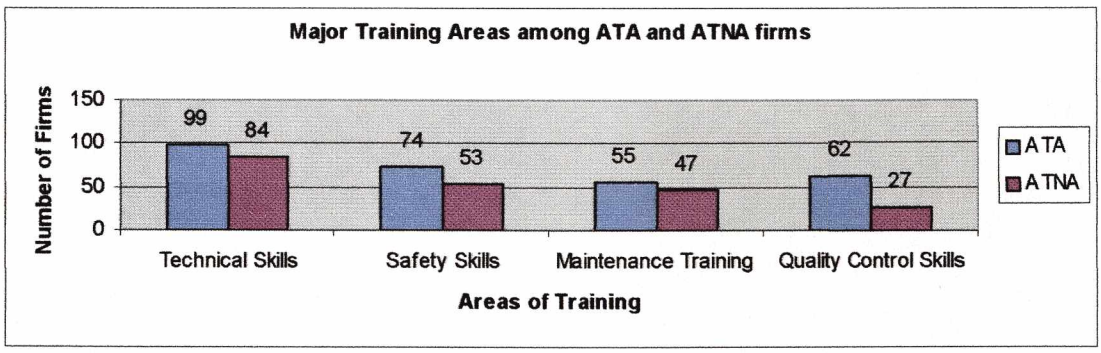

Figure 4.3.11: Major Training Areas among ATA and ATNA firms

Among 118 advanced technology-adopted firms, Technical Skills (99 firms), Safety skills (74 firms) followed by Quality control skills (62 firms) and Maintenance training (55 firms) have been cited as the major areas in which training is given.

Among 99 advanced technology not adopted firms also, Technical Skills (84 firms), Safety skills (53 firms) followed by Maintenance training (47 firms) and Quality control skills (27 firms) have been cited as the major areas in which training is given.

Perception about benefits of Training across the Sample:

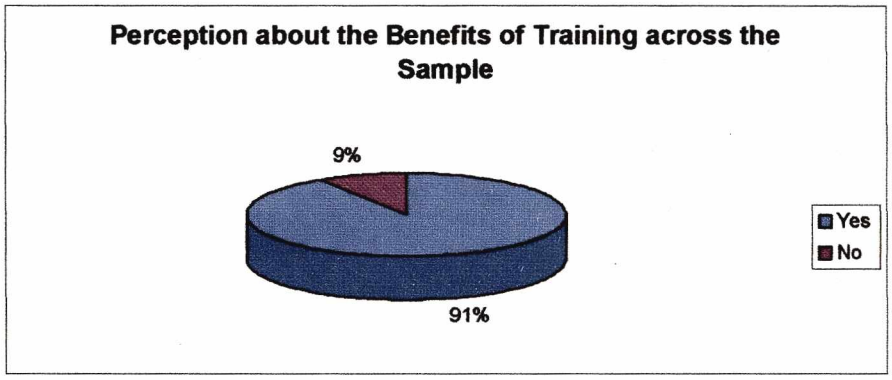

Figure 4.3.12: Perception about Benefits of Training

198 firms accounting for a staggering (91.24 percent) are aware of the benefits of training while only 19 firms (8.76 percent) have responded negatively about the perceived benefits of training. (Fig 4.3.7)

From the Surveyed sample, Training is seen as significantly beneficial to firms according to Z-test. (p value = 0.000)

Major Benefits of Training across the Sample:

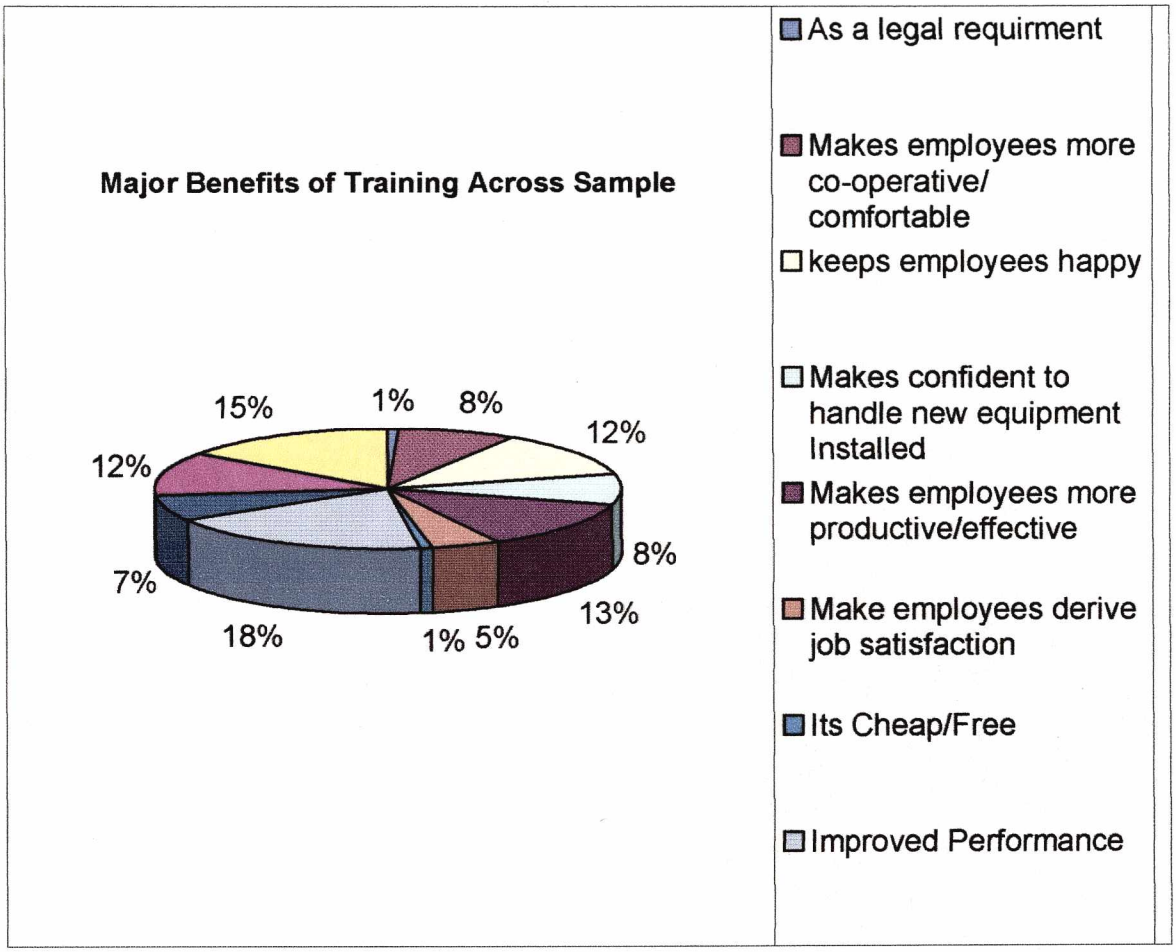

Figure 4.3.13: Benefits of Training across the surveyed sample

Improved Performance (146 firms), Increased Self confidence (119 firms) followed by making employees more productive/effective (100 firms) and Keeping employees happy (93 firms) have emerged as the major benefits of Training. (Fig 4.3.13)

Major Discouraging factors for training across the Sample:

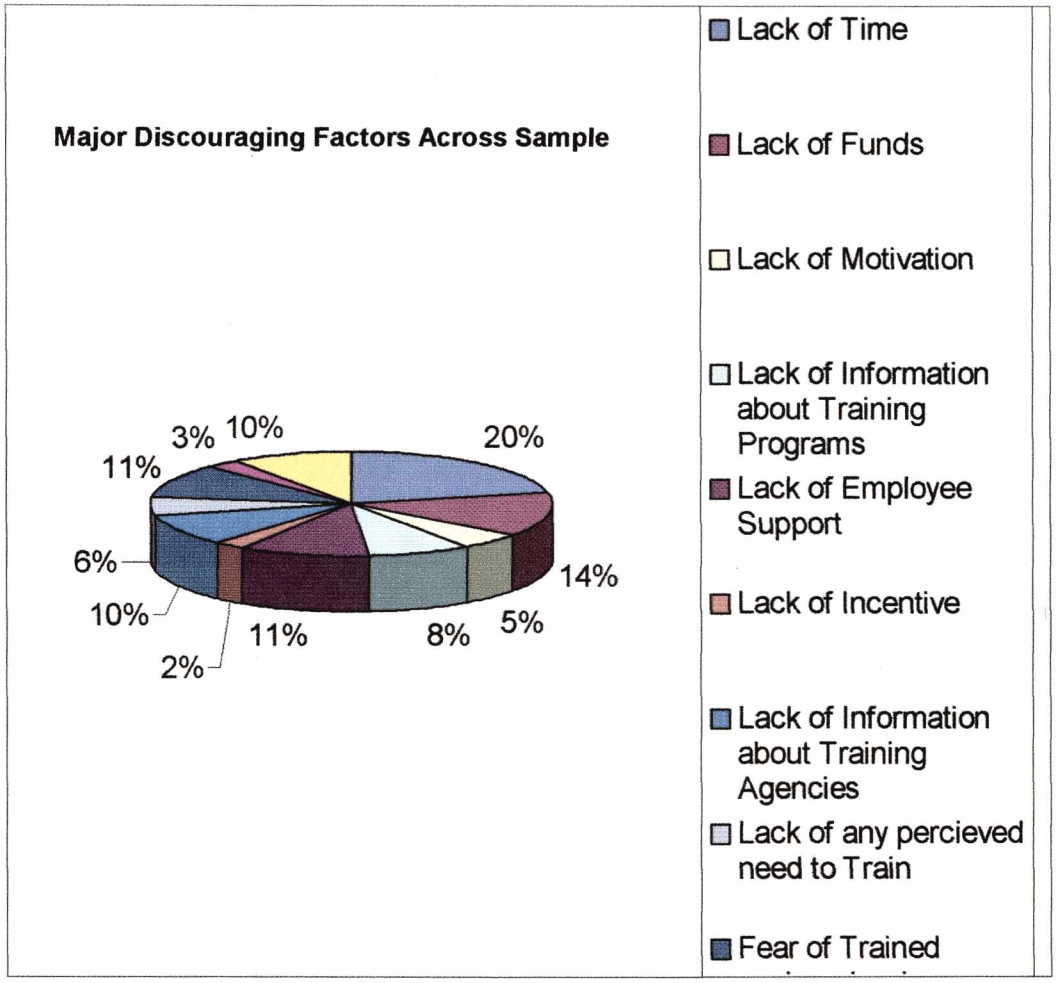

Figure 4.3.14: Discouraging Factors for Providing Training

Lack of Time (43 firms), Lack of Funds (29 firms) followed by Lack of Employee Support (26 firms) and Fear of Trained workers leaving or being poached (23 firms) have emerged as the major discouraging factors for providing Training to their employees. (Fig 4.3.14)

Perception - whether Training as a continuous Process?

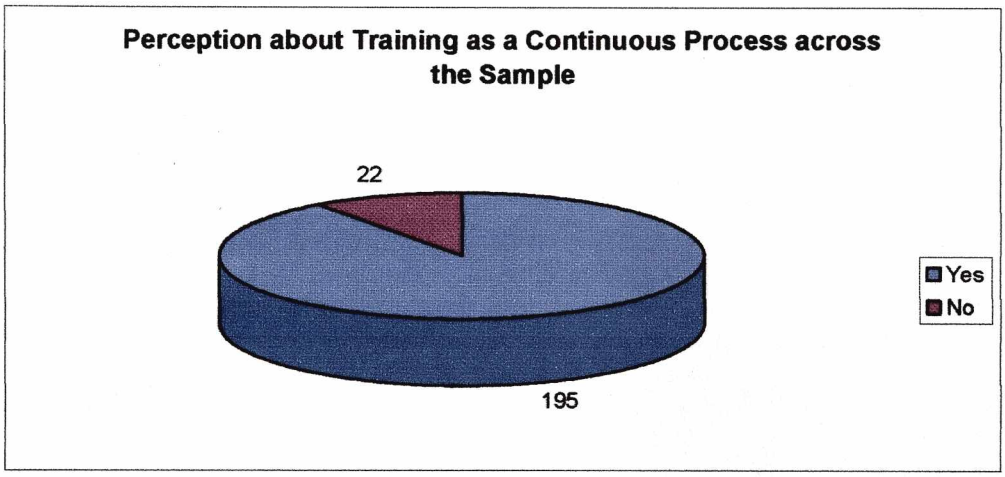

Figure 4.3.15: Training as a continuous Process

An overwhelming 195 firms accounting for an 89.86 percent are of the strong opinion that Training is a continuous process where as only 22 firms (10.14 percent) have responded negatively. It is very clear from the above observation that training is considered as continuous process both by firms, which have adopted advanced technology, and firms, which have not adopted advanced technology. (Fig 4.3.15)

From the Surveyed sample, Training is seen as a continuous process by owners/managers significantly by Z-test.

Cost of Training borne across the Sample:

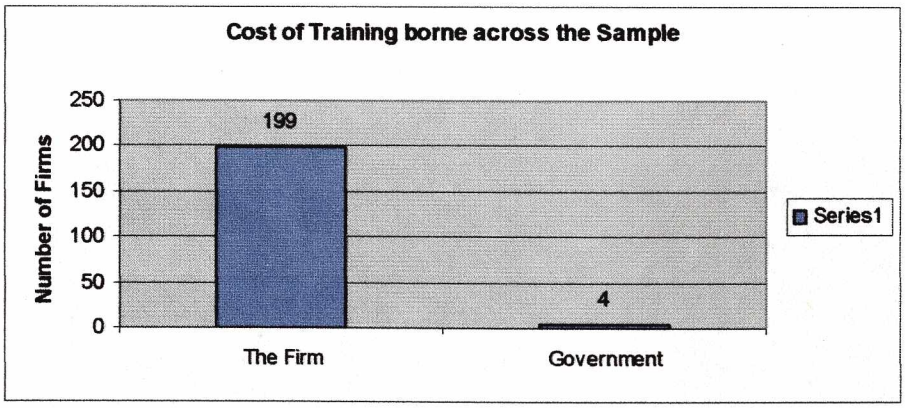

Figure 4.3.16: Cost of Training borne across surveyed sample

From the sample of 217 firms surveyed, a good number of firms (199) accounting for a 91.70 percent bear the cost of training when compared to only 4 firms (1.94 percent) for which government has borne the cost of training. (Fig 4.3.16)

From the Surveyed sample, a significant number of firms have borne the cost of training their employees when compared Govt.Assistance by Z-test.

Maintain Separate budget provision for Training across the Sample:

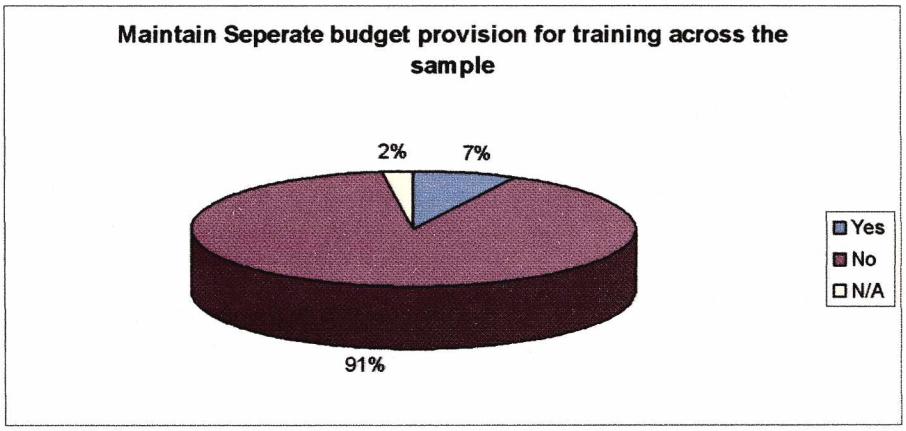

Figure 4.3.17: Maintain Separate Budget Provision for Providing Training

An overwhelming no. of firms (196) accounting for a staggering 90.32 percent do not maintain a separate budget provision for training their employees while only 16 firms (7.37 percent) have responded positively and maintain a separate budget provision for training. (Fig 4.3.17)

From the Surveyed sample, a significant number of firms **does not** have a separate budget provision for training their employees according to Z-test.

Agencies Utilized to Train Employees across the Sample:

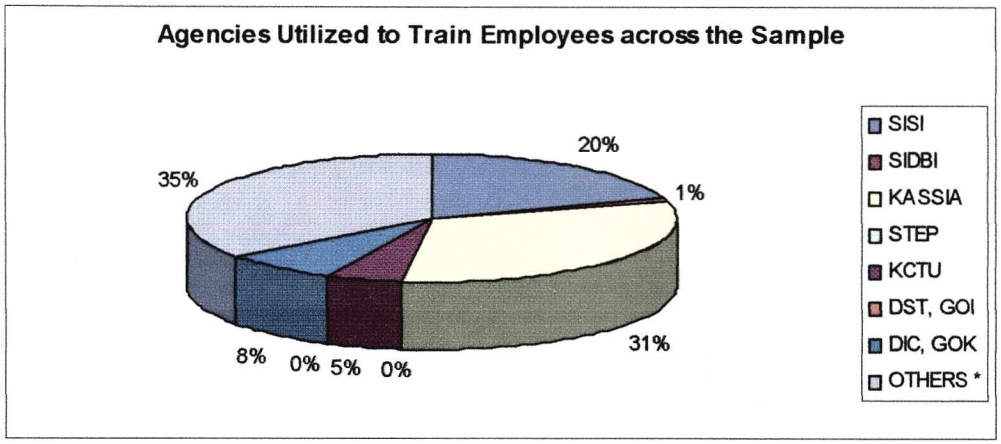

Figure 4.3.18: Agencies Utilized to Train Employees across the sample

Among 217 firms Surveyed, KASSIA (32 firms), SISI (20 firms) followed by Others (36 Firms) have emerged as the major Training agencies utilized by surveyed firms to train their employees. (Fig 4.3.18)

* Others = Foreman Training Institute [FTI], Govt.Tool Room and Training Centre [GTTC], Peenya Industrial Association [PIA], FKCCI, NIQR, NTTF, Pvt.Agencies, Consultants etc.

Duration of Training across the Sample:

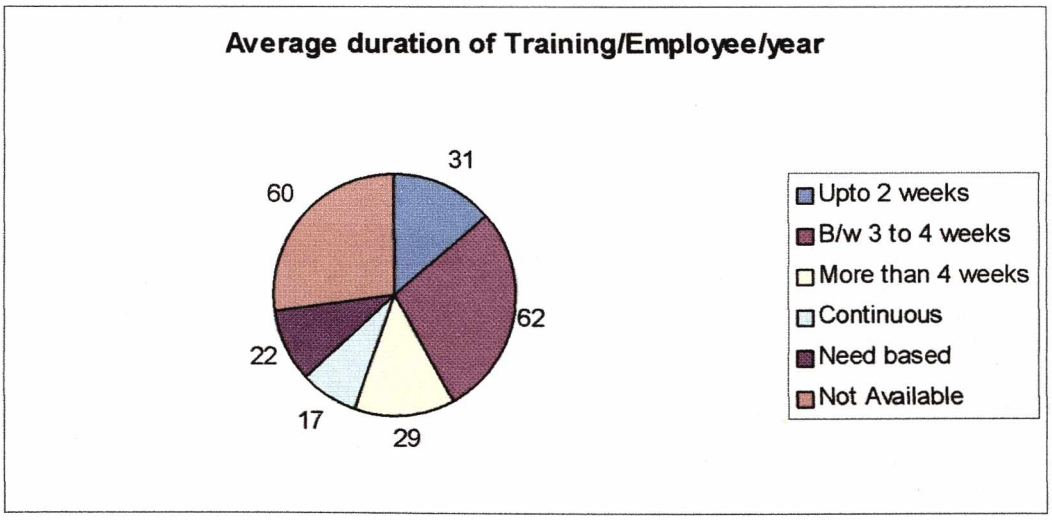

Figure 4.3.19: Average duration of Training/Employee/Year

62 firms (28.57 percent) provide between 3-4 weeks of Training, 31 firms (14.28 percent) provide up to 2 weeks of training while 29 firms provide more than 4 weeks of training (13.36 percent) on an average. 22 firms (10.13 percent) feel that training is need based where as 17 firms (7.83 percent) feel that training is continuous and day-to-day routine. (Fig 4.3.19)

HRM Practices

Presence of a Qualified Human Resource Manager across the surveyed sample:

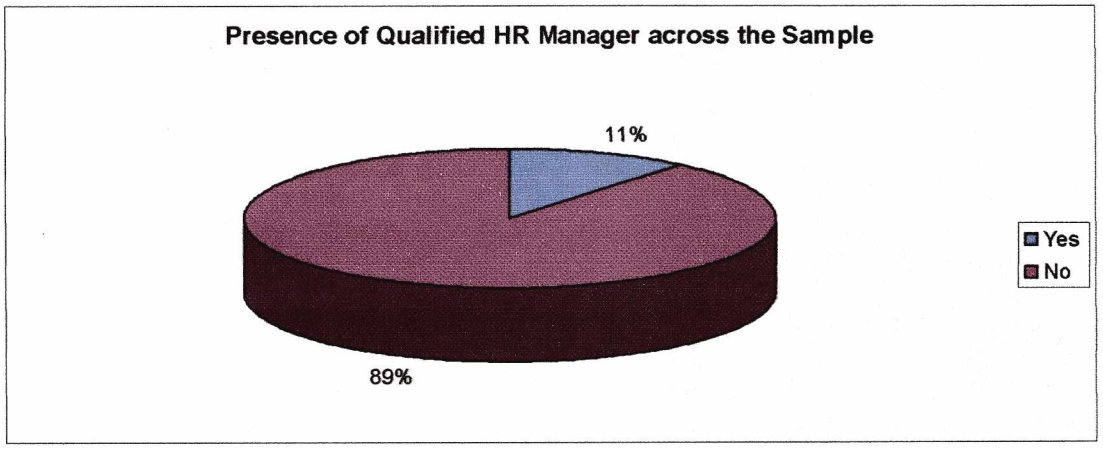

Figure 4.3.20: Presence of Qualified HR Manager across the Sample

From the sample of 217 firms surveyed, an overwhelming no. of firms (193) accounting for a staggering 89 percent do not have a Qualified HR Manager in their firms while only 24 firms (11. percent) have a qualified HR Manager to take care of their firm's HR activities. Overall, the Presence of Qualified HR Manager is significantly low among the surveyed firms. (Fig 4.3.20)

Presence of a Qualified HR Manager among ATA and ATNA firms:

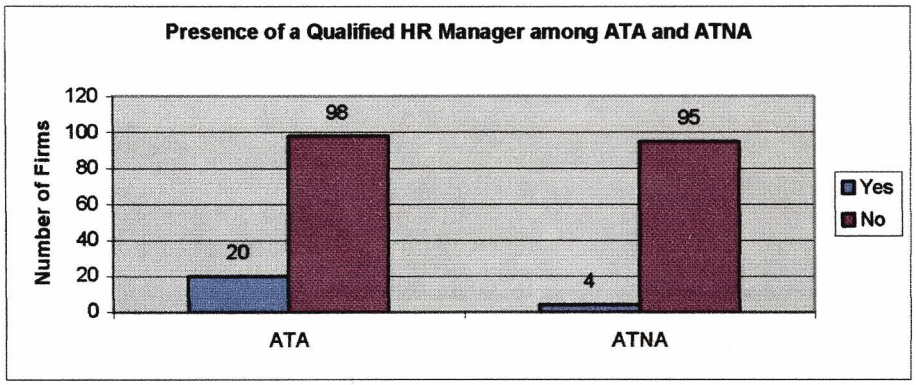

Figure 4.3.21 Presence of a qualified HR Manager among ATA and ATNA

The presence of a qualified HR manager is significantly low among the surveyed firms. Even then, the firms, which have adopted advanced technology, have more number of qualified HR Managers in their firms than the firms, which have not adopted advanced technology.

Presence of a Qualified HR Manager and technology adoption of a firm are dependent according to Pearson chi-square test.

Wish to consult Human Resource Consultant for:

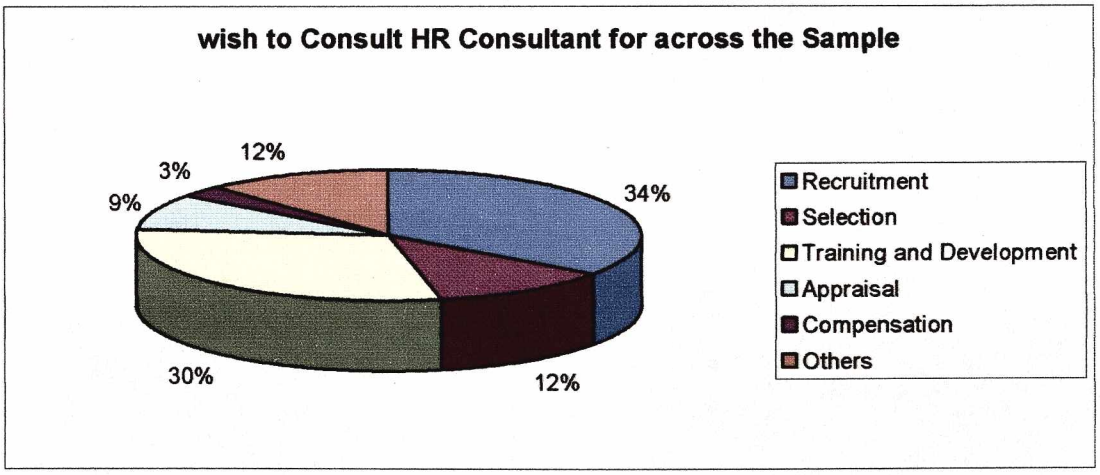

Figure 4.3.22: Consult HR for in the absence of Qualified HR Manager

Recruitment (79 firms), Training and Development (67 firms) followed by Selection (26 firms) and Appraisal (20 firms) have emerged as the major activities that firms consult HR consultant in the absence of HR Manager in their firms. (Fig 4.3.16)

HR Practices Followed across the Sample:

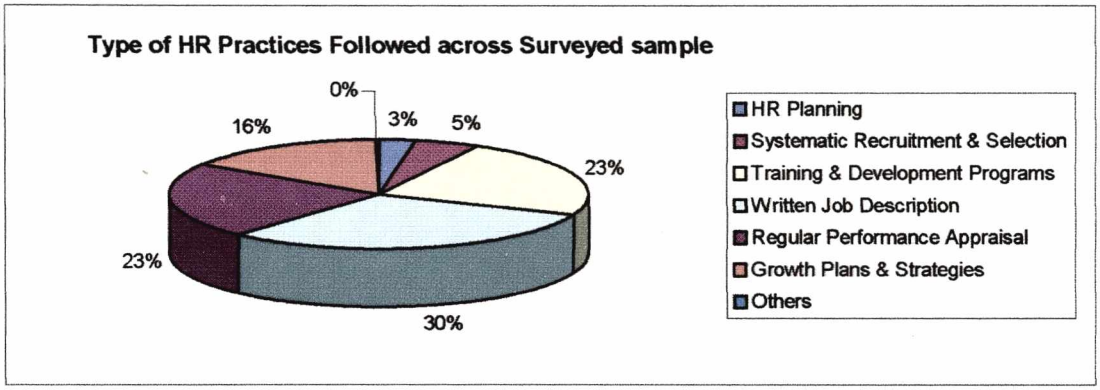

Figure 4.3.23: Type of HR Practices followed

Written Job Description (134 firms), Training and Development Programs (102 firms) followed by Regular Performance Appraisal (99 firms) and Growth Plans and Strategies (68 firms) have emerged as the major HR Practices followed. (Fig 4.3.23)

Tables A to D show different perceptions of the owners/managers with respect to HR practices.

Table A: Current Educational Qualification Levels of the Employees Across the Surveyed Firms						
	P.G	**Graduate**	**Diploma**	**ITI**	**Trained at NTTF/GTTC etc**	**PUC & Lower**
Management	25	141	42	4	2	9
Professionals	4	87	40	15	3	2
Skilled Production Workers	0	3	74	145	17	58
Unskilled Production Workers	0	0	3	17	11	168
Clerical	1	96	5	1	0	13
Sales/Service	0	24	7	0	0	0
Casual	0	0	0	3	1	26

The various educational qualifications of the employees across the sample firms surveyed are tabulated in Table A. It is clear from the table that in Management, majority of the employees have good educational qualifications. Most of the Skilled Production workers have either Diploma or ITI Qualification. A good number of unskilled/semi skilled production workers have come from PUC and Lower Background. A significant number of employees working as clerical staff are Graduates.

Table B: Factors Considered absolutely essential for a candidate to be selected for different positions in an industry by Owners/Managers across the Surveyed Firms							
	Age	Qualification	Technical Skills	Experience	Personality	Background	Leadership/Team work /Interpersonal/Communication
Management	52	127	135	164	52	40	73
Professionals	40	130	145	154	33	33	38
Skilled Production Workers	60	67	174	193	37	55	12
Unskilled/Semi Skilled Production Workers	41	12	31	104	41	125	4
Clerical	35	104	13	96	15	21	6
Sales/Service	14	26	26	33	17	10	8
Casual	7	2	2	3	6	12	1

Table B presents some of the perceptions of the owners/managers with respect to some of the absolutely essential factors for a candidate to be selected for different positions in an industry across the surveyed firms. It presents an interesting observation.

For a candidate to be considered for selection in the management, Owners feel that candidate must have Experience along with Technical Skills followed by Qualification as the absolutely essential factors. Similarly, they resort to the same criteria for recruiting a professional. For Skilled Production Workers, Experience is seen as the main and absolutely essential factor followed by technical skills. For unskilled/semi-skilled production workers background is seen as an absolutely essential factor followed by experience. For Clerical staff, Qualification is seen as the main criteria for selection followed by experience.

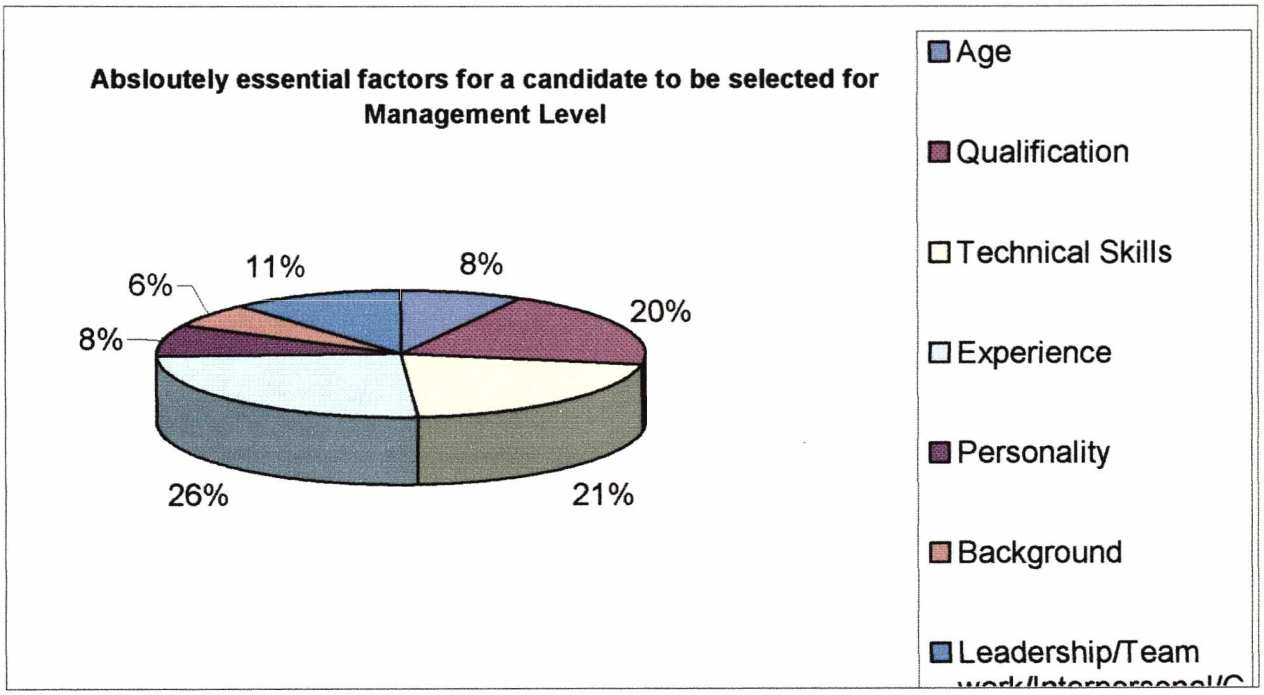

Figure 4.3.24:Absolutely essential factors for a candidate to be selected for Management level

For a candidate to be considered for selection in the management cadre, Owners feel that Experience (164 firms) followed by Technical Skills (135 firms) and Qualification (127 firms) as the absolutely essential factors.

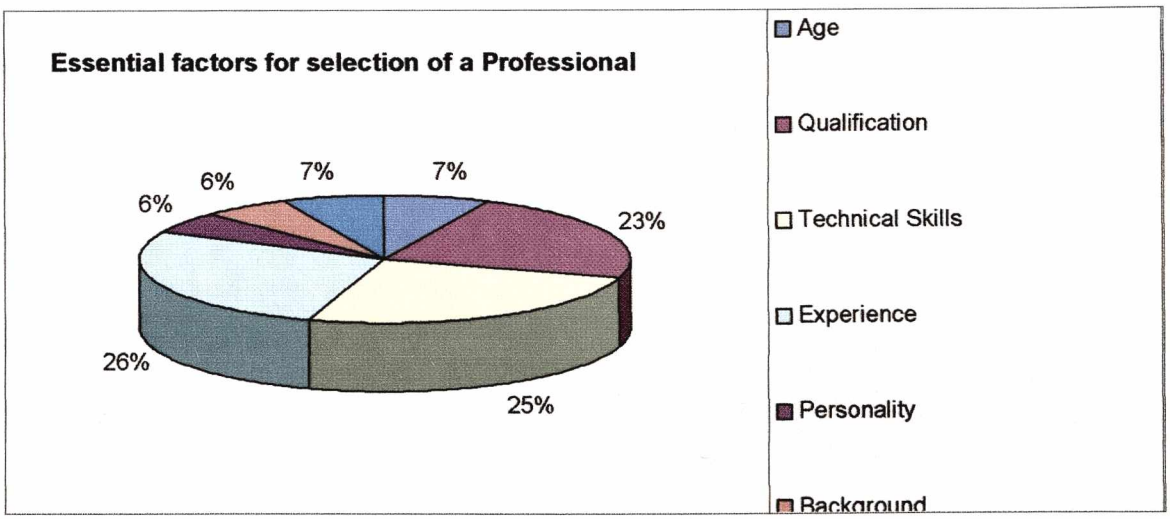

Figure 4.3.25: Essential factors for a candidate to be selected as a Professional

For a candidate to be considered for selection in the Professional stream in the organization, Owners feel that Experience (154 firms) followed by Technical Skills (145 firms) and Qualification (130 firms) are seen as the absolutely essential factors.

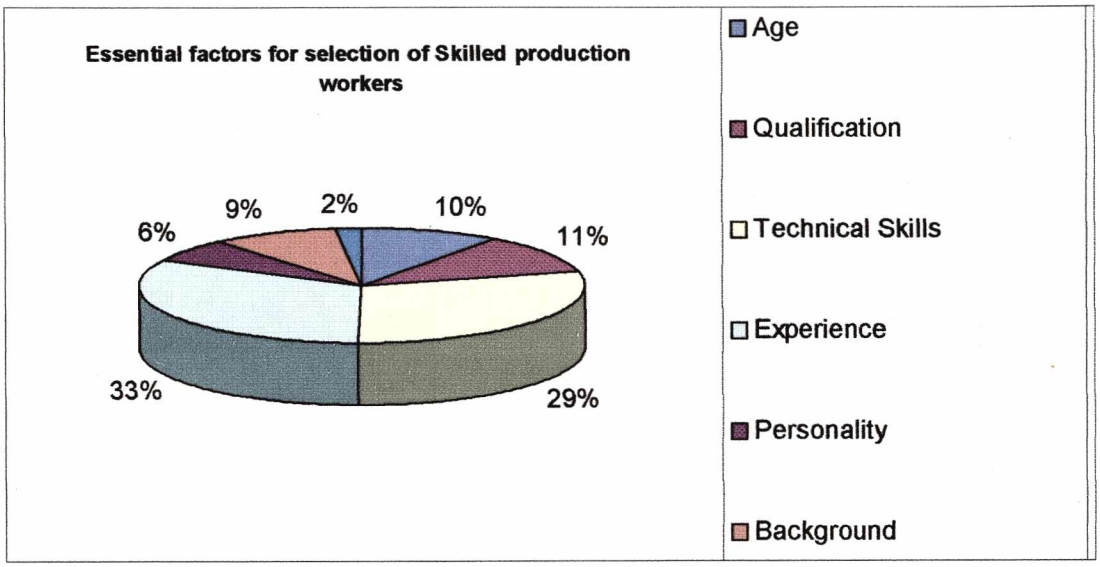

Figure 4.3.26: Essential factors for a candidate to be selected as a Skilled Production worker

For a candidate to be considered for the selection as a skilled production worker, Experience (193 firms), followed by Technical skills (174 firms) and qualification (67 firms) are seen as the absolutely essential factors.

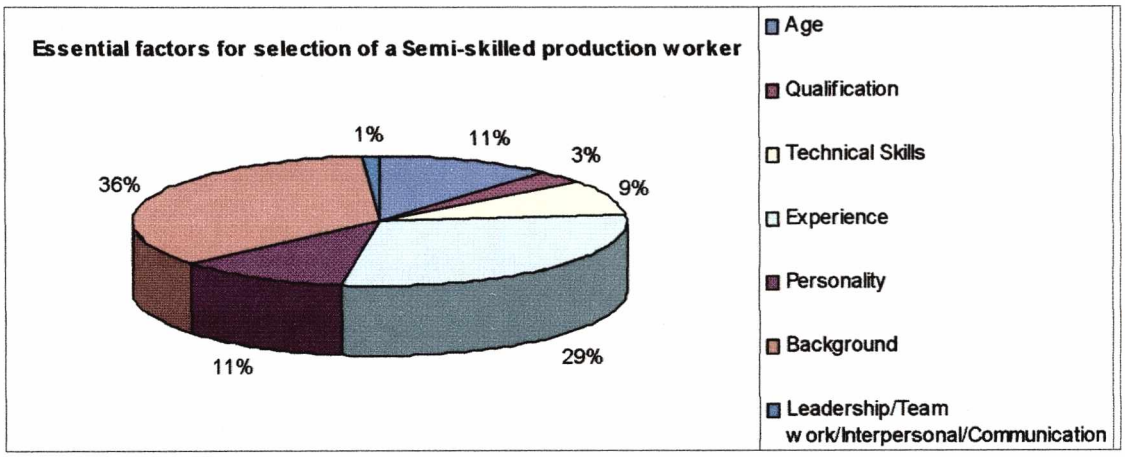

Figure 4.3.27: Essential factors for a candidate to be selected as a semi-skilled Production worker

For a candidate to be considered as a semi-skilled production worker, Background (125 firms), followed by Experience (104 firms) and age (41 firms) are seen as the absolutely essential factors.

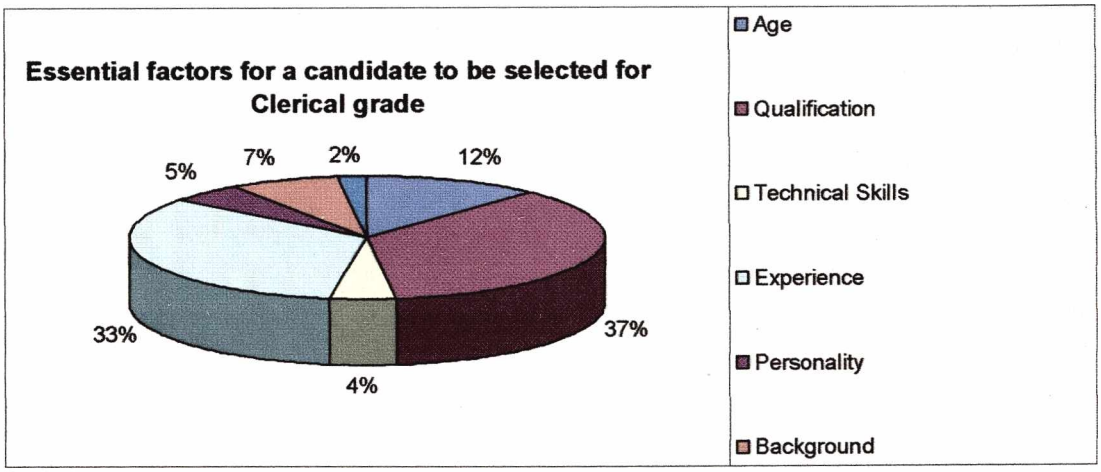

Figure 4.3.28: Essential factors for a candidate to be selected for a clerical grade

For a candidate to be considered for selection in the clerical grade, Qualification (104 firms), followed by Experience (96 firms) and Age (35 firms) are seen as the absolutely essential factors.

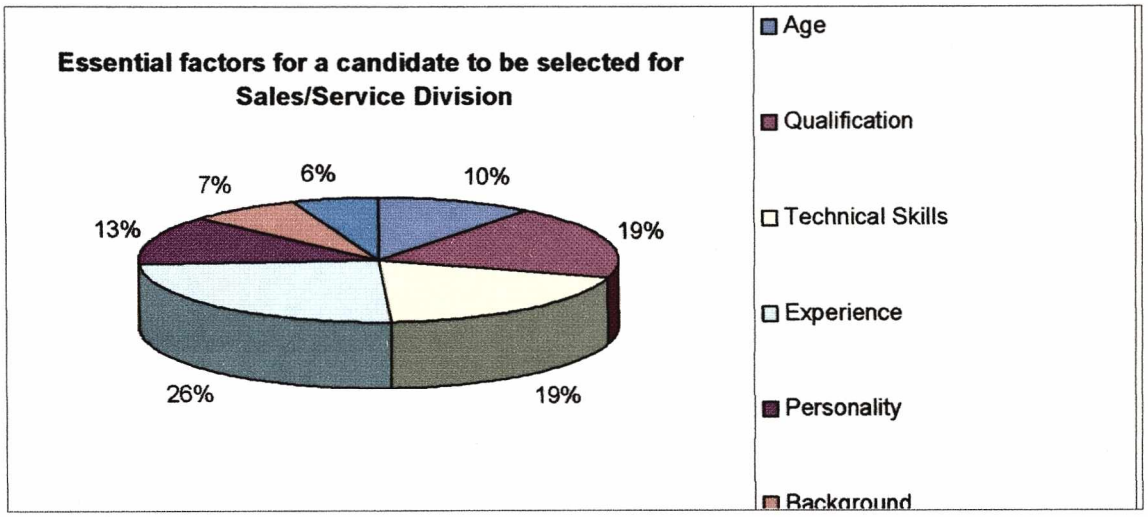

Figure 4.3.29: Essential factors for a candidate to be selected for Sales/Service Division

For a candidate to be considered for selection in the Sales/Service division Experience (33 firms) followed by Qualification (26 firms) and personality (17 firms) are seen as the absolutely essential factors.

Table C: If Candidate is not available, would you make a compromise?	
	Number of Firms
Yes	185
No	32

Table C shows that if the right candidate is not available a significant no. of firms (185) make a compromise in employee selection where as only 32 firms do not make a compromise in selecting the employees.

Table D: Train Employee after Selection?	
	Number of Firms
Yes	182
No	03

Table D shows that Among the 182 firms who make a compromise for selecting the employee would train their employees after their selection where as only 3 firms have responded negatively.

Chapter 5

Conclusions and Recommendations

Some of the important conclusions and recommendations of the study are as follows:

- In general, there is a great awareness among surveyed firms towards the advanced technologies and its relevance to the small-scale sector in the Indian scenario to survive and remain competitive globally.
- There exists no direct link between the adoption of advanced technology and the educational qualifications of founders. But there exists a significant and a positive relationship between the cost of Project and firm size.
- Adoption of advanced technology and skill shortages are not associated significantly. Skill shortages occur mostly at operator/helper level when technology is adopted forcing the firms to provide more training in technical skills, maintenance and safety skills.
- Providing training for skill upgradation followed by recruiting the skilled person have been the major steps taken to bridge the skill shortages noticed when advanced technology is adopted.
- Majority of the firms have been using the training need assessment methods and feel that training is a continuous process. Significantly, it is to be noted here that training is not perceived as a stop-gap/need based program.
- Informal training is the most preferred method of training given by small firms when compared to formal training. On-Job training is the most preferred mode of training adopted when compared to off-job training. Job-instruction training has been the major training method adopted

among on-job training methods by surveyed small firms. This might be due to many constraints such as lack of time, lack of funds etc.

- Even though, training is seen as a major productive/beneficial activity, firms have been averse to keep a separate budget provision for training their employees. Only a few/marginal number of firms have maintained a separate budget provision for training their employees.
- The cost of training is borne overwhelmingly by the firms themselves when compared to any external support such as the Govt. More Governmental financial support is needed in order to percolate training as even more a productive culture in the small-scale sector.
- Industrial associations and other independent private agencies have emerged as the major sources for providing training.
- Majority of the firms do not have a qualified human resource manager to manage their human resource. This could be due to the fact that in small firms, the owners themselves supervise all the aspects related to management of their firms.
- When the human resource of required competencies are not available, SSIs will compromise in selection and then provide training.

Recommendations:

The rate of adoption of some of the advanced technologies in the Indian SSIs is encouraging. But still, some efforts are needed to catch up with the global standards of developed countries to remain competitive. In that direction, the Government can be more proactive in promoting the appropriate technologies.

Presently, there is no linkage between the industries and training resources and also pooling of training facilities available within the State has not been thought of. Based on the interactions we had, a list of institutes both at the Government level as well as private within the state are listed at annexure V.

The following strategy could be ideal to streamline the training process.

1. Organize a one-day workshop inviting all the institutes listed at annexure V wherein they will present the facilities available at their place including expertise.
2. With the information at the Sl.No 1, a meeting to be organized with the Government departments, Industrial associations etc., to formulate training schedule and hence streamline the entire process.

In order to bring out the policy to support and promote training in SSIs, it is suggested that the present report can be used as a base document, which could be discussed by the Government in interdepartmental meetings so that a policy statement could be made at Government level.

Annexure – I: Final Questionnaire

Form No.:

Confidential when completed
For Research information only

Survey of Training Needs and Technology use in SSIs

Dept of Industrial Engineering and Management
JSS Academy of Technical Education
Kengeri-Uttarahalli Road, Mylasandra,
Bangalore-560 060
Ph.NO: 080-28603425
Fax:080-28603706

I. General Information

1. Name of the Industrial Unit .....
   Address .....
   .....
   .....
   .....
   Telephone No .....
   Fax .....
   E-mail .....

2. Name of the Proprietor/Manager .....
3. Name of the Founder .....

4. Level of Education
   Technical ☐ Non Technical ☐

   Post Graduation ☐
   Graduation ☐
   Under Graduate ☐
   Diploma ☐
   ITI ☐
   Other ☐ Specify: .....

5. Name of the person interviewed .....
   Position .....
   Education .....

6. Cost of the Project (current value of the Plant and Machinery)
   1 to 10 Lakhs ☐
   11 to 25 Lakhs ☐
   26 to 50 Lakhs ☐
   51 Lakhs to1 Crore ☐

7. Year of Establishment .....

8. Average Number of employees working in the Plant
   Less than 10 ☐
   11 to 25 ☐
   26 to 50 ☐
   51 to 100 ☐
   More than 100 ☐ Specify: .....

9. Nature of activities in your firm
   Production ☐
   Job Works ☐
   Export Oriented Unit ☐
   Others ☐ Specify: .....

II. Technology Adoption and Awareness

1. Are advanced technologies and modern management techniques being used in the industry? Yes ☐ No ☐

If **Yes**, please indicate whether the following advanced technologies are used in your plant.

i. Design and Engineering

Computer Aided Design/Engineering (CAD/CAE) ☐
Computer Aided Design/Manufacturing (CAD/CAM) ☐
Modeling or Simulation Technologies ☐

ii. Processing Fabrication and Assembly

Flexible Manufacturing Cells or Systems (FMC/FMS) ☐
Programmable Logic Control (PLC) machine/s or process/es ☐
Lasers used in Materials Processing (including Surface Modification) ☐
Robot/s with sensing capabilities ☐
Robot/s without sensing capabilities ☐
High Speed Machining ☐

iii. Automated Material Handling

Part identification for Manufacturing automation (Ex: Bar coding) ☐
Automated Storage and Retrieval System (AS/RS) ☐

iv. Inspection

Automated vision-based systems used for inspection/testing of inputs and/or final products ☐
Other automated Sensor based systems used for inspection/testing of inputs and/or final products ☐

v. Management Techniques

Continuous improvement (Including TQM) ☐
Benchmarking ☐
Plant Certification (Ex: ISO9000) ☐
Certification of Suppliers ☐
Just-In-Time inventory control ☐
Statistical Process Control (SPC) ☐
Electronic Work order management ☐

vi. Integration and Control

Manufacturing Resource Planning (MRP II/Enterprise Resource Planning (ERP) ☐
Computer/s used for control on the factory floor ☐
Computer Integrated Manufacturing (CIM) ☐
Supervisory Control and Data Acquisition (SCADA) ☐
Use of Inspection data in Manufacturing Control ☐
Digital remote controlled Process plant control (Ex: Field bus) ☐

Knowledge based software ☐

vii. Network Communications

Local Area Network (LAN) for Engineering/Production ☐
Company-wide computer Networks (including Intranet and WAN) ☐
Inter-company computer Networks (including Extranet and EDI) ☐

viii. Others

National Board of Accreditation ☐

Any other, please specify .....
.....
.....

If **No**, do you have plans to use any of the above listed Advanced technologies in the near future?

Yes ☐
No ☐, Please go to Qn.2

If **Yes**, why?

Competition ☐
Customers' demand ☐
Self-Motivation ☐
Advice from experts/well wishers ☐

2. Please select the discouraging factors for not adopting the Advanced Technologies.

Small market size ☐
High cost of equipment ☐
Shortage of skill ☐
Workers resistance ☐
Inability to evaluate New Technology ☐
Lack of Technical Support/Service (from consultants and vendors) ☐
Others Specify: .....
.....

3. Do you agree that advanced technologies could be adopted in the small-scale sector in the Indian scenario?

Yes ☐
No ☐

4. If **Yes**, please select the benefits you are getting or hoping to get from the adoption of Advanced technology.

Reduced labour requirement/unit of output ☐
Reduced material consumption/unit of output ☐
Reduced Set-up time ☐
Reduced Rejection rate ☐
Reduced time to market ☐
Increase in product quality ☐
Increased production flexibility ☐
Increases skill level ☐
Increased Equipment Utilisation Rate ☐
Increased Market Share ☐
Increased Profitability ☐
To overcome Competition ☐
Others Specify: .....
.....
.....

III. Training needs Analysis

1.In the adoption of Advanced technology/Management skills and Techniques in your plant, have you experienced skill shortages? Yes ☐ No ☐

If Yes, Please mention at what level?

Manager ☐

Supervisor ☐

Operator/Helper ☐

Others ☐ Specify: .....

2.Which of the following steps have you taken to bridge the skill shortages?

Providing Training for skill up gradation ☐

Established stronger links with Educational institutions/Training agents ☐

Improved wages and benefits to attract skilled persons ☐

Recruited the trained person ☐

Others ☐ Specify: .....

3. Are you using Training Need Assessment methods? Yes ☐ No ☐

If Yes, Please select the following Training Needs Assessment methods that you are using.

Performance Appraisal	☐
Work Sampling	☐
Interview	☐
Rating Scale	☐
Attitude Survey	☐
Questionnaire	☐
Quality Circle	☐
Customer Survey	☐

4.If you are providing or planning to provide Training, what methods would you adopt?

Formal Training ☐

Informal Training ☐

On job Training ☐

- Orientation Training ☐
- Job Instruction Training ☐
- Apprentice Training ☐
- Coaching ☐
- Job rotation ☐
- Internships and assistantships ☐

Off job Training ☐

- Conference or Discussion ☐
- Case Study ☐
- Role Playing ☐
- Simulation ☐
- Lecture ☐
- Programmed Instruction ☐
- Laboratory Training ☐
- Special Study ☐
- Television ☐
- Films ☐

5.If you have provided Training, Please Indicate in which of the following areas training was provided.

Basic Literacy/ Numeracy	☐
Computer Literacy	☐
Technical Skills	☐
Orientation for new employees	☐
Safety Skills	☐
Management Training	☐
Maintenance Training	☐
Skill Up gradation Training	☐
Group Morale	☐
Quality Control Skills	☐
Managerial / Supervisory Training	☐
Sales & Marketing Training	☐
Export Related Training	☐
Others	☐ Specify: .....

6. Have you been benefited by the Training? Yes ☐ No ☐

7 .In what way do you think Training has benefited your plant? Please select all those that are applicable.

As a legal requirement ☐

Makes employees more co-operative/comfortable ☐

Keeps employees happy ☐

More confident to handle new equipment installed ☐

Makes employees more productive/effective ☐

Make employees derive job satisfaction ☐

It's Cheap / Free ☐

Improved Performance ☐

Increases the Organisationsal Competitiveness ☐

Increases the Morale of the employees ☐

Increases Self confidence among the employees ☐

8. Average duration of Training/Employee/Year ..... Days

9.Who bears the cost of Training? Please select all the relevant ones.

Employees ☐

The Firm ☐

Government ☐

Some Combination? ☐Specify: .....

10. Please select the agencies that you have utilized to train your personnel.

Small Industry Services Institute (SISI)	☐
Small Industries Development Bank of India (SIDBI)	☐
Science and Technology Entrepreneur's Park (STEP)	☐
Karnataka Small Scale Industries Association (KASSIA)	☐
Karnataka Council for Technology Up gradation (KCTU)	☐
Department of Science & Technology (DST, GOI)	☐
Dept of Industries and Commerce (DIC, GOK)	☐
Others	☐ Specify:.....

11.Do you have separate Budget Provision for Training your employees? Yes ☐ No ☐

If Yes, How much? .....Rs/Year

12.What were the discouraging factors that prevented you from providing Training? Please select all those that apply.

Lack of Time ☐

Lack of Funds ☐

Lack of Motivation ☐

Lack of Information about training programmes ☐

Lack of Employee Support ☐

Lack of Incentive ☐

Lack of information about training agencies ☐

Lack of any perceived need to Train ☐

Fear of trained workers leaving or being poached ☐

Lack of space to provide in-house Training ☐

Lack of Expertise / Skilled trainers ☐

13.Do you feel that Training is a continuous process? Yes ☐ No ☐

IV. HRM Practices

1. Do you have a Qualified Human Resource Manager in your Industry?

Yes ☐
No ☐

If No, do you consult a HR consultant for?

Recruitment ☐
Selection ☐
Training & Development ☐
Appraisal ☐
Compensation ☐
Others ☐
Specify: .....

2. Do you have the following practices in your firm?

Human Resource Planning ☐
Systematic Recruitment & Selection ☐
Training and Development Programs ☐
Written Job Description ☐
Regular Performance Appraisal ☐
Growth Plans & Strategies ☐
Others ☐
Specify: .....

3. Present Education Levels of Personnel:

Sl. No.	Category	Post Graduate	Graduate	Diploma	ITI	Trained at NTTF/GTTC etc.	PUC and Lower	Others, please specify
1.	Management	☐	☐	☐	☐	☐	☐	☐
2.	Professionals	☐	☐	☐	☐	☐	☐	☐
3.	Skilled Production Workers	☐	☐	☐	☐	☐	☐	☐
4.	Unskilled Production Workers	☐	☐	☐	☐	☐	☐	☐
5.	Clerical	☐	☐	☐	☐	☐	☐	☐
6.	Sales/Service	☐	☐	☐	☐	☐	☐	☐
7.	Casual	☐	☐	☐	☐	☐	☐	☐
8.	Others	☐	☐	☐	☐	☐	☐	☐

4. Which are the factors that you consider absolutely essential for a candidate to be selected for the different positions in an industry?

Sl. No.	Category	Age	Qualification	Technical Skill	Experience	Personality	Background	Leadership/Team work/Interpersonal/ Communication	Others, please specify
1.	Management	☐	☐	☐	☐	☐	☐	☐	☐
2.	Professionals	☐	☐	☐	☐	☐	☐	☐	☐
3.	Skilled Production Workers	☐	☐	☐	☐	☐	☐	☐	☐
4.	Unskilled Production Workers	☐	☐	☐	☐	☐	☐	☐	☐
5.	Clerical	☐	☐	☐	☐	☐	☐	☐	☐
6.	Sales/Service	☐	☐	☐	☐	☐	☐	☐	☐
7.	Casual	☐	☐	☐	☐	☐	☐	☐	☐
8.	Others	☐	☐	☐	☐	☐	☐	☐	☐

5. Suppose such candidates are not available, will you make compromise? Yes ☐ No ☐

If **Yes**, will you train the employee after selection? Yes ☐ No ☐

Thank you for your co-operation!

Comments

Comments regarding this Survey, Please provide them in the space below

Do not hesitate to contact the JSSATE(B)-STEP if you have any Concerns/Questions.

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Annexure – II: Pilot Questionnaire

Confidential when completed

JSSATE (B)

Survey of Training needs, Technology use in SSIs

Date: For Research information only ID.NO:

1. Name of the Industrial Unit:
   Address:

   Tel.No: Fax No: E-mail:
2. Name of the Proprietor/ Manager.
3. Level of Education

   Technical-Qualification ☐ No Education ☐

   Post –Graduation ☐ Non-Graduation ☐

   Graduation ☐
4. Name of the Person Interviewed:
5. Cost of Project
   a. 1 to 10 Lakhs ☐
   b. 10 to 25 Lakhs ☐
   c. 25 to 50 Lakhs ☐
   d. B/w 50 to 1 Crore ☐
6. Year of Establishment Month Year
7. Please indicate ☑ average No. of Employees working in your Plant

   Less than 25 ☐ 25 to 50 ☐

   50 to 100 ☐ More than 100 ☐ Please Specify_____

8. Nature of activities of your firm:

   1. Production ☐ **3.** Ancillary ☐

   2. Service ☐ **4.** Any other, Please Specify

Advanced Technologies

1. Please indicate ☑ whether you are currently using, planning to use or have no plans to use the following advanced technologies in your plant.

Design & Engineering	In use	Planning to use	No plans to use
a) Computer Aided Design/Engineering (CAD/CAE)	☐	☐	☐
b) Computer Aided Design/Manufacturing (CAD/CAM)	☐	☐	☐
c) Modeling or Simulation Technologies	☐	☐	☐
Processing Fabrication And Assembly			
a) Flexible Manufacturing Cells or Systems (FMC/FMS)	☐	☐	☐
b) Programmable Logic Control (PLC) machine(s) Or Process (es)	☐	☐	☐
c) Lasers used in Materials Processing (including Surface Modification)	☐	☐	☐
d) Robot(s) with Sensing capabilities	☐	☐	☐
e) Robot(s) without Sensing capabilities	☐	☐	☐
f) High Speed machining	☐	☐	☐
Automated Material Handling			
a) Part identification for Manufacturing automation (e.g. bar coding)	☐	☐	☐
b) Automated Storage and Retrieval System (AS/RS)	☐	☐	☐

Any other, Please specify

_____

_____

_____

_____

_____

	In use	Planning to use	No Plans to use
Integration and Control			
a) Manufacturing Resource Planning (MRP II/Enterprise Resource Planning (ERP)	☐	☐	☐
b) Computer(s) used for control on the factory floor	☐	☐	☐
c) Computer Integrated Manufacturing (CIM)	☐	☐	☐
d) Supervisory Control and Data Acquisition (SCADA)	☐	☐	☐
e) Use of Inspection data in Manufacturing Control	☐	☐	☐
f) Digital, remote controlled Process plant control (e.g. Field bus)	☐	☐	☐
g) Knowledge based Software	☐	☐	☐
Inspection			
a) Automated vision-based systems used for inspection/testing of inputs and/or final products	☐	☐	☐
b) Other automated Sensor based systems used for inspection/testing of inputs and/or final products	☐	☐	☐
Network Communications			
a) Local Area Network(LAN) for Engineering and /or Production	☐	☐	☐
b) Company-wide computer Networks (including Intranet and WAN)	☐	☐	☐
C) Inter-company computer Networks (including Extranet and EDI)	☐	☐	☐
Management Techniques			
a) Continuous improvement (Including TQM)	☐	☐	☐
b) Benchmarking	☐	☐	☐
c) Plant certification (e.g. ISO9000)	☐	☐	☐
d) Certification of Suppliers	☐	☐	☐
e) Just-in-time inventory control	☐	☐	☐
f) Statistical Process Control(SPC)	☐	☐	☐
g) Electronic work order management	☐	☐	☐

2. If 'No', Please tick ☑ the reasons for not adopting the Advanced Technologies.

a. Small market size ☐
b. High cost of Equipment ☐
c. Shortage of Skill ☐
d. Worker Resistance ☐
e. Inability to evaluate New Technology ☐
f. Lack of Technical Support/Service ☐
(From consultants/vendors)
g. Others, Please Specify ☐

3. **'Yes',** Please tick ☑ the benefits you are getting from the adoption of new technology.

a. Reduced labour requirement/ Unit of output ☐
b. Reduced material consumption / Unit of output ☐
c. Reduced Set-Up time ☐
d. Reduced Rejection rate ☐
e. Reduced time to market ☐
f. Increase in Product Quality ☐
g. Increased Production flexibility ☐
h. Increases Skill level ☐
i. Increased Equipment Utilization rate ☐
j. Increased Market Share ☐
k. Increased Profitability ☐
l. Others, Please specify. ☐

4. In the adoption of advanced technology/Management Techniques, have you experienced skill shortages at your Plant?

Yes ☐ NO ☐

If Yes, Please mention at what level?

I] 1) Manager ☐ 2) Supervisor ☐ 3) Operator/Helper ☐
4) Others_____

II] At what situation?

1) When Technology is adopted ☐
2) When Organisation wants to adopt new advanced technology ☐
3) Any other situation, Please specify _____

5. Which of the following steps have you taken to bridge the skill shortage? Tick ☑ all those that apply

1) Providing Training for upgradation ☐
2) Established stronger links with Educational Institution/ Training agents ☐
3) Improved Wages and benefits to attract skilled persons ☐
4) Recruited the trained person ☐
5) Others, Please specify _____

6. If you have provided Training, please indicate in which of the following areas training was provided. .
Please tick ☑ all that apply.

	Yes		Yes
a) Basic literacy/numeracy	☐	h) Skill Up gradation Training	☐
b) Computer literacy	☐	i) Group Morale	☐
c) Technical Skills	☐	j) Quality Control Skills	☐
d) Orientation for new employees	☐	k) Managerial / Supervisory Training	☐
e) Safety Skills	☐	l) Sales and Marketing Training	☐
f) Management Training	☐	m) Other (Please Specify):	☐
g) Maintenance Training	☐		

7. Why do you train?
Please tick ☑ all those that are applicable.

1.As a legal requirement	☐	5.Makes employees more productive/effective	☐
2. Makes employees more Co-operative/Comfortable	☐	**6.** Make employees derive job satisfaction	☐
		7.It's cheap/free	☐
3.Keeps employees happy	☐		
4.More confidant to handle new equipment Installed	☐		

8. Avarage Training per duration/ employee/year _____

9. Average Expenditure/Employee/Year? _____

10. Who bears the cost of Training?
Please tick ☑ all the relevant ones.

1.Employees	☐	3. External agency (Specify)	☐
2.The Firm	☐	4. Some combination? **(**Specify**)**	☐

11. What benefits does the firm gain by Training?

1. Improved Performance	☐
2. Increases the Organizational Competitiveness	☐
3. Increases the Morale of the Employees	☐
4. Increases self confidence in the Employees	☐

12. Do you face any discouraging factors for training?
Please tick ☑all that apply

1) Lack of Time ☐
2) Lack of funds ☐
3) Lack of Motivation ☐
4) Lack of information ☐
About Training programmes
5) Lack of Staff Cover ☐
6) Lack of Incentive ☐
7) Lack of information about Training agencies ☐
8) Lack of any perceived need to Train ☐
9) Fear of trained workers leaving or being poached ☐
10) Lack of space to provide in-house training ☐
11) Lack of Expertise/ skilled trainers ☐

13. Do you have a Qualified Human Resource Manager?

Yes ☐ NO ☐

If NO, will you consult the HR Consultant for?

1. Recruitment
2. Appraisal
3. Training & Development
4. Selection
5. Compensation
6. Any other, Please mention. _____

14. Do you have the following practices in your firm?

1. Written Job Description ☐
2. Regular Performance Appraisal ☐
3. Training and Development Programs ☐
4. Growth Plans & Strategies ☐
5. Human resource planning ☐
6. Systematic recruitment/ Selection ☐
7. Any other Please specify

15. Which are the factors that you consider absolutely essential for a candidate to be selected?

	Age	**Qualification**	**Technical Skill**	**Experience**	**Personality**	**Background**	**Soft Skills**	**Any other, Please Specify**
Operator								
Supervisor								
Manager								
Others								

16. Suppose such candidates are not available, will you make compromises?

Yes ☐ NO ☐

If yes, will you train after selection?

Yes ☐ NO ☐

Thank you for your co-operation

Comments:

Comments regarding this survey, Please provide them in the space below

Do not hesitate to Contact the JSSATE(B)-STEP, If you have any concerns/questions.

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Dept.of Industrial Engineering & Management
JSS Academy of Technical Education
Kengeri-Uttarahalli Road, Bangalore
Phone: 080-6346182

Annexure- III: List of Surveyed Industries – Final Survey

Sl. No	Name of the firm	Address
1	Raga Precisions	No.138, 4th Main, Industrial Town, Rajajinagar, Bangalore-560 044
2	Supreme Tool Company	F-57, Industrial Estate, Rajajinagar, Bangalore-560 044
3	Ncon Turbo Tech (P) Ltd	F-62&63, Industrial Estate, Rajajinagar, Bangalore-560 044
4	R.K.Engineering Enterprises	B-86, Industrial Estate, Rajajinagar, Bangalore-560 044
5	Protekz Tool & Die Makers	Plot No. V6, 3rd Main Road, 2nd Stage, Peenya Industrial Estate, Bangalore - 560 058
6	Scorpion Engineering Pvt.Ltd	Plot 55, 4th Main, 3rd Phase, Peenya Industrial Area, Bangalore
7	Sri Revanna Siddeswara Industries	C-64, 2nd Main, II stage, Peenya Industrial Estate, Bangalore-58
8	Spectrum Tool Engineers (p) Ltd	#25, Petechennappa Industrial Estate, Kamakshipalya, Magadi Main Road, Bangalore-560 079
9	Krupanjali Tool Tech	#89/3, 3rd Main Road,Rajajinagar Industrial Town, Bangalore-44
10	CIM Tools Pvt.Ltd	Plot No. 485/9A, 14th Cross, 4th Phase, Peenya Industrial Area, Bangalore-58
11	Primex Presscomp(p) Ltd	No.40H, Doddanekundi industrial Area, Mahadevapura Post, Whitefield Road, Bangalore-48
12	Bhuvaneswari Engineering Enterprises	No.16, 5th Main, A.D.Halli, Industrial Town Extension, Bangalore-79
13	Elvee Springs Pvt.Ltd	No. B-88/45/2, KSSIDC Industrial Estate, Rajajinagar, Bangalore-44

Sl. No	Name of the firm	Address
14	Genuine Products	#66, 1st Main Road, Pete Chennappa Industrial Estate, Kamakshipalya, Bangalore-79
15	Bhagavathi Toolings Pvt.Ltd	#4, 145/B, 17/3, Shivakrupa Industrail Complex, 4th Main, Industrial Town, Rajajinagar, Bangalore-44
16	Sony Industries	#59, Pete Channppa Industrial Estate, Kamakshipalya, Bangalore-79
17	Shakthi Engineering Industries	No.20, Pete Chennappa Industrial Estate, Kamakshi Palya, Bangalore-79
18	G.B.Industries	65/2, Nanjappa Building, Kamakshipalya, Magadi Road, Bangalore-79
19	Manjunatha Auto Products	#33, Pete Chennappa Industrial Area, Kamakshipalya, Bangalore-79
20	Quality Engineering Works	135, Shed No.2, Shiva Farm, Magadi Main Road, Kamakshi Palya, Bangalore-79
21	Madhu Enterprises	No.446, 4th Phase, Peenya Industrial Area, Bangalore-58
22	Ashwini Engineering Industries	No. B-205, 2nd Stage, Peenya Induatrial Estate, Bangalore-58
23	Sri Lakshmi Industries	No.86/C, 3rd Main Road, Industrial Town, Rajajinagar, Bangalore-44
24	Praveen Automac	23/2, 4th Main, 'B'Street, Rajajinagar Industrial Town, Bangalore-44
25	Sri Ramakrishna Engineering Works	86/D, 3rd Main Road, Rajajinagar Industrial Town, Bangalore-44
26	Jayeem Industries	85/1/1, 3rd main, Industrial Town, Rajajinagar, Bangalore
27	RVS Machine Tools	Plot No. 315, 8th Cross, 4th Phase, Peenya Industrial Area, Bangalore-58

Sl. No	Name of the firm	Address
28	Aruna Engineering Works	23/1, 4th Main, Rajajinagar Industrial Town, Bangalore-44
29	Accutech Enterprises	#450, 12th Cross, 4th Phase, Peenya Industrial Area, Bangalore-58
30	Arvee Precisions	244, 4th Main, Rajajinagar Industrial Town, Bangalore-44
31	Precitech Engineering Systems	#M-398, 7th Cross, Ist Stage, Peenya Industrial Area, Bangalore-58
32	Sree Sai Tools	C-264, 6th Cross, Ist Stage, Peenya Industrial Estate, Bangalore-58
33	OM Enginnering Works	No. A-1, 5th Cross, Peenya Industrial Eatate, Bangalore-58
34	Sri Vinayaka Tools	# 96, 2 nd stage, 4 th phase, Sri Maruthi Industrial area, near ace designers plant 2, Peenya industrial area, Bangalore-58
35	Ace Tools and Gauges	Nagaraj Buildings, Whitefield Road, Mahadevapura Post, Bangalore-48
36	B1-V-K Industries	#529/14, Behind Reddy complex, Whitefield Road, Mahadevapura Post, Bangalore-48
37	SLV Engineering	No.3, Garudacharpalya, Whitefield Road, Bangalore-48
38	Kailash Engineering Company Pvt.Ltd	No.135/15, Shiva Farm, Kamakshipalya, Bangalore
39	Sharma Industries	No.72, 3rd Cross, Singayanapalya, Mahadevapura, Whitefield Road, Bangalore-48
40	Vijaya Precisions	C-2, Industrial Estate, Yelahanka, Bangalore-64
41	Shanthala Industries	3rd Cross, Dooravani Cables Road, Singayyanapalya, Whitefield, Mahadevapura Post, Bangalore-48

Sl. No	Name of the firm	Address
42	Canara Fasteners	C199A, 4th Cross, Industrial Estate, Peenya Ist Stage, Bangalore-58
43	Sugam Engineering Industries	Spl.Plot, Behind A-198, 4th Cross, Ist Stage, Peenya Industrial Area, Bangalore-58
44	Sharana Engineering	# C-336, 3rd Main, 7th Cross, Peenya Ist Stage, Bangalore-58
45	Presswell Products	21/5, Vasanthapura Cross, Kanakapura Road, Bangalore-62
46	V.R.Engineering Works	No.26/A, J.C.Industrial Area, Kanakapura Main Road, Bangalore-62
47	Maxpreci Machines Pvt.Ltd	A-373, 4th main, 6th Cross, Ist Stage, Peenya Industrial Estate, Bangalore-58
48	Yashaswini CNC	#455, 12th Cross, 4th phase, Peenya Industrial Area, Bangalore-58
49	Finetech Toolings	Plot No V-16, 4th Main, Peenya Industrial Estate, 2nd Stage, Bangalore-58
50	Kalpa Engineering	326, 9th Cross, 4th Phase, Peenya Industrial Area, Bangalore-58
51	Sunmas machine tools pvt ltd	# 432/1,4 th main, 12 th cross,4 th phase, Peenya Industrial Area
52	Srinu engineering works	B-1 20, 3 rd main, 2 nd stage, Peenya Industrial Area
53	Sphoorti machine tools	B-55, 3 rd stage, Peenya Industrial Area
54	Hari Prakash Precision Tools & Components Pvt.Ltd	#479/418, J.C.Induatrial Estate, Bikasipura Main Road, Yelachenahalli, Bangalore-62
55	Pavithra Springs & Toolings (P) Ltd	#35, 2nd Stage, 6th Main, J.C Industrial Estate, Kanakapura Road, Bangalore-62
56	R.B.Castings	C-75, Veerasandra Industrial Estate, Hosur Road, Bangalore-29

Sl. No	Name of the firm	Address
57	Ashwini Engineering	#12, 8th Cross, Govardhan Garden, Behind JC Industrial Layout, Yelachenahalli, Kanakapura Road, Bangalore-62
58	Hitek Engineering	No.19, J.C.Industrial Estate, 7th Mile, Kanakapura Road, Bangalore-62
59	Sree Divya jyothi industries	B-20, VeerSandra Industrial Area, Hosur Road, Bangalore-29
60	Cosmos tools	C-338, 6 th cross, 3 rd main, 1 st stage, Peenya Industrial Area, Bangalore-58
61	Amtech Tools	# 72, 6 th main, 3 rd phase, Peenya Industrial Area, Bangalore-58
62	A.B.Precission Toolings Pvt Ltd	C/145, 2 nd stage, Peenya Industrial Area, Bangalore-58
63	Power Pack	B-374, 1 st stage, Peenya Industrial Estate, Bangalore-58
64	Smart Engineers	Plot No.19, 5th Main, 3rd Phase, Peenya Industrial Area, Bangalore-58
65	Sri Hari Industries	110-L, 8th Cross, Bommasandra Industrial Area, Bangalore-99
66	Mesha Engineering Industry Pvt.Ltd	110/A, 8th 'A" Cross, Bommasandra Industrial Area, Bangalore.
67	Trishul Machine Tools Pvt.Ltd	#B-8, KSSIDC Industrial Estate, Bommasandra, Hosur Road, Bangalore-09
68	Engineering Enterprises	Plot No.457/A, 10th 'A' Cross, 4th Phase, Peenya Industrial Area, Bangalore-58
69	Maniram Enterprises	#27/30, 2nd Main Road, Industrial Town, Rajajinagar, Bangalore-44
70	Sri Sathish Press Tools	#B-88/45, 5th Main Road, Industrial Estate, Rajajinagar, Bangalore-44

Sl. No	Name of the firm	Address
71	Shyam Banagel	#C-35, 3rd Main Road, Industrial Estate, Rajajinagar, Bangalore-44
72	Chaitanya Preci-Tech(P) Ltd	#A68/1, 2nd Cross, Rajajinagar Industrial Estate, Bangalore-44
74	Ram Engineering	# 21, H.M.T Industrial Estate, Bangalore-31
75	Ragukul Industries	No.B-68, Bommasandra Industrial Area, Hosur Road, Bangalore-58
76	Concept Machine Tools	# B-182, 4 th main, 2 nd stage, Peenya Industrial Area, Bangalore-58
77	Concord Tools Pvt Ltd	# A-27, 3 rd stage Peenya Industrial Estate, Bangalore-58
78	Card Corporation	C-53, Veersandra Industrial Estate, Hosur Road, Bangalore-29
79	Ravi Engineering	C-56, Veersandra Industrial Estate, Hosur Road, Bangalore-29
80	Karnataka Enterprises	# 15, J.C.Industrial Estate, Kanakapura road, Bangalore-62
81	Manju Enterprises	# 23C/A, J.C.Industrial layout, 3 rd main, 1 st stage, Kanakapura Road, Bangalore-62
82	R.N Engineering	# 240, 8 th cross, J.C Industrial Area, Kanakapura Road, bangalore-62
83	Deeyem CNC Machining Pvt Ltd	# 77, 8 th main, 4 th cross, J.C.Industrial layout, Bangalore-62
84	Trishul Engineers	# 72, J.C Industrial Estate, Kanakapura Road, Bangalore-62
85	Srushti Automations	# 39/C, J.C Industrial Layout, Kanakapura Road, Bangalore-62
86	Nagambusham Industries	# A-13, HMT Industrial Estate Bangalore-31

Sl. No	Name of the firm	Address
87	Prasad Enterprises	B-20, H.M.T Industrial Estate, Bangalore-31
88	Fatima Small Scale Industries	# B-08, H.M.T Industrial Estate, Bangalore-31
89	Chamundi Machine Tools	# B-12, H.M.T Industrial Estate, Bangalore-31
90	Mac Tools	# B-03, H.M.T Industrial Estate, Bangalore-31
91	Abi Precision Tools Pvt Ltd	# C-62, 2nd main, 2nd stage, Peenya Industrial Estate, Bangalore-58
92	Nucleus Engineers	# 68, 3 rd phase, 6th main, Peenya Industrial Estate, Bangalore-58
93	V.K Industries	# 14/C, % th main road, Peenya Industrial Estate, Bangalore-58
94	Dhatha Nirman Pvt Ltd	# B-16, Veerasandra Industrial Estate, Hosur Road, Bangalore-100
95	Superiam Products Private Ltd	# D-44, Veerasandra Industrial Estate, Bangalore-100
96	Screens & Filters	# B-21, Veerasandra Industrial Estate, Bangalore-229
97	Turbotech Precision Engineering Pvt Ltd	# C-45, 3 rd main Road, Rajajinagar Industrial Estate, Bangalore-15
98	Timex	# 28, J.C Industrial Estate, Kanakapura Road, Bangalore-62
99	DPK Engineers Pvt Ltd	# 2/1, JCI Layout, Kanakapura Road, Bangalore-62
100	Rollon Hydraulics	# 39/5, J.C Industrial Estate, Kanakapura Road, Bangalore-62
101	Concept Hydro Pneumatic Pvt Ltd	# 450, 10th A cross, 4th phase, Peenya Industrial Estate, Bangalore-58

Sl. No	Name of the firm	Address
102	S.K.Precitech	#87/21, 3rd Main Road, Sir M.V.Industrial Town, Rajajinagar, Bangalore-44
103	Balaji Industries	#24E, KIADB Industrial Area, Ist Phase, Kumbalgodu, Mysore Road, Bangalore-74
104	Navkar Metals	No.B-32, 3rd Stage, Peenya Industrial Estate, Bangalore-58
105	Kumbalgodu Alloy Steel Castings Pvt.Ltd	No.30, A-1, Ist Phase, Kumbalgodu Industrial Area, Bangalore-74
106	Cancam Engineers (P) Ltd	#B-86, 2nd Cross, Ist Stage, Peenya Industrial Estate, Bangalore-58
107	All Cast Industries	B-31, Functional Industrial Estate, Ist Stage, Ist Cross, Peenya, Bangalore-58
108	Unitech CNC Centre Pvt Ltd	#B-443, Peenya Industrial Estate, Ist Stage, Bangalore-58
109	Preci-fit (India)	#B-143(a), 3rd Cross, Ist Stage, Peenya Industrial Estate, Bangalore-58
110	NK Precision Components	47, 2nd Main, N.S.Palya, Bannerghatta Road, Bangalore-76
111	Automaticks Gears Private Ltd	#200/46D, Devarachickanahalli Road, Bilekahalli, Bannerghatta Road, Bangalore-76
112	Bombay Industrial Industries	A-186, 4th Cross, Peenya Industrial Estate, Bangalore-58
113	Ace Super Auto Forge Pvt.Ltd	Plot No.28 C, 2nd Phase, Peenya Industrial Area, Bangalore-58
114	Prakash Industries	B-225, 1st Stage, 4th cross, Peenya Industrial Estate, Bangalore-58
115	Ram Engineering Company	C-100, 3rd Stage, Peenya Industrial Estate, Bangalore-58
116	Sathish Engineering Co.,	#B-69, 3rd Stage, Peenya Industrial Estate, Bangalore-58

Sl. No	Name of the firm	Address
117	Bhat's Tooling Equipments	#22/A, N.S.Palya, Bannerghatta Road, Bangalore-76
118	Siva Extrusions Pvt.Ltd	A-147, Ist Stage, Peenya Industrial Estate, Bangalore-58
119	Rapsri Engineering Industries Ltd	39 & 40/2, Gowdanapalya, Subramanyapura P.O, Bangalore-61
120	Vijay Spheroidals	17-b, 2nd Phase, Peenya Industrial Area, Bangalore-58
121	Hi-Tech Forgings (Bangalore) Pvt.Ltd	V-1(A), 3rd Cross, Ist stage, Peenya Industrial Estate, Bangalore-58
122	Sree Rama Engineering Works	#14/17, 1 st main road, Rajajinagar Industrial Town, Bangalore-44
123	Dolphin Die Cast(P) Ltd	68, 15th Cross, J.P.Nagar, 3rd Phase, Bangalore-78
124	Ashwin Precision Products Pvt.Ltd	#A158, C-270, Peenya Industrial Estate, Ist Stage, Bangalore-58
125	C.D Associates	#43, 2nd Main, N.S.Palya, Bannerghatta Road, Bangalore-76
126	Kashi Precision Products	B-132, 1st Stage, 3rd Cross, Peenya Industrial Estate, Bangalore-58
127	Brass Bronze & Copper Cast Industries	#157, 18th Main Road, 40th Cross, 4th 'T"Block, Jayanagar, Bangalore-41
128	Zigma Engineering	A275(B), 2nd Stage, Peenya Industrial Estate, Bangalore-58
129	Accuspirals	D-425, 2nd Stage, Peenya Industrial Estate, Bangalore-58
130	Prashanth Automats	No.N3/1, 4th Cross, Ist Stage, Peenya Industrial Estate, Bangalore-58
131	Engineering Enterprises	Plot No. 457/A, 10th 'A" Cross, 4th Phase, Peenya Industrial Area, Bangalore-58

Sl. No	Name of the firm	Address
132	United Forgings	465, Peenya Industrial Area, 4th Phase, Bangalore-58
133	Sadbhava Fabricators	SB-52, 4th Cross, 1st Stage, Peenya Industrial Estate, Bangalore-58
134	Super Bright Steels Pvt.Ltd	A-172, 4th Cross, 1st Stage, Peenya Industrial Estate, Bangalore-58
135	Precision Gears Limited	Plot.No 57/6, 6th Cross, Kaverappa Road, B.T.M Layout, 2nd Stage, Bangalore-76
136	Excel Tools & Engineering Enterprises	B-20, 1st Cross, 1st Stage, Peenya Industrial Estate, Bangalore-58
137	Mysore Foundries	P.B.No.8209, Jayanagar 7th Block West, Bangalore-82
138	Sumangala Engineering	B-97, 1st Stage, Peenya Industrial Estate, 2nd Cross, Bangalore-58
139	Kavcon Engineers Pvt.Ltd	20 KM, Mysore Raod, Kumbalgod, Bangalore-74
140	Alpha Tech	C-244, 5th Cross, 1st stage, Peenya Industrial Estate, Bangalore-58
141	Lens Enterprises	A-181, 4th Cross, Peenya Industrial Estate, Bangalore-58
142	Datacast Malleables	A-370, Peenya Industrial Estate, 1st Stage, Bangalore-58
143	Priya Precision Gears	C-439, 1st Stage, Peenya Industrial Area, Bangalore-58
144	NSR Industries	Plot No 26D, 2nd Phase, Peenya Industrial Area, Bangalore-58
145	Indus Automation	B-92, 2nd Cross, 1st Stage, Peenya Industrial Estate, Bangalore-58
146	Die Crafts	No.5, 2nd Cross, N.S.Palya Industrial area, Bannerghatta Road, Bangalore-76

Sl. No	Name of the firm	Address
147	Growell CNC Systems	No. C-438, 1st Stage, Peenya Industrial Estate, Bangalore-58
148	A.G.Industries	No.142, 1st Cross, Siddapura, Wilson Garden, Hosur Road, Bangalore-27
149	Universal Press Tools & co	#2, Garudachar Palya, Whitefield Road, Mahadevapura Post, Bangalore-48
150	Gayathri Metal Works	28 A & B, 4th Main, 5th Cross, Industrial Town, Rajajinagar, Bangalore-44
151	Mechfab Industries	Dooravani nagar, Bangalore-18
152	Summit-Tech(P) Ltd	#314, 1st Floor, Vishal Mansion, 9th Main Road, 25th Cross, BSK 2nd Stage, Bangalore-70
153	Auto - Mech Engineers	B-64, 2nd Cross, 1st Stage, Peenya Industrial Estate, Bangalore-58
154	Maini Precison Products Pvt.Ltd	B-59/ 1st Stage, Peenya Industrial Estate, Bangalore-58
155	Dubas Engineering Pvt.ltd	347/ 1A, Bilekahalli, 6th Cross, 2nd Stage, BTM Layout, Off Bannerghatta Raod, Bangalore-76
156	Chaitanya Preci-Tech(P) Ltd	#A68/1, 2nd Cross, Rajajinagar Industrial Estate, Bangalore-44
157	Veda Tooling Systems Pvt.Ltd	B-137, 1st Stage, Peenya Industrial Estate, Bangalore-58
158	Azad Coach Builders Pvt.Ltd	27th KM, Mysore Road, Sheshagirihalli, Bangalore Rural Dist.-562 109
159	Burji Speed on Clutches	C-247, 1st Stage, 5th Cross, Peenya Industrial Estate, Bangalore-58
160	V.M Engineers	B-30, 1st Stage, 1st Cross, Peenya Industrial Estate, Bangalore-58
161	Hydraulics India Services Pvt.Ltd	C-294, 8th Cross, 1st Stage, Peenya Industrial Estate, Bangalore-58

Sl. No	Name of the firm	Address
162	Bangalore Gears(P) Ltd	B-76, 2nd Cross, 1st Stage, Peenya Industrial Estate, Bangalore-58
163	V-3 CNC Centre	Next to Plot-M1, Peenya 1st Stage, 4th Cross, Bangalore-58
164	Sai Quality Castings	#470/D, 12th Cross, 4th Phase, Peenya Industrial Area, Bangalore-58
165	Centra line Lubro-Tech Engineers Pvt.Ltd	A-173, 4th Cross, 1st Stage, Peenya Industrial Estate, Bangalore-58
166	Vacumac Machine Tools Pvt.Ltd	# 472A, 12th Cross, 4th Phase, Peenya Industrial Area, Bangalore-58
167	Asha Engineering Works	B74, 2nd Cross, Peenya 1st Stage, Bangalore-58
168	Kamath Transformers	No. B 124, 3rd Cross, 1st Stage, Peenya Industrial Estate, Bangalore-58
169	Alutop SB-Impex	A-146, 1st Stage, 3rd Cross, Peenya Industrial Estate, Bangalore-58
170	Metacraft	B-80, 2nd Cross, 1st Stage, Peenya Industrial Estate, Bangalore-58
171	Vasthushilpi Enterprises	B-219, 4th Cross, 1st Stage, Peenya Industrial Estate, Bangalore-58
172	Pai Enron Technologies and Systems Ltd	#26, 1st Phase, Kumbalagodu Industrial Area, Mysore Road, Bangalore-74
173	Neri Engineering	# C-199, 4th Cross, Peenya Industrial Area, 1st Stage, Bangalore-58
174	Atlanta Pumps Private Ltd	487, D1& D2, 4th Phase, Peenya Industrial Area, Bangalore-58
175	Glastronix	Plot No.21-E2, 2nd Phase, Peenya industrial Area, Bangalore-58
176	Sea Rock Precision Products Pvt.Ltd	B-44(b), Kumbalagodu Industrial Estate, Bangalore-74
177	New Uma Engineering Works	#91, 3rd main road, Rajajinagar Industrial Town, Bangalore-44

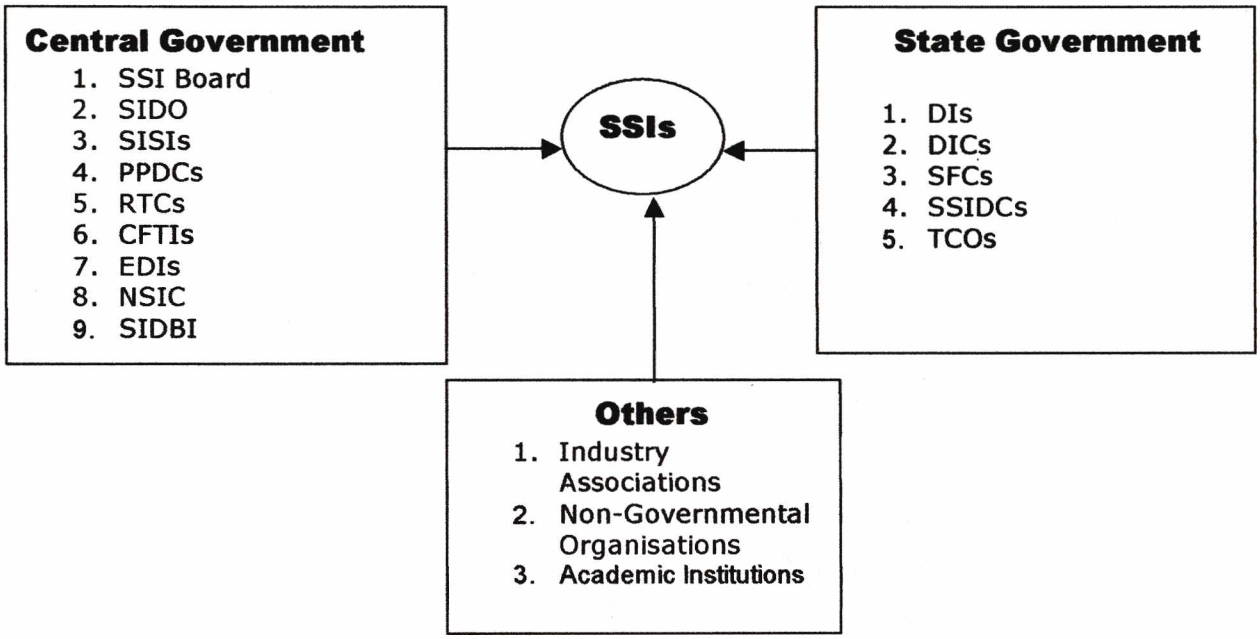
Sl. No	Name of the firm	Address
178	Maruthi Machine Tools Pvt.Ltd	#460A, 4th phase, Peenya Industrial Estate, Bangalore-58
179	3D Concept Tooling	#SB-44, 1st Cross, 1st stage, Peenya Industrial Estate, Bangalore-58
180	Jaycee Industries	153, 40th Cross, 18th Main Road, 4th T Block, Jayanagar, Bangalore-41
181	J.D. Marketing Private Ltd	A-41 & A-42, KSSIDC Industrial Estate, Kumbalagodu, Mysore Road, Bangalore-74
182	Giliyal Industries	Plot No. N3, 5th Cross, 1st Stage, Peenya Industrial Estate, Bangalore-58
183	Instruments India	B-8, ITI Industrial Estate, Mahadevapura, Bangalore-48
184	Emvee Industries	C19, NGEF Industrial Area, Mahadevapura , Bangalore-48
185	Naveen Industries	B-12, ITI Ancilliary Industrial Estate, Mahadevapura , Bangalore-48
186	Sri Rama Industries	ITI Industrial Estate, Mahadevapura, Bangalore-48
187	Rotomac	C18, NGEF Industrial Estate, Mahadevapura, Bangalore-48
188	Evershine Industries	B-42, ITI Ancilliary Industrial Estate, Mahadevapura, Bangalore-48
189	Mark Industries	B9, ITI Ancilliary Estate, Mahadevapura, Bangalore-48
190	Mikros	C20, NGEF Industrial Estate, Mahadevapura, Bangalore.
191	Roto Services	L13, ITI Industrial Estate, Mahadevapura, Bangalore-48
192	Transphone Corporation	B-24, ITI Industrial Estate, Mahadevapura, Bangalore-48

Sl. No	Name of the firm	Address
193	N.P.Electricals	B-45, ITI Industrial Estate, Mahadevapura, Bangalore-48
194	Subari Metal Stumping Industries	B-50, ITI Industrial Estate, Mahadevapura, Bangalore-48
195	Precitech	C-19, KSSIDC Industrial Estate, Metagalli, Mysore-16
196	Hindustan Spring Mfg.Co	C111&112, Industrial Estate, Yadavagiri, Mysore-20
197	Ideal Engineering	No.L-12A, Yadavagiri Industrial Estate, Yadavagiri, Mysore-20
198	Sri Rama Engineering Industires	No.69-S, Hootagalli Industrial area, Mysore-86
199	Sri Durga Tech	#27, Belagola Industrial Area, Mysore-16
200	Mysore Precision Engineers	C-123/124, Industrial Estate, Yadavagiri, Mysore-20
201	M.C.Engineering Components	L-12A, Yadavagiri Industrial Area, Mysore.
202	Sarang Engineering Pvt.Ltd	B-60, Industrial Estate, Hebbal, Mysore-16
203	Essar Fine Fabs	No.D-139, Yadavagiri Industrial Estate, Yadavagiri, Mysore-20
204	Vishwas Turners	D-51, KSSIDC Industrial Estate, Metagalli, Mysore-16
205	Saarathy Engineering Works	# S.M 162, Hebbal Industrial Estate, Mysore-16
206	Unique Machining Centre	Plot No. Q31, KSSIDC, Hebbal Industrial Estate, Mysore-16
207	RPG Engineers	Shed No.7, 148, New Bannimantap Extension, Mysore-26
208	AJ Precisions	No.149, Belagola Industrial Area, Metagalli, K.R.S.Road, Mysore

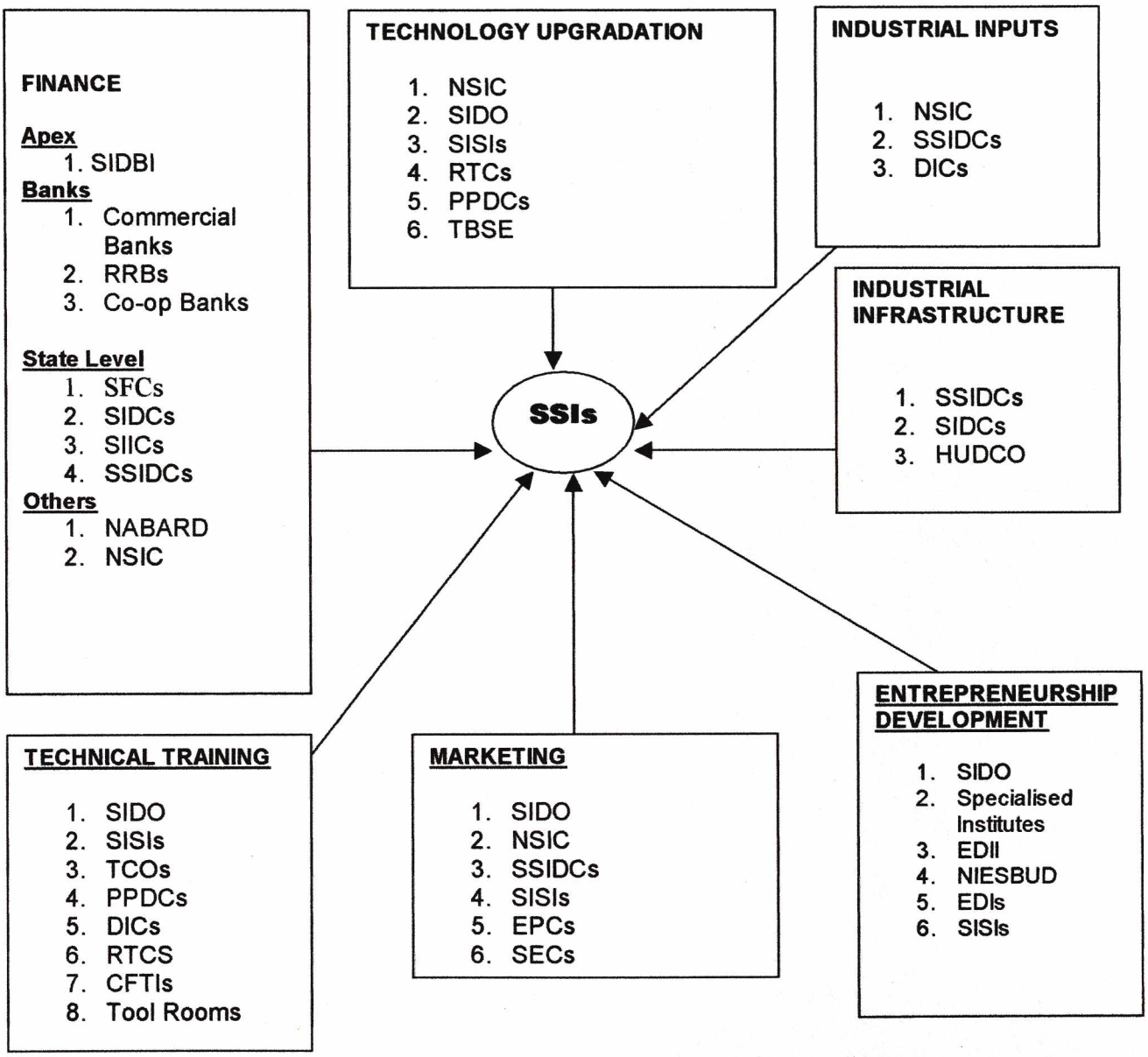
Sl. No	Name of the firm	Address
209	Swathi Engineering & Industries	C-17, Metagalli Industrial Estate, Metagalli, Mysore-16
210	Legend Designers	#149B, Belagola Industrial Area, Metagalli, Mysore-10
211	Bharath Precision Gears	C-14, KSSIDC Industrial Estate, Metagalli, Mysore-16
212	KLN Engineering Products Pvt.Ltd	F-56, Industrial Estate, Rajajinagar, Bangalore-44
213	A.P.Tools	No.93/1c, B.Narayanapura, Whitefiled Road, Bangalore-560016
214	Crescent Tool Engineering	B-69, Peenya Industrial Estate, Bangalore-58
215	Sringar Switch Gears	D-388, 1st Cross, 1st Stage, Peenya Industrial Estate, Bangalore-58
216	Magnum Engineers	C437, 1st Cross, 1st Stage, Peenya Industrial Estate, Bangalore-58
217	Mamcom Machine Tools	No.9, 4th Main, 4th Cross, Rajajinagar Industrial Town, Bangalore.

Annexure: IV Support Agencies for SSIs

(Source: SIDBI Report on Small Scale Industrial Sector 2000)



Providers of Finance and Specialized Support Services



Annexure V

List of Prominent Institutes at the Government Level (Training Resources)

Sl.No	Name of the Institute/Agency
1	Small Industries Service Institute (SISI)
2	Small Industries Development Bank of India (SIDBI)
3	Govt.Tool Room and Training Centre (GTTC)
4	Foreman Training Institute (FTI)
5	Karnataka Council for Technology Upgradation (KCTU)

List of Prominent Private Agencies/Associations (Training Resources)

Sl.No	Name of the Institute/Agency
1	Karnataka Small Scale Industries Association
2	Peenya Industrial Association (PIA)
3	Bommasandra Industries Association (BIA)
4	ITI Ancillary Industries Association
5	Science and Technology Entrepreneurs Park (STEP)
6	Nettur Technical Training Foundation (NTTF)

Annexure: VI: References

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