

SECTION 1 - INTRODUCTION

1.1.0 BACKGROUND

The Machine Tools Cluster of Bangalore has been adopted by UNIDO for development under the “US/IND/97/148: Restructuring and Modernising SME based Clusters” Programme. The UNIDO methodology prescribes a diagnostic study to understand the problems and prospects of an industry at the onset of intervention.

A cluster diagnosis on pilot basis was conducted during the pilot phase. Indian Machine Tools Manufacturers Association (IMTMA) has been identified as the nodal agency for the implementation of this cluster development programme.

A diagnostic study of a cluster serves to lay down the broad path for initiation of cluster development. One of the main objectives of such a study is to suggest a vision for the future and strategic plan in line with UNIDO methodology by understanding the current situation of the Machine Tool Cluster of Bangalore.

IMTMA and UNIDO constituted a team for the diagnostic study comprising Mr. H. R. Gupta, M.D., BeQuest (Technical Expert and Advisor) and M/s Delphi Research Services Private Limited (DELPHI) to undertake a diagnostic study in line with their requirements. The study was carried out between November, 1999 and February 2000.

1.2.0. SCOPE OF THE STUDY

The scope of the study has been defined by UNIDO along the lines of cluster diagnostic studies carried out in the past by them and in line with the scope as outlined in the UNIDO document.¹

In essence, the study aims at obtaining a bird's eye view of the Bangalore machine tool cluster and insights into the working, effectiveness and dynamics of the cluster. It also is meant to identify the factors constraining the smooth functioning and growth of the cluster and areas that need to be strengthened.

1.3.0. METHODOLOGY

The methodology adopted for the study was defined by UNIDO, with inputs taken from Mr. H. R. Gupta and IMTMA for their knowledge of technical aspects as well as of the machine tool industry. The methodology was along the lines specified in the UNIDO document with Delphi being given some leeway in developing the research instruments for the study.

In brief, the methodology involved the following activities:-

1) **Review of Secondary Data Sources** relating to the machine tool industry and to major end-use industries; the major sources accessed include IMTMA publications (for information relating to the Indian machine tool industry and exports from India), Publications of Association of

¹ “Cluster Diagnosis & Restructuring Methodology - A Guide for Practitioners” by Dr. James Keddie.)

Manufacturing Technologies (AMT), USA and back issues of American Machinist (for world trade statistics), studies conducted by various entities on the Machine Tool Industry, besides others. A list of major secondary sources accessed appears in Annexure 1.

2) **Primary Research** which was limited but focused in nature involved carrying out interviews primarily among the following entities:

- Policy Making and Regulatory Bodies;
- Infrastructure Providers;
- Machine Tool Manufacturers (MTMs);
- Major Suppliers to MTMs;
- Major Vendors/Sub-Contractors catering to MTMs;
- Technical Institutions;
- Training Institutions;
- Testing Laboratories;
- Finance Providers;
- Enterprise and Industry Associations;
- Others.

In all, about 70 interviews were carried out among a cross-section of stakeholders. All the interviews were done in Bangalore only. A list of the various types of organisations contacted appears in Annexure 2.

3) A second activity under the purview of primary research was the outcome of a workshop among Supplier and Vendor enterprises convened by IMTMA and UNIDO and facilitated by Mr. H. R. Gupta, which was held on the 20th January 2000. The outcome of this workshop provides insights into some of the problems being faced by these firms as well as suggestions to develop the Bangalore machine tool cluster into one with global excellence, from a Suppliers and Vendors' perspective. The insights and suggestions thus obtained have been incorporated into this report.

1.4.0. CAVEATS AND LIMITATIONS

The findings of the study as reported in this document must be qualified and viewed in the light of several limitations such as: -

1) The sample size achieved is very small and may not be representative given the diversity of respondent categories contacted during the study. However, some minimal representation was attempted among Vendors/Sub-Contractors of MTMs, in order to elicit information from 2 such entities for each large and medium sized MTM in the city.

2) The sample coverage did not include customers of MTMs, who play a vital role in shaping the fortunes of the MTMs, their suppliers and vendors; and also in driving/fashioning changes in the working, strategies and dynamics of these enterprises. This is a serious limitation. Thus, the findings of the study relating to linkages of core enterprises with customers must be viewed with caution.

3) The brief time frame in which the study was conducted. (The bulk of the field work for the project took place between end November, 1999 and mid January 2000. The findings were compiled and the draft report submitted in February 2000).

4) Barring in a few instances, involvement levels of individuals contacted across various respondent categories seemed very low. This has a significant bearing on the nature and depth of information obtained.

5) At the very outset, this study was meant to provide a “Bird’s eye view” or “Helicopter view” of the working, effectiveness and dynamics of the cluster. Therefore, by definition, detailed understanding and insights are not forthcoming from this study. Also, most of the insights, inferences and conclusions are largely qualitative, in nature.

6) Current and accurate data relating to the machine tool industry, both for the city of Bangalore, as well as at a national level, are not easy to come by. The figures compiled by IMTMA relate only to those of its members who report their returns annually (sales value of production), most of whom are players from the organised sector. Reportedly, only a few researchers have attempted to get a fix on the number of small firms in the machine tool industry and their relative share in the total production of machine tools in the country. No reliable estimates are available for the contribution of the small and unorganised sector to the machine tool industry.²

SECTION 2 - THE MACHINE TOOL INDUSTRY - IN PERSPECTIVE

2.1 ROLE OF THE MACHINE TOOL INDUSTRY

From a country perspective, the Machine Tool industry has been traditionally regarded as the “Mother industry” for the entire engineering industry. The strength of the “Mother industry” tends to have a direct bearing on the intrinsic strengths and capabilities of the other industries in the country. This phenomenon assumes added relevance especially in times of conflict such as when economic and trade sanctions are imposed on a given country. In this situation, if the machine tool industry is not strong, the other industries are unable to cope with the challenges of being self-sufficient, and more importantly, its defence needs and capabilities are compromised.

It is for this reason that in all the countries where the Machine Tool industry has a strong presence, the industry continues to receive some measure of support and patronage from its governments.

Ever since the industrial revolution ushered in a new era, the machinery-producing sector has been at the hub of the economic development process of all industrialising countries. However, it was only in the late 1950s that Abramowitz and Solow demonstrated empirically that it is a technical change rather than accumulation of capital that explains the growth of industrialised countries. Until then, most economists tended to ignore the contribution of productivity and technical change in determining the costs, competitiveness and economic growth of nations.³ By the end of the 1970s and early 1980s, a significant amount of intellectual effort by well-known economists-Rosenberg, Lakatos, Nelson, Winter and others, was invested in

² Machine Tool Industries in India & Taiwan – Ashok Desai, Hanumanta Charya, Marc Lautier, A Study prepared for OECD Development Centre, Paris, 1995, Pg.20

³ Strategies to meet Competition: Firm level Study of Indian Machine Tool Industry, Vinish Kathuria, 1999, Sage Publications

understanding the process of technical change. However, it was Rosenberg who first emphasised the central role played by the machinery-producing sector (especially the capital goods sector) in the process of technical change leading to the competitiveness of nations.⁴

The role of the capital goods (especially the machine tools) industry in introducing and diffusing technological change leading to international competitiveness is multi-dimensional. This is because of the fact that any advancement in process and product requires a technologically advanced new machinery. Since the machinery provided by one user can be often utilised by others (with some adaptations), the capital goods industry acts as the main locus for the diffusion of innovations throughout the economic system. Thus, the machinery-producing sector lies at the heart of the production and diffusion of technical change. Further, the widespread linkages of the machine tool industry, where it is less than 2 per cent of industrial output has a latitude to affect the remaining 98 per cent output, suggests that the cost reduction by the capital goods industry is capital saving for the economy. This cost reduction raises the marginal efficiency of the capital of all other machine tool-using industries, which ultimately results in international competitiveness among nations.⁵

2.2 KEY CHARACTERISTICS OF THE MACHINE TOOL INDUSTRY

This is a volume and technology driven industry. It is for this reason that global dominance in the industry has been shifting over the years to countries which can either effect the maximum production efficiencies or maintain a high and ongoing level of technological up-gradation or to those countries that can deliver on both these aspects.

It is a vertically integrated industry wherein, in an ideal situation, the MTMs out-source most of the components while they concentrate on their forte and core competence which encompass design, tooling solutions and systems integration.

In the advanced countries and among Newly Industrialised Countries (NICs), CNC Machines account for the bulk of machine tools produced.

Reportedly, the automotive industry, consisting of automotive manufacturers as well as manufacturers of auto components and ancillaries, tends to account for a significant share of the market for machine tools and to have an over-riding impact on the industry. Other major end-use sectors include Farm equipment, Earth Moving equipment, Defence, Railways, other General Engineering and Capital Goods industries. In India, another end-use sector with growing opportunities for the machine tool industry is the small scale sector, especially those units that need to upgrade their facilities from conventional machines to Computerised Numerically Controlled (CNC) machines.

The machine tool industry is generally segmented along the following lines :-

- Metal Cutting versus Metal Forming
- Numerically Controlled (NC) and Computerised Numerically Controlled (CNC) versus Conventional Machines
- Machines versus Tools (Cutting/Forming; Within Machines - General Purpose Machines (GPMs) and Special Purpose Machines (SPMs).

⁴ Ibid

⁵ Strategies to meet Competition: Firm level Study of Indian Machine Tool Industry, Vinish Kathuria, 1999, Sage Publications

Within each segment, there are a large number of products and sub- categories.

Another basis of segmenting the machine tool industry is to split the industry into 2 categories, namely, Metal Cutting and Metal Forming. Within each of these, one can further classify products in each of these segments under NC/CNC and Conventional.

While the manufacturing process for machine tools varies widely depending on the product in question, Chart 1 that follows provides a broad understanding of the typical process flows for 1 type of machine tool in what is known as an “A” type production system or process.

2.3 THE WORLD MACHINE TOOL INDUSTRY

Machine tools still retain the characteristics of a classical engineering industry. It is a small industry and pales into insignificance when comparing the value of global output of the industry with the value of global output of the automotive industry and several other capital goods industries.⁶ In 1998, global consumption of machine tools was barely 33 billion dollars.

World-wide, although the number of firms producing machine tools in most countries is very large, the typical pattern is a small number of large firms producing a broad range of machines and a large number of small firms specialised in simpler products or special machine tools or components.

For almost 50 years, between the 1920s and the 1970s, Germany, USA and the U.K dominated the world machine tool industry. Since 1970 and over the last 3 decades, the machine tool industry has been profoundly affected by two related events :

- The entry of Japan and its growing dominance for the most part in the last 30 years; and
- The introduction of electronic controls.

In the post 1970s period, Japan revolutionised the industry in several ways during its reign as a world leader. Some of the strategies adopted by Japan during this period were:

- It became the market leader in electronic controls by reducing costs and producing reliable simple and sophisticated products
- Along with electronic controls, Japan adopted a number of process innovations that hastened its growth and leadership status such as developing standardised machines, based on a study of end-user requirements, that could be mass produced; simplification of machines by reducing the number of parts; higher productivity; lowering costs of production.⁷

Along with Japan’s growing dominance, the last 20 years has seen the emergence of South Korea and Taiwan as significant players in the world machine tool industry. While Taiwan’s visibility has perhaps been much more since the late 1980s or 1990s, in reality, Taiwan has been evolving, fine-tuning and nurturing a conscious export strategy for its machine tool industry. As far back as the late 1960s, Taiwan used to export machine tools predominantly to South Asian countries such as Thailand, Philippines and Vietnam. During the 70s, its exports to the USA began to rise steadily until it peaked at over 50% of its exports in 1986. The rising share of Taiwanese machine tools in USA’s imports made waves and culminated in a voluntary

⁶ Ashok Desai et. al

⁷ Ashok Desai et al

restraint agreement in 1986 restricting Taiwan's share in the US market to 5 %. This effectively led to drying up of exports to the US and forced Taiwan to seek other markets. Taiwan, since then, stepped up its exports to Western Europe (UK, Holland, Italy, Germany, France and Belgium). By 1990, almost a third of its exports were to Western Europe. In the early 1990s, when the European market was beset with a recession, Taiwan was able to find a market in China.⁸ Currently, Taiwan exports its machine tools to many countries and has made serious inroads into the Indian market since the last 5 years. The paper cited also offers very useful cluster-specific insights into the underlying success of Taiwan as against the performance of India to date in the machine tools industry.

Over the 1980s and 1990s, Asian countries have emerged as a major force both in terms of production and consumption, fuelling demand and driving growth of the industry. These countries are expected to register higher growth rates than in western countries over the next few years. One of the key determinants of the growing stature and role of the Asian countries is price competitiveness, which is influencing the shift of machine tool production from high cost areas of Europe to the Asian countries. In this context, an opportunity exists for India to step up its share of exports in world exports since it has many advantages (theoretically) over countries such as Taiwan, provided of course it is able to gear up in terms of quality and delivery - for example, its base of English speaking technical work force, technology, wide resource and skill base etc.

Based on the most current data available, the key indicators of the world machine tool industry can be summarised thus:-

1. World consumption of machine tools was of the order of US\$ 33.753 billion in 1998. Table 1A provides a rapid understanding of trends in global consumption of machine tools between 1991 and 1998. Table 1B provides a similar understanding of global production and world trade in machine tools, between 1982 and 1998.

TABLE 1 A - WORLD CONSUMPTION OF MACHINE TOOLS BETWEEN 1991 TO 1998

YEAR	VALUE IN MILLION US\$
1991	39,373
1993	25,650
1995	33,038
1998	33.753

Source: AMT

TABLE 1 B - WORLD PRODUCTION AND TRADE OF MACHINE TOOLS BETWEEN 1982 TO 1998

(Value in Million US Dollars)

YEAR	PROD- UCTION	IMPORTS	EXPORTS	CONSU- MPTION
1982	22,370.0	7958.6	9105.3	21,223.3

⁸ Ashok Desai et al

1987	33,081.5	13010.4	15,196.8	30,895.1
1991	42,947.1	15,547.7	18,947.6	38,928.4
1992	34,088.8	18,927.2	17,230.4	30,785.6
1993	28,247.8	11,934.3	14,531.8	25,650.3
1994	28,849.1	14,075.4	16,398.5	26,526.0
1995	36,504.1	18,239.5	21,706.0	33,037.6
1998	36,647.3	18,999.2	21,893.3	33,753.2

(Source: AMT- Refer Annexure 3)

2. Seven countries (Japan, Germany, Italy, Switzerland, USA, Taiwan and U.K.) together account for the bulk (84% in 1998) of global machine tool exports.
3. In 1998, Asia accounted for 36% of world production, 36% of world exports and 26% of world consumption in 1998.
4. India ranks 19th globally in machine tool production, 26th in global exports and 15th in global consumption.
5. On these same measures, China stands 6th in world production, 13th in global exports (08.4%) and 4th in global consumption.

2.4 THE INDIAN MACHINE TOOL INDUSTRY

Brief History and Evolution of the Indian Machine Tool Industry

A rich description of the origins and evolution of the Indian machine tools industry is featured in the paper authored by Ashok Desai, Hanumantha Charya and Marc Lautier cited earlier.

The history of the Indian machine tool industry can be classified into 5 phases.

Phase 1 – The Early Years

From its early origins itself, the Indian machine tool industry has been widely dispersed and fragmented. The early firms producing machine tools evolved in 3 geographical clusters, namely, in and around Bombay and Pune, Bangalore and Punjab. In Bangalore and Pune, the presence of the armed forces regional headquarters, presence of ordnance factories and repair workshops, provided an early impetus to the industry especially during and immediately after World War II.

Among the earliest firms recorded are Cooper Engineering, Pune (1937) subsequently taken over by Premier Automotive, an automobile manufacturer, Mysore Kirloskar, Harihar in Karnataka (1941) and Hindustan Machine Tools (HMT), Bangalore (1953). Other than these several other medium and large firms were established between 1951 and 1966 in different parts of the country, although the bulk were in the 3 clusters mentioned.

Emergence of Various Types of Firms

- The 1st unit that came up, Cooper Engineering was a licensee of Alfred Herbert, the British machine tool manufacturer

- Mysore Kirloskar was set up when imports were cut off during the second World War and there was a severe shortage of machine tools
- Between 1951 and 1966, when most of the other firms were set up, severe import restrictions made imports difficult and domestic industry was given complete protection. Many of the units that came up in this period set up firms as subsidiaries or licensees of foreign manufacturers. Many of such firms had been import agents of foreign companies such as Voltas, Batliboi, Machine Tools India, Empire Machine Tools, Allen-Bradley India, Advani Oerlikon and Traub India, all began as import agents, Bharat Fritz Werner (BFW), a firm that was established in 1958 in Bangalore was headed by a former Managing Director of HMT
- During the 1960s, a number of user firms set up divisions or subsidiaries whose prime task was maintenance, setting up jigs and fixtures, die making, making out specifications and costs of machine tools to be purchased. Some of these firms also made machine tools. Examples of such firms include Tata Engineering and Locomotive Company (TELCO), the largest truck and commercial vehicle manufacturer, which acquired Ivesta Machine Tools and turned it into a captive machine tool unit and Mico Bosch, which is mainly in fuel injection equipment. None of these firms became major suppliers of machine tools to the Indian market
- Not much is known about the origins of a large number of small firms that came up in Punjab. However, in the wake of unprecedented prosperity following the Bhakra Nangal irrigation project and later the green revolution, a number of new engineering industries emerged. In particular, the first workshops sprang up to make and repair sewing machines, bicycles and diesel irrigation pumps. Later, the boom in agricultural output gave a fillip to the machine tool industry as well. The machine tool industry in Punjab was concentrated in 2 centres, Ludhiana and Batala
- Other than in Punjab, around the same period, a number of small firms began to proliferate in centres concentrated with small-scale industries in parts of Gujarat (Rajkot, Surendranagar and Surat), in Coimbatore and Madras

Major aspects that characterised this period (1951 to 1966)

- It was the golden age of import substitution. The government banned imports of machine tools that were produced indigenously and also encouraged new manufacturers to produce machines that were not produced within the country
- The result was a mapping out of the Indian machine tool industry, with competition minimised in each segment and a system of product monopolies came into being
- Production grew rapidly
- Demand was buoyant
- Competition was constrained both at home and from abroad.

Phase 2 – 1967-1968 - End of the Golden Years

The golden years seemed to have come to an end in 1967. Official output of the machine tool industry as per IMTMA figures revealed a 40% fall in output. According to Ashok Kapur et al, this fall was more an indication of a shift in the shares of producing firms with small firms accounting for a greater share of output of machine tools. The output of small firms does not tend to get reflected in the official figures, which generally represents the output only of large and medium firms from the organised sector.

The shift was due to 2 factors: -

1. A shift in the demand pattern from government to private purchases; (an economy-wide recession in 1967-68 led to a collapse of government investment, real government revenue fell and investment was more strongly affected than government consumption. The green

revolution led to a surge in demand for engineering goods and services to agriculture, especially in Punjab. This brought sudden prosperity to the small machine tool manufacturers who began to manufacture a wide variety of machine tools. They relied entirely on reverse engineering. Most of these small firms produced crude machine tools, which were called "Addas". They were modelled on brands of larger firms but were poorly made with non-standard components).

2. The end of sellers' market in inputs. (The shift in the market was reinforced by a change in the market for inputs. There was a continual shortage of pig iron and steel between 1955 to 1966. Both were allocated by the government and large firms with industrial licenses had privileged access to them. Small firms were also given a small quota which was channelled through various industry departments of state governments and its allocation was ridden with corruption. Therefore, small firms were forced to buy steel in the black market at prices that were considerably higher than those paid by large firms. Even at the high prices, the supply was limited and unreliable. In 1966, the shortage of steel and pig iron suddenly disappeared and, with it, a binding constraint on the growth of small firms.

Phase 3 – 1968 to 1983 – Access to International Technology via Collaborations Becomes Difficult

During this period, the large firms faced twin problems a shrinking market in the late 1960s and difficulty in obtaining licenses from foreign firms.

Between 1967 and 1982, the number of new licenses fell to less than 6 a year from an average of 16 a year in 1966-67. Some of the reasons for this are the government's efforts towards import substitution in technology and towards forcing foreign firms to disinvest their shares in their Indian subsidiaries. The ties between foreign companies and their subsidiaries were forcibly loosened by the Foreign Exchange Regulation Act (FERA) of 1973, which forced the foreign companies to reduce their holdings to less than 40%. Thus, the foreign firms often lost majority control. Herman Traub, for instance, sold out to its Indian partner and Traub (India) became Perfect Machine Tools (PMT). Even in instances where the parent company retained control, it was often difficult for it to confine the subsidiary to the parents' products when profits depended on diversification. So, subsidiaries (such as Bharat Fritz Werner) got more freedom in diversification and were even allowed to take licenses from firms other than the parent. The forced divestment of foreign controlling shares combined with the prolonged slump between 1966 to the late 1970s made the industry unattractive to licensors. Thus, in the 1970s, the industry witnessed large firms extending their product range by marginal variations by reverse engineering. This period saw India insulating itself against the world market and moving away from international trends in the machine tool industry.

Phase 4 – The 1980s

The Indian machine tool industry during the 1980s was characterised by the following major aspects:

- In this period, globally, the leading machine tool industries moved into numerical controls. The Indian machine tool industry was very slow off the blocks. The reason for this was that in 1979, the government decided to move away from quantitative import restrictions to tariffs. In pursuit of this policy, an increasing number of machine tools was placed on Open general License (OGL); the number increased from 24 in 1972-82 to 128 in 1982-85 and 300 in 1985-88 [Wogart et al 1993:78]. Generally speaking, advanced-technology products, including NC machine tools, were placed on OGL. Those so placed bore higher tariffs and tariff differentials were raised throughout the 1980s. In 1972-82 there were two tariff bands for machine tools – 25 % and 48 %. In 1986-89 there were four bands – 35 %, 55 %, 95 % and 115 %. The idea was to give more protection to more advanced products.

- There was a spate of technology imports in 1983 and 1984. 15 collaborations were signed in these 2 years.
- In 1983, a major change in government policy came into being – broad banding. This implied that machine tool producers did not have to get industrial licenses to produce new models. They could diversify without government permission.
- This period saw the emergence of several new firms. Only 1 of these firms is reported to have imported technology. All the others did not receive any technology from outside the country and were set up by technocrats who left either HMT or CMTI.
- During the late 1980s, import duties rose significantly. Official figures of output of machine tools indicate stagnation but there do not appear to be any discernible reasons for the stagnation.
- Small firms in Punjab suffered a setback between 1985-90 because of an outbreak of terrorism, which resulted in a drying up of credit and a decline in out-station buyers. Ironically, the decline of small firms in Punjab is believed to have triggered off growth in the number of small firms in Rajkot and Coimbatore.

Phase 5 – The 1990s - The Liberalisation Years

The 1990s were punctuated with a series of catastrophic and traumatic events for the Indian machine tool industry. Some of these were: -

- The collapse of the Soviet Union in 1990 which resulted in the drying up of a significant chunk of Indian exports
- The government delicensed the machine tool industry in 1991. This resulted in the removal of official restrictions on domestic competition. It also abolished import licensing in machine tools and industrial inputs in 1992 and abolished forced import substitution programmes. Finally, it began to bring down import duties. From 170 % in 1992, the maximum rate came down to 90 % in 1993, 65 % in 1994, 50 % in 1995 and 20 % in 1997.
- This resulted in a flood of imports in subsequent years. Imported machine tools are now only about 25 % to 30 % higher in price in the Indian market than that of locally manufactured products.
- Between 1990 and 1993, an industry wide recession swept the industry. 1 firm wound up while most firms made losses. Only the new technocrat promoted firms and well-run small firms were able to insulate themselves from the effect of the recession. This forced the machine tool producing firms to restructure themselves and improve their efficiencies and cost competitiveness. Another change is a tendency among firms to build networks. They are no longer insistent on producing components in-house and have instead been looking for sub-contractors to reduce costs.
- While the industry was trying to set its house in order to cope with the challenges thrown up by liberalisation, a boom swept the industry in 1994, particularly in the area of NC tools. The off-take of NC machine tools was 689 in 1991, 425 in 1993 and 700 in 1994.
- Between 1995 and 1998, Taiwanese machine tools made severe inroads into the Indian market. Coupled with the downturn in the fortunes of the automotive industry during 1997 to 1999, Indian machine tool producers were in fairly dire straits. As per IMTMA figures, the share of imports in consumption was almost 63 % in 1998.

India's Share of Global Machine Tool Industry

India's share of global exports in 1998 was 0.06%.

Geographic Spread

South: Bangalore, Chennai, Coimbatore, Cochin, Hyderabad

West : Pune, Mumbai, Baroda Rajkot, Jamnagar, Surendranagar;

North : Batala, Jullunder, Ludhiana, Faridabad, Ghaziabad.

Trends in Production, Imports, Exports & Consumption of Machine Tools In India Between 1985 and 1998

In 1998, the production of machine tools in India was valued at Rs. 6683 million. Imports were of the order of Rs. 10,500 million. Exports amounted to a little over Rs. 600 million. Table 2 that follows provides an understanding of trends over the last 14 years in production, imports, exports and consumption in the Indian machine tool industry.

**TABLE 2
TRENDS IN MACHINE TOOL AVAILABILITY,
EXPORTS AND CONSUMPTION IN INDIA
BETWEEN 1985 AND 1998**

(Value in Million US\$, at 1998 Prices - 1 US\$ = Rs.40)

YEAR	PRODUCTION	GROWTH (%)	IMPORTS	EXPORTS	CONSUMPTION
1985	85.5	12	38.8	07.5	116.8
1986	93.0	09	43.8	11.5	125.3
1987	104.3	12	50.0	17.5	136.8
1988	115.8	11	50.0	11.5	154.3
1989	138.8	20	50.0	20.0	168.8
1990	174.8	26	56.3	34.8	196.3
1991	193.8	11	85.0	31.3	247.5
1992	196.0	01	120.3	12.5	303.8
1993	160.2	-18	121.3	11.6	269.9
1994	205.0	28	156.7	14.1	347.6
1995	177.7	17	275.0	11.1	441.6
1996*	202.0	13.7	275.1	06.2	470.9
1997*	199.1	- 01.5	180.5	08.0	371.6
1998*	167.1	-27.3	262.5	15.0	414.6

Source: IMTMA

* Denotes Calendar Year; for the other years, the data relates to fiscal years.

Note: The figures relating to production are for organised sector units, the bulk of whom are IMTMA members. No accurate estimates are available of the figures for small and unorganised sector units

Government Policies & Their Impact on the Industry

Government policies have played a significant role in shaping the fortunes of the machine tool industry at various points in time, in general, and the Bangalore machine tool cluster, in particular. This assumed added relevance post liberalisation. In this brief study, it has not been possible to gain access to all the policy changes with a bearing on the machine tool industry)

over the years in order to discuss and do justice to the impact of each shift in policy on the machine tool industry. However, **some** of the significant and more recent policy changes and their implications on the machine tool industry, in general, and the Bangalore machine tool industry, in particular, were as follows: -

1. Delicensing of the industry in 1991
2. Abolition of import licensing of machine tools and industrial inputs in 1992 followed by the abandoning of the Phased Manufacturing Programme (PMP)
3. Progressive reduction of import duties over the years, which triggered off substantial imports from South Korea and Taiwan
4. 1993-94 - Allowing project imports at zero duty; this resulted in some automotive manufacturers importing entire plants including machine tools and machining facilities
5. For 2 to 3 years after 1995 or so, the units in the machine tool industry were struck by a severe blow in the form of having the highest state sales tax in the country at 12%. In most other states the sales tax was about 4%. It was eventually reduced but caused some hardship to local machine tool units.

SECTION 3 - THE BANGALORE MACHINE TOOL CLUSTER - IN BRIEF

3.1 HISTORY, EVOLUTION & GROWTH OF THE CLUSTER

Bangalore is predominantly a metal cutting cluster. The nucleus or building blocks of the machine tool cluster in Bangalore undoubtedly has been the Public Sector owned Hindustan Machine Tools (HMT). While another machine tool producing firm existed in the state that was set up in 1941 (The Mysore Kirloskar Limited at Harihar), it was HMT's inception in 1953 that provided the impetus for the evolution and growth of the cluster.

At the end of World War II, as part of India's goals towards self-sufficiency and as part of India's Planning process, the Indian Government regarded the machine tool industry as one of its most important industries, which would need planning and regulation by the central government. About the same time as HMT came into existence, other public sector units such as Hindustan Aeronautics Limited (HAL), Indian Telephone Industries (ITI), Bharat Electronics Limited (BEL) also came into being. Since a pool of technical workforce needed to be created, the Government also set up a series of Industrial Training Institutes. One of the existing machine tool manufacturing companies came into existence with the sole purpose of catering to the needs of machines required by the Industrial Training Institutes. HMT began its activities by catering to India's fledgling automotive industry and to the needs of public sector units located in Bangalore.

HMT went about setting up a support system for the entire machine tool industry in Bangalore through setting up Ancillaries as well as by providing opportunities for a wide range of suppliers, job-shops and sub-suppliers to come up in and around the city. This phenomenon also created unprecedented job opportunities at varying skill levels in the city. The 1960s saw a boom in the Indian automotive and construction industries which fuelled the growth of the machine tool industry, in general, and at Bangalore, in particular. In the early 1960s, the Central Machine

Tool Institute (CMTI) was formed to cater to the technology, testing and R & D needs of the machine tool industry.

By the early 1970s, Bangalore had become a major machine tool producing centre. Thereafter, it has emerged as one of the largest machine tool producing clusters in the country. The cluster accounts for 30% to 40% of the value of production of machine tools in the country.

Over the years, between the late 1950s, through the 1970s, and even beyond this period, a steady stream of Supplier and Vendor firms came into being, some in waves, some sporadically over the years. While looking at the evolution of most of the Supplier and Vendor firms that were contacted, one striking aspect is the abundance and wealth of technical skills in the cluster. The critical roles played by the following institutions and types of institutions in spawning such firms in the cluster must be acknowledged:-

Level 1: HMT and CMTI

Level 2: Other MTMs especially early entrants

Level 3: The Public Sector, Defence and Aerospace Establishments in the city (such as BEL, ISRO, BEML, ITI, etc.)

Level 4: Automotive Manufacturing firms and Auto component
Manufacturing firms in and around the cluster

Level 5: Leading Supplier and Vendor Firms.

Each level must be viewed as a ripple or concentric circle with Level 1 comprising HMT and CMTI being the epicentre or wellspring of the cluster. The institutions in each of these levels have, in varying orders of importance, contributed to the evolution of Supplier and Vendor firms in the cluster, wherein ex-employees of these organisations have spun off units of their own at various times during the life of the cluster.

The major reasons governing entry of these firms were to exploit a perceived business opportunity. Thus, many of the firms chose import substitution as a strategy governing their entry decisions.

Some firms have evolved into strong firms from relatively humble origins, sometimes with the support of MTMs or customers from other sectors.

Several firms among Vendors/Sub-Contractors (especially in the machining components category) are former CNC Lathe Operators with considerable experience who have either set up on their own or been encouraged, motivated and supported by their erstwhile employers.

3.2 GROWTH OF THE CLUSTER & SEMINAL PERIODS IN LIFE OF THE CLUSTER

The Machine Tool industry in Bangalore has come a long way since its early years.

Currently, the machine tool cluster at Bangalore accounts for between 30% to 40% of the value of machine tool production in the country. In value terms, taking only the value of production of MTMs into account, this works out to approximately Rs. 5900 million in 1999, taking the production of organised sector units (comprising mainly Large and Medium units) as well as that of the Small and unorganised sector units. It must be noted that this figure also includes the

turnover of 1 very large MTM which is not located in Bangalore but in another location in Karnataka and has close linkages with the cluster.

The estimated shares of various types of MTMs is as follows:-

TABLE 3 – No. & SHARES OF EACH CATEGORY OF MTM FIRMS IN CLUSTER

CATEGORY/ SIZE OF FIRM	NO. OF FIRMS IN CLUSTER	VAL. OF PRDN. IN 1998-99 (IN MLN Rs.)	SHARE (%)
Very Large	2	2000	34
Large & Medium	5	2400	41
Small	50	1500	25
Total	57	5900	100

Note: The bulk of the small firms are not members of IMTMA and hence their output figures do not get reflected in official industry statistics. The production of 1 manufacturer in the Large & Medium category whose value of output is estimated at Rs.500 million is for captive purposes predominantly. 1 manufacturer in the “Very Large” category (value of production Rs.1000 million) is located outside Bangalore in interior Karnataka. Thus, if these figures are eliminated and Rs.3000 million is removed from the total value of output, the balance is Rs. 2900 million. On a rough and approximate basis, the cluster provides direct employment to approximately 10,000 individuals in the city and indirect employment to about 26,000 individuals. (Basis: Our estimate, based on Primary research).

Seminal Periods/Turning Points in the Life of the Cluster

The seminal periods or turning points in the life of the cluster are featured in Table 4.

TABLE 4 SEMINAL PERIODS/TURNING POINTS IN THE LIFE OF THE CLUSTER

PERIOD	EVENTS	IMPACT
1950 - 60	HMT established; Several Other Defence, Aeronautical, Aerospace, Other Public Sector Units established; Many Academic and R&D Institutions (e.g. . I. I. Sc.), Established.	Forms the Nucleus and building blocks for the machine tool cluster; Ancillaries and Support firms proliferate; Creates manufacturing and business opportunities for the cluster; Ensures skill base for the cluster at all levels.
1960s	CMTI established; ITIs, Technical Training Institutions come into being; BFW set up; Growth of auto industry.	Technical linkages evolve and grow; HMT develops a wide range of conventional machine tools; Growth of auto industry provides impetus to the cluster.
1970s	1 st CNC Lathe developed by HMT; Number of Supplier and Vendor units rises steadily; Large no. of firms in the engineering sector come up in/around Peenya; High quality Training Institutions come into being; 1 st IMTEX held.	Support Services to MTMs for key inputs begins to get concentrated in/around Peenya; Support systems fall into place to cater to growing needs of the cluster; 1 st IMTEX in 1979 – window to technology, markets, new ideas, leads, business for cluster; also opportunity for showcasing capabilities of firms.
1980s	Changes in Govt. Policy enable few Japanese Co.s to enter into JVs with Indian Co.s; ACE set up - Charts a new path; WIDIA – adds machine tools to its business line; Small MTMs set up.	Infusion of technology to customers from the auto industry and to MTMs; Exports effected to new (western) markets for 1st time as opposed to 3 rd world and Communist bloc countries; During the 80s, relatively high growth and upgrading of technology across the board in cluster.

TABLE 4 - (CONTINUED) TURNING POINTS IN THE LIFE OF THE CLUSTER

PERIOD	EVENTS	IMPACT
1990s	<p>Liberalisation & Changes in Govt. Policy; Boom in auto sector for several years in this decade;</p> <p>1996 – TOOL TECH</p> <p>1997 and 1998 - slow down in auto and other major end use sectors of the machine tool industry;</p> <p>More Small MTMs set up in early 1990s;</p> <p>Vishwaroop Project</p> <p>2000 - 1st Design School to be set up</p>	<p>Good, steady growth for most firms in cluster during this decade barring 1 year in early 1990s and in 1997-98; 1994-96 – the demands of the automotive industry forced Supplier & Vendor firms to upgrade technology and modernise; Downsides to Policy Issues: Some global auto players import entire plants including machine tools facilities; Imports especially from Taiwan increase; Indian m/cs not cost competitive with Taiwanese m/cs;</p> <p>Exhibition held once in 1 ½ years- allows Suppliers & Sub-Suppliers to participate & showcase their capabilities;</p> <p>2 years of slow down in the auto industry lead to severe problems especially for smaller firms. Many smaller Supplier & Vendor firms not geared to fend for themselves, undertake market development and expansion.</p> <p>A beginning - 4 MTMs joining together (via sharing of technical information, capacities, technology up-gradation efforts) to enhance export competitive-ness.</p> <p>To be run by IMTMA.</p>

3.3 A BIRD'S EYE VIEW OF THE CLUSTER

The Bangalore Machine Tool Cluster comprises a wide assortment of entities/stake-holders that are inter-connected in different ways. For ease of understanding, all these diverse entities can be broadly classified into the following groups:-

- 1) Core Enterprises - these comprise MTMs (Large, Medium and Small), Firms that supply finished components (hereinafter referred to as "Suppliers") and Firms that may be described as "Vendors/Sub-Contractors", who essentially supply parts or components to the specifications of MTMs/Other Customers or undertake a process (as Job Work) for MTMs/Customers. It makes sense to consider all these 3 entities, namely, MTMs, Suppliers and Vendors/Sub-Contractors as "Core Enterprises" since, as can be seen in this report, they hold the key to the growth and development of the cluster.
- 2) Customers of MTMs, Suppliers and Vendors;
- 3) Sub-Suppliers (Including Raw Material) to MTMs, Suppliers and Vendors/Sub-Contractors;
- 4) Technical Institutions & Testing Laboratories;
- 5) Training Institutions;
- 6) Finance Providers - Formal and Non-Formal;
- 7) Consultants - Technical, Finance, Labour;
- 8) Regulatory Bodies;
- 9) Enterprise Associations;
- 10) Infrastructure & Utilities Providers;
- 11) Agents Selling Imported Machines;
- 12) Entities that Provide Other Support Services - Packing, Transport, Sale of Scrap etc.

The following chart (Chart 2) provides a bird's eye view of the cluster and of the broad linkages between various entities in the cluster.

The following section (Section 4) provides a description of each of the major groups and entities in the cluster as well as an understanding of the working, effectiveness, linkages and dynamics of these players.

From Chart 2, one can infer the major stakeholders in the cluster and the nature of linkages between entities in the cluster. In a nutshell, the workings of the cluster (based on the key linkages) can be described thus:

Linkages Within Core Enterprises

The main linkages within this group are: -

- MTMs → Suppliers → Sub-Suppliers;
- MTMs → Vendors/Sub-Contractors → Sub-Suppliers;
- MTMs → Customers;
- Suppliers → Customers (comprising MTMs, other customers);
- Vendors/Sub-Contractors → Customers (comprising MTMs, Other Customers);

Linkages With Technical & Training Institutions

The main linkages within this group are: -

- MTMs → Technical Institutions;
- MTMs → Testing labs;
- MTMs → Training Institutions;
- Suppliers & Vendors/Sub-Contractors → Technical Institutions ;
- Suppliers & Vendors/Sub-Contractors → Testing Labs;
- Suppliers & Vendors/Sub-Contractors → Training Institutions;

Linkages With Other Entities

MTMs, Suppliers & Vendors/Sub-Contractors with: -

- Enterprise Associations;
- Sources of Finance - Formal, Non-Formal;
- Regulatory Authorities;
- Other Support Service Providers.

SECTION 4- THE BANGALORE MACHINE TOOL CLUSTER - IN FOCUS

4.1 DESCRIPTION OF THE VARIOUS STAKE- HOLDERS IN THE CLUSTER

4.1.1 Machine Tool Manufacturers (MTMs)

The Machine Tool Manufacturers (MTMs) in the Bangalore Cluster (as indicated in Chart 2) comprises 3 broad categories:

Category 1: Very Large (Rs. 1000 million +)

- There are 2 firms in this category. (Strictly speaking, 1 of these firms has its manufacturing facility located in interior Karnataka. However, it has a corporate office in the city and has strong linkages with various entities in the cluster.) Each firm accounts for machine tools valued at Rs. 1000 million (Rs. 1 billion) per annum.
- Coincidentally, both these units are the oldest units in the city and in the country, one established in 1941, another in 1953. Both these units manufacture a wide range of machine tools in both metal cutting and metal forming, both CNC as well as conventional. 1 is a PSU, another part of an old, established business group with diversified business interests. 1 of these firms has played a pioneering role in the growth of not just the cluster but also of the machine tool industry in the country.

Category 2: Large & Medium (Rs. 100 million to Rs. 1000 million)

- There are 5 firms in this category.
- Of these, 2 are Multi-National Companies (MNCs). One of these firms is a major manufacturer of components for the automotive industry and 95 % of its machine tools output is meant for captive purposes. The other MNC firm is a market leader in its category, one of the best run firms in the industry, and specialises in SPMs, Cutting tools, Mining Tools and Forming Tools.
- Next, there are 2 other wholly Indian firms with turnovers upwards of Rs. 450 million. 1 of these firms is a technocrat-promoted, fast track company and definite success story in the industry (a firm that will be studied closely later in this section). The other is a relatively old firm set up over 35 years ago which is part of a large business group with major business interests being in the plantation industry.

- The last firm in this category is relatively small, an SPM manufacturer, with its machine tool manufacturing business accounting for Rs. 120 million in 1998-99. However, this unit is part of a Rs. 1000 million group that has been in the business of trading and servicing machine tools for almost 50 years. This firm is a very impressive player and worth studying closely for several unique reasons (which will be studied later in this section).

Category 3: Small (Rs. 10 million to Rs. 100 million)

- There are widely divergent estimates of the number of firms in this category, even among knowledgeable individuals from the industry.
- When the study commenced, it was believed that there were very few firms in this category and that, strictly speaking, most of such firms could not be regarded as “MTMs”. Estimates of the number of such firms vary widely from 20-30 to 100 +. However, it appears that there are at least 50 firms in this category, some of whom are SPM manufacturers, while others are small MTMs making General Purpose Machines.
- This category appears to be the most interesting of the 3 categories of firms given the stark contrast between them and their counterparts in the other 2 categories, in terms of their enterprise functioning and adaptability. Since only 5 firms in this category were contacted, it is not possible to describe the category in terms of the composition of firms adequately. However, of the 5 firms that were contacted, 1 is part of a Rs. 5000 million business group, is an SPM and specialises in machines for the Auto Rebuilding Market, with a turnover of Rs. 30 million. The other 4 firms are not part of large business groups, are small with turnovers ranging from Rs. 15 million to Rs. 50 million. These firms have been set up by individuals who have worked in either Large and Medium MTMs or Automotive companies. Most of these are small, technologically sound, efficient and well-run firms.

4.1.2 Major Suppliers

Suppliers to Machine Tool producing firms in Bangalore may be defined as those firms that supply finished products to the machine tool producing firms. These firms have the following characteristics:

- 1) There are several large and medium firms in this category, especially in the case of Controls, Hydraulics & Pneumatics; (for example, Fanuc and Siemens, both MNCs, are major suppliers of Controls for CNC machines. Vickers, Rexroth and Yuken, again all firms with equity held by international companies/ collaborators, are major suppliers of Hydraulics. Of these, only Yuken has a plant at Bangalore, while the other 2 units have Sales Offices).
- 2) There are also many small firms in this category. It is interesting to see the smaller firms in this category manfully competing with their large and medium counterparts.
- 3) Some firms are located in other cities within the state (e.g. Hubli, in north Karnataka seems to have emerged as a cluster for Chip Conveyors, with the maximum number of firms supplying Chip Conveyors located there). Some Supplier firms are located in cities from other states (e.g. almost every Large & Medium MTM has more than 1 supplier in other locations, outside the state).

4) Many of these firms also supply directly to customers from other segments such as from the automotive industry, defence etc. This is a very significant point to note, which will be discussed at length later in this report.

5) Several firms in this category are not dependent solely on the machine tool industry. It also appears that many suppliers are consciously trying to reduce their dependence on MTMs and on the automotive industry, since there was a significant down turn in the businesses of MTMs and the auto industry in the last 2 years.

6) In value terms, the products supplied by these firms tend to account for the bulk of the value of out-sourced products and services of machine tool producing firms in Bangalore.

7) The firms can be further classified into 4-5 broad categories, based on the products supplied, as described in Table 5 that follows.

TABLE 5 – CLASSIFICATION OF SUPPLIERS

SUB-CATEGORY	Estimated No. of Firms in Bangalore
Controls	5
Electrical & Electronics	50 +
Hydraulics & Pneumatics	10-15
Chip Conveyors	1-2
Accessories (Tool Turrets, Machine Protection equipment and cladding etc.)	100 +
Coolants & Refrigeration Systems	10
Total	182 +

4.1.3. Vendors & Sub-Contractors

Vendors and Sub-Contractors to Machine Tool producing firms in Bangalore may be defined as those firms that supply a product built to the specifications of machine tool producers or undertake a service comprising a Job Shop type activity involving 1 or more processes upon a given component for machine tool producing firms. These firms have the following characteristics: -

1) They are predominantly medium and small firms in this category.

2) The bulk are located within the city.

3) Several of these firms tend to be fairly highly dependent on the machine tool industry. However, their services are also used by other customers comprising entities such as Automotive manufacturers, Auto component and ancillary manufacturers, Other firms from General and Heavy engineering industries, Small Scale units in and around the area where such firms are located.

4) In value terms, the products/services supplied by these firms tend to account for a small proportion of the value of out-sourced products and services of machine tool producing firms in Bangalore.

5) The firms can be further classified into 4-5 broad categories, based on the products/services offered, along the lines depicted in Table 6 that follows.

TABLE 6 -CLASSIFICATION OF VENDORS /SUB-CONTRACTORS

SUB-CATEGORY	Estimated No. of Firms in Bangalore
Machining Components	500
Sheet Metal	35-40
Castings	05
Others	200 +
Total	745 +

4.1.4. Customers

The term “Customer” in the context of the cluster is meant to connote the customers of MTMs (who typically are from the automotive industry-automobile manufacturers as well as auto component manufacturers, farm equipment and earth moving equipment industries, defence, railways and a wide range of other general engineering and capital goods industries); MTMs themselves who constitute customers of Supplier and Vendor/Sub-Contractor firms; Other (Non MTM) Customers of Supplier and Vendor firms.

While customers were not contacted during this study, (an omission that a draft action plan must address), it is the most important entity in the cluster and for the cluster. This is because: -

- 1) It is imperative for all strategies of the core enterprises to be evolved working backward from the market and customer end.
- 2) The emerging trends suggest that automotive manufacturers will graduate to sourcing most of their requirements of components including machine tools externally and concentrate on their core competence, design and manufacture of automobiles. They also suggest that there will be an increasing degree of direct relationships and co-operation between auto manufacturers and their suppliers and vendors, which has just begun in the auto component industry.
- 3) Strong linkages with customers will help re-vitalise the cluster and ensure sustained growth.
- 4) Our reading is that there does not seem to be a clear understanding of the composition of the market for machine tools in India, among most entities. This too must be remedied. In this context, it is important for planners and policy makers and anybody interested in the welfare of the machine tool industry to also take into account the share of the small and unorganised sectors. Of paramount importance is the need to understand the following :
 - What is the size of the market, defined in terms of effective consumption, in India? In Bangalore?
 - What are the most meaningful bases for segmenting the market? How does this market pan out in terms of :-
 - Domestic consumption versus exports?

- Shares of Domestic production and imports in consumption;
 - What are the relative shares of Organised sector and small and unorganised sectors?
 - What is the composition of the domestic market (reflected by effective consumption) in terms of metal cutting versus metal forming, (within these, the shares of CNC and Conventional machines), shares of major end-use industries? How have these proportions been changing over the last 4-5 years?
- What are the likely trends in the market over the next 3-5 years?
 - What, if anything, can be done, by local players, to survive and thrive, in the next 3-5 years?

4.1.5. Other Entities in the Supply Chain

Sub-Suppliers of Raw Materials, Other Products - these firms cater to the requirements of Suppliers and Vendors/Sub-Contractors. It is very difficult to try and slot these into meaningful sub-groups and to estimate the number of such firms primarily because there is a bewildering assortment of such firms as well as because it comprises a motley bunch of entities. For instance, some in this category are traders and dealers, some are small manufacturing units, some are Job Shops and so on.

Many of the firms in this category are very small (often in the tiny sector) and are often the ostensible cause for quality problems reported by customers. This makes the task of trying to improve quality levels down the line a daunting and terribly unwieldy task, on the face of it.

Testing Laboratories & Facilities

Several End-User organisations and customers of MTMs and of Supplier/vendor firms have their own captive testing facilities.

Similarly, some of the MTMs and larger Supplier and Vendor firms claim to have their own captive testing facilities.

Those units that do not have captive facilities, and who have the need for testing of any kind, have to avail of the services of Testing Labs in the city. The (commercially available) testing facilities in the cluster can be classified into 3 broad categories: -

1. Independent Private Testing Labs;
2. Enterprise Association Owned testing Labs (KASSIA);
3. Technical Institutions that also offer testing facilities (CMTI).

There are a large number of private testing laboratories in the city (ranging from 30 to 50), catering to the needs of the firms in the cluster. Their prices tend to be more than 50% cheaper than that of CMTI for most tests. (For instance, for spectrometry, Private labs charge approximately Rs. 30 per element for ferrous elements and Rs. 50 per element for Non-ferrous elements. As against this, CMTI charges Rs. 100 per element for both ferrous and non-ferrous elements).

The private labs vary widely in terms of their profiles and range of services offered. Some labs offer specialised testing services. However, on an indicative basis, the broad range of testing services offered by private labs is as follows:

- Chemical testing
- Mechanical testing
- Metallurgical

- Physical
- Environment
- Micro-biological
- Non destructive Testing (including for castings, pipes, pipe joints, welded joints etc.)
- Besides others.

A brief description of some Private Testing Labs appears in Annexure 4.

Over and above this, in the case of Electrical and Electronics, there are organisations such as Electronic Testing Development Corporation (ETDC) and the Central Power Research Institute (CPRI) in the cluster.

4.1.6. Technical and Training Institutes

The cluster is home to CMTI, a technical institution that is highly regarded in terms of its technical capabilities and expertise in the machine tool industry. It has undoubtedly played a very important role in the growth and development of the cluster. Together with HMT, it can be regarded as the fountainhead or gene bank from which a large number of enterprises have emerged in the machine tool industry, both within the cluster as well as in other parts of the country. A brief profile follows. A more detailed profile appears in Annexure 5A.

Brief Profile of the Central Manufacturing Technology Institute (CMTI)

Origin

CMTI (originally known as the Central Machine Tool Institute) was established in 1962 by the government of India to cater to the needs of the growing network of the machine tool industry both in the public and private sectors. Its role was to function as an industry-oriented research and development organisation. The formal activities of the organisation were commissioned in 1965 with technical assistance from Czechoslovakia.

Governance

It is an autonomous body registered as a society. It is governed by a council whose members are drawn from government bodies, machine tool manufacturing and user industries from the public and private sectors.

Infrastructure

It has a staff strength of 390 of which 121 are Engineers and Scientists.

It has a wide range of equipment and facilities for design, research, prototype manufacture, precision engineering and measurement, testing, inspection and calibration, CAD/CAM/CIM, training and technical information.

Main Objectives

To render technical assistance to machine tool and other engineering industries in the areas of:

- Design, development and standardisation in the areas of machine tools, attachments/accessories and control systems
- Research and investigation in manufacturing technology
- Prototype testing and evaluation
- TQM services

- Development of tools and tooling
- CNC/CAD/CAM/FMS/CIM
- Robotics
- Software
- Precision engineering, measurement and calibration
- Technical services
- Training

Advanced Machining Centre

A Computer Integrated Manufacturing (CIM) project has been implemented with UNDP assistance with an outlay of US\$ 2.513 million from UNDP and Rs. 10.35 million from the government of India. The main aim of the project is to establish a CIM centre with production quality machines and systems. The facility provides hands on experience to CMTI engineers, demonstration of various CIM concepts to industry and a means of testing industry proposed products in a prototype CIM environment.

A CIM system comprising 2 Horizontal Machining Centres, 13 pallet flat FMS (Flexible Machining Systems) with pallet shuttle, one Turn Mill centre and other associated hardware and software supplied by Yamazaki Mazak of Japan has been installed and is in operation. UNIDO is also supporting this project and has assisted in CMTI engineers receiving overseas training.

Utilisation of CMTI's Services by the Machine Tool Industry

According to senior spokespersons of CMTI, the shift in focus away from the machine tool industry has been a gradual one between 1986 to 1993. Since 1993, its revenues from the machine tool manufacturers have been low. Currently, there is greater pressure on the organisation to be self-sustaining than ever before.

Revenues and Profile of Customers

It has about 816 unique customers that have used their services at one time or another since inception. Each year approximately 350 regular customers utilise their services.

In 1998-99, its earnings for services rendered were just under Rs. 60 million (Rs. 59.5 million). Of this, design and development accounted for 42%, Services (including Consultancy) for 54% with the balance being accounted for by Miscellaneous activities.

Currently, the proportion of its earnings from the machine tools industry is less than 5% of its total income.

Training Institutions

The major training institutions in the cluster catering to the machine tool industry are Nettur Technical Training Foundation (NTTF), Government Toolroom and Training Centre (GTTC) and Apex/Foreman Training Institute. These 3 are regarded as the best in the cluster, in the order of their importance. Other than these, 1 MTM which is also an auto component manufacturer has its own Training centre, which is also highly reputed in terms of the quality of training. There are also a large number of Industrial Training Institutes (ITIs), which are not in the same league as the other institutions mentioned and also appear to have out-dated technology and curricula. Brief profiles of each of the 3 training institutions follow. Detailed profiles of these institutions appear in Annexure 5B.

NETTUR TECHNICAL TRAINING FOUNDATION

NTTF today comprises a group of organisations engaged in training, manufacturing and consultancy services. The Bangalore chapter of Tool and Die Making was established in 1982. NTTF has also set up a training institute for Electronics and Telecommunications in Bangalore. To support the institute financially, an associate company, NTTF Industries was set up. NTTF Industries mainly caters to companies in the automobile sector such as Maruti Udyog Ltd., Mahindra & Mahindra Ltd., TELCO, FIAT UNO, General Motors India Ltd. and LML Ltd.

The institute was offered a soft loan of about Rs. 50 Million from ICICI Ltd., about 2 years ago towards upgrading/additional infrastructure. Other than this, the institute gets some support, both technical and financial, from companies and Government bodies in and outside the country.

The institute has a staff strength of about 25 in each of the centres. NTTF has received ISO 9001 certification in the year 1998.

As part of training imparted to faculty members and to keep pace with the changing needs of the industry, they participate in training programmes conducted by some of the Machine Tool Manufacturers. In this regard, they have participated in short term fee-based technical training programmes conducted by 1 MTM. Besides this, some candidates have obtained training in some MTMs for 6 months in the year 1998-99.

FOREMAN TRAINING INSTITUTE (APEX)

Also known as APEX, the Foreman Training Institute (FTI), Bangalore, was established in 1969 under the Director General of Employment and Training (D.G.E &T), Ministry of Labour. Training courses were introduced in 1971. The institute used to have an affiliation when it started with the State of Baden - Wurttemberg, Germany. The affiliation was primarily:

- To provide training to faculty members; and
- To provide machinery and equipment to facilitate training.

Currently, the institute is no longer affiliated to the German state since the agreed tenure of the affiliation is complete.

Against sanctioned faculty strength of 30, the institution has 20 faculty members at present. Reportedly, FTI has found it difficult to recruit additional faculty due to procedural delays and cumbersome procedures of the Ministry of Labour. Besides the permanent faculty, the institute attracts visiting faculty from various industries, predominantly from the Large and Medium sectors.

Some of the industry segments that have availed of these courses include automobile manufacturers, automobile component manufacturers, machine tool manufacturers, heavy engineering, oil & natural gas, defence, electrical & electronics, garments etc.

It has a very impressive list of companies that have availed of these courses from the private and public sectors. From the machine tool industry, the Ace Group has availed of their services.

GOVERNMENT TOOL ROOM & TRAINING CENTRE (GTTC)

The Government Tool Room & Training Centre (GT & TC), Bangalore, was set up with assistance from the Govt. of Denmark under the Bilateral Development Co-operation Agreement. In this project 6 Tool Rooms were set up, 1 each at:-

- Jamshedpur (Bihar);
- Bhubaneshwar (Orissa);
- Delhi;
- Calcutta (West Bengal);
- Mysore (Karnataka); and
- Bangalore (Karnataka).

The Bangalore centre was established in 1972 and has 2 wings, namely,

- the **Service Centre**, which undertakes Tooling assignments on turnkey basis for complete product lines. It has about 85 customers from the Automobile/Automobile component, Defence, Pharmaceutical, Telecom, Consumer Durable, Heavy Engineering and Machine Tool sectors. In the Machine Tool industry, they have executed projects for HMT, Lakshmi Machine Works and MICO.
- the **Training Centre**, which offers various courses in Tool & Die Making, Tool Engineering and Tool Design.

Besides the regular and short term courses, GT&TC conducts various need-based training programmes for industry specific requirements. Some of the companies/institutions that have used their services in this regard are BHEL, BEL, ITC, CITD, Foreman Training Institute.

GT & TC has an overall staff strength of 150 across all the centres. In Bangalore the strength is 50.

4.1.7. Regulatory Bodies and Policy Makers

It may seem un-necessary to mention these entities given that they are generally present in all clusters. However, it is worth listing some of them since it will serve as a perspective for the reader. An understanding of the type of entities in these categories may also provide cues for the reader to infer the impact on the cluster of aspects such as land issues, policy aspects and so on.

The major organisations in this group include:-

- Office of the Commissioner of Industries
- The Department of Industries and Commerce
- Karnataka Industrial Areas Development Board (KIADB)
- Karnataka State Small Industries Development Corporation (KSSIDC)
- Karnataka State Industrial & Investment Development Corporation (KSIIDC).

4.2 THE INDUSTRIAL POLICY OF THE STATE GOVERNMENT & ROLES OF MAJOR REGULATORY ORGANISATIONS

4.2.1. Major Thrust of the Industrial Policy of the State

Given the scale of industrial investments attracted by the state in the post liberalisation years between 1991 and 1996, the government of Karnataka announced a revised and comprehensive New Industrial Policy-1996 with effect from April 1996. The main thrust of the new policy so far as the machine tool industry is concerned is as follows:-

1. Promotion of industries in backward areas to encourage de-centralisation; 5-6 areas were identified by the state as high tech areas, requiring focused support. These are Electronics, I.T. and Software, Garments, Bio-technology and Machine Tools.
2. Priority is given to these industries both in and out of Bangalore vis-a-vis infrastructure support - land, water, power etc.. In this context, since the late 1980s, the government is trying to promote de-centralisation of industries i.e. actively discouraging most new industries from locating in Bangalore and encouraging them to locate in other parts of the state. However, for the 6 industries that have been identified as thrust areas, an exception is made by the government, allowing these types of units to locate in and around Bangalore.
3. Indirect support has also been provided to these industries by the state attracting investment in these areas. For the machine tool industry, the government has encouraged investment in automotive industry (Volvo, Toyota, Telco and TVS) and heavy engineering industries.
4. Special incentives (subsidies and sales tax exemption) were offered to SSIs in the machine tool industry and were available till March, 1999. These have been withdrawn (due to changes in national policy) now and are available only for the "Tiny" sector;
5. International Machine tool companies such as Makino Corporation of Japan were invited by the government to set up machining centres in the state.
6. A grant (to the extent of Rs. 75,000) by way of support is given to machine tool companies for ISO 9000 certification.
7. KCTU (Karnataka Council for Technology Upgradation) organises seminars for firms in the favoured sectors on Quality, WTO, Technology issues etc.
8. VITC (Vishweshwara Industrial Trade Centre) makes available data relating to world trade and market data.
9. There is provision for some quantum of funds to be given to the machine tool associations for arranging seminars etc.

.4.2.2 Role of the KIADB – In brief

It is a land development authority whose role is to acquire land and form Industrial Areas providing all infrastructural facilities such as roads, water and power. They do not have any focus or incentives for any particular industry.

4.2.3 Role of the KSSIDC – In brief

To provide basic infrastructural facilities to the small scale industries in the state.

Its services include allotting industrial sheds, developing industrial estates for SSIs, assistance in sourcing raw material, technology transfer, construction, management guidance, library facilities.

It has no specific focus on the machine tool industry but it has been giving a thrust, as part of the states industrial policy, to Electronics and Garments industries.

4.3. PROVIDERS OF FINANCE

There is a wide assortment of entities, both from the formal and non-formal sectors, that come into play vis-a-vis sources of finance for the core enterprises in the Bangalore machine tool cluster.

Among the formal institutions, the major entities are SIDBI, Exim Bank, KSIIDC, IDBI, KSFC, Canara Bank - the lead bank for Bangalore urban district, another 128 bank branches under the lead bank system for the district, and other Nationalised Banks. Brief profiles of some of the major formal institutions follow.

Brief Profile of the Small Industries Development Bank of India (SIDBI)

Role & Activities

The major role of the Small Industries Development Bank of India (SIDBI) encompasses the following

- Providing re-finance to SSIs through a network of commercial banks and primary lending institutions (PLIs) - (at an interest rate of 9% per annum for loans of less than Rs. 200,000 and at an interest rate of 10.5% per annum for loans of more than Rs. 200,000. Banks and PLIs are expected to charge an additional 3% by way of interest for loans of less than Rs. 200,000 and have the discretion to charge any additional amount by way of interest for loans in excess of Rs. 200,000).
- Direct Financing to SSIs if loan amount exceeds Rs. 15 million - for this, interest at the rate of 15% to 16.5% per annum is charged. Direct finance has been undertaken by SIDBI since 1993-94. To date 15 units in Bangalore across all industry sectors have been provided such finance. None of these are MTMs. 1 unit is a firm in Bangalore that is a supplier of electrical motors to MTMs. According to SIDBI, the unit is not doing well at present.
- Bill Discounting - done through commercial banks and PLIs for amounts of less than Rs. 100,000; and directly by the bank for amounts upwards of Rs. 100,000.
- Providing Working Capital loans under Single Window Schemes or as Term Loans and Working Capital Finance. It also provides direct short-term working capital loans.
- Promotion & Development (P&D) of SSI Units - this is done by providing assistance via training programmes in enterprise promotion, training, assistance in technology up-gradation, quality and environment management, market promotion. SIDBI claims that it has not yet taken up all these activities in a concerted manner as yet in Karnataka.
- Providing forex loans on a Term Loan basis to SSIs for procuring equipment and machinery - the rates of interest for such loans is at LIBOR + 3% per annum for US dollar loans and LIBOR + 2.5% per annum for Deutsche Mark loans. Forex loans are also provided for Working capital to Export Oriented SSI units to purchase raw materials, equipment and machinery at an interest rate of LIBOR + 1.5% per annum for US dollar loans.
- Other than these, SIDBI is also providing Peenya Industries Association (PIA) with a loan for construction of the Trade Centre (which will also have a complex for displaying the products manufactured by SSIs). It also subsidises the cost of internet access and presence to the extent of Rs. 3000 per connection to SSIs and to the extent of Rs. 30,000 for development of websites.
- SIDBI has also started Micro Credit groups for SSIs in select clusters of the country.

Focus & Thrust

Reportedly, SIDBI has never had any thrust or focus on the machine tool industry and does not have any such thrust at present.

Perceptions regarding the Machine Tool industry

According to spokespersons of SIDBI, one of the reasons for the current plight of the industry, per se, and of SSIs from the machine tool industry in particular, is the very origin, concept or basis upon which the SSIs in the industry came into existence. They indicate that SSI units in this industry were established with the concept of a "Mother Unit" and ancillary units revolving around these mother units. In such a situation, the health of the ancillary units depends solely on the health of the mother units. Over-dependence on 1 customer (the mother units) for SSIs is very bad for overall growth of the ancillary units.

Other reasons constraining growth of SSIs in this industry, according to SIDBI, are:-

- 1) that these units have not upgraded quality and technology adequately and not rapidly enough.
- 2) they are experiencing unprecedented competition - both from imports as well as within the domestic market. Most of the units are very poorly equipped to cope with this situation. Competition is also expected to intensify which will worsen the situation for SSIs in the industry.

Brief Profile of the Export Import Bank of India (EXIM BANK)

Role & Activities

Established in 1982, Exim Bank is the principal financial institution in the country for co-ordinating working of institutions engaged in financing exports and imports. The main role of the bank can be split into 3 broad categories. These are:-

1. Providing Finance/Export Finance - It finances export of Indian machinery, manufactured goods, consultancy and technology services. Finance is also available at export production stages. It undertakes co-financing with global and regional development agencies. It assists Indian exporters in their efforts to participate in such overseas projects;
2. Providing a wide gamut of Information & Advisory Services - to enable exporters to evaluate international risks, export opportunities and competitiveness. Its services include undertaking Country studies, merchant banking services, advice on international marketing, providing data to enable participation in opportunities offered by projects funded by multi-lateral institutions, search for overseas partners, identification of technical suppliers, negotiating an alliance and consummating Joint Ventures (JVs);
3. Dissemination of Information (obtained via research and analysis) on specific sub-sectors with export potential and on international trade-related subjects - the bank undertakes several studies on an ongoing basis and disseminates such information among exporters, academicians, industry and trade organisations and the government.

The bank also offers a grant (to the extent of 50% of the cost) to companies that wish to participate in international trade fairs and exhibitions.

Focus & Thrust

Based on their own assessment, the most attractive industry sectors at present by way of export potential are Software, Pharmaceuticals, Agro-based products, Textiles and Services (Hotels, Tourism etc.).

Reportedly, the bank has no particular focus or thrust on the machine tool industry. However, it appears that EXIM bank has participated in a recent machine tool industry CEOs Vision meeting in 1999.

Utilisation of its services by the Machine Tool Industry

Very few companies from the machine tool industry in Bangalore seem to have availed of the bank's services and assistance in recent years. A few MTMs have availed of a grant more than 5 years ago to participate in international trade fairs.

Brief Profile of the Karnataka State Industrial Investment Co-operation (KSIIDC)

Role & Activities

Established in 1964, KSIIDC came into existence with the objective of promoting industrial growth in the state, especially in medium and large sectors.

The major role of the KSIIDC encompasses the following:-

- Identifying industrial opportunities;
- Providing guidance and advice to prospective entrepreneurs;
- Extending financial assistance;
- Providing assistance in securing Single Window Clearances for land, power, water etc.

Focus & Thrust

They do not have any focus or thrust on the machine tool industry. At present, such units tend to get clubbed under the "Auto Ancillaries" category.

Utilisation of its services by the Machine Tool Industry

To date, they have provided finance to approximately 900 units. Of these, about 7 or 8 units are from the machine tool industry including units manufacturing tools and dies, forgings etc. Of these 7 to 8 units, 2 are reported to be floundering with 1 on the verge of closure. Reportedly, no unit from the machine tool industry has been funded in the last 5 years.

Brief Profile of the Lead bank for Bangalore Urban District – Canara Bank

Role and Coverage

Bangalore urban district comprises Anekal, Yelahanka and Bangalore South taluks. The lead bank is the pivotal and co-ordinating bank for the fixing of targets, sharing of information and monitoring for all the bank branches come under the lead bank system. As seen earlier, there are 128 bank branches that come under the lead bank system in the district.

The annual credit plan is drawn up along with the constituent bank branches to ensure the implementation of various government sponsored schemes.

Utilisation of its services by the Machine Tool Industry

According to the lead bank, since there is no specific unique category for units in the machine tool industry, they are not in a position to indicate the number of units or extent of finance availed by such units. At present, such units are clubbed with all other SSIs. In order to obtain this information, one will need to collate this at the level of each constituent bank branch and at the office of the DIC (District Industries Centre).

Perceptions regarding the Machine Tool industry

According to spokespersons of the lead bank, the machine tool industry is in the throes of a crisis at present, due to lack of initiative. The SSI units are excessively dependent on medium and large-scale units. At present, these units themselves are in bad shape due to lack of orders and recession. The automobile industry is the major consumer of machine tools and is going through a recession.

In the lead bank's opinion, the machine tool industry is the backbone of all engineering industries and therefore must be supported by the government.

Since the latter half of 1999, the economy is showing signs of a revival. Thus, over the next 3-5 years, the fortunes of the machine tool industry also should start looking up.

Brief Profile of the Industrial Development Bank of India (IDBI)

Role & Activities

IDBI focuses only on medium and large-scale industries. It provides direct finance to such units amounting to upwards of Rs. 100 million. It also provides indirect financing via refinance to such industries. The bank also conducts sector and industry specific studies. However, such studies are carried out primarily at their head office in Mumbai.

Focus & Thrust

It has no specific focus or thrust on any particular sectors or industries.

Utilisation of its services by the Machine Tool Industry

In the last 5 years, the bank has not provided finance to a single company from the machine tool industry in Bangalore. It claims that, at present, there are no applications pending either from such units. However, during this period, it has provided finance to a gear box manufacturer.

Perceptions regarding the Machine Tool industry

According to spokespersons of IDBI, since the industry is the mother industry to all engineering industries, it must be supported in some form by the government. However, the units in the industry must also take the initiative to keep pace with the changing market and competitive environment. They need to constantly upgrade capabilities in technology, quality, delivery and cost competitiveness. Unless this is done, it is very difficult for any entity to support the industry for long. Most Indian companies have not been able to adapt to changing conditions.

The machine tool industry is a volume game in which the Indian companies may find that it is too late to join the game and be effective players. If Indian companies can gear up and step up exports in the next 3-5 years, then there is hope for the industry and the units in the industry will be able to thrive and flourish.

Non Formal Sources of Finance

There appears to be a wide assortment of sources of Non-Formal Finance (encompassing Relatives, friends, Private Finance Companies, registered Chit Funds, Unregistered Chit Funds, Individual Money Lenders, Pawn Brokers etc.) predominantly catering to the needs of small MTMs, and medium and small Suppliers and Vendor firms. These sources score over their formal counterparts primarily due to their being far more flexible and adaptive than the formal institutions which are perceived to be rigid, inflexible, slow and bureaucratic.

4.4. PROVIDERS OF OTHER SUPPORT SERVICES

The Indian Machine Tool Manufacturers Association (IMTMA)

The IMTMA is one of the oldest industry associations in the organised sector, established over 50 years ago. It is one of the most active industry associations in the country. It has a membership of over 350 companies across the country manufacturing a wide range of machines, tools, accessories and other ancillary equipment.

In Bangalore it has 42 members. The bulk of these comprise Suppliers (27). It is headquartered in Delhi and has a registered office in Mumbai. It has a regional office in Bangalore and representative offices at Pune and Rajkot.

The main focus of the association encompasses:

- Improving the image and brand equity of the industry
- Promoting quality management within the industry
- Bringing the industry closer to customers
- Promoting the need to improve technology standards
- Supporting companies develop strategies for the future
- Disseminating information required by the industry
- Disseminating information about the achievements of the industry
- Fostering international linkages and bringing about healthy alliances for mutual growth
- Promoting the concept of "Buy more- make less"- vendor development
- Keeping the industry informed about the developments within the industry and the programmes of the user sectors
- Promoting the capabilities of the industry through exhibitions, seminars and workshops on a wide variety of issues.

It convenes programs for end-user industries, machine tool manufacturers and for suppliers and vendors to the industry. For instance, in the last one year, it has convened programs relating to machine tool hydraulics, new generation cutting tools, calibration of dimensional measuring equipment and gauges, CE marking besides others. Until 2 years ago, most of its programmes seem to have been tailored to the needs of end-use industries, large and medium MTMs and large suppliers. Since the last 2 years, the association has begun to convene programmes for smaller firms among suppliers and vendors. For instance, in the last one year, IMTMA has held interaction meetings with suppliers of Panel Acs and Chip Conveyors.

Other Enterprise Associations

There are 2 large associations in the cluster, 1 of which (KASSIA) is an umbrella organisation for many small scale associations. The other is Peenya Industries Association (PIA). In both these associations, there is such a diversity of industries across various sectors, that they do not have a ready figure available with them relating to the number of firms that are members in these associations from the machine tool industry. Neither KASSIA nor PIA has any specific programmes or activities specifically for the machine tool industry. One clear indication of this is the fact that both the associations are unable to provide an accurate estimate of the number of member firms from the machine tool industry.

Other than these, there are several small associations within various private industrial estates. None of these are focused on the machine tool industry or have separate programmes and activities for the industry.

A detailed profile of the 2 large associations appears in Annexures 6B and 6C.

4.5 AN UNDERSTANDING OF THE LINKAGES & INTER-RELATIONS BETWEEN VARIOUS STAKE-HOLDERS IN THE CLUSTER

An understanding of the linkages between various entities within a cluster offers a basis for assessing the intrinsic strengths, dynamism and vitality of the cluster. Given the diversity of firms even within an entity type or category, it is extremely difficult to generalise the nature of these linkages, based on our sample coverage for this study. However, for the purposes of lucidity, and at the risk of over simplification, it has been attempted to describe the linkages between major entities in an overall fashion, for each entity and their relationships with various stakeholders. Wherever there are exceptions or unique linkages, mention has been made of such distinctive linkages.

1. Relationships between MTMs and other entities in the Cluster

It is meaningful to begin with the linkages between the key entities or stakeholders in the cluster. These comprise core enterprises comprising MTMs, Suppliers and Vendors/Sub-Contractors and their linkages with major supporting entities in the cluster. This sub-section begins with the relationships between MTMs and other entities in the cluster.

a. MTMs and Suppliers, Vendors/Sub-Contractors

- Most MTMs have a large number of Suppliers and Vendors/Sub-Contractors. This by itself is an indication of the relationship between these entities and the mind set among MTMs, although most MTMs are trying to change this situation. It appears that, until recently, the mentality of most MTMs seems to have been governed by the need to have at least 2 or more suppliers and vendors/sub-contractors in each category. This was done to “keep the supplier and vendor firms on their toes” by way of costs, to reduce dependence on 1 source and to ensure assured supply. At present, most MTMs are making concerted efforts to reduce the number of Suppliers and lament the lack of suppliers of sub-assemblies.
- Most MTMs complain that they are a long way from having an ideal number of top class Suppliers who can deliver at least 95 % of the time on aspects such as Right First Time, Just in Time, Adherence to delivery Schedules, Consistent Quality etc.
- The existing relationships between MTMs and Suppliers and Vendors do not appear to be strong. This is manifested in having multiple suppliers for a given product, a lack of trust in MTMs among Suppliers including among some with long standing relationships (10 + years, for instance) and a lack of open-ness. In this regard, some such Suppliers indicate that they are often exploited by MTMs who play one against the other.
- By and large, the relationship between MTMs and their Suppliers and Vendors appears to be paternalistic and sometimes high handed.

- There is no sharing of vision, goals and even short-term plans by most MTMs. (In this context, 1 large MTM indicated that they have not done anything of this kind formally since almost 4 years. Prior to this, they used to have an annual meeting with their Suppliers).
- All MTMs have a Vendor Rating System in place. However, most do not have a Vendor Policy. The term “Vendor Policy” is meant to denote a comprehensive policy that is documented and endorsed by the top management of the company. Such a policy ideally enshrines and epitomises a firm’s values, ethos, attitudes and practices towards Suppliers and Vendors. These issues encompass aspects such as fair dealings, payment deadlines, specific support measures that the firm will adopt for good Suppliers and Vendors etc.
- While MTMs claim to be supportive (in terms of assistance in upgrading quality, technology etc.) to their Suppliers and Vendors, this appears to be the exception rather than the rule or is being very selectively done, at present.
- On account of the slow down in the automotive industry, the major end-use segment for the machine tool industry, MTMs have been badly affected in the last 2 years. Thus, during this period, many MTMs have not been able to make payments to their Suppliers and Vendors in time.
- Most MTMs seem to lack a detailed (grass-root level) understanding of their Suppliers in terms of how their enterprises function, their profitability, the problems faced, the inadequacy of working capital etc.
- 1 MTM (which was not contacted but about whose practices it was possible to get some information on from their Suppliers and Vendors) does appear to be doing things quite differently from most other MTMs. In fact, for the record, this company is a very well run firm and is a market leader in its field. It has done well even during the last 2 years by reducing costs and registering higher growth than the industry. This firm’s linkages with its Suppliers and Vendors seem to be characterised by:
 - Considerable open-ness and trust
 - Fair dealings
 - Respect and sensitivity for the Suppliers
 - Sharing of vision and goals
 - Communicating their forecasted requirements for the next 3 months
 - Discouraging Suppliers from doing work for others (keeping in mind its ability to provide regular work to the Supplier)
 - Unstinting and whole-hearted Support in the form of technical inputs, assistance in upgrading technology and quality, regular orders, advanced training programmes for their key technical personnel and even training programmes for the proprietors/CEOs of small firms in entrepreneurship, financial management, cost management etc.
- Another MTM (which is a Success Story given the rapid progress it has made in a relatively short period) also tends to stand apart from the other MTMs for its:-
 - fair dealings and clean image

- whole-hearted support to its Suppliers (wherein 1 such claims that, thanks to the support and patronage of the MTM, it has become the only player in India with the technology to manufacture ceramic paint indigenously). This MTM has also encouraged and supported (in various ways) several new firms to come up
- conscious efforts to upgrade the quality and technology of its suppliers.
- A third MTM that stands apart from the others appears to be a very impressive firm. It is classified in the Medium and Large category by virtue of its turnover but is considerably smaller than most of the other MTMs in this category. This MTM is unique in several respects. In the context of what is being discussed, this MTM has close relationships and strong linkages with some of its key Suppliers. It has sent the technical staff of the Supplier company (which supplies Electrical and Electronic components) to Germany at their expense. However, this MTM admits that it is still grappling with the task of narrowing down its Suppliers and Vendors to a small number of high quality firms. Over the last 2 years, it has been experimenting with various firms in an attempt to identify and short-list a set of key, high quality and reliable suppliers.

b. **MTMs and Customers**

- Most MTMs seem to be production-oriented rather than solutions or market-driven. They also appear to be somewhat insular and not closely in tune with customer needs. All this is changing now out of necessity and a rapidly changing competitive environment.
- MTMs claim that many customers seem enamoured of “foreign” technology and tend to look down on indigenous technology. Hence they (MTMs) end up catering primarily to the needs of Auto component and ancillary manufacturers rather than Automotive manufacturers themselves.
- Most MTMs admit that they do not have a formal mechanism for eliciting, monitoring and tracking feedback from customers. By and large, they depend on their sales infrastructure to capture feedback and complaints from customers.
- 1 MTM (the one that was not contacted in this study) seems to be an exception on this count. It is truly market-focused and market-driven, going by its impressive performance (higher than industry growth in sales and profits) even during the last 2 years.
- 1 MTM appears to be more sales and marketing oriented than the others. It also happens to be India’s largest manufacturer and exporter of CNC machines. It was among the first MTMs to open a marketing office and a wholly owned subsidiary in the U.S.A. to cater to the export market.
- 1 MTM supplies dedicated SPMs /machining lines directly to some automotive manufacturers. This needs to be underscored since other MTMs are catering to Tier 1 Suppliers of the automotive manufacturers such as auto component manufacturers, primarily.
- 1 relatively small MTM uses technology (via its foreign collaborator) as an edge to gain access to customers and (as can be seen later in this section) even influences the technology of the customer, some of whom are automotive manufacturers themselves.

- Another aspect, which is very significant and a measure of the kind of bond/commitment between MTM and Supplier, is the instance of a small MTM, which has been encouraged and motivated to set up shop by a customer from the automotive component industry. What is more the customer took a stake in the company at inception and continues to have a stake almost 9 years later.

c. **MTMs and Technical Institutions**

There appears to be a yawning perception gap vis-a-vis how CMTI is viewed by MTMs. This obviously has a bearing on the nature and extent of utilisation of CMTI's services by MTMs. What is meant by a "Perception Gap"? By this, it is meant that it is odd that within the same industry (and so few players), there should be so much divergence of opinion about CMTI and its perceived utility and effectiveness.

The MTMs can be classified into 2 groups based on their perceptions of CMTI. One group views CMTI poorly. The other group is more upbeat about CMTI.

The first group of MTMs (that views CMTI unfavourably) believes that:-

- it is performing sub-optimally.
- it has good facilities and technical staff but is not commercially oriented, is not professional (in terms of deadlines) and offers its services at very high prices.
- it is not able to cater to the needs of small firms because of its high prices.
- it could have done much more for the machine tool industry by way of technological developments and upgrading technology all these years.
- it is living in a dream world.
- it is very bureaucratic and run like a government organisation.
- it is not as useful to the machine tool industry as it used to be ever since it has shifted its focus away from the industry.

Most of these firms use CMTI's facilities to a very limited extent, for testing and calibration purposes primarily. 1 MTM in this group uses the services of the institution for product development and has an ongoing project sponsored by them.

The second group of MTMs (that views CMTI in a more positive light) believes that CMTI:

- is a very sound and technically top class organisation.
- has very good facilities and high calibre technical staff.
- has the best testing facilities in the city and provides the most accurate, unbiased and credible test results, despite their prices being high.
- is an excellent source of technical information.
- is not utilised extensively (as much as it should be) by firms from the machine tool industry.

That is not the fault of CMTI. It is the fault of the MTMs and Supplier/Vendor firms.

Most of these firms use the facilities of CMTI at least 3 times a year or more often for multiple purposes.

d. **MTMs and Private / Other Testing Labs**

Most of the medium and large MTMs do not use the services of Private laboratories and a Kassia-run testing laboratory. Some MTMs have in-house testing facilities. Among the few small

MTMs that do use the services of commercial testing laboratories, they use the services of private testing laboratories in and around Peenya, predominantly.

e. MTMs and Training Institutions

Most MTMs seem to have very little formal interaction with the major training institutions in the city.

Despite the lack of formal interaction with the training institutions, most of the medium and large MTMs absorb candidates of the 3 premier institutions - NTTF, GTTC and Apex, in that order. The last named is also known as the Foreman Training Institute (FTI) and several MTMs send their technical shop floor staff here for training.

All MTMs also have in-house, on the job training programmes.

1 MTM has its own Vocational Training School that serves as a captive source for its workforce. It claims that its trainees are sought after by MTMs and end-user industries. (This has been cross-checked informally and found to be true, by and large).

f. MTMs and Industry Associations

MTMs can be split into 2 distinct groups in terms of how they perceive IMTMA and the extent to which they perceive its utility to themselves.

Group 1 - Positively Disposed (4 MTMs)

It is very good, very active, has a lot of programmes.

IMTEX is an ideal opportunity to showcase their products, capabilities, get leads, win customers, make contacts.

It is a source of useful information about the industry and major end-use industries.

It lobbies for the cause of the machine tool industry (to the best of its ability) as and when issues need to be raised with Policy makers.

It deserves credit for playing a facilitating and catalytic role for conceptualising and creating the Vishwaroop project, a unique project for bringing together MTMs.

It is able to attract the services of top notch professionals and technical people with vast experience from the machine tool industry to assist them in their efforts.

All the MTMs in this group are active in most of IMTMA's programmes and participate in IMTEX.

Among this group, two need gaps were expressed.

- IMTMA can do much more than what they are doing now. For instance, it would be extremely useful if they could give MTMs forecasts for the next 1 year of the performance of major end-use industries. This will help immensely since MTMs are unable to forecast accurately at present. Currently, they provide a lot of data relating to statistics for the machine tool industry and trends for the past 6 months to 1 year for major end-use sectors.

- They need to lobby with the government for support to be given to the industry since machine tools is the mother industry. The kind of support required from the government is along the lines provided by the government in Taiwan.

Group 2 - Negatively Disposed (Mainly Small MTMs)

Among this group, IMTMA is perceived as an organisation that caters mainly to the needs of large MTMs. It is felt that IMTMA is not sensitive to the needs of smaller MTMs.

Most of the MTMs in this group are not very active in IMTMA's programmes. However all claim to participate in IMTEX and acknowledge the utility of the exhibition.

Karnataka Small Scale Industries Association (KASSIA), Peenya Industries Association (PIA)

There is very little interaction between MTMs and these associations. One needs to bear in mind that KASSIA is an umbrella body for associations all over the state and has members drawn from all types of industries. Similarly, PIA is an association with members drawn from a wide assortment of industries in Peenya.

g. MTMs and Providers of Finance - Formal

Most MTMs did not pointedly choose to talk at length about finance-related issues during this study. Strangely, most MTMs also did not indicate that they are facing any severe problems with respect to access to finance. However, without a doubt, many MTMs have been affected by the slow down in the economy and the low off-take from the major machine tool consuming sectors. In fact, a few MTMs seem to have been very badly affected by the current situation. This tends to get reflected and manifested in the feedback obtained from Supplier and vendor firms.

Barring the very large MTMs, most others seem to be banking with banks with which they have a long relationship. One is not sure if this is due to a strong bond between the 2 or a case of "known devil is better than unknown devil". This assumes added relevance in the context of most banks being slow, bureaucratic and extremely cautious and of the need for forging a relationship with a bank over time. Most of these banks are nationalised banks. The bulk of their working capital needs are met by these banks in the form of overdrafts, cash credit, bill discounting and bank guarantees.

Some MTMs indicate that the playing field is not level since their international counterparts have access to much cheaper funds.

h. Inter Firm Relations - MTMs and MTMs

It appears that over the years, among medium and large MTMs, there is some inter-relations between firms. However, in most instances, they have had some sporadic business relationship with other MTMs, wherein each MTM was supplied with a component of the other from their in-house or captive facilities. Apparently, this has been going on for several years. This is one indication of sharing/ co-operation of some kind between MTMs. Other than this, senior executives of these MTMs meet with senior executives of other MTMs at IMTMA programmes and IMTEX..

Since 1998, a project epitomising an era of unprecedented sharing and co-operation between MTMs has come into being heralding a new beginning for the Indian machine tool industry, as a whole, and for the Bangalore machine tool cluster in particular. IMTMA has played a pivotal and

catalytic role to make this project come into being. Known as “Vishwaroop”, it is a project wherein 4 MTMs (including 1 very large MTM) have come together to collectively focus efforts on pushing up exports of machine tools from India. One of the goals of the project is to step up exports from 5% of production to 35% within the next 5 years. This is one concrete instance of 4 competing MTMs attempting to cast aside their differences, share know-how, technology and even capacities and pull together in order to make India a significant player in world exports of machine tools.

The goals of the project are: -

1. To make India among the top 10 producers of machine tools by 2005.
2. To export 35% of the value of its production of machine tools by 2005.

The major milestones to date of the project are the signing of a Memorandum of Understanding (M.O.U.) between these 4 companies and a personal commitment of support to the project made by the CEOs of each company.

Two facilitators have been appointed for this project, both senior and respected individuals from the machine tool industry.

In terms of specific activities undertaken thus far, a market survey has been undertaken abroad and efforts to create a common sales and service infrastructure overseas are underway. With respect to sharing of technology between these MTMs, there appears to be some sharing of technical information between MTMs taking place. Other than this, a lot of effort has gone in to develop Vendors via Meetings/Workshops with Suppliers and Vendors.

Production will, ideally, be optimised among MTMs. At present, the effort with respect to capacity sharing is low-key due to the adverse market conditions. One of the members of Vishwaroop (a very large MTM) has appointed a “Single window” person at the G. M. level to co-ordinate with the other project members.

Perhaps the biggest achievement thus far of this project is having been able to change the mind sets of the 4 firms. It is a step in the right direction.

2. Relationship between Supplier Firms & Other Entities in the Cluster

a. Suppliers and MTMs

- It must be noted that among Supplier firms, especially in the categories of Controls for CNC machines and Hydraulics and Pneumatics, most of the players are medium and large firms, with a major stake owned by international companies. Many of these firms have sophisticated plants and in-house testing facilities. Some of these firms are almost as large (in terms of turnover) as the MTMs themselves.

Therefore, the linkages and equations between MTMs and these types of firms are very different from that of MTMs and smaller firms. By and large, the relationships between MTMs and these firms are fairly strong and professional. However, even these firms have been hit by

payment delays by MTMs and the slow down in the automotive sector and the economy, at large, in the last 2 years. Two of the firms (including a medium sized firm with foreign technical and financial collaboration) in this category indicates that they have consciously begun to reduce their dependence on MTMs since 1991, when MTMs used to account for almost 100% of their sales. Today, the dependence is about 80% for one unit and 0% for another firm.

- In all other Supplier categories, the firms are predominantly small and medium units with turnovers ranging from Rs. 3 million to Rs. 70 million. The current degree of dependence on the machine tool industry in each category of these firms is as follows:-

Electricals & Electronics	:	75% to 90%
Coolant systems etc.	:	25% to 50%
Accessories	:	50% to 90%.

- Some of these firms indicate that they too have reduced their dependence on MTMs since the last 2-3 years, as a survival and growth strategy. They also indicate that they will attempt to reduce this further in the next few years.

- The linkages are not strong uniformly among all firms and MTMs. There is evidence of a lack of trust in MTMs and a suspicion that they often play off 1 supplier against another with the sole intention of forcing down prices of suppliers.

- Most of these firms have been very badly hit by the delays in payments over the last 2 years. They also do not appear to have adequate working capital to sustain themselves when cash flows are affected.

- Most of these firms are also affected by the inability of MTMs to communicate in advance their requirements for at least 3 months. In this situation, they find it difficult to plan their finances and production, which in turn affects their profitability. There is also a growing sense of concern and uncertainty about the future.

- It is evident that, if MTMs had been truly supportive to these firms, they would certainly not find themselves in the situation that they are in today.

- A few suppliers stand out for their unflinching loyalty to 1 or 2 MTMs. However, it appears that in such instances, this kind of loyalty stems from reasons such as getting their first break/order, continuous flow of orders, support in upgrading technology and referral to other customers.

b. Suppliers and Customers (Other Than MTMs)

- The linkages between Suppliers and Customers (other than MTMs) seem to be much stronger than it is with MTMs. There seems to be more frequent and closer interaction with customers than with MTMs. For instance, this has helped a Supplier of Panel ACs to introduce many new products and variants.

- Here too, the firms indicate that they have been experiencing a problem in receiving payments, which are delayed beyond the stipulated credit period. Public Sector units (PSUs) are the worst offenders. They have one more grouse against PSUs stating that they are forced to compromise on quality or be out-priced by smaller players since PSUs place orders on the lowest bidder. They believe therefore that PSU customers are not at all concerned about quality.

c. Suppliers and Technical Institutions

Supplier Firms and CMTI

- Most of the Suppliers that were contacted indicate that they have never used the services of CMTI, at any time in the past. They state that they have never felt the need for using their services.
- Two firms that have used the services of CMTI, at some time in the past, have a fund of goodwill for the organisation and hold it in high esteem. They use their services for technical information, technology inputs as well as testing. One of these firms indicates that they have stopped using CMTI for testing since there is a private lab located more conveniently. Coincidentally, both are suppliers of Hydraulic systems.

Supplier Firms and Private / Other Testing Labs

- Only some firms seem to have the need to use the services of Private testing Laboratories.
- One firm that is in the Electrical & Electronics category uses the services of CPRI or ETDC. It is reasonably happy with the quality, accuracy, certification and costs charged for testing by these institutions.
- Suppliers of Coolants Systems and Panel ACs have minimal testing requirements and have in-house facilities.
- Suppliers of Accessories also indicate that there is no need for testing. They are able to get the raw materials that are tested and supplied by their suppliers.
- One Supplier of hydraulics has in-house facilities, while another uses a Private lab, whose services are adequate.

d. Suppliers and Training Institutions

There is minimal interaction between Suppliers and Training Institutions, since they are relevant to only 1 or 2 categories of Suppliers. None of these firms recruit from Training institutions.

e. Suppliers and Finance Providers

- The main sources of funds for working capital are nationalised banks - in the form of overdrafts, cash credit, bill discounting and bank guarantees. While a few among these firms indicate that they are very happy with the support provided by their banks, in most instances they feel that the banks do not understand the problems faced by small units, are slow and bureaucratic, and most rigid and inflexible. A complaint voiced by many firms about nationalised banks is that they ask for too much collateral, often over and above the plant and machinery offered by the firms. To compound matters, this group indicates that their banks have stopped discounting cheques issued by MTMs, especially in the last 1 year.

- Some of these (smaller) Supplier firms claim to have availed of start-up funds when they set up their units from financial institutions such as KSFC.
- It is quite amazing to find that a small section of the units that are doing better than others are able to manage with virtually no external borrowings. It is even more amazing that these units are able to do this despite the slow down and difficult times experienced by small units in the industry in the last 2 years. While part of the reason for this is that they are well run units, another reason is the extent to which the proprietors of such units abhor borrowing from banks.

f. Suppliers and Industry Associations

Suppliers and IMTMA

- Among Suppliers, there is a clear divide once again. The large and medium firms (especially in Controls and Hydraulics) have a more benevolent and favourable view towards IMTMA than their smaller counterparts. Firms in this group (such as firms in the categories of Controls and Hydraulics) are all members of IMTMA and believe that it does a reasonably good job through its programmes, training programmes, information dissemination and lobbying for the cause of the industry.
- Among the smaller firms however, only a few are members. Irrespective of membership, most of the firms share a perception that IMTMA is a body that caters primarily to large organisations and large MTMs. They believe that it is not sensitive to the needs of smaller firms such as themselves. They cite the example of all or most of their programmes being convened at 5 star hotels with the fees for participation being quite high. However, those small firms in this group who are members of IMTMA, set a lot of stock by IMTEX since it is quite literally their window to the outside world and markets, so to speak.

Suppliers and Local Industry Associations – KASSIA, Peenya Industries Association (PIA), Other private industry associations

- Almost all the Suppliers (other than the large firms in the Controls and Hydraulics categories) are members of one or more of these associations. They believe that all the associations, especially, PIA and KASSIA can do much more than what they are doing at present. They indicate that the main beneficial activities that the 2 major associations carry out are the addressing of regulatory issues (what may be termed as “Inspector Raj” issues encompassing labour laws, excise, sales tax, commercial tax etc.) and assistance in obtaining specific benefits (such as subsidies) that SSIs are entitled to.
- Some of the Suppliers are intrigued about the proposed Trade Centre that PIA is setting up but are not sure of what specifically the benefits will be for themselves from the project.
- The Private Industrial Estate Associations seem to be more closely knit than the larger associations, in terms of inter-firm co-operation and sharing. Perhaps this is also a function of the sheer size of the larger associations, which make it difficult to get the kind of bonding that takes place in a small industrial estate.

g. Suppliers and Suppliers/Peers/Competitors

There appears to be very little interaction between Suppliers themselves, by and large, across all categories of suppliers.

There is the odd exception (but these are very few) wherein Suppliers indicate that they help each other when some kind of trouble-shooting is required either for a basic enterprise functioning issue or when a technical bottle-neck is encountered.

3. Vendors Sub-contractors

a. Vendors/Sub-Contractors and MTMs

- Most of the firms in this category are small enterprises. Their linkages with MTMs must be viewed in this context. In terms of turnovers of such firms, they range from :-
 - Rs. 1.5 million to Rs. 25 million in the case of Sheet Metal;
 - Rs. 1.5 million to Rs. 25 million in the case of Machining Components; and
 - Rs. 12.5 million to Rs. 35 million, in the case of Castings.
- By and large, the relationships between MTMs and these firms seem to be stronger than between MTMs and Suppliers. At any rate, this is how the Vendors/Sub-Contractors feel. It appears that in each category, individual firms have developed a strong relationship with 1 MTM, who seem to have singled out these firms as Vendors worth developing. In this context, 3 MTMs (one of which is also a major manufacturer of automotive components) seem to be providing greater degree of support and thereby winning loyalties and commitment from Vendor firms. Support provided by MTMs is generally in the form of regular orders, bulk orders, relatively prompt payment, technical inputs, assistance in upgrading technology etc.
- Here too, the slow down in the automotive sector and the delay in realising payments have taken a severe toll on these firms. In the case of Vendors/Sub-Contractors in the Sheet Metal category, dependence on the MTMs predominantly ranges from 50% to 80%; in the Castings category, dependence on MTMs predominantly ranges from 30% to 60 %; in the Machining Components category, dependence on MTMs predominantly ranges from 10% to 70%. Some firms in all categories have consciously reduced their dependence and are still trying to reduce dependence on MTMs in the future.
- Just as was witnessed in the case of Suppliers, so too with Vendors/Sub-Contractors, it appears that most MTMs are not fully aware of the types of problems that firms such as Vendors/Sub-Contractors face. MTMs do not seem to be fully aware of the enterprise aspects of Vendors/Sub-Contractors and are not able to appreciate what it will entail for these firms to effect economies in production in order to keep reducing costs. Most of these firms seem to make do with very low working capital levels, are thus hit very quickly by payment delays and face considerable harassment from “Inspector Raj” officials. Some firms in this group, especially, Castings manufacturers also face severe problems in procuring good quality raw material at retail prices. All these issues will be discussed in more detail in the following sub-section featuring the dynamics and key business processes of enterprises.
- Some Vendors indicate that PSU customers (MTMs and others) and 1 MTM have been making payments often after 12 months. As a result, many of the firms catering to these

customers have black-listed these customers and have vowed not to take any further orders from them.

b. Vendors/Sub-Contractors and Customers (Other Than MTMs)

- Among this group as well, the linkages between Vendors/Sub-Contractors and Customers (other than MTMs) seem to be much stronger than it is with MTMs. There seems to be more frequent and closer interaction with customers than with MTMs. Reportedly, for Vendor/Sub-Contractor firms, Customers are the main sources of information about technology, markets and design inputs.
- Here too, the firms indicate that they have been experiencing a problem in receiving payments, which are delayed beyond the stipulated credit period. Many firms have sizeable outstandings that are more than 6 months old. They believe that PSU customers are not at all concerned about quality and place orders on the firms that have quoted the lowest prices.

c. Vendors and Technical Institutions

Vendors and CMTI

- Among Vendors in the Sheet Metal category, all but 1 state that they do not use the services of CMTI at present for any purpose. Some indicate that they have used CMTI for testing purposes at some time in the past but found their charges too high, despite the quality and credibility of their certification being high.
- The bulk of the Vendors in all the other categories (Castings and Machining Components) also do not use the services of CMTI at present. A few have used their services at some time in the past but have been deterred by prices that are too high for SSIs.

Vendors and Private/Other Testing Labs

- Only a few firms (in the Sheet Metal category) seem to have the need to use the services of Private testing Labs or the KASSIA testing facility. They indicate that testing is done only when customers ask for it, which is very rare and infrequent. They also state that whenever testing is required, it is done by Customers themselves.
- Most of the 4 Vendors of Castings contacted have some in-house testing facilities. Whenever certain other testing is required for which they lack the facilities (which is minimal), they make use of the services of KASSIA's testing lab or Private labs.
- Among Vendors of Machining Components, there is a lot of divergence. Those firms who are mainly into machining alone offering job work have no need for testing but require calibration services. This is frequently done at the customer's end and very rarely at CMTI.

Those firms that also manufacture machining components (such as Spindles for example) have in-house testing facilities or indicate that the testing (mainly raw material component testing) is done by customers.

d. Vendors and Training Institutions

- Among this group as well (namely, Vendors) there is minimal interaction between them and Training Institutions. One firm indicates that they used to be able to recruit from premier training institutions such as NTTF and GTTC about 10-15 years ago. However, at present, the alumni of these institutions are sought after (some even finding jobs abroad), get very high (relatively speaking) starting salaries that SSIs are not able to afford, and also tend to be highly mobile.
- In fact, most firms in this group feel that all the candidates produced by the good training institutions are regarded as employees who look upon SSIs as a stop gap arrangement to gain experience and switch jobs at the first opportunity. Hence, they are not looked upon favourably by these firms.

e. Vendors/Sub-Contractors and Finance Providers

- Especially among the smaller Supplier firms, there appears to be a high degree of utilisation of funds from non-formal sources of finance. These include professional money lenders, chit funds, relatives and friends, pawn brokers etc.
- Other than these, the main sources of funds for working capital are nationalised banks - in the form of overdrafts, cash credit, bill discounting and bank guarantees. Here too, a few among these firms indicate that they are very happy with the support provided by their banks. However, in most instances they feel that the banks do not understand the problems faced by small units, are slow and bureaucratic, and most rigid and inflexible. A complaint voiced by many firms about nationalised banks is that they ask for too much collateral, often over and above the plant and machinery offered by the firms. It is also mentioned that when one adds up all the "hidden" charges and penalties levied by nationalised banks, the effective interest rate works out to rates comparable with that offered by non-formal sources. And, the latter entities (non-formal sources) are much less bureaucratic and inflexible than the banks. To compound matters, this group indicates that their banks have stopped discounting cheques issued by MTMs, especially in the last 1 year.
- Some of these (smaller) Vendor/Sub-Contractor firms claim to have availed of start-up funds when they set up their units from financial institutions such as KSFC.
- Here too, it is interesting to find a small group of vehemently anti credit/anti borrowing firms who manage with their own funds and internal accruals. Again, part of the reason is that they are well run units. Another part of the reason is that the proprietors of such units hate the idea of borrowing and kow-towing to the bank managers. Some of these firms indicate that when they started, no bank was willing to fund them and asked for huge collateral that they did not have. Ever since then, they have sworn never to approach a bank for any loans.

f. Vendors and Industry Associations

Vendors and IMTMA

- Among the Vendors contacted, about 6 (out of 30) are members of IMTMA. They all confess that their involvement with its activities is very low key. Since their involvement is low key, they do not have much to say about the perceived effectiveness of IMTMA.
- Both members and non-members also seem to have the perception that it is a body that caters primarily to large MTMs. Whether this is true or not is a moot point, but this is a perception.

Vendors and Local Industry Associations - KASSIA, Peenya Industries Association, Other Private Industrial Estate Associations

- Almost all the Vendors are members of one or more of these associations. Their involvement however with these associations is very low. They too believe that all the associations, especially, PIA and KASSIA can do much more than what they are doing at present. They indicate that the associations are not doing anything great/extraordinary at present.
- The main beneficial activities that the 2 major associations carry out are the addressing of regulatory issues (what may be termed as “Inspector Raj” issues encompassing labour laws, excise, sales tax, commercial tax etc.) and assistance in obtaining specific benefits (such as subsidies) that SSIs are entitled to. However, these associations seem to be unable to address case specific or an individual firm’s problems that need to be redressed.
- Some of the Vendors have heard about the proposed Trade Centre but do not seem to know much in terms of what the proposed facility will offer.

g. Inter Firms Relations - Vendors and Vendors/Peers/ Competitors

- There appears to be very little interaction between Vendors themselves, by and large, across all categories of firms.
- Here too, there are a few exceptions wherein neighbouring firms (not necessarily in the same line of business) help each other as and when some kind of problems arise.

4.6. AN UNDERSTANDING OF THE DYNAMICS AND WORKING OF THE CLUSTER & MAJOR BUSINESS PROCESSES OF ENTERPRISES

This sub-section provides cues and insights into the working of each of the core enterprises and into the impact (whether positive or negative) on the working of the cluster as a whole.

4.6.1. MTMs

a) **Markets**

In all honesty, deep insights into this aspect are not forthcoming since this was not a detailed study and there was reluctance among MTMs to divulge information of this nature. However, from what has been obtained, it is interesting to see the highly contrasting approaches of the enterprises in this category vis-a-vis their product ranges and specialisations, obtaining market

information and market intelligence, understanding the market for their products, addressing their markets and in their efforts in fashioning growth and market expansion.

These details for 1 MTM are not being included since barely 5% of its production caters to the commercial market for machine tools. The bulk of its production is meant for captive purposes in the manufacture of automotive components.

Current Product Range, Specialisations (if any) and Market Segments

Attribute/Parameter	Very Large MTMs	Large & Medium	Small
Range of Products	Full range of Conventional and CNC machines, tools and accessories	SPMs (Dedicated Lines for Auto manufacturers); CNC Lathes, Tooling Solutions; Range of Metal Cutting M/cs, Test Equipment, M/cs for Finishing Operations, Others; Honing M/cs, Gun Drilling M/cs, Super Finishing M/cs, Tools & Abrasives for Honing M/cs.	Mainly SPMs (Wide Range)
Proportion of Value of Sales from CNC M/cs	30%	60 % to 95%	30% to 70%
Exports (as % of value of sales)	5%	5% to 10%	Currently, nil
Proportion of Sales to Automotive industry	50%	55% to 70%	55% to 100%
Other Segments (Mainly Defence, Gen.Engg., Railways, Farm equipment, Earth Moving equipment, Other Capital Goods industries)	50%	30% to 45%	0% to 45%

Source : MTMs contacted ⁹

2) Sources of Market Information & Market Intelligence

⁹ In the case of Small MTMs, Other Segments include several other industries besides Defence, Railways, Gen. Engineering.

1 MTM indicates that prior to the late 1980s, sales to the automotive segment used to be 30% of the value of its annual sales. It also reveals that the bulk of its customers in the auto industry are auto component manufacturers and 2 wheeler manufacturers, since most of the car manufacturers have upgraded their technology substantially or have imported entire plants including machining facilities in the last few years.

CATEGORY OF MTMs	MAJOR SOURCES
Very Large	Internal : Sales force, Marketing personnel; External : Customers, IMTEX, Trade Fairs
Large & Medium	Internal : Group marketing Company, Overseas Offices, Sales force, Marketing personnel, Agents / Distributors overseas; External : Customers, IMTEX, Trade Fairs, Internet
Small	Internal : Sales force, Agents/Distributors ; External : Customers, IMTEX, Trade Fairs, Internet

It appears that for most MTMs this area is definitely not a strength and there is much more that can be done.

3) Understanding of the Market for their Products

CATEGORY OF MTMs	Level/Adequacy of Understanding
Very Large	Low to Average
Large & Medium	Low to Average
Small	Average

4) Efforts towards Market Expansion and Driving Growth

CATEGORY OF MTMs	Level/Adequacy of Understanding
Very Large	Low
Large & Medium	Low to Average
Small	Low

5) Effecting Sales/Addressing Markets

CATEGORY OF MTMs	Mode of Effecting Sales
Very Large	Mainly through direct sales to customers; Sales Offices across the country; Also Have Service and Support Personnel in all major cities;
Large & Medium	Mainly through direct sales to Customers; Sales Offices in major cities; Also Have Service and Support Personnel in major cities; 1 MTM has a group company that undertakes sales, distribution and service for all the companies in the group. It also has Agents/Distributors overseas; 1 MTM has technical personnel from overseas (from its parent company) who visit India and its customers once in 3 months;
Small	Predominantly direct sales to customers;

	1 MTM has an Agent in Delhi who, it claims, is one of the largest distributors in the country representing a large number of Indian and international companies.
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b) Technology Sources & Flows

TECHNOLOGY SOURCES

CATEGORY OF MTMs	MAJOR SOURCES (At Present)
Very Large	Trade & Industry Journals, IMTEX, Trade Fairs, New Machines Purchased by Customers, Product Catalogues
Large & Medium	Own/In-House either through Reverse Engineering and gradually through independent design, IMTEX, Trade Fairs, Customers, Internet; Collaborator/Parent Company abroad; (1 MTM also uses CMTI for inputs).
Small	In house, I.I.Sc., CMTI, IMTEX, Customers, Internet.

Technology Flows

The technology flows at present within the cluster are best illustrated in the chart that follows (Chart 3).

Technology Flows to MTMs

The relatively (and relatively is the operative word) strongest flows of technology within the cluster seem to be from the market end which flows through customers and trade shows such as IMTEX to MTMs.

One MTM which has offices overseas and a concerted export thrust is able to obtain and update inputs by way of technology from the overseas markets and customers.

In few cases, especially where there is an active foreign collaborator, there is a strong flow to the MTM from the collaborator or principal company if the collaborator has a major stake in the company.(1 MTM seems to have the strongest technology inputs thanks to this).

Again, in a few cases, there is some linkage with CMTI.

To Suppliers and Vendors

For Suppliers and Vendors/Sub-Contractors, the relatively strongest flow is via MTMs and through IMTEX. However, as can be seen in this report, this seems to be selectively happening in a few cases.

An exception to this is the case of medium and large Suppliers in the areas of Controls and Hydraulics who have ongoing access to the technology of their principals/parent companies or equity partners abroad.

To Sub-Suppliers

For this group, it is mainly from Suppliers and Vendors. However, it does appear to get diluted significantly by the time it percolates to this level.

One Noteworthy Exception in the Flow of Technology

1 MTM, in which an international company has a stake and is the world leader in its field, appears to be one of the few firms in the cluster with the wherewithal to reverse the technology flow to customers. And top rung customers such as automobile manufacturers at that. How does it do this?

1. It has foreign technical experts arriving in India once in 3 months.
2. These experts visit the customers every visit. They obtain feedback about the performance of their machines, trouble-shoot if there are problems, and, because they are world leaders in the field, are even able to influence the technology choice and upgrade the technological capabilities of the customer in the process updating the customer on the latest technological developments!

c) Finance - Major Sources

CATEGORY OF MTMs	MAJOR SOURCES (At Present)
Very Large	Start Up : Large Financial Institutions; Working Capital : Large Financial Institutions, Nationalised Banks, Internal Accruals Export Market Development : N.A.
Large & Medium	Start Up : IDBI, KSIIDC Working Capital : Nationalised Banks; Internal Accruals; Export Market Development : Exim Bank
Small	Start Up : IDBI, KSIIDC, Nationalised Banks, Working Capital : Mainly Nationalised Banks; Internal Accruals, Non Formal Sources.

Nationalised banks seem to be playing a significant role in catering to the needs of the machine tool industry (especially for working capital), perhaps more than any other source of finance.

d) Diversification

Since the last 2 years have been very bad for most of the MTMs due to the slow down in the automotive sector and in most other sectors, most of the MTMs have, understandably, put their diversification plans for the future on hold. This has also been done because the future seems extremely uncertain and increasingly difficult to predict.

How have MTMs diversified in the past since their inception?

For the present, it is not very meaningful to look at the very large MTMs who run the risk of becoming anachronisms in a rapidly changing industry. These companies are trying to come to grips with the changing business environment (which demands technological strengths and production efficiencies of the highest order) and have no choice but to re-structure themselves, which they are addressing at the moment.

It is very interesting to see how the other MTMs have evolved and their growth trajectories. It makes sense to begin with the MTM which is widely regarded as a very successful, technologically sound, fast track company and a "Success Story" in the industry. Incidentally, this company despite being the last off the block is today the largest manufacturer and exporter of CNC lathes in the country. Brief descriptions of two other MTMs (growth trajectories of 1 large MTM and 1 small MTM) appear in Annexure 7. The reasons for selecting these cases are that 1

is an old MTM but has achieved some break-throughs in the market in terms of being able to net prime customers from the auto industry while another is a small MTM whose relationship with its customer and benefactor is rock solid and a bond that has endured from inception to date.

GROWTH TRAJECTORY & DIVERSIFICATION OF 1 MTM -THE “SUCCESS STORY” OF THE INDUSTRY CATEGORY : MEDIUM AND LARGE

CIRCA/PERIOD	ACTIVITY
1979	<i>2 Individuals (technocrats) from CMTI get together to form a Design Consultancy firm. They have been motivated by a former colleague (also ex CMTI) who has set up a firm to manufacture specialised accessories for the machine tool industry</i>
1979 – 1982	<i>The firm undertakes only design work</i>
1982	<i>1st diversification in response to a market need - SPMs for Engine Valve industry</i>
1983	<i>1st machine developed was a Turning Machine with wider applications in other industries</i>
1983 – 1986	<i>The firm began to be known as a Turning Machine manufacturer with strong design capabilities</i>
1986	<i>Developed 2 CNC Lathes, Participated in IMTEX for the first time</i>
1987	<i>Focus on Turning Machines and CNC Lathes ; Bag 1st export order for CNC Lathes from a German company;</i>
1987 to 2000	<i>Steady growth in sales and reputation. Shifted from conventional machining to CNC machining for all components. Discovered the greatest weaknesses in indigenous technology available in areas of sheet metal, paints and aesthetics. Worked very hard through own efforts and a Swiss Consultant (for paints) to overcome these shortcomings. Gains in stature and reputation for its proven technological and design capabilities and tooling solutions. Opened offices in USA. Emerges as the largest manufacturer and exporter of CNC lathes in the country. Recently bagged an export order for CNC lathes based on its tooling solution capabilities alone.</i>

e) Skills and Upgrading of Skills

Most of the small MTMs are extremely lean in terms of the size of their workforce. They prefer to recruit skilled and experienced individuals and go out of their way to retain good performers. They do not recruit from training institutions. Most of the skill upgrading and training is provided in-house, on the job and in some cases, at the plant of the customer.

In the case of Large and Medium MTMs, a fair amount of the recruitment is from premier training institutions such as NTTF, GTTC and Apex. Here too, skill upgrading takes place primarily in-house. Some of the MTMs indicate that they send their staff to the Foreman Training Institute (FTI and also known as Apex), which is rated fairly highly by them in terms of quality of training.

4.6.2. Suppliers & Vendors/Sub-Contractors

a) Markets

The large and medium Supplier firms, especially those which are multinationals or companies in which international companies have a stake (such as manufacturers of Controls and Hydraulics), are professionally organised in terms of marketing, sales, distribution and service. They have sales offices and service locations in most major markets and cities in the country. Sales are effected both directly to customers as well as through their distribution networks. Reputation-wise most of such firms stand head and shoulders above their smaller counterparts, in terms of technology as well as quality. Most of these firms also cater to customers other than MTMs, some consciously in order to reduce their dependence on MTMs.

In the case of Suppliers and Vendors from other categories, most of whom are small firms, the major characteristics are as follows :-

- Most of the firms have been accustomed to getting orders passively rather than through selling and market development. Perhaps this is a hangover of the years prior to liberalisation when MTMs had devoted units as ancillaries to cater to their requirements. Thus, for many of these firms, especially those that have been in business for over 15 to 20 years, it is difficult to change.
- This tends to get reflected even today in the manner in which new business is generated. Sales and orders are clinched directly from the customer. By and large, new business comes from referral from an existing customer or repeat business, after a firm has demonstrated its capabilities in terms of being able to deliver as per specifications of MTMs, on technological capabilities, infrastructure, quality, timeliness and price. Typically, this takes anywhere from a few months to 1-2 years, depending on the product line or process. Good suppliers (who are several notches ahead of their counterparts in these respects) are gradually singled out by MTMs and supported in different ways.
- In troubled times as in the last 2 years, most of these firms who have never been market-driven and run predominantly by technocrats, have found themselves poorly equipped to do market planning and initiate selling efforts. They feel the need for a source that could provide them assistance in broad-basing their customers and effecting sales or in feeding them with regular orders.
- There are a few exceptions to this which makes such firms stand out in comparison. 1 such is a small firm and supplier of hydraulic systems. Another is a small firm supplying Coolants Systems, Panel ACs and Industrial Water Chillers, that manages to do well despite competing with large players.

Sources of Market Information & Market Intelligence

CATEGORY	MAJOR SOURCES
Suppliers	Customers, IMTEX, Trade Fairs
Vendors/Sub-Contractors	Customers, Business Newspapers, IMTEX, Trade Fairs, Private Consultants.

b) **Technology Sources & Flows**

CATEGORY	MAJOR SOURCES
Suppliers	Predominantly Customers including Non MTMs; Lesser extent Pvt. Consultants, Parent company/Collaborator, CMTI.
Vendors/Sub-Contractors	Predominantly Customers including Non MTMs; Lesser extent CMTI, Seminars organised by Customers/OEMs.

The flows of technology to this group can also be inferred from Chart 3 and the brief description in the pages preceding this chart.

c) **Finance - Major Sources**

CATEGORY	MAJOR SOURCES (At Present)
Suppliers (Other than Large & Medium Co.s)	Start Up : KSFC, Nationalised Banks, Own Savings, Loans from Individuals; Working Capital : Nationalised Banks, Internal Accruals, Host of Non-Formal Sources including Chit Funds, Individuals etc.
Vendors/ Sub-Contractors	Start Up : Nationalised Banks, KSFC, Own Savings, Loans from Individuals; Working Capital : Nationalised Banks, Internal Accruals, Host of Non-Formal Sources including Chit Funds, Individuals etc.

Most of the Suppliers and Vendors/Sub-Contractor firms seem to be making do with extremely low levels of working capital. Most of them indicate the need for higher working capital limits.

Nationalised Banks play a major role with these firms as a source of finance. The feedback of Supplier and Vendor firms, despite a few exceptions, suggests that the banks are not sensitive to their needs, are slow and bureaucratic, ask for collateral over and above the plant and machinery and do not give loans for buying 2nd hand machines.

d) **Diversification & Growth Trajectories - Suppliers, Vendors/Sub-Contractors**

When looking at the evolution and growth of most of the Supplier and Vendor firms that were contacted, the sheer abundance and wealth of technical skills in the cluster stands out like a beacon. One must acknowledge the critical roles played by institutions such as HMT and CMTI, other MTMs, PSUs, Defence and Aerospace organisations, companies from the Auto industry and lastly, Supplier and Vendor firms themselves, in spawning and fostering the growth of such firms in the cluster.

Some firms have evolved into strong firms from relatively humble origins, sometimes with the support of MTMs or customers from other sectors.

Several firms among Vendors/Sub-Contractors (especially in the machining components) category are former CNC Lathe Operators with considerable experience who have either set up on their own or been encouraged, motivated and supported by their erstwhile employers.

Across both Suppliers and Vendor/Sub-Contractor firms, many have diversified their range of products and upgraded their technologies and capabilities between the time they set up and the present. However, this may not be good enough in the present business environment.

Indicative profiles/descriptions of the growth trajectories of a few Supplier and Vendor Firms appear in Annexure 8.

e) Skills and Upgrading of Skills

Most of the Supplier and Vendor firms recruit both fresh as well as skilled and experienced individuals. However, they maintain that over the years and particularly since the 1990s it has become increasingly difficult to retain skilled workers. Some firms find it difficult to identify and recruit skilled workers and solicit the help of placement agencies.

Apparently, between 1993 and 1996, a large number of garment factories came up in and around Peenya, where a large number of these firms are located. This resulted in an exodus of semi-skilled and unskilled workers to the garment manufacturing units who offered higher pay, less strenuous work and better working conditions.

The bulk of the training is provided in house, both to freshers as well as to senior workers. In a few (exceptional) instances, customers including some MTMs, also assist in upgrading skill levels through training programmes conducted by them.

In essence, there is no significant problem in availability of workers/man power at most levels. However, according to knowledgeable individuals from the industry, it appears that there may be one exception to this, namely, availability of high quality designers and design engineers.

4.6.4. Insights into the Nature of Problems Being Faced by Suppliers and Vendors/Sub-Contractors

These insights have been obtained through 2 routes, namely, the primary research in the course of interviews during this study as well as through the 2 workshops convened by IMTMA and UNIDO on the 20th January 2000 among a sample of these firms. A consolidation of the information obtained from these 2 routes appears in the following tables. Annexure 9 which features the major responses obtained from the 2 workshops also provides a list of the types of firms that participated in the workshops, which will lend perspective to the feedback thus obtained.

Indicative Problems Faced At Present by Supplier Firms

Finance-related Issues
1. Lack of working capital
2. Delays in Payments - some excessive (1 year +); blocks funds
3. Banks refusing to discount cheques of MTMs
4. Do not have adequate funds to invest in upgrading technology.
Business & Profitability Issues
1. Decline in sales/orders in the last 2 years
2. MTMs pushing us very hard on prices, not increasing prices over the years
3. Profit margins coming down and very low at present
4. Need more orders, regular orders
5. MTMs should give us large enough volume orders
Relationships with MTMs/Trust Issues
1. MTMs exploit us by playing one off against the other; Fair dealings required
2. Some customers including MTMs do not know what they want
3. No sharing by MTMs, we must be partners, greater trust required
4. Lack of Accountability in MTMs due to lack of co-ordination between Departments within MTMs; Need a Single Window System
5. Access to technology/assistance in upgrading technology
6. No quid pro quo - MTMs expect Service Calls to be attended in 4 hours; yet they take their own time to make payments.
Other Issues
1. Standardisation required
2. Customers should make no distinction between Foreign and Indian Suppliers (esp. In payment terms)
3. Assistance in handling "Inspector Raj" entities; and to reduce harassment
4. Assist smaller units in marketing and recruitment
5. Good quality, reliable, testing facilities with objective, impartial, credible certification. (Lot of malpractices going on at present).

Indicative Problems Faced At Present by Vendor/Sub-Contractor Firms

Finance-related Issues
1. Delays in Payments - some excessive; blocks funds; biggest problem; especially in last 2 years; Banks not discounting cheques from MTMs
2. Inadequate working capital and access to funds
3. Finance situation has worsened. Used to get some advance earlier, now nil
4. Do not have funds to invest in R&D; upgrade to CNC machines
Business & Profitability Issues
1. Erratic orders, low capacity utilisation
2. Profit margins coming down and very low at present
3. Stiff competition and cut-throat pricing
4. Need assistance in getting orders; in sales & marketing
5. Need more orders, regular orders
6. Need inputs for technology/skill upgrading; Access to technology/assistance in upgrading technology
7. MTMs force us to keep our prices very low, no increases effected in many years

8. MTMs must forecast their requirements for at least 3 months
9. Documentation excessive, esp. Among PSUs
10. Volumes of MTMs not viable for us
11. Raw Materials - Prices too high (steel), cannot be globally competitive
12. Very little market information available, whatever we get is from Customers; also need forecasts so we can plan better
Relationships with MTMs/Trust Issues
1. MTMs to give prompt, clear-cut requirements and specs. (esp. In Design, Drawing and Technical Information)
2. More interaction and sharing of information - MTMs and Vendors; and between Vendors
Other Issues
1. Standardisation of bought-out items required; including those purchased by MTMs
2. Raw material availability-good quality, retail quantities, reasonable prices
3. Assistance in handling "Inspector Raj" entities; and to reduce harassment
4. Assistance in identifying and supporting good, reliable Sub-Vendors through training and entrepreneurship programmes
5. Good quality, reliable, testing facilities reasonably priced, of global standards including certification
6. Assistance, training in Negotiation and Contract finalisation for export orders

SECTION 5- DIAGNOSIS OF THE CLUSTER

5.1 ROUTES EMPLOYED IN CLUSTER DIAGNOSIS

Two routes have been adopted in assessing the health and vitality of the cluster. The first route is based on an analysis of the major findings of the study, assessment of the cluster, the experience of the authors as researchers as well as 2 detailed cluster studies undertaken in the past. The second route is via a SWOT Analysis of the cluster.

5.2 ASSESSMENT OF THE CLUSTER

The Bangalore machine tool cluster is likely to go through a turbulent and perhaps traumatic phase in the next 3-5 years. This is because:

1. It is an industry which seems to be driven by the automotive industry.
2. With the globalisation of the Indian economy, the same is bound to happen in the automotive industry as well. It is already happening. Global auto majors are here, some have imported entire plants including machining facilities en masse, some have been importing components in CKD/SKD form till such time as they can indigenise to the levels required by Indian law and MOUs signed by the international companies. Almost all the global auto majors are now present in India. Ford has roped in their global vendors in order to help them indigenise rapidly and to achieve cost economies in the shortest period - they have already done this for the IKON. The number and presence of Indian players is dwindling. There is likely to be a

growing trend of Customers from the automotive sector entering into alliances directly with select and high quality Suppliers and Vendors for auto components.

3. Coupled with this, imports of machine tools are expected to increase over the next 2-3 years. This will be devastating for the cluster as well as for the industry.

4. There is likely to be a shake-out in the industry and in the cluster in the next 2-3 years. In the process, a consolidation will take place with MTMs and Supplier and Vendor firms either shaping up or shipping out. Many firms will not be able to survive or will try and shift to other business lines.

At present, the cluster seems to be lacking in several of the key ingredients that make for a successful and thriving cluster. Some of these ingredients that are either absent or at a low ebb in the cluster are:-

- Weak/Inadequate linkages between MTMs and Suppliers and Vendors; the relationships do not seem to be strong and complementary by and large. This is compounded by a lack of trust among stake-holders and especially among core enterprises;
- Inadequate technology linkages between Technical Institutions and core enterprises and between MTMs and Suppliers and Vendors;
- Weak and fractured Local Governance; (this is a vital ingredient for a successful and thriving cluster);
- Finance appears to be a constraint both for working capital as well as for investment for R&D, technology upgrading especially for most Supplier and Vendor firms;
- There appears to be an absence of vitality and dynamism in the cluster;
- The linkages with markets and flows of market information and market intelligence appear to be weak across the cluster.

Despite these major weaknesses, vulnerabilities and constraints, the cluster does have certain elements that can be used to try and put the cluster back on track and on to a growth path. These are:-

- Reputation for quality and technological capabilities (within the country)
- Abundant, vast base of technical skills and work force
- The industrial setting and support services that are in place (in terms of availability of premium technical institutions, training institutions, large number of Supplier and Vendor firms, large number of Sub-Supplier firms, infrastructure, pockets/belts with density and concentration of firms catering to the machine tool industry, an active and strong industry association, industrial estate associations and so on)
- Rich base of senior and high level technical personnel with vast experience in the machine tool industry and proven technical skills

- Some support from the State Government from the industry.

It appears that is a cluster that was probably much stronger in its early years than it is now.

5.3 THE SWOT ANALYSIS

5.3.1. Strengths

- Within the country, it is considered among the most competent technologically and quality-wise, so far as machine tools are concerned.
- A wide gamut of Support Services is in place, by and large. By the term “Support Services” aspects such as the following are implied :
 - Wide and abundant skill base
 - Proliferation and solid base of Supplier, Vendor and Sub-Supplier firms
 - The industrial settings - Concentration of the activity in select pockets and belts (such as Peenya) in the city wherein there is an agglomeration of firms (of all sizes) within the machine tool industry as well as in the engineering industry which can and do complement each other. There are also several private industrial estates in different parts of the cluster with similar characteristics
 - Sound Knowledge Base - Existence of several Machine Tool Manufacturers and High quality, well established Technical Institutions such as CMTI
 - Several Technical Training Institutions including some of high repute
 - Easy availability of unskilled and semi-skilled workforce
 - A strong and extremely active industry association with a strong presence in the cluster, IMTMA
 - Several other Industry and Industrial Estate Associations representing the interests of small firms/SSIs (such as KASSIA, PIA etc.)
 - Availability of raw material and inputs
- Rich and illustrious history in the industry
- Some automotive manufacturers and auto component manufacturers located in and around the city (within Bangalore city limits and Hosur)
- New, emerging auto component belt coming up in and around Bidadi, not very far from the cluster
- Some degree of support to the industry from the State Government through a variety of measures including attracting investments in the auto sector (Volvo, Toyota, Telco etc.) in the state and certain other incentives and measures for the machine tool industry
- The existence of 1 success story in the cluster which will serve to motivate others
- A sizeable number of small MTMs that appear to be dynamic and high in vitality
- Some linkages already exist between the core enterprises and other stakeholders.

5.3.2. Weaknesses

Linkages between Core Enterprises

- The linkages between various stakeholders and especially between core enterprises comprising MTMs, Suppliers and Vendors/Sub-Contractors are not strong or not as strong as they should be. Similarly, within each group too, there is very little sharing and co-operation although a beginning has been made among MTMs with the Vishwaroop project.
- There also does not appear to be a commonality of goals among various entities in the cluster. In the same vein, there are not too many instances of unity within the cluster (even among firms in the same group).
- There seems to be an underlying lack of trust that pervades the relationships between various entities in the cluster. This is a serious issue and distinct weakness.
- Technology flows within the cluster appear to be low, whether it is from MTMs to Suppliers and Vendors or from Technical Institutions to core enterprises. One of the reasons for this springs from a vast perception gap that exists among the various stakeholders (especially core enterprises) regarding the perceived utility and effectiveness of 1 of the premier technical institutions.

Market Linkages

- Most of the firms among core enterprises do not seem to be market-driven and customer-oriented. They seem to be more production oriented. Many of these firms are technically sound but need inputs and guidance in entrepreneurship and cost management. While the reasons for this are many and varied, the firms will be in for a rude shock if they do not change this mind set and orientation.
- Many Suppliers and Vendors are consciously trying to reduce their dependence on the machine tool industry out of the sheer need for survival and to insulate themselves from the vagaries of 1 end-user industry
- There appear to be inadequate flows of market information and intelligence within the cluster. In fact in a thriving cluster this is one feature which is very strongly present making the cluster hum with activity almost all through the year.

Finance, Research & Development

- Most of the Suppliers and Vendors/Sub-Contractor firms (especially the medium and small firms) seem to be operating with very low working capital limits. In this situation, they are unable to weather the traumas associated with delayed payments and erratic orders, negative cash flows and rapidly changing market environment. This is a severe drawback and weakness. Another weakness relating to this group is that most do not have the funds to invest in technology upgrading and R & D.
- The MTMs as well have not invested adequately in R & D over the years and most are a long way from being globally competitive.

Size of firms & Economies of scale

- There are too many players in an industry which is volume driven and which ideally demands (and will continue to demand in the future) tier-ization in the supply chain and flexibility. While this may be a hangover from the years of a protected economy, it is a fact and grim reality.
- Another issue with sociological ramifications is that it is going to be extremely difficult for a large number of firms (especially those with a public sector mentality typified by a large workforce, waiting for orders to come to their doorsteps etc.) to unlearn and shake off their existing mind sets, attitudes and old ways. This assumes added relevance in the context of 2 issues, namely,
 1. Historically, most of the units (among Supplier and Vendor firms) have come into existence and thrived in a “Mother company and ancillary units” environment for a long time;
 2. There are several firms in this group which are headed/promoted by individuals with past experience in public sector companies comprising MTMs, Technical Institutions and other organisations such as BEML, ISRO, BEL etc.

Strategic Focus

- One more aspect which can be construed as a weakness is that among MTMs only 1 firm is truly and completely focused on the machine tool industry. All the others are part of larger business groups or have other business lines as well. This has a bearing on the drive and dynamism within the cluster. It is here that small MTMs, especially those which are lean, dynamic and flexible can play a major role in re-vitalising the cluster.

Inspector Raj Issues

- Supplier and Vendor firms are wasting a lot of their energies on addressing statutory issues and harassment from “Inspector Raj” entities. In fact, some of them lament that there is no time to think of upgrading quality and technology when they spend so much of their time, energy and effort in handling and trouble-shooting these issues. This is a weakness and is counterproductive, constraining the cluster.

New Markets

- By and large, among MTMs, there is a very low export focus. The best of the firms exports about 10% of the value of its sales turnover.

Other Cluster-intrinsic Weaknesses

- Again, from a cluster perspective, another key ingredient for a thriving and robust cluster, namely, strong Local Governance is conspicuous by its absence. By the term “Local Governance” is meant the ability of the cluster to fiercely protect and look after the interests in all respects of the cluster and the main economic activity of the cluster. Typically, this could be in the form of lobbying for the interests of the industry, warding off and pre-empting threats to the industry, removing impediments and bottle-necks to ensure the smooth functioning and working within the cluster and so on. In some clusters there is a formal body or organisation that plays this role. In other clusters, there could be a loose association of individuals and

organisations that play this role. In our view, there does not appear to be any local governance for the cluster, leave alone strong governance.

5.3.3. Opportunities

- There are many end use sectors that consume machine tools. Besides, the automotive industry, other end use industries include farm equipment, earth moving equipment, defence, railways, several other general engineering and all capital goods industries. The economy is showing signs of a revival and turnaround. Robust growth in the economy as a whole and in each of the end use sectors can drive growth of the machine tool industry, as a whole, as well as for the cluster.
- According to knowledgeable individuals and past studies on the machine tool industry, for every percentage point of GDP growth there is a corresponding growth of over 2% in the machine tools industry. By this token, assuming a GDP growth of 6% annually over the next 5 years, the Bangalore machine tool cluster production will proportionately (assuming annual growth of 13%) reach a level of Rs. 10,870 million in 2003-04 from the current level of Rs. 5,900 million. These figures include the value of production of small firms and non-members of IMTMA.
- A new automotive and auto component belt is coming up in Bidadi that is close to the cluster. This should create new business opportunities for the cluster.
- Export markets (world exports) are growing at approximately 14% per annum between 1992 and 1998. If world exports of machine tools register growth of 10% or more over the next 3-5 years, theoretically, an opportunity exists for India, especially given its English speaking workforce and vast resource/skill base.
- Chennai is developing into a major automotive component belt especially in and around Maraimalainagar and Irrungutakotai, where several global auto majors have located their plants. Theoretically, given the proximity to Chennai, the Bangalore machine tool cluster could cater to the growing needs of this market.
- If markets demand superior and high quality products, Suppliers and Vendors will have to, perforce, upgrade technology and quality. This is an opportunity for MTMs
- The presence of small MTMs is an opportunity since they are already lean and flexible. With consortia in place for exports, finance, markets, they can play a significant role in strengthening the cluster.

5.3.4. THREATS

Markets & The Competitive Environment

- Imports of machine tools are likely to increase in the next 2-3 years, up from almost 65 % at present. What is more, import duties are likely to come down further within the next 2 years. Imports from Taiwan and South Korea are expected to increase in the future.

- Import of second hand cars is now permissible although there is fierce lobbying going on at present for and against the policy. With WTO around the corner, it is unlikely that the policy will be scrapped or toned down.
- In the export markets, the biggest threats for India are Taiwan, South Korea and even China. India suffers from a poor brand image abroad which will take a lot of effort and brand building activity to overcome.
- Leading Japanese companies have set up machining and demonstration centres in India and Bangalore.

Emerging Developments

- There is likely to be a shake-out in the machine tool industry in the country as well as in the cluster. In the process, only a few firms (among MTMs as well as Suppliers and Vendors) will be able to stay in business. Thus, those that are unable to shape up will either close down or try and find alternate customers outside the machine tool industry to survive.
- The automotive industry will demand vastly improved quality, better technology at lower and lower prices. Can Indian MTMs, Suppliers and Vendors deliver?

SECTION 6- WHAT CAN BE DONE TO REJUVENATE AND STRENGTHEN THE CLUSTER ?

6.1 ACTION LINES & RECOMMENDATIONS TO REJUVENATE AND STRENGTHEN THE CLUSTER

Over the next 2-3 years, a shake-out is likely. The fall-out will mean some firms among core enterprises will either fold up or try and cater to other business lines. This is inevitable, a grim reality and cannot be wished away. This notwithstanding, based on the findings of this study, the steps that need to be taken to revitalise, strengthen and rejuvenate the cluster are as follows:-

I. SENSITIZATION OF STAKE-HOLDERS

Convene preliminary meetings with Mainstream and Support Entities comprising MTMs and other Cluster stake-holders, Policy level entities, Support & Service Institutions and Financial Institutions, in order to:

- Communicate the vision, goals and objectives of the Cluster Development Programme;
- Communicate the diagnosis of the cluster and what needs to be done to strengthen the cluster;
- Obtain willingness to participate in the Project and obtain commitment for participation.

II. CAPTURE CONCERNS & SENSITIVITIES OF SMALL FIRMS - MTMs, SUPPLIERS & VENDORS VIS-A-VIS THE CLUSTER DEVELOPMENT PROGRAMME, IMTMA

Here, one will need to elicit the fears, reservations and misgivings among small firms vis-a-vis the cluster development programme, per se, as well as towards IMTMA. Once this is done, it will be necessary and extremely useful to gain insights into the basis for the existing, underlying perceptions of the small firms. This will aid immensely in understanding the small firms, their concerns and in evolving appropriate and relevant programmes, fee structures and even working modalities that will address and take into account their concerns.

III. CREATION OF FORUM WHICH WILL PLAY AN ENABLING ROLE FOR CLUSTER

A forum or body will need to be created which will play a facilitative and enabling role in the cluster development activities. Ideally, this body will include representatives of MTMs, Suppliers and Vendors/Sub-Contractors, Sub-Suppliers, Finance Providers, Technical Institutions, Training Institutions, besides others. Following this, one will need to form sub-groups that will assist in one or more aspects of the cluster development programme.

Within the overall forum, it will be necessary to form a Steering Committee that will play a co-ordinating role for the cluster development programme. While the eventual composition of this group can be finalised at a later date, tentatively, it must include representatives of MTMs, Suppliers and Vendors, Enterprise Associations, UNIDO and Technical Experts.

IV. OTHER TASKS

Carry out a study to have a better understanding of the market for machine tools wherein obviously a large and representative base of customers across sectors must be contacted. This is imperative not merely to plug gaps of this study but in order to be able to have clear-cut direction for the cluster development programme.

Identify as many Small MTMs as possible. It would be useful to know their exact number. Some of these firms could well play an extremely useful role in the cluster development effort.

The most important and critical areas, in our opinion, that the Cluster Development Programme needs to address are as follows:

- Trust building among core enterprises comprising MTMs, Suppliers and Vendors/Sub-Contractors
- Understand the profiles, situation, orientation and working of Supplier and Vendor firms. This itself will go a long way in creating and nurturing trust between the MTMs and these entities
- Inculcating a Market/Customer focus, especially among MTMs but also among Supplier and Vendor firms
- Facilitate better technology flows and linkages between MTMs and Suppliers and Vendors as well as between Technical Institutions and these firms
- Explore ways and means of creating a consortium or mutual credit guarantee fund that provides Finance at competitive interest rates especially to Supplier and Vendors for both Working Capital as well as Investment for upgrading technology and quality.

6.2 OTHER INPUTS FOR IMTMA's/UNIDO's CONSIDERATION IN DEVELOPING AN EFFECTIVE ACTION PLAN FOR RE-STRUCTURING THE CLUSTER

Based on the workshops convened with a group of Supplier and Vendor firms, a number of suggestions were forthcoming in response to a key question, namely, "What can we do to make Bangalore Machine Tool Cluster grow and achieve global excellence?"

The suggestions appear in Annexure 9 and offer some ideas and inputs for IMTMs and UNIDO's consideration.

Over and above this, all participants were asked to indicate whether, in principle, they would be willing to join the cluster. The bulk of the participants expressed a desire to join the movement.

6.3. TENTATIVE ACTION PLAN FOR ORGANISING & IMPLEMENTING THE CLUSTER DEVELOPMENT PROGRAMME FOR THE BANGALORE MACHINE TOOL CLUSTER

A broad approach for initiating the Cluster Development Programme is set forth for IMTMA and UNIDO's consideration.

Forum Composition

The forum will consist of members from MTMs, Suppliers, Vendors/Sub-Contractors and Sub-Suppliers.

Entry to Forum

Entry to forum activity will be through a nominal annual entry fee. The forum will start with the initial membership as finalized at the workshops and will keep on adding to membership as firms show more and more interest.

Secretariat

The secretariat services may be provided by IMTMA office at Bangalore. The secretariat will also do all the co-ordination activities that may be required from time to time in managing different relationships.

Meetings

The forum will meet once a month - every first Saturday of the month. There will be 12 meetings in a year without fail.

Venue of the Meetings

The venues for the meetings can be decided subsequently. CMTI is one option as a venue.

Forum Chair Person

At the beginning of the year one forum chairperson from the participating members will be nominated by IMTMA. He will conduct the proceedings of the forum in line with the wishes of the members. IMTMA-UNIDO managers and advisors will guide them.

Programme Structure

The forum will identify subjects that need to be settled in the first year of operation of forum activity. In the first few months, relatively simple issues will be picked. The basic agenda will be drawn from the vision, mission and value statements of the Forum.

For each subject, a task force of 3-4 members will be established. Each task force will study, make proposals, seek consensus in forum meetings and go ahead with implementation of activities. Wherever they need help of co-ordination with various stakeholders, they will seek the help from the secretariat.

It is proposed, based on the outcome of the workshops, that the following task forces be established in the forum:-

1. Technology
2. Standardisation/Databanks
3. Marketing
4. Training
5. Government
6. Finance.

A detailed Terms of Reference will need to be provided to each task force. Along with this, a Monitoring system coupled with time frames and deadlines for each proposed activity will need to be evolved.

Costs

The costs of arranging meetings and all secretarial expenses will be met by IMTMA-UNIDO. Each participating member company would share the costs incurred towards individual programmes. However, the costs relating to arranging experts may be supported by UNIDO.

6.4. KEY FACTORS FOR SUCCESS OF CLUSTER DEVELOPMENT PROGRAMME

While all the key determinants of success of a cluster development programme can be best identified following a better understanding of the cluster, some of the key determinants are as follows:-

1. Strong Local Governance
2. Strong links with markets
3. Ongoing access to and upgrading of technology for core enterprises
4. Strong relationships and linkages between MTMs, Suppliers, Vendors and Sub-Suppliers
5. Access to finance for working capital and for investing in technology upgradation
6. Strategic focus by firms in cluster
7. Common Vision.

A common vision for the cluster is best defined/articulated in a participatory framework involving major entities in the cluster. However, for the purposes of planning for the cluster development activity, a starting point may be the along the lines of the Vision statement of the MTMs themselves. The Vision statement may be along the following lines:-

We will

- Strive to grow by over 35 % annually and consciously export 30 % of our production
- Attain cost leadership through volumes, vendorisation, productivity and co-operative efforts amongst the members
- Adopt a consortia approach wherever feasible
- Continuously redefine and benchmark quality to meet customer needs and expectations
- Be professionally structured and managed to become lean, learning organisations of highly motivated, empowered, skilled and customer-oriented people
- Develop a work culture that continuously upgrades leadership skills, team building and result orientation at all levels
- Develop technologies to build state of the art products suitable for world markets
- Continuously upgrade products, services and solutions to maximize value to customers
- Leverage information technology to gain business leadership.