CHAPTER 5

TECHNICAL SUPPORT SYSTEMS AND THEIR USE

5.1 Introduction

What we call "research and development (R&D)" today is a learning process in the generation of new technologies. R&D includes several different forms of learning that are relevant to the innovation process. The "development" end of the spectrum in R&D addresses the commercial dimensions of the innovation process: combining product characteristics desired in the market. When a novel product is put into production, "learning by doing" consists of learning new productive activities. This has the effect of reducing real labour costs per unit of output. A related form of learning by doing, which is not highlighted in the literature, is the many kinds of productivity improvements, often individually small but cumulatively very large, which result from the productive process. Another form of learning, especially in capital goods, is "learning by using," in which use of a new product generates gains for the firm.

Why should such learning matter to a firm? A firm’s competitive strength is determined by its ability to create, acquire, process and assimilate knowledge, in a way different from that of its competitors. A learning organisation has been defined as one that is "skilled at creating, acquiring and transferring knowledge, and at modifying its behaviour to reflect new knowledge and insights." Any firm that is performing is learning. What has to be understood is the variation in the learning

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135 This is different from "learning by doing" in the sense Arrow (1962) used it as a function of accumulated past output.
ability, what one learns, what sort of effort is made for learning, what aspect is emphasised for learning and the various modes of learning. These variations differentiate an innovative firm from an adaptive, and that from an imitative firm.

Organisational learning is a process through which knowledge is internalised, and a cumulative knowledge base is built. This is the absorptive capacity that helps a firm to access information on newer and emerging technological signals, and also to assimilate the knowledge that gets generated both internally and externally to the firm. This is done by sharing information amongst different units within the organisation, and through linkages with the external world.

There are several ways of learning, but it can be understood in terms of self-learning (learning by doing) and through interaction (formal educational and organisational training). Learning by doing helps in accumulating the existing knowledge base. The tacit knowledge that accumulates among the individuals is meaningful for the firm. Every learning process facilitates tacit knowledge building, and making the best use of this knowledge is essential for a competitive firm. This skill in the firm gives shape to knowledge in the form of a product, design, or process. Formal education and training enhance the absorptive capacity of the individuals. Along with this, problem solving in the workplace enhances the ability to create new insights into the existing knowledge base, and facilitates creation of new knowledge. A firm that wants to be a market leader ventures into this sort of exploratory research for doing things differently from its competitors. It makes large investments in R&D. An adaptive firm is basically a follower of the innovative market leader, and is satisfied by taking advantage of the introduction of new technologies for making incremental innovations. That does not require large-scale investment in R&D, but rather an emphasis on reverse
engineering and learning by problem solving. An imitative firm bases its production on standardised technology with little scope for technological improvement. The emphasis here is on price competition and supplying niche markets.

Developing new products, acquiring new production capabilities, and improving upon those that a firm already possesses, are crucial to success in export markets. Some of the SMEs surveyed by us, and most of the SMEs in four other countries surveyed earlier, in fact reported substantial technical improvements. One important influence on technical effort and performance is the extent to which policies expose firms to domestic or international competition, and thereby act as a spur to improve capability. Another important influence is the education policy, particularly education in science and engineering, and its impact on the supply of technologically useful human capital. The management processes within firms and their impact on on-the-job technological learning are also influential.

The present study focuses on a fourth influence, viz., the micro environment of private, governmental and NGO market and institutional technological supports external to the firm, on which it can draw as it seeks to build technological capability. A central goal is to evaluate the impact of collective technical supports. In principle, their impact could be substantial: inter-firm spillovers of knowledge are pervasive, so individual firms do not capture for themselves all the benefits of their investments in knowledge. Accordingly, firms may, in the absence of solutions to classic problems of collective action, rationally under-invest. However, the challenges of collective provision can also be substantial, since for information to be useful, it may need to be tailored to the specific needs of an individual industry, if not an individual firm.
Moreover, as with export marketing, there exists a variety of external private mechanisms which support a firm’s technological effort. Consequently, we embed our analysis of collective technical support within the broader context of the range of private and collective mechanisms that can aid technological effort.

We identify here three broad categories of external technological support. The first category comprises technological learning that occurs as a by-product of a firm’s transactions with its buyers and suppliers. Knowledge is accumulated and even shared over a longer period of time, an asset generated due to the concerted effort of firms.¹³⁹ A long period of association, especially in a buyer-supplier relationship, can result in the development of certain relation-specific unique assets.¹⁴⁰ Once internalised, this enhances the absorptive capacity of a firm. The second category comprises technological learning that is facilitated by a firm’s being located in an “information-rich” environment, one replete with other firms engaged in similar activities, with a menu of courses that address its specific business problems, and with access to a network of specialised consultants. The final category consists of “high-intensity” technological support, including formal transfer of technology agreements with other private firms engaged in a similar line of business, and sustained joint work with specialist technology institutions. It is to be noted that while the channels for learning in the first category are entirely private, in the latter two categories the channels may be either private or collective.

SMEs compared to LEs, however, have neither well-qualified technical personnel nor financial resources to invest in R&D activities or to acquire foreign technologies. For these reasons, effective technical

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¹³⁸ These are Japan, Korea, Indonesia and Colombia, reported in Levy (1994).
5.2 The Evolution of Technical Support Systems

The Indian government has introduced an extensive network of collective technical support systems for SMEs. These systems may be grossly categorised into four main supporting services: technical assistance, technical training programmes, technical information service, and joint research. Most support agencies provide multiple services. For example, those that provide technical assistance also offer training programmes and technical information services.

Collective technical support systems have evolved over time. Although some of the collective support agencies, such as the Small Industry Service Institutes and the Bureau of Indian Standards were established in the late 1950s and early 1960s, the government took serious measures to promote SMEs in the late 1970s. Most public agencies established during these years were broad based. It was only in the early 1980s that industry-specific non-profit agencies were set up.

Exhibit 5.1 presents a schematic diagram of institutional arrangements related to the technical support systems.

For the SMEs, there are limited choices to seek out technology. They can either look within the country upon large enterprises or outside the country at SMEs. On both fronts, the results have not been encouraging in India. Sixteen sub-contract exchanges set up in India for facilitating relationships between large enterprises and SMEs have not taken off. In terms of government policy effective 1993, large enterprises can only invest up to 24 per cent in the equity of a small sector unit, but this is not enough to foster long-term relationships. Foreign SMEs also do not perceive the investment climate in India to be attractive, resulting in a virtual blockage of this source of technology for Indian SMEs. Lately, survival of SMEs in a large majority of natural clusters has been threatened by endemic technological obsolescence. Critical barriers to
technological development are perceived to be government policies and regulatory practices governing factor markets. For one, labour laws have driven proprietors to contract work to enormous household enterprises equipped with primitive techniques.\textsuperscript{142}

The main agencies providing technical support to SMEs are as follows. A brief description of the scheme of the support services listed in Exhibit 5.1 above is provided in Annex-I to Chapter 5.

(i) The Small Industries Development Organisation (SIDO) and its 28 Small Industries Service Institutes (SISIs).

(ii) Six Product and Process Development Centres (PPDCs), which are affiliated to the SIDO.

(iii) Four Regional Testing Centres (also affiliated to SIDO).

\textsuperscript{142} Drawn from UNIDO (1996).
(iv) The National Small Industries Corporation (NSIC), and its five Prototype Development and Testing Centres (PDTCs).

(v) The 17 Technical Consultancy Organisations (TCOs).

(vi) The 10 Central Tool Rooms, including 4 under Indo-German collaboration and 3 under Indo-Danish collaboration. These are also affiliated to the SIDO.

(vii) The National Productivity Council (NPC).

(viii) The Bureau of Indian Standards.

(ix) The Technology Bureau of Small Enterprises (TBSE), which is a joint venture of the Small Industries Development Bank of India (SIDBI) and the Asia-Pacific Centre for Transfer of Technology (APCTT).

(x) The Exports Inspection Council (EIC).

The enforcement of industrial standards has been used in many countries as a means of raising the technology level of SMEs. The Bureau of Industrial Standards in India has played a catalytic role in stimulating technological improvements in the past but is not reportedly doing so now.\(^{143}\) In the electronics industry, an acute need for common infrastructure for development of instrumentation, calibration and precision tools has been felt but has not been forthcoming. The training and quality control facilities have also needed upgrading in consonance with emerging demands. SMEs located in a few metropolitan areas like Bangalore, Pune, Mumbai and Hyderabad have shown promise in some high-tech industries. Specifically, they have demonstrated innovation potential in specialty chemicals, pharmaceuticals, information technology, bio-technology and machine design.\(^{144}\) However, the yield of commercially successful technology has been small due to the absence of

\(^{143}\) See UNIDO (1996).

\(^{144}\) See Jethmandani (1996).
intermediaries between research institutions and SMEs, i.e., counsellors, research associations and engineering consultants. Governments in developed countries have focussed their efforts at assisting the growth of such intermediaries.

SIDO has over the years set up a wide range of technology support institutions, which have performed a useful role in the past, but need to be restructured now to become commercially oriented, so that a higher level of services can be delivered to the SSI sector.

In terms of financial support for technology upgrading, not a lot has happened in India. SIDBI operates a Rs. 2 billion Technology Development and Modernisation Fund (TDMF), which, however, is linked to 25 per cent export obligation. The State Bank of India and some nationalised banks also operate schemes for sector-specific technology upgrading, which is hardly of any consequence.

The technical support required by SSIs includes research and development support, testing and calibration, assistance in environmental technology, assistance in pollution control mechanisms, and assistance in meeting quality in terms of national and international industrial standards. Although a fairly large amount of innovation is observed in the small-scale sector, these firms are not equipped to perform R&D functions. What is required is co-operation among SSIs in the same industry to identify common technical problems that require R&D assistance. There has been little institutional support in this regard in India. Regional engineering colleges and other industrial training institutions (ITIs) have very little interaction with SSIs.

With regard to training of human resources to absorb technological change, large firms have their own in-house training mechanisms but small sector firms depend upon private and public support systems. Several such institutions have been created over the years as stated above.
5.3 Two Hypotheses on the Use of Technical Support

Private and collective mechanisms of technical support can be viewed as partial substitutes. We can hypothesise that SMEs initially meet their technological needs internally, as a by-product of their core business activities, or through existing business contacts. Only if they still perceive unmet technological needs are they likely to demand collective technical support. \(^{145}\) Thus:

**H1:** Demand for collective support is likely to be higher the more complex are the technological requirements of production – lowest for craft-based technologies, higher for simple engineering technologies, and higher still for complex engineering technologies. (*The production complexity hypothesis*)

**H2:** Demand for collective support is likely to be higher the weaker are the country- and industrial organisation-related endowments of private technological networks available to a firm. (*The private endowment hypothesis*).

A straightforward extension of the above two hypotheses is that, within a given sub-sector, there can be variations in the technology-related endowments of individual SMEs, with the demand for collective support greater for poorly endowed firms. Viewed in relation to the first hypothesis, it might be argued that the relevant variable is technological complexity relative to a firm’s internal capabilities, and thus that demand for collective technical support will be greater for firms with weaker capabilities. Viewed in relation to the second hypothesis, SMEs within a given sub-sector might plausibly vary in their access to private

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\(^{145}\) There is abundant evidence that many technologically primitive firms do not perceive their own limitations. See, for example, evidence from Sri Lanka and Tanzania in Levy (1993).
technological networks, and hence in their demand for collective technical support.

These hypotheses are not exhaustive. They are based upon the author's extensive experience of handling SME development agencies, discussion with entrepreneurs during the Sample Survey, and interaction with industry leaders.

5.4 Introduction of New Products

Table 5-1 presents data on the proportion of SMEs that have introduced new products during the past four-year period (1993-1996). It shows that 12 (40 per cent) of 30 sample SMEs in auto components introduced new products compared to 67 per cent in the software sub-sector. The corresponding proportions were 37 per cent for footcomp, 25 per cent for jewellery and 14 per cent for garments. The large batch operation in the auto components sub-sector accommodates new products more easily than in footcomp, jewellery and garments. Again, new products are introduced in auto components more frequently due to the relatively higher rate of technological change in auto components than in footcomp, jewellery and garments. The somewhat low level of introduction of new products in auto components (40 per cent) may have occurred for two reasons. First, most auto body building SMEs, which figured in the sample, did not undertake significant process innovation. Second, innovation in the production technology of auto components comes largely from the auto assemblers rather than in-house initiatives of component manufacturers.
Table 5-1: New Product Development (Innovation), 1996

<table>
<thead>
<tr>
<th>(A) FREQUENCY OF NEW PRODUCT DEVELOPMENT</th>
<th>AC</th>
<th>FC</th>
<th>G&amp;J</th>
<th>RMG</th>
<th>CS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average number of new products introduced per year in the past 4 years (1993-1996):</td>
<td>1.98</td>
<td>6.35</td>
<td>0.77</td>
<td>0.86</td>
<td>8.52</td>
</tr>
<tr>
<td>Proportion of firms that have introduced new products in the past 4 years:</td>
<td>40%</td>
<td>37%</td>
<td>25%</td>
<td>14%</td>
<td>67%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(B) NEWNESS* OF NEW PRODUCTS (Proportion of sample, 1996)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. No difference from existing products</td>
</tr>
<tr>
<td>2. Moderate difference</td>
</tr>
<tr>
<td>3. Intermediate difference</td>
</tr>
<tr>
<td>4. Significant difference</td>
</tr>
<tr>
<td>5. Radical difference</td>
</tr>
</tbody>
</table>

| Weighted Mean score (between 1 and 5 above) | 3.00 | 3.00 | 2.00 | 2.50 | 3.89 |

<table>
<thead>
<tr>
<th>(C) ORIGINALITY** OF NEW PRODUCTS (Proportion of sample, 1996)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Imitation of domestic models</td>
</tr>
<tr>
<td>2. Imitation of foreign models</td>
</tr>
<tr>
<td>3. Application of domestic technology</td>
</tr>
<tr>
<td>4. Adaptation of foreign technology</td>
</tr>
<tr>
<td>5. Products performing better than foreign models</td>
</tr>
<tr>
<td>6. Products never previously developed abroad</td>
</tr>
</tbody>
</table>

| Weighted Mean score (between 1 and 6 above) | 2.29 | 3.00 | 3.00 | 2.50 | 5.20 |

AC = Auto Components; FC = Footcomp; G&J = Gems & Jewellery; RMG = Readymade Garments; CS = Software

* Newness refers to the difference from existing products of the same firm. Its weighted mean score is an ordinal position between 1, being no difference, and 5, being radically different.

** Originality refers to the difference from existing products or technologies available anywhere. Its weighted mean score is again an ordinal position between 1, being an imitation (no originality) and 6, being a completely new product.

Table 5-1 also presents the quality – newness and originality - of new products introduced in 1996. Newness refers to the degree of quality difference between the new product and existing products of the same SME, while originality refers to the degree of quality difference between the new product and existing products available elsewhere. 10 per cent SMEs introduced new products, which had about the same quality as existing products. 10 per cent reported intermediate level difference from existing products. 20 per cent reported significant difference. The mean score of the sample for newness was 3 on a 1-5 scale, indicative of moderate newness. Similarly all new products introduced in 1996 were either imitations of domestic and foreign models or applications of existing domestic or foreign technology, with a mean score of the sample for originality of 2.29 on a 1-6 scale. This is the lowest in the sub-sectors studied and represents a very basic level of originality. For this reason,
the assemblers use local suppliers for less technology-intensive parts and components, while they rely on foreign suppliers for more technology-intensive parts and components.

The *footcomp* sub-sector introduces, on average, more new products (6.35) every year than auto components (1.98), jewellery (0.77) and garments (0.86), next only to software (8.52), as it graduates technologically to accommodate the design changes demanded by importers. At the same time, the number of firms that introduce new products is about the same as auto components, but much higher than jewellery and garments. This shows that firm-level technology upgrades in *footcomp* have an exclusive character and little spillover effect, with some firms introducing many new products, and some none at all. The increased sourcing by importers from India for supply of footwear components for better quality footwear has fostered close linkages of the industry with foreign buyers, who point the sub-sector to new sources of technology. 40 per cent of the sample SMEs reported moderate to significant difference in the quality of their new products, and a mean score of 3 (out of 5), reflecting dynamism in innovation, when coupled with the mean score of 3.8 (out of 6) for originality. 21 per cent SMEs in *footcomp* stated that their products were better than foreign products, and 13 per cent also claimed global originality.

Technological innovation is noticeably absent for SMEs in jewellery. The average number of new products introduced in the last four years was less than 1 per year, according to Table 5-1. We must, however, hasten to report that the respondents in the jewellery sub-sector were perhaps the most reticent, which may have introduced a downward bias in these data. The proportion of SMEs that had not introduced a new product in the last four years was 75 per cent, second only to garments (86 per cent). Even among the new products, the newness score was at a
low 2 out of 5, the lowest among the five sub-sectors, and 33 per cent of the sample SMEs claimed only “moderate difference” from existing products. Again, the originality score was 3 out of 6, limited largely to imitation of domestic products and application of domestic technology.

The garments sub-sector, like jewellery, is characterised by minimal product innovation. The average number of new products introduced during 1993-1996 was less than 1 per year, and that too was done by only 14 per cent of the sample SMEs. 86 per cent of the sample firms did not introduce any new product in this period. Table 5-1 gives the newness score of 2.5 out of 5 and originality score of 2.5 out of 6 to this sub-sector, both of which are low.

Technological innovation is a crucial element for SMEs in software to survive and grow. This point is well demonstrated in Table 5-1. It shows that the average number of new products introduced is 8.52 per annum, the highest in the five sub-sectors, and that two thirds of the sample SMEs have introduced new products. The newness score is 3.89 out of 5, again the highest among the studied sub-sectors, demonstrating that new products in this sub-sector were significantly different from the existing products of the SMEs. 67 per cent of the sample introduced significantly different products, which is the highest in the five sub-sectors.

The degree of originality of new products in software is also the highest among the five sub-sectors; the originality score is 5.2 (out of 6) for software, compared to 3.8 for footcomp, 3 for jewellery, 2.5 for garments and 2.29 for auto components. 58 per cent of the sample reported introducing products never previously developed.
5.5 Sources of Technical Support for Innovation

Table 5-2 presents 16 different sources of external support for improvement in product quality, the frequency of use and usefulness of these sources, as mentioned by sample SMEs. For product quality improvements, international exhibitions and local buyers were the most frequently mentioned sources in auto components. Observation of international exhibitions and inputs from local buyers provide product ideas for exports. This finding is consistent with the findings of previous studies in Korea and elsewhere. Equipment suppliers, both foreign and domestic, were also an important source of product and process improvement in auto components. There may be two reasons. First, process improvement and product quality improvement cannot be separated in auto components, as in other sub-sectors except software. The supply of automated equipment also results in better quality products. In many cases, automation is more important for product quality improvement than cost saving. Second, supplying equipment to many users, the equipment suppliers appear to provide crucial knowledge on the output of the new equipment and the practice of previous clients to new clients. Public R&D institutes got a relatively higher mention (30 per cent) compared to other sub-sectors included in this study. Private consulting firms got an equal mention, but joint venture partners, other firms, and university researchers got much lower mention.

Table 5-2 also reports the evaluation made by sample SMEs in terms of usefulness for each of the aforementioned sources. Foreign equipment suppliers and technological conferences received high scores,

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146 Kim and Kim (1985) found that local customers played a major role in offering product ideas in the machinery industry in Korea. von Hippel (1988) called it the “user paradigm” of innovation.
147 See Linsu Kim (1988a).
close to 5 on a 5-point scale in auto components. Most other scores were below 3.

Table 5-2: Sources of Technology and Their Usefulness in Product Quality Improvement

<table>
<thead>
<tr>
<th>Source of Technology</th>
<th>Auto Comp</th>
<th>Footcomp</th>
<th>Jewellery</th>
<th>Garments</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Order-placing firm</td>
<td>20%</td>
<td>2.5</td>
<td>33%</td>
<td>3</td>
<td>33%</td>
</tr>
<tr>
<td>(2) Joint venture partners</td>
<td>10%</td>
<td>1</td>
<td>21%</td>
<td>1.6</td>
<td>25%</td>
</tr>
<tr>
<td>(3) Domestic equipment supplier</td>
<td>30%</td>
<td>2.67</td>
<td>42%</td>
<td>2.4</td>
<td>50%</td>
</tr>
<tr>
<td>(4) Foreign equipment supplier</td>
<td>20%</td>
<td>4</td>
<td>50%</td>
<td>3.5</td>
<td>33%</td>
</tr>
<tr>
<td>(5) Local buyers</td>
<td>40%</td>
<td>2.5</td>
<td>25%</td>
<td>2.17</td>
<td>42%</td>
</tr>
<tr>
<td>(6) Foreign buyers</td>
<td>20%</td>
<td>2.5</td>
<td>58%</td>
<td>3.18</td>
<td>50%</td>
</tr>
<tr>
<td>(7) Firms engaged in similar business activities</td>
<td>10%</td>
<td>1</td>
<td>33%</td>
<td>2.5</td>
<td>33%</td>
</tr>
<tr>
<td>(8) Private consulting firms</td>
<td>30%</td>
<td>3.33</td>
<td>13%</td>
<td>1</td>
<td>17%</td>
</tr>
<tr>
<td>(9) Industry association or other non-profit institution</td>
<td>20%</td>
<td>2</td>
<td>36%</td>
<td>2.44</td>
<td>25%</td>
</tr>
<tr>
<td>(10) Public technology support agency</td>
<td>30%</td>
<td>2</td>
<td>21%</td>
<td>1.9</td>
<td>17%</td>
</tr>
<tr>
<td>(11) International exhibition</td>
<td>60%</td>
<td>2.67</td>
<td>46%</td>
<td>2.55</td>
<td>25%</td>
</tr>
<tr>
<td>(12) Imitating similar domestic products</td>
<td>20%</td>
<td>2</td>
<td>21%</td>
<td>1.4</td>
<td>25%</td>
</tr>
<tr>
<td>(13) Individual researchers from university</td>
<td>10%</td>
<td>1</td>
<td>17%</td>
<td>1.25</td>
<td>25%</td>
</tr>
<tr>
<td>(14) Individual foreign professionals</td>
<td>20%</td>
<td>2.5</td>
<td>25%</td>
<td>2.17</td>
<td>17%</td>
</tr>
<tr>
<td>(15) Technological conferences</td>
<td>20%</td>
<td>5</td>
<td>17%</td>
<td>1.5</td>
<td>17%</td>
</tr>
<tr>
<td>(16) Other (Specify)</td>
<td>20%</td>
<td>2.5</td>
<td>8%</td>
<td>1</td>
<td>33%</td>
</tr>
</tbody>
</table>

*The number of sample SMEs reporting use, expressed as proportion of sample. Percentages would not add up to 100, as one SME may report use of more than one source.

*The degree of usefulness mentioned by interviewees, 1 being least useful and 5 being most useful.

Table 5-3 presents similar data for improvements in the production process. The frequency of use of sources of technical support is the same as for product quality improvements, but satisfaction scores differ. Technological conferences, domestic equipment suppliers and private consulting firms provided satisfaction scores in that order, beginning with 4.5. Lesser mention of foreign equipment suppliers reflects the maturity of the domestic engineering industry as well as the policy bias against capital goods imports.¹⁴⁸ Public technical support

¹⁴⁸This and another finding that foreign equipment suppliers are important sources of technology development are consistent with previous studies. Various studies undertaken by Kim and his associates (e.g., Kim, 1991 and Kim and Kim, 1985) consistently show that foreign equipment suppliers provide a crucially important role in transferring product and process technologies. Their expertise on the equipment and their experience with many other equipment users enable them to provide users with crucial information on products.
agencies were mentioned for process improvement, just as they were for product quality improvements. It appears that low cost automation in production processes may easily be installed locally with the assistance of public support agencies.

**Table 5-3: Sources of Technology and Their Usefulness in Process Improvement**

<table>
<thead>
<tr>
<th>Source of Technology</th>
<th>Auto Comp</th>
<th>Footcomp</th>
<th>Jewellery</th>
<th>Garments</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order-placing firm</td>
<td>20%</td>
<td>1.5</td>
<td>33%</td>
<td>2.36</td>
<td>33%</td>
</tr>
<tr>
<td>Joint venture partners</td>
<td>10%</td>
<td>1</td>
<td>21%</td>
<td>2.2</td>
<td>25%</td>
</tr>
<tr>
<td>Domestic equipment, supplier</td>
<td>30%</td>
<td>3.33</td>
<td>42%</td>
<td>2.9</td>
<td>50%</td>
</tr>
<tr>
<td>Foreign equipment supplier</td>
<td>20%</td>
<td>3</td>
<td>50%</td>
<td>3.59</td>
<td>33%</td>
</tr>
<tr>
<td>Local buyers</td>
<td>40%</td>
<td>2.5</td>
<td>25%</td>
<td>1.8</td>
<td>42%</td>
</tr>
<tr>
<td>Foreign buyers</td>
<td>20%</td>
<td>3</td>
<td>68%</td>
<td>3.23</td>
<td>50%</td>
</tr>
<tr>
<td>Firms engaged in similar business activities</td>
<td>10%</td>
<td>1</td>
<td>33%</td>
<td>2.14</td>
<td>33%</td>
</tr>
<tr>
<td>Private consulting firms</td>
<td>30%</td>
<td>3.33</td>
<td>13%</td>
<td>1</td>
<td>17%</td>
</tr>
<tr>
<td>Industry association or other non-profit institution</td>
<td>20%</td>
<td>2</td>
<td>38%</td>
<td>2.44</td>
<td>25%</td>
</tr>
<tr>
<td>Public technology support agency</td>
<td>30%</td>
<td>2.33</td>
<td>21%</td>
<td>1.8</td>
<td>17%</td>
</tr>
<tr>
<td>International exhibition</td>
<td>60%</td>
<td>2.17</td>
<td>46%</td>
<td>2.68</td>
<td>25%</td>
</tr>
<tr>
<td>Imitating similar domestic products</td>
<td>20%</td>
<td>2</td>
<td>21%</td>
<td>1.4</td>
<td>25%</td>
</tr>
<tr>
<td>Individual researchers from university</td>
<td>10%</td>
<td>1</td>
<td>17%</td>
<td>1.25</td>
<td>25%</td>
</tr>
<tr>
<td>Individual foreign professionals</td>
<td>20%</td>
<td>1.5</td>
<td>25%</td>
<td>2.2</td>
<td>17%</td>
</tr>
<tr>
<td>Technological conferences</td>
<td>20%</td>
<td>4.5</td>
<td>17%</td>
<td>1</td>
<td>17%</td>
</tr>
<tr>
<td>Other (Specify)</td>
<td>20%</td>
<td>2</td>
<td>8%</td>
<td>1.67</td>
<td>33%</td>
</tr>
</tbody>
</table>

1. The number of sample SMEs reporting use, expressed as proportion of sample. Percentages would not add up to 100, as one SME may report use of more than one source.
2. The degree of usefulness mentioned by interviewees, 1 being least useful and 5 being most useful.

For product quality and process improvements, all of the sample SMEs in footcomp, as in auto components and jewellery, have used one or more of 17 difference sources of collective and private technical support systems, as reported in Tables 5-2 and 5-3. In footcomp, too, foreign buyers were the most important source of technology, followed by foreign equipment suppliers and international exhibitions. 33 per cent of footcomp SMEs also reported order-placing firms as an important source of technology. The response is similar for both product quality improvement and process improvement, because the two are interdependent in the footcomp sector as well.
To develop technically and commercially successful products from new ideas acquired from buyers and international exhibitions, SMEs in jewellery appear to seek technical assistance mainly from equipment suppliers. Tables 5-2 and 5-3 show that domestic equipment suppliers were most frequently mentioned as a source of their technology (50 per cent for product quality and 42 per cent for process improvement) but with low average usefulness scores (2.25 and 2.1 respectively). Mention was also made, highest among the five sub-sectors, of university researchers and foreign professionals, but their usefulness was accorded surprisingly low scores around 1. It would appear that SMEs identify, informally, individual professionals in universities with specific expertise of direct relevance to technical tasks, and hire these professionals temporarily on a moonlighting basis, which is cost effective. But the experience does not appear to have been satisfactory, unlike Korea, where both LEs and SMEs use Japanese engineers during the weekend on a moonlighting basis.

The quest for technology support in garments is dictated by foreign designs, which are handed by foreign buyers and imitated locally. Tables 5-2 and 5-3 show maximum frequency of use (about 30 per cent of SMEs) of “foreign buyers” as a source of technology for both product quality improvement and process improvement in this sub-sector.

From Table 5-2, foreign buyers, international exhibitions and technological conferences were mentioned as the sources of support for product quality improvement by around 50 per cent of the software SMEs. Regarding process improvement, too, use of foreign buyers and international exhibitions got 42 per cent mention. This is consistent with the knowledge-base nature of the industry, where technology is entirely dependent on interaction among experts. This is further supported by zero
use of collective support, as shown in Table 5-4, and loudly proclaimed as “irrelevant” in Table 5-5.

5.6 Collective Technology Support Agencies and Their Use

Table 5-4 gives detailed information on the effectiveness of specific collective support agencies. The agencies were grouped into three categories by the nature of support they provided, viz., (i) technical information, (ii) technical assistance, and (iii) training. The SMEs selected only one agency under each category. This Table reports that at least 60 per cent SMEs in auto components used collective support agencies for technical information, but only 20 per cent of them for technical assistance and 20 per cent for training. The figures for technical information are the highest among the five sub-sectors in this study, reflecting the high level of technical activity in the sub-sector. The figures for technical assistance are the lowest, indicating that the sub-sector taps other sources for technical assistance. Broad-based agencies were selected, and industry-specific agencies were not mentioned at all by the respondents.

Table 5-5 presents in detail the reasons given by sample SMEs for not using the public technology support agencies. A list of 25 institutions was presented to the SMEs. Each provides technical information, technical assistance or training or a combination. Choice was to be made of one out of four reasons for not using the agency. These were:

(i) Did not know of the support system.
(ii) Knew about the support system but it was irrelevant.
(iii) Knew about the support system, but its effectiveness for us was not clear.
(iv) Intended to use the system, but could not.
Table 5-4: Public Technology Support Agencies and Their Usefulness

<table>
<thead>
<tr>
<th>Agency</th>
<th>AC</th>
<th>FC</th>
<th>G&amp;J</th>
<th>RMG</th>
<th>CS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Usf</td>
<td>n</td>
<td>Usf</td>
<td>n</td>
</tr>
<tr>
<td>TECHNICAL INFORMATION</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 District Industries Centre</td>
<td>4%</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Small Industries Development Organisation</td>
<td>13%</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 National Small Industries Corporation</td>
<td>10%</td>
<td>2</td>
<td>4%</td>
<td>3</td>
<td>33%</td>
</tr>
<tr>
<td>4 Bureau of Indian Standards</td>
<td>10%</td>
<td>2</td>
<td>4%</td>
<td>3</td>
<td>33%</td>
</tr>
<tr>
<td>5 Indian Institute of Packaging</td>
<td></td>
<td></td>
<td>4%</td>
<td>2</td>
<td>33%</td>
</tr>
<tr>
<td>6 National Productivity Council</td>
<td>20%</td>
<td>3</td>
<td>4%</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7 Other Government Institutes</td>
<td>4%</td>
<td>3</td>
<td>4%</td>
<td>2</td>
<td>25%</td>
</tr>
<tr>
<td>8 Exim Bank</td>
<td></td>
<td></td>
<td>4%</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>9 National Institute of Design</td>
<td></td>
<td></td>
<td>9%</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>10 Federation of Chambers of Commerce &amp; Industry</td>
<td></td>
<td></td>
<td>4%</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>11 PHD Chamber of Commerce &amp; Industry</td>
<td>10%</td>
<td>3</td>
<td>4%</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>12 Confederation of Indian Industry</td>
<td>10%</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub total Technical Information</td>
<td>60%</td>
<td>2.8</td>
<td>57%</td>
<td>2.8</td>
<td>25%</td>
</tr>
<tr>
<td>TECHNICAL ASSISTANCE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Small Industries Development Organisation</td>
<td>10%</td>
<td>3</td>
<td>9%</td>
<td>3.5</td>
<td>33%</td>
</tr>
<tr>
<td>2 National Small Industries Corporation</td>
<td></td>
<td></td>
<td>4%</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>3 Tool Room</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25%</td>
</tr>
<tr>
<td>4 Indian Institute of Packaging</td>
<td></td>
<td></td>
<td>4%</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5 Exim Bank</td>
<td></td>
<td></td>
<td>4%</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>6 National Institute of Design</td>
<td></td>
<td></td>
<td>13%</td>
<td>3.33</td>
<td>25%</td>
</tr>
<tr>
<td>7 Confederation of Indian Industry</td>
<td>10%</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub total Technical Assistance</td>
<td>20%</td>
<td>3.5</td>
<td>35%</td>
<td>3.6</td>
<td>50%</td>
</tr>
<tr>
<td>TRAINING</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 National Small Industries Corporation</td>
<td></td>
<td></td>
<td>4%</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2 National Productivity Council</td>
<td>10%</td>
<td>3</td>
<td>4%</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>3 Other Government Institutes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25%</td>
</tr>
<tr>
<td>4 Fedn. Of Assns. Of Small Industries of India (FASII)</td>
<td>10%</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub total Training</td>
<td>20%</td>
<td>3</td>
<td>9%</td>
<td>2.5</td>
<td>25%</td>
</tr>
</tbody>
</table>

AC = Auto Components; FC = Footcomp; G&J = Gems & Jewellery; RMG = Readymade Garments; CS = Software.

1The number of sample SMEs reporting use, expressed as proportion of sample. Percentages would not add up to 100, as one SME may report use of more than one source.

2The degree of usefulness mentioned by interviewees, 1 being least useful and 5 being most useful.

The reason "Didn’t know about the support system" was mentioned by 70 per cent SMEs in auto components for the Indian Federation of Tiny Enterprises, closely followed by 60 per cent each for the World Assembly of Small and Medium Enterprises (WASME) and the Indian Council of Small Industries. Industrial cooperatives were adjudged "irrelevant to us" by 70 per cent SMEs both because they either did not exist in that geographical area or had facilities that were outdated or monopolised. Industrial associations had a similar non-use response, probably because access to their facilities was restricted to their members. 50 per cent non-users stated the services of SIDBI were ineffective,
followed by 44 per cent citing the same reason for NSIC and 40 per cent for Exim Bank.

Table 5-5: Public Technology Support Agencies - Reasons for Not Using

<table>
<thead>
<tr>
<th>Auto Components</th>
<th>Footcomp</th>
<th>Jewellery</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>1. District Industries Centre</td>
<td>40%</td>
<td>40%</td>
</tr>
<tr>
<td>2. Small Industry Development Organisation (SIDO)</td>
<td>33%</td>
<td>33%</td>
</tr>
<tr>
<td>3. National Small Industries Corporation (NSIC)</td>
<td>33%</td>
<td>22%</td>
</tr>
<tr>
<td>4. Bureau of Indian Standards</td>
<td>25%</td>
<td>50%</td>
</tr>
<tr>
<td>5. Tool Room</td>
<td>30%</td>
<td>50%</td>
</tr>
<tr>
<td>6. Indian Institute Of Packaging</td>
<td>10%</td>
<td>80%</td>
</tr>
<tr>
<td>7. National Productivity Council</td>
<td>14%</td>
<td>57%</td>
</tr>
<tr>
<td>8. Industrial Cooperative</td>
<td>20%</td>
<td>70%</td>
</tr>
<tr>
<td>9. Product &amp; Process Development Centre</td>
<td>40%</td>
<td>40%</td>
</tr>
<tr>
<td>10. Other Govt. Institutes</td>
<td>11%</td>
<td>56%</td>
</tr>
<tr>
<td>11. SIDBI</td>
<td>20%</td>
<td>30%</td>
</tr>
<tr>
<td>12. Exim Bank</td>
<td>10%</td>
<td>50%</td>
</tr>
<tr>
<td>13. National Institute of Design</td>
<td>20%</td>
<td>80%</td>
</tr>
<tr>
<td>14. Federation of Assns. of Small Industries of India</td>
<td>33%</td>
<td>67%</td>
</tr>
<tr>
<td>15. Indian Council of Small Industries</td>
<td>60%</td>
<td>40%</td>
</tr>
<tr>
<td>16. Indian Federation of Tiny Enterprises</td>
<td>70%</td>
<td>30%</td>
</tr>
<tr>
<td>17. World Assn. of Small and Medium Enterprises</td>
<td>60%</td>
<td>40%</td>
</tr>
<tr>
<td>18. All India Manufacturers Organisation</td>
<td>10%</td>
<td>70%</td>
</tr>
<tr>
<td>19. FICCI</td>
<td>20%</td>
<td>70%</td>
</tr>
<tr>
<td>20. PhD Chamber of Commerce and Industry</td>
<td>13%</td>
<td>75%</td>
</tr>
<tr>
<td>21. Confederation of Indian Industries</td>
<td>25%</td>
<td>75%</td>
</tr>
<tr>
<td>22. Entrepreneurship Dev &amp; Training Institute of India</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>23. Indian Institute of Entrepreneurship, Guwahati</td>
<td>56%</td>
<td>33%</td>
</tr>
<tr>
<td>24. Nat'l Inst. for Entre. &amp; Small Busi Dev (NIESBUD)</td>
<td>30%</td>
<td>70%</td>
</tr>
<tr>
<td>25. Nat'l Inst. for Small Ind. Extn. and Training (NISIE)</td>
<td>50%</td>
<td>50%</td>
</tr>
</tbody>
</table>

A = Did not know of the support system.
B = Knew about the support system, but it was irrelevant.
C = Knew about the support system, but its effectiveness for us was not clear.
D = Intended to use the system but could not.

Table showing garments and software continued on next page ->
### Table 5-5: (Continued)

<table>
<thead>
<tr>
<th>Garments</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>1. District Industries Centre</td>
<td>36%</td>
</tr>
<tr>
<td>2. Small Industry Development Organisation (SIDO)</td>
<td>40%</td>
</tr>
<tr>
<td>3. National Small Industries Corporation (NSIC)</td>
<td>36%</td>
</tr>
<tr>
<td>4. Bureau of Indian Standards</td>
<td>30%</td>
</tr>
<tr>
<td>5. Tool Room</td>
<td>25%</td>
</tr>
<tr>
<td>6. Indian Institute Of Packaging</td>
<td>18%</td>
</tr>
<tr>
<td>7. National Productivity Council</td>
<td>25%</td>
</tr>
<tr>
<td>8. Industrial Cooperative</td>
<td>25%</td>
</tr>
<tr>
<td>9. Product &amp; Process Development Centre</td>
<td>33%</td>
</tr>
<tr>
<td>10. Other Govt. Institutes</td>
<td>25%</td>
</tr>
<tr>
<td>11. SIDBI</td>
<td>25%</td>
</tr>
<tr>
<td>12. Exim Bank</td>
<td>33%</td>
</tr>
<tr>
<td>13. National Institute of Design</td>
<td>42%</td>
</tr>
<tr>
<td>14. Federation of Assns. of Small Industries of India</td>
<td>33%</td>
</tr>
<tr>
<td>15. Indian Council of Small Industries</td>
<td>42%</td>
</tr>
<tr>
<td>16. Indian Federation of Tiny Enterprises</td>
<td>42%</td>
</tr>
<tr>
<td>17. World Assn. of Small and Medium Enterprises</td>
<td>45%</td>
</tr>
<tr>
<td>18. All India Manufacturers Organisation</td>
<td>42%</td>
</tr>
<tr>
<td>19. FICCI</td>
<td>25%</td>
</tr>
<tr>
<td>20. PHD Chamber of Commerce and Industry</td>
<td>33%</td>
</tr>
<tr>
<td>21. Confederation of Indian Industries</td>
<td>25%</td>
</tr>
<tr>
<td>22. Entrepreneurship Dev &amp; Training Institute of India</td>
<td>50%</td>
</tr>
<tr>
<td>23. Indian Institute of Entrepreneurship, Guwahati</td>
<td>58%</td>
</tr>
<tr>
<td>24. Nat'l Inst. for Entre. &amp; Small Busi Dev (NIESBUD)</td>
<td>50%</td>
</tr>
<tr>
<td>25. Nat'l Inst. for Small Ind. Extn. and Training (NISIET)</td>
<td>58%</td>
</tr>
</tbody>
</table>

A = Did not know of the support system.  
B = Knew about the support system, but it was irrelevant.  
C = Knew about the support system, but its effectiveness for us was not clear.  
D = Intended to use the system but could not.

How are the frequent users of technical support mechanisms (including both collective and private sources) different from the less frequent users in auto components? The result of a Spearman correlational analysis shows that the frequency of technology support mechanisms used is related significantly (statistically at .05 level) to firm size (0.32), entrepreneur's educational level (0.57), export share of total sales (0.47), export marketing supports received (0.51), process modernisation finance (0.60) and tax incentives (0.37). That is, SMEs that are active in developing inter-organisational links to acquire technical assistance from external sources are likely to be relatively larger in size, and more active in export activities. They are also likely to be able to take more advantage of such support mechanisms as export market entry and process modernisation finance than those that are less active in
seeking external technical assistance. In other words, export-oriented SMEs are active in technical activities. Our data does not give clear information as to whether sample SMEs used support systems at their infancy and have grown thereafter, or larger SMEs use support systems more frequently than smaller SMEs do. But the less frequent users, young or old, are consistently smaller than the frequent users.

In *footcomp* the use of public support agencies was stated by about 60 per cent SMEs for technical information. In Table 5-4 the respondents mentioned use of 10 out of 12 agencies. 13 per cent had used SIDO, 9 per cent had used National Institute of Design and 4 per cent had used each of eight others. Even though a usefulness score of 4 is more in the nature of an exception, it can be concluded that SMEs in *footcomp* have aggressively sought a whole range of public technology support systems for technical information, with a low mean usefulness score of 2.8. Similarly, 35 per cent of SMEs in *footcomp* used 5 out of 7 agencies for technical assistance, with a mean usefulness score of 3.6. For training, however, only a small proportion, 9 per cent, of the SMEs in *footcomp* used 2 out of 4 public agencies, with a mean usefulness score of 2.5, which shows that training was largely by private support agencies such as equipment suppliers. For an industry whose unique selling point is human skills, it makes sense that skill upgrade is on the shop floor by way of "learning by doing" with new equipment. As in auto components, the frequent users of collective technical support mechanisms are larger in size than the less frequent users. Other variables are not significantly associated with the frequency of use. SIDO and the National Institute of Design received the highest mention (13 per cent each) but had modest usefulness scores of 3 and 3.33 respectively.

From Table 5-5, based on a choice of one out of four reasons, 75 per cent of the *footcomp* respondents did not know of the technical
support services offered by the Entrepreneurship Development and Training Institute of India in Ahmedabad, followed by 57 per cent who did not know about the Indian Institute of Entrepreneurship in Guwahati, followed by 52 per cent each for WASME and the Indian Federation of Tiny Enterprises. A majority of the 25 institutions were considered "irrelevant" technology supports. The major reasons for not using collective technology support systems in *footcomp* were "did not know" and "irrelevant to us."

How is the profile of the frequent users of technical support mechanisms different from the less frequent users in *footcomp*? The results of Spearman correlational analysis here show that the frequency of use of technology support is related significantly (statistically at .05 level) to firm size (0.24), entrepreneur's educational level (0.28), export value (0.28), export marketing supports received (0.27), export finance (0.26), and process modernisation finance (0.27). Here, too, the more frequent users are likely to be relatively larger in size, more active in export activities and able to access export marketing support, export finance and process modernisation finance.

In regard to frequency of innovation, the correlation is statistically significant at 5 per cent with firm size (0.36), marketing support (0.25) and technology finance (0.27).

In jewellery, Table 5-4 shows that 25 per cent of SMEs used "other Government institutes" for obtaining technical information, with usefulness score of 3 (on a scale of 1 to 5), the reference being to the Gems and Jewellery Export Promotion Council. Similar was the pattern for training, but its usefulness was rated very low at just 1. Three-quarters of the sample SMEs did not use a collective support agency for these two needs. Regarding technical assistance, 25 per cent each of the sample
reported use of tool room and the National Institute of Design, but again with very low usefulness scores of 1.5 and 2, respectively.

The reasons for not using are tabulated in Table 5-5. The sample SMEs were asked one of four reasons why they did not use the 25 collective support agencies. Two-thirds of the sample cited "irrelevance of the support" as the reason for not using, for example, the tool room or the National Institute of Design. Two-thirds reported non-use because they did not know of the support extended by Exim Bank or SIDBI for technological upgrading. 60 per cent did not use the Indian Institute of Packaging because they thought its support was irrelevant.

In the jewellery sub-sector, too, the major reasons for not using collective technology support were "did not know" and "irrelevant to us."

Again, correlation analysis was made to determine differences in firm profile in jewellery between the frequent users and the less frequent users of collective technical support mechanisms. The results are quite similar to those reported above. Technical support is positively related to export marketing support (0.39) and export finance (0.36). In other words, those SMEs, which use technical support mechanisms more frequently, also take advantage of collective marketing support and export finance more frequently.

As for the profiles of innovative SMEs in jewellery, the results of our correlation analysis show that innovation frequency is positively correlated, at the 5 per cent statistical significance level, with export value (0.37) and export finance (0.34). In other words, larger jewellery exporters that can access support systems for export marketing and export finance are likely to be more frequent innovators.

In garments, Table 5-4 indicates mention by 33 per cent sample SMEs of the Bureau of Indian Standards and the Indian Institute of Packaging as the two sources of technical information, with significant
usefulness scores of 5 and 4, respectively, out of 5. SIDO has been cited as a source of technical assistance, but with a low usefulness score of 2 out of 5. No public agency was mentioned for training, indicating that whatever little training was needed was provided by private sources, presumably in the areas of design and actual fabrication on the shop floor.

Again, among the major reasons of non-use of the support systems available in 25 institutions, the dominant ones were "did not know" and "irrelevant to us."

The correlation analysis for garments reveals that collective technical support is used more frequently by firms that are larger in size (0.34), have larger share of exports in total sales (0.43), and are more able to access process modernisation finance (0.42) and tax incentives (0.73). Similarly, our correlation analysis reveals that in garments, innovation is related to the entrepreneur's educational background (0.53) at the 5 per cent significance level.

In all, for all sub-sectors, around 25 per cent of the sample SMEs cited unawareness of collective technical support systems as the reason for non-use, and around 50 per cent found them irrelevant.

5.7 Conclusions on Technical Support Systems

This Chapter has presented the characteristics of technical support systems and evaluated their effectiveness on the basis of the data collected from sample SMEs in the five Indian sub-sectors in this study. The findings in this Chapter provide several conclusions.

First, the demands for sophisticated technical help have been handled mainly in the private sector. This is corroborated by the fact that industry-specific non-profit R&D centres are very few. Collective technical support systems in India have evolved mainly as governmental
responses to industry needs. Most agencies appeared in the 1960s and 1970s in response to the increased recognition of the importance of SMEs in further developing the Indian economy, providing broad-based support.

Second, sample SMEs did not use the collective technical support systems frequently. Software did not use them at all. SMEs in the technologically less intensive sectors used collective technical support systems more frequently. That is, collective technical support systems are not expected to play an increasingly important role in future. The arena will belong to the private providers of support.

Third, broad-based state or public agencies are used but their usefulness was reported by sample SMEs as low. Such a problem appears to stem from three sources.

(1) State or public technology support agencies lack manufacturing know-how and consequently cannot compete with foreign equipment suppliers in furnishing detailed blue prints. They are also unable to assist industry in solving the teething problems in the crucial stage in production.\(^{149}\)

(2) Public agencies can easily suffer from the symptoms of bureaucracy: time-serving, inertia, and the assertion of status rather than serving clients.

(3) While SME needs change rapidly in response to changing market environment, the capability of status-secured public agencies may not be able to change as dynamically as the market.

One way to solve the problem is to develop industry-specific, non-profit technical extension centres. For example, technical extension centres organised by trade associations in Germany, and prefecture level

\(^{149}\)See Kim (1989) for a detailed discussion of public research institutes in Korea.
technical R&D centres in Japan to cater for a geographically clustered group of SMEs in the same sector, play an effective role in diffusing and upgrading technology in the sector. Even in this study, SIDO in footcomp, and “other government institutes” in garments and jewellery, were the most frequently mentioned sources of technology with fairly high usefulness scores, indicating their effective role in upgrading the technological level of SMEs geographically clustered in different regions.

Fourth, the government has followed the policy of reserving certain products for production only in the small-scale sector. Our data, however, shows that there is no statistically significant association between the use and usefulness of collective technical support systems and such product reservation. Despite the fact that product reservation, as in footcomp and garments, is designed to provide collective assistance to relatively smaller SMEs, our data shows that larger SMEs use collective technical support systems more frequently and consistently assigned a higher usefulness score than smaller ones. That is, larger SMEs with enough experience and internal capabilities are in a better position to take advantage of external resources available elsewhere. While it is important to promote these larger SMEs, equally important, if not more, is to promote the birth of technologically dynamic smaller firms. Collective support systems should develop new measures to foster smaller SMEs emerge and overcome “infant mortality” in order to enable them to grow strongly in early years.

Fifth, this study found that SMEs, which are active in taking advantage of technical support systems, are also likely to benefit from marketing and financial support systems. A high correlation in the use of different support systems may be attributed to the fact that support programmes are complementary. For example, when SIDBI provides financial support for process modernisation, it takes into account if the beneficiary SME has appropriate access to training, technical assistance,
and information services to help implement the modernisation project. There could be another possibility of explaining the aforesaid correlation, as witnessed in Japan, Korea and Columbia. The same public agency may provide multiple support services. SIDO in India could be such an agency, but the sample SMEs did not corroborate it, perhaps because SIDO is a purely promotional body. A more flexible agency, such as the Technology Upgradation Fund of SIDBI, could be a step in this direction.

Sixth, individual professionals from universities and technical institutes were infrequently mentioned by sample SMEs, except in jewellery. It may be less costly and more effective for SMEs to identify individual engineers who might have specific expertise on problems SMEs face, and to hire them temporarily on a moonlighting basis than to enter formal research contracts with institutions.

Seventh, the mode of technology transfer differs between sectors according to the dynamism of technological change. In *footcomp*, jewellery and garments, where product technology is relatively simple, SMEs rely mainly on informal technology transfer mechanisms such as imitative reverse engineering. In contrast, in auto components and software, where product technology is complex and changes dynamically, SMEs tend to use formal technology transfer mechanisms such as foreign collaboration, and joint R&D. Some studies in Korea also postulate that SMEs in the same sector also evolve in acquiring external technology, as technical tasks become more complex over time.\(^{150}\) While they continue to imitate existing products, they take initiatives in developing technical ties with external organisations in order to make a major jump in building up their technological capability and to enter more sophisticated local and overseas markets than they have catered for thus far.

\(^{150}\)See Kim (1990)
Eighth, low imports of technologically sophisticated parts and components may appear to lend stability to Indian industries, but this feature may only be a result of import impeding government policies, rather than technological progress. On the other hand, heavy imports of components may make an industry lag behind in product and process innovations, and highly vulnerable in price and quality competition against foreign competitors. Writing about the Korean auto industry, Porter in his multi-country analysis of international competitiveness expressed his concern that Korean large assemblers had largely focussed their efforts on end products, with heavy dependence on imported parts and machinery from Japan.\footnote{See Porter (1990).} The problem is not so much the cost of inputs as its effects on the innovation process. In India, however, low imports of technology coexist with lack of innovation, which might be a sign of a lack of concern for international competitiveness.

Lastly, our data suggest that the role of private support systems may be significantly greater than the data in Table 5-2 and 5-3 would seem to indicate. It is important to develop a rich network of public technical support systems, but equally important is to develop mechanisms, whereby private actors may interact more freely for technical supports. The importance of order placing firms, equipment suppliers, and international exhibitions are well demonstrated in our data.
5.8 Cross-country Comparison

As we did for export marketing in Chapter 4, we would now compare our conclusions regarding technical support for SMEs with the experience of Indonesia, Japan, Korea and Colombia (Levy, 1994).

Leading Sources of Technological Capability

In Japan, vertical relations with large firms emerged as a crucial source of external capability. This highlights the power of inter-firm flows of information within industrial districts as an important source of technological capability. Interactions with the international marketplace emerged as the most important source of technological capability for Indonesian SMEs. In Korea, however, the leading mechanisms involved the transfer of technological capabilities from abroad, with the transfer requiring conscious technological effort by firms. Thus international exhibitions, formal technology transfers, and moonlighting by Japanese engineers figured high in the list for the sub-sectors with relatively complex technological requirements. This appears to be a purposeful strategy to substitute for the relative weakness of vertical inter-firm relations as a channel for technological learning. Colombia presented rather *ad hoc* patterns of technological learning. Unlike Japan and Indonesia, Colombia’s SMEs received strikingly little support from buyers downstream. Again, unlike Korea, Colombian firms do not appear to have purposefully substituted overseas private sources for weak vertical inter-firm relations. There is, however, evidence of some horizontal inter-firm flow of information, and noticeable technological support role of some industry associations. India, too, resembles the Colombian scene in its technological isolation, and *ad hoc* learning. It has weak inter-firm linkages, and appears to depend heavily on foreign
equipment suppliers and international exhibitions for its SMEs to acquire technological capabilities.

In all five countries, private sector rather than collective mechanisms emerge as leading external sources of technological capability. Yet, underlying this aggregate similarity, there are substantial cross-country (and cross-sector) differences in mechanisms of technology acquisition. While our number of sub-sector observations is limited, we nonetheless find it heuristically useful to identify in Table 5-6 distinctive country patterns of technological acquisition.

Table 5-6: Mechanisms of External Technical Support – An Overview

<table>
<thead>
<tr>
<th></th>
<th>Craft-based Activities</th>
<th>Engineering-based Activities</th>
</tr>
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<tbody>
<tr>
<td>Japan</td>
<td>Vertical inter-firm relations plus geographical concentration</td>
<td>Vertical inter-firm relations plus geographical concentration</td>
</tr>
<tr>
<td>Indonesia</td>
<td>Linkages through international marketplace</td>
<td></td>
</tr>
<tr>
<td>Korea</td>
<td>Horizontal flows within geographical cluster</td>
<td>Activist technology strategies at firm and industry levels</td>
</tr>
<tr>
<td>Colombia</td>
<td>Limited geographical concentration phenomena</td>
<td>Ad hoc technological learning</td>
</tr>
<tr>
<td>India</td>
<td>Limited horizontal flows within geographical cluster</td>
<td>Ad hoc technological learning</td>
</tr>
</tbody>
</table>

A striking feature of Table 5-6 is the influence of country “endowments” of technology networks available to SMEs on the mechanisms of technological acquisition. Japan’s vertical and horizontal inter-firm relations, Indonesia’s international linkages with the extended Chinese community, and Korea’s horizontal linkages within an industrial district play an important role. Where endowments are limited, the challenge of technology acquisition is a formidable one, and as in Colombia and India, the consequence can be technological isolation and ad hoc learning. Yet the experiences of both Korea’s engineering-based SMEs, and to a lesser extent Colombia’s craft-based leather and garment
SMEs, suggest that it is possible to successfully surmount this challenge via activist strategies at both the firm and collective levels.

**Collective Technical Support: Its Demand and Use**

Evidence in the country studies enables us to group our country-sub-sector observations to correspond with the three schedules of demand for collective technical support depicted in Exhibit 5.2:

1. Demand is lowest (i.e., corresponds with D1D1) for SMEs in the six Japanese and Indonesian sub-sectors, and for Korea’s woven textile SMEs. In India, the jewellery and garments sub-sectors belong to this category. Their technologies are relatively simple and they have good access to private technological support.

   **Exhibit 5.2: Use of Collective Technical Support**

2. Demand is somewhat higher (i.e., corresponds with D2D2) in Colombia’s two craft-based sub-sectors, as also in India’s footcomp sub-sector. While technologies are relatively simple, their access to private technologies are relatively simple and they have good access to private technological support.

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152 Table 5-3, lines (9) and (10).
technical support is weaker than for their Indonesian and Japanese counterparts.

(3) Demand is highest (i.e., corresponds with D3D3) for Colombia's machinery SMEs, and for SMEs in Korea's three engineering-based subsectors. India's auto components sub-sector belongs to this category. An apparent exception is the knowledge-based computer software sub-sector in India, which though highly complex in its technology, does not demand collective support systems for technology acquisition. This would be a wrong conclusion arising only from definitional problems. Respondents perceived collective technical support to be public institutions providing hardware support to the industry, which do not exist. If, however, technical support is interpreted in terms of institutions providing skilled manpower that develops software, the demand for public institutions such as institutes of technology and engineering colleges is paramount, thus confirming our hypothesis that this sub-sector should conform to D3D3.

Additionally, within individual sub-sectors, smaller and less well-connected firms are on a higher demand schedule than their larger counterparts, as hypothesised.

There are substantial cross-country and cross-sector variations in the supply capabilities of collective institutions. Consequently there can be serious identification problems in distinguishing between supply-side and demand-side explanations for such variations.

Demand-side variations alone seem sufficient to account for two of the empirical patterns observed. First, in Korea collective technical support was valued most highly for the technologically complex automotive parts and factory automation sub-sectors, and least highly for the technologically straightforward woven textile sub-sector, a pattern that is consistent with the first hypothesis we presented in section 5.3.
This holds for India as well. Second, in both Colombia and Indonesia, there was evidence that collective technical support was more highly valued, within some individual sub-sectors (leather products in Colombia; rattan and wood furniture in Indonesia), by firms which were small at start-up and achieved substantial subsequent success, including export success. Such clear evidence is missing for other sub-sectors in Colombia, or for that matter in Japan, Korea or India. We have, however, seen already that in India it is the relatively large firm that uses collective support more frequently.

On the supply-side, evidence on delivery of collective support suggests, presented in the following sub-section, that it is reasonable as a first approximation to distinguish among three supply schedules:

1. S1S1, corresponding to Indonesia, whose institutional capabilities to supply support appear weakest among the countries studied;
2. S2S2, corresponding to Colombia and India, which appear to have an intermediate level of collective supply capability; and
3. S3S3, corresponding to Korea and Japan, where the institutional capabilities for collective supply are strongest.

As is illustrated in Exhibit 5.2, taken together the above propositions as to supply and demand imply that, among the countries and sub-sectors studied, the use of collective technical support should be highest for SMEs in Korea’s three engineering based sub-sectors, and lowest for Indonesian firms. By and large, this pattern is supported by evidence. The relative importance of collective technical support among the remaining sub-sectors, India included, depends on the magnitudes of shifts in demand and supply schedules, and hence cannot be depicted unambiguously.
The Delivery of Collective Support

Collective technical support takes on one of two very different forms. It can be “broad-based,” and work to facilitate the emergence of an “information-rich” environment. Alternatively, it can try to promote “high-intensity” technological learning by supplying technical inputs directly to firms. While it is reasonably easy to distinguish between the supply of “broad-based” and of “high-intensity” support for India, Colombia, Indonesia and Japan, the two types of support are provided jointly in Korea.

“Broad-based” collective support works to enhance the overall availability of usable information, leaving it to firms to judge what information sources might be most useful, and how they might be adapted to a firm’s specific needs. Examples include: sponsoring courses on specialised topics; facilitating the use of specialised consultants; and promoting information sharing among firms. Supports along these lines can be used across all levels of technological complexity, and the institutional demands of provision are relatively light. Support along these lines was used – and reported to be quite useful – in India, Indonesia, Colombia and Japan. Broad-based support was delivered by decentralised institutions – either by industry associations, independent non-governmental organisations, or by local governments in industry clusters. Financing, though, sometimes was provided by central institutions.

The goal of high-intensity collective support is to meet those specific technological needs of firms that are not adequately addressed through other channels. Demand for support along these lines emerges only at relatively substantial levels of technological complexity. Similarly, the institutional demands of supplying useful high-intensity support are likely to be substantial – the collective agency supplying such
support needs to have more competence on very specific problems than do the firms themselves. In India, Indonesia and Colombia firms did not report benefiting on any significant scale from public programmes to provide direct high intensity technical assistance. In Japan, such support was indeed provided in the early parts of the twentieth century, but there is less evidence of the same now. In Korea, however, the sampled firms, which were relatively large and export-oriented, reported receiving substantial benefits from that country's network of state-owned support institutions. Also, comparative empirical research on parastatal behaviour has revealed Korea to be an outlier in its ability to establish and sustain a relatively efficient parastatal sector.

**Implications for Public Policy**

As with export marketing, a central lesson of the comparative research is that private mechanisms play the leading role in the efforts of firms to acquire technological capability. Consequently, the priority task for public policy is to ensure that the business environment facilitates, rather than obstructs, the private-to-private flow of information. Key measures here might include:

(i) an openness to expatriate workers and technology transfer from abroad;

(ii) investment in human capital, including engineering education; and

(iii) a spatial policy that nurtures the emergence of industrial clusters.

Yet once a friendly business environment is in place, the question remains as to whether there might be pro-active interventions at the micro level which can accelerate technological upgrading by firms. Cross-country analysis suggests that there are. There exist identifiable categories of firms, sub-sectors and countries for which the benefits derived from collective technical support are substantial.
Our analysis uncovered two distinct approaches to collective technological support: (i) broad-based and (ii) high-intensity support. The goal of broad-based support is to contribute to an information-rich environment, and its delivery mechanisms characteristically are decentralised. The role of the central government remains limited to that of partial financier. It can be a useful aid to the technological efforts of firms of all levels of technological complexity. By contrast, the goal of high-intensity support is to offer direct technical assistance to firms, typically by parastatal providers. Its role becomes increasingly salient as industrial development begins to encompass technologically complex activities.

While it is possible that, if successful, the returns from high-intensity support can be very substantial, on all other counts the advantages would appear to lie with broad-based support. Costs are likely to be lower, since provision of broad-based support does not require the kind of elaborate physical and personnel infrastructure that high-intensity support does. Being institutionally less elaborate, the organisational demands of broad-based support are fewer, and the risks of organisational failure lower. And being decentralised in delivery, broad-based providers are more likely to gauge accurately what kinds of technical support firms would indeed find useful.

In sum, we find that broad-based collective technical support may be worth pursuing in many settings. Countries that already have in place a well-functioning system of broad-based collective support, and are moving into technologically more advanced activities could consider also the option of high-intensity support, but in doing so should proceed with caution.
ANNEX-I TO CHAPTER 5
TECHNICAL SUPPORT INFRASTRUCTURE IN INDIA

This Annex contains a brief description of the institutional infrastructure available in India for technical support to SMEs. This inventory of Indian support institutions and their performance is based upon their published but scattered reports. While it contributes to our understanding of the Indian support infrastructure, it is also the first such compendium for purposes of reference.

5-1.1 TECHNOLOGY SUPPORT NEEDS OF SMEs

In today's globalised economies, advance in product and process technology is a driving force towards competitiveness. Internationally, large corporations have recognised this and usually devote considerable resources towards innovations in product and process technologies, as well as the development of entirely new products and processes. Such technologies developed by these private organisations are proprietary and become part of the intangible assets of the firm. Development of such proprietary technologies is not feasible in the case of most individual SMEs, since in most industries it requires more financial infrastructural and human resources, which they are unable to muster.

2. An area related to the development and adoption of new technologies is the modernisation and upgrading of the existing technologies. A firm level study by the NCAER-FNST in December 1993, revealed that the small scale units surveyed were still largely using manual or semi-automatic processes, and the incidence of automatic processes was very low. The level of technology used by the SMEs in India, is by and large, outdated or obsolete. Amongst the reasons for the continued use of outdated technologies by the SMEs are the lack of financial resources, and lack of knowledge and skills for modernisation of processes.

3. The second major driver of competitive advantage in today's markets is product quality. Quality enhancement enables an enterprise to move up the value chain and retain discerning, quality conscious customers. As the experience of the quality movement in Japan illustrates, quality improvement may be concomitant with lowered costs as well. In the context of exporting firms from developing countries, high quality standards and international quality certification are necessary for market entry into developed economies in most product categories.

4. Most SMEs however, cannot afford to employ professionals in the quality function, for spreading quality awareness and co-ordinating quality improvement programmes in their organisations. Nor do they know how to gear up the systems and processes in their organisations for international quality certification like the ISO 9000 series. In the related area of testing and calibration services, expensive machinery and infrastructure is required for many forms of testing which again is beyond the capabilities of SMEs.

5. In mechanical engineering industries, design development and manufacture of tools, dies, jigs and fixtures require fairly large investments in machinery and related infrastructure. SMEs need supporting organisations that offer these services.
6. Two other directions in technology evolution are those towards energy conservation and environment friendliness. SMEs need the support of competent organisations to assist them in energy conservation efforts, and to establish adequate pollution control measures.

5.1.2 OVERVIEW OF TECHNOLOGY SUPPORT SERVICES

7. To meet these technology support needs there are a large number of organisations offering one or more areas of support to SMEs. These take the form of:

(1) **Equipment / Infrastructure leased services**, such as:
   (a) Testing, Calibration and Inspection
   (b) Prototype Design and Development
   (c) Tool Design, Development and Manufacture
   (d) R&D and Technology Development, and

(2) **Knowledge / Skill / Information based services**, such as:
   (a) Modernisation and Technology Upgrading Assistance
   (b) Process Innovation and Productivity Improvement
   (c) Quality Awareness and Quality Improvement
   (d) Facilitation of Technology Access and Transfer
   (e) Energy Conservation
   (f) Pollution Control
   (g) Consultancy and Project Feasibility Appraisals.

8. An overview of the forms of technology related services available to SMEs and the organisations providing them, was presented in Exhibit 5.1. The following sections describe each area of service, mention the institutions that offer that service and summarise the major achievements of each institution in providing that service (as reported in their latest available literature / annual reports).

9. Each section concludes with remarks on the relevance of the key institutions in the current scenario and, where appropriate, suggests a list of the areas / services that need to be introduced or strengthened.

10. The organisations providing technological services to SMEs are:

(1) The Small Industries Development Organisation (SIDO) and its 28 Small Industries Service Institutes

(2) Six Product and Process Development Centres (PPDCs), which are affiliated to the SIDO.

(3) Four Regional Testing Centres (also affiliated to SIDO)

(4) The National Small Industries Corporation (NSIC), and its five Prototype Development and Testing Centres (PDTCs)

(5) The 17 Technical Consultancy Organisations (TCOs)
(6) The 10 Central Tool Rooms, including 4 under Indo-German collaboration, and 3 under Indo-Danish collaboration. These are also affiliated to the SIDO.

(7) The National Productivity Council (NPC)

(8) The Bureau of Indian Standards

(9) The Technology Bureau of Small Enterprises (TBSE)

(10) The Exports Inspection Council (EIC)

5.1.3 TESTING, CALIBRATION & INSPECTION SERVICES

11. The Ministry of Industry, Government of India has taken initiatives to set up a network of common service testing facilities for SMEs in various industries. The services provided by these institutions broadly include:

Mechanical testing, which includes the areas of material testing, i.e., inspection and material profile tests, cantor and surface testing of products.

Electrical testing, which includes testing of domestic electrical appliances, measuring instruments and electrical machinery like motors, transformers, etc.

Metallurgical testing, which involves destructive testing of metallic and non-metallic parts, and non-destructive testing through X-rays, magnafux, and metallography test facilities.

Chemical testing, which includes laboratory agent based testing of ferrous and non-ferrous metals and alloys and chemical composition testing, as well as coating thickness measurement facilities.

12. The key organisations providing these testing facilities are briefly discussed below.

(1) The 4 Regional Testing Centres (RTCs) and the field testing stations affiliated to them. They were created for the specific purpose of providing the whole range of testing services to SMEs, and possess extensive infrastructure and testing facilities catering to most of their routine needs. The RTCs are located in Calcutta, Mumbai, New Delhi and Chennai. The RTCs carry out routine activities of product testing, calibration services, third party inspection and related guarantees, and diagnostic study / failure analysis. They also carry out quality awareness, ISI certification, and ISO 9000 programmes.

(2) Two of the Central Tool Rooms also extended testing facilities to SSIs, though their basic thrust is on tool engineering services. These were the Central Institute of Hand Tools at Jallandhar, and the Hand Tool Design, Development and Training Centre at Nagaur.
(3) The Prototype and Process Development Centres (PDTCs) attached to the NSIC are industry specific institutions set up to assist SSIs in product and process innovation. 3 PPDCs also provide testing and calibration services, to their respective industries. These are:

(a) PPDC for essential oils at Kannauj.

(b) PPDC for foundry and forgings at Agra.

(c) Institute for Development of Electrical Measuring Instruments (IDEMI), at Mumbai.

(4) Besides these institutes, which serve the small-scale sector specifically, there are various laboratories / institutes serving all industries in this area. These include Government Labs such as the National Physical Laboratory (NPL), and those under the CSIR, which serve all sectors for their testing needs. In the private sector, the Sri Ram Institute for Industrial Research, New Delhi is one such institute.

13. Amongst the small-scale sector specific testing facilities, the 4 RTCs and the FTS attached to them are dominant organisations providing these services. The following aspects can improve the effectiveness of these organisations:

(a) Enhanced reach: This may be done either by setting up more such institutions in unserved or inadequately served areas that need these services - say industrial pockets; or by setting up communication and collection systems by which the test samples can be easily and quickly inspected and certified.

(b) Enhanced awareness of services: A campaign or contact program can assist in improving awareness of services and consequently their utilisation.

5-I.4 TOOL DESIGN AND ADVANCED MECHANICAL FABRICATION SERVICES

14. In mechanical engineering industries, a central element of technological capability is the ability to design, develop, manufacture and maintain sophisticated tools, moulds, dies and fixtures. These require the setting up of a tool room, with expensive and often complex machinery and trained engineers / technicians who are skilled at tool engineering. The government has set-up a well spread out network of dedicated tool-room-cum-training centres, known as the Central Tool Rooms to cater to the tooling needs of the SMEs on a preferential basis.

15. These Tool Rooms have been set-up in international collaboration with

(a) Germany: There are four Indo-German Tool Rooms - located in Ahmedabad, Aurangabad, Indore and Ludhiana.

(b) Denmark: The three Indo-Danish Tool Rooms are at Ban Hoogly (Calcutta), Jamshedpur and Bhubaneswar.
(c) UNDP/ILO: The Central Institute of Tool Design (CITD) at Balanagar, Hyderabad, Central Institute of Hand Tools, Jallandhar and Hand Tool Design Development & Training Centre, Nagaur (Rajasthan) were set-up with their assistance.

16. A summary of the activities of the tool rooms is provided below. In general, the activities of these Central Tool Rooms are in the areas of:

(a) Providing advisory / consultancy support for the design, development, and manufacture of tools, dies, moulds, jigs, gauges fixtures and related items

(b) Providing service facilities in the above areas i.e. to prepare designs or develop / manufacture the tools and other items using advanced design and manufacturing facilities available at the tool room

(c) Imparting training in various aspects of tool engineering, tool making and allied engineering trades

(d) Common service facilities like precision machining and heat treatment facilities

17. Though the tool rooms offer their various facilities to SMEs on a preferential, non-profit basis, they also serve the large-scale sector.

18. The focus of different tool rooms mentioned above varies. The CITD at Hyderabad is primarily a training and consulting organisation in this field and undertakes limited production of complex tools. The Indo-Danish Tool Room at Calcutta, however, reports production of tools/moulds/fixture to be its major activity.

19. In general, the Tool Rooms concentrate on imparting training on various aspects of tool and die making using its advanced machinery, consult on solving complex tool engineering problems, and make available their state-of-the-art equipment for the manufacture of complex tools and related items.

20. Besides the above tool rooms, two PPDCs, which are basically oriented to serving the Electronics and Electrical Instrumentation Industries, provide similar tool room services, as a part of their overall range of services. They are:

(a) Electronic Service and Training Centre (ESTC), Ramnagar (Nainital). This institute provides training and common services facilities for SSIs in the areas of

   (i) PCB design, Manufacturing and Assembly,

   (ii) Basic Electronics, TV and VCR,

   (iii) Testing and Calibration of Electrical instruments and devices,

   (iv) Computer and related facilities,

   (v) Electrical Winding services, and
(vi) Mechanical Workshop and Tool Room.

(b) Institute for Design of Electrical Measuring Instruments (IDEMI), at Mumbai:

This institute has been set-up primarily to provide services in the areas of:

(i) Calibration and Testing of Electrical Measuring Instruments,
(ii) Process Control Instrumentation,
(iii) Technical Consulting, Design and Development in the above areas,
(iv) Prototype Fabrication in the Mechanical Workshop,
(v) Consulting in Tool design, and
(vi) Training in Calibration and Testing of Instruments and their maintenance.

21. Besides the above institutes, 25 of the 28 SISIs and the Product Development and Testing Centre (PDTC) on Foundry and Forgings at Agra, also provide Mechanical Fabrication and Tool Development Services. Most of the SISIs have basic Mechanical Workshops where SMEs can get their precision fabrication jobs undertaken. However, they usually do not possess sophisticated equipment needed for manufacturing advanced/complex jobs or tools. For such jobs, the units have to approach one of the Tool Rooms.

5-1.5 QUALITY AWARENESS, IMPROVEMENT AND CERTIFICATION SERVICES

22. The quality of the products manufactured by SMEs, in general, is reported to be inferior to those of the large enterprises. This has been the result of several factors, some of which are explained below:

(a) Since SMEs compete largely in the low priced segment of the market, the customers tend to accept the lower quality of their goods.

(b) In the case of products reserved for the SSI sector, they have been sheltered from competition from higher quality products of the large-scale enterprises.

(c) Lack of awareness of design and implementation of quality systems has also acted as a barrier to their growth.

(d) The small companies generally employ low cost labour, and their lack of technical skills also prevent the growth of a quality culture among them.

23. This scenario is, however, changing rapidly, with the SMEs increasingly finding it necessary to upgrade quality in order to compete in both domestic and international
markets. In the domestic market, this pressure has been brought on by the increasing quality consciousness of the consumers, increasing competition from imports, which have now been liberalised, and from large companies in product categories like ice creams, which have recently been de-reserved. In the global markets for products like footwear and garments, India's traditional strengths in providing lower cost, inferior quality products is facing competitive threats from other low cost producers like China and the Philippines.

24. In this context, the SMEs are in urgent need to re-look at the issue of product quality. Their support needs in the area of quality fall broadly into three areas:

(a) Awareness creation among the entrepreneurs about the need and importance of focussing on quality, and the consequent benefits.

(b) Assistance in measurement, improvement and maintenance of quality, and setting up of quality systems like those of the ISO 9000 series, and training.

(c) Certification on quality standards.

25. In India, support services are available for SMEs in all three of the above areas, as described in the following paragraphs.

Quality awareness:

26. These services usually take the form of short seminars on quality systems like the ISI or the ISO, wherein the SSIs are made aware of the benefits of obtaining these quality certifications, and encouraged to implement these programmes. The institutions providing these services were 17 of the SISIs (as reported in their annual report for 1992-93), all the 4 Regional Testing Centres (RTCs), the Bureau of Indian Standards (BIS), and two of the Product and Process Development Centres (PPDCs), besides the initiatives taken by various industry associations like the CII. The workshops and seminars are often conducted in collaboration with local industry associations.

Assistance in Quality Improvement and Setting Up of Quality Systems:

27. The BIS is a key agency providing quality improvement services for SMEs, as a precursor to its certification programmes. It provides pre-certification services such as:

(a) Quality System Certification Program

(b) Quality System Survey

(c) Quality System Trial Assessment

28. It also provides training and consulting in company standardisation, statistical quality control, laboratory testing, and other related areas.
29. The SISIs also take up the task through quality improvement programmes, focussed usually on specific industries located in nearby clusters. The SISI at Kanpur, for example prepared a report on the glass bead industry in 1992-93, and suggested quality control measures for it. During the same year, the SISI at Cuttack prepared similar reports on the foundry, industrial fasteners, and aluminium collapsible tube industries.

30. The National Productivity Council (NPC), besides its primary task of productivity improvement services, also provides assistance to companies for acquiring Total Quality Management, ISO-9000, and ISO-14000 certification.

31. The Export Inspection Council was set up in order to ensure sound development of export trade of India through Quality Control and Inspection. It advises the Government regarding measures for enforcement of these standards in relation to commodities intended for exports. The Council implements the various measures and policies through its five Export Inspection Agencies.

32. The other institutions assisting the SMEs in this area are

(a) the Product and Process Developement Centres (PPDCs) at Kannauj (for essential oils) and at Agra (for foundry and forgings)

(b) the Central Institute of Tool Design at Hyderabad, and the Central Tool Room and Training Centre at Calcutta, which provide this service to the mechanical engineering industries, in addition to their primary task of extending tool engineering services.

33. Besides the institutional forms of support, some ancillary units obtain quality improvement support, besides other forms of technological support from their parent organisations, as in the case of the auto components industry.

Assistance in Quality Certification:

34. The BIS is the primary agency for formulating the national standards (the IS), certifying their achievement, as well as for assisting the SMEs in upgrading their quality systems for obtaining product certification. Under the certification scheme of the BIS, manufacturers are granted licence to use the ISI Standard Mark on their products. A host of public and private organisations give preference in purchases to products that have this certification.

35. The BIS provides concessions to SSIs in its fees. Besides the IS certification, the BIS is also the nodal agency appointed by the government for assistance in certification of the ISO 9000/ ISO 14000 series of standards, and those of the IEC (for electrical equipment). Besides, it acts as a technical enquiry and information service for international standards like the IEC, the ASTM and the API, as well as that of more than 75 other countries.

36. For the international quality standards like the ISO, there are other private organisations like the BVQI which provide this certification in India. However, these
being international organisations, their charges are often beyond the reach of small businesses.

37. The SME sector in India needs to focus sharply on achieving quality standards so that they can be competitive at the international level. Product quality and systems quality both will need to be enhanced to achieve this objective. There is an urgent need to augment the awareness and motivational efforts of the various institutions to persuade the SMEs to improve their quality standards.

5-I.6 PROCESS INNOVATION & PRODUCTIVITY IMPROVEMENT

38. Process innovation involves a detailed study of the various processes in the selected unit and suggestions on feasible improvements in them. These process changes/innovations are aimed at lesser wastage, better utilisation of resources and improved throughput. The key institutes providing these services to the small-scale units are the six PPDCs and the NPC.

39. Productivity improvement efforts are carried out through in-plant studies of the organisation, management, production and technical procedures of the unit with the objective of removing process and procedural redundancies, and the overlaps in tasks, so as to smoothen and streamline the operations.

National Productivity Council (NPC)

40. The NPC was set up as an autonomous organisation under the Ministry of Industrial Development. Its main objective is to promote efficiency and productivity in industry as well as in business and trade. It has established six regional branches and sponsored over fifty local productivity councils. The local councils are representative of industrial enterprises, trade unions, government agencies, and technical and professional institutions. The main functions of the Council are to stimulate and sustain productivity movement countrywide through studies, seminars, surveys and other related activities. It undertakes studies on the operation of individual enterprises, in particular their production and technical procedures and recommends changes/improvements.

Product-cum-Process Development Centres (PPDCs):

41. Six PPDCs were set up under SIDO primarily to assist the SSIs in product and process development in specialised areas. These were household electrical appliances at Mumbai, castings & forgings at Agra, essential oils at Kannauj, sports goods at Meerut, electronics industry at Ramnagar (Nainital) and glass industry at Firozabad. The activities and achievements for the two PPDCs that provided significant service in the area of process innovation/improvement in the year 1992-93 are mentioned below:

(a) PPDC - Meerut: The Centre was set-up with UNDP assistance in 1984 for development of sports goods industries in the small and cottage sectors. Improving the quality of existing products and developing new products for export markets, imparting training, and providing common facility services were the other objectives. Two notable achievements of this PPDC in 1992-93 have
been developing a process of controlled & quick drying method for drying of the "inner core" of a cricket ball, and developing a special process of clicking die for the thigh pad. The direct assistance received by the industry at Meerut has contributed in a steep rise in exports of sports goods from Meerut compared to overall exports of sports goods from the country.

(b) **Centre for the Improvement of Glass Industry, Firozabad (UP):** This is a PPDC affiliated to the SIDO, specifically set up to provide technological support to the small-scale glass industry through long term programming and creation of support facilities within the centre. The key objectives of the centre are development and adoption of new technologies, processes and products for the glass industry, and to provide support for efficient utilisation of resources i.e. in productivity improvement.

(c) **Small Industries Services Institute (SISI):** Some of the SISIs, notably those at Bangalore, Mumbai, Calcutta, Hyderabad and Muzaffarpur provide services in the area of process innovation and improvement.

42. NPC, being an apex body for productivity improvement and process innovation can play a critical role in this area, given its internal resources and the knowledge base developed over the years. In this regard, it may be noted that even though support to the SMEs is the thrust area of the objectives behind setting up of NPC, it being a self funded council, preference is given to projects from the larger industries, which can afford to pay higher charges.

**5-1.7 PRODUCT & PROTOTYPE DESIGN AND DEVELOPMENT**

43. The key institutions that provide technical services to the SMEs in the area of product / prototype design and development are:

(a) **Six Process and Prototype Development Centres (PPDCs) under the SIDO.**

(b) **Five Prototype Development and Training Centres (PDTCs) under the NSIC.**

44. Their activities in these areas are described in the subsequent paragraphs. Besides these institutions, seven of the SISIs, and two of the Central Tool Rooms (at Calcutta and at Hyderabad) also extend product design / development services to SMEs.

*Prototype / Product Development Assistance by the PPDCs:*

45. The six PPDCs provide the SSIs with design / development assistance for improving their existing products, and assist them in designing prototypes with indigenous technology. As mentioned earlier, these are industry specific institutions, designed to work as R&D Institutions to carry out advanced developmental work in the concerned fields.

46. The main functions of these PPDCs are:
(a) To serve as R&D institutions in areas of dense industry clusters.

(b) Carry out product design and innovation in their designated product categories.

(c) Provide product and process improvement services.

(d) Development of improved packaging techniques.

(e) Common facility centres for carrying out developmental and testing work.

(f) Manpower development and training in the above areas.

Prototype Development & Training Centres:

47. The five Prototype Development & Training Centres under NSIC, located in Chennai, Howrah, Hyderabad, Okhla (New Delhi), and Rajkot, provide diverse technical support to the small-scale sector, including assistance in product design, and extension of common service facilities for prototype manufacturing. Besides, they also conduct a large number of technical training programmes on different industries for trainees and skilled workmen. In 1996-97, the PDTCs and sub-centres trained 5821 technical personnel (5394 during the previous year) and provided common facilities support to 9646 units (9262 during the previous year). On the production front also, these centres achieved a production of Rs. 49.6 million in 1996-97 against Rs. 44.7 million during the previous year.

48. On the technology side, the major achievements are (a) introduction of CNC technology at PDTC, Chennai and Hyderabad, and (b) introduction of new training programmes in Product Modelling and Product Design at PDTC, Okhla, in fibre optics technology at PDTC, Hyderabad, and post-diploma courses in footwear technology at PDTC, Chennai. The four main centres at New Delhi, Howrah, Rajkot and Chennai continued to enjoy the status of "In-house R&D Centres" of the Department of Scientific Industrial Research (Ministry of Science & Technology) in 1996-97.

49. Reports on the activities of the PDTCs indicate that they are engaged mainly in the training and extension of common service facilities functions. These institutions can play a more active role in assisting SMEs in prototype design and development for specific products. Specific finance schemes may be arranged by financial institutions to defray the expenses and fees. There is also a need to increase awareness of the facilities available with these institutions.

50. Further, the general industrial design institutes like the Industrial Design Centre of IIT in Mumbai, and the National Institute of Design at Ahmedabad could be encouraged to take up projects for the small-scale sector, perhaps on a subsidised basis.
5.1.8 MODERNISATION & TECHNOLOGICAL UPGRAADING

51. There are several institutions providing various forms of assistance to SMEs for modernisation and technological upgrading. These include the SIDO and all its SISIs, the PPDCs of SIDO, the NSIC and its PDTCs, nine of the Technical Consultancy Organisations (TCOs), the National Productivity Council (NPC), and the TBSE. The activities of each of these organisations is discussed below:

SIDO and the SISIs:

52. The SIDO and the SISIs conduct industry specific studies in large concentrations / clusters of SSIs, in conjunction with SIDBI and other banks to establish the commercial viability of modernisation. The financial institutions provide financial support to these industries on a priority basis. Accordingly, SIDO has identified a few clusters and the programme of study and implementation is entrusted to the SISIs all over the country.

National Small Industries Corporation (NSIC):

53. One of the services offered by the NSIC is to transfer technology and know-how to the SMEs through its five Prototype Development and Testing Centres. For the benefit of the software sector, the Corporation has set up a Software Technology Park and Technology Transfer Centre at Okhla, New Delhi. It is in the process of expanding its activities by having another Software Technology Park in Chennai.

54. Under the technology upgrading programme, NSIC has been conducting a technology fair "Techmart" as well. The Techmart concept has created inter-linkages and economic co-operation between SMEs in the developed and developing countries with NSIC as a facilitator for technology transfer. Techmart India 1996 had 272 enterprises from all over India coming from almost all industrial segments, which displayed a wide range of technologies, plant and machinery and products conforming to international standards.

55. The corporation organised the fifth international technology fair in November, 1996, sponsored by SIDBI. This has become an excellent platform for the technology and marketing needs of the SSI sector, and also for stepping up exports of the Indian technologies particularly to the developing countries.

56. Under its "Technology Dissemination/ South-South Co-Operation" programme, the NSIC also organised an exclusive technology fair in Mali in December 1996 for strengthening of South-South co-operation. This was a first-ever exhibition in a Francophone country. The technologies and products displayed were well received by the entrepreneurs in Mali and other neighbouring Francophone countries.

57. NSIC has taken major initiatives in the area of international co-operation. The Ministry of Industry has identified nine countries for the purpose of international co-operation to upgrade technology levels in Indian small enterprises. The international co-operation scheme was started about two years back. During 1996-97, NSIC has been able to establish partner institutions in South Korea, Taiwan, UK, Germany and Israel.
58. NSIC has also been working very closely with the Italian Institute of Foreign Trade, Italy especially for co-operation within the Toscana region of Italy, which is the stronghold of Italian small and medium enterprises. Partner institutions are yet to be established in the three remaining countries of USA, Japan and Singapore. The major initiatives taken in the area of international co-operation during the year 1996-97 entail not only various small industry missions and delegations to other countries but also various tie-ups and joint ventures between SMEs of India and other countries.

**Technical Consultancy Organisations:**

59. The Technical Consultancy Organisations (TCOs), set up in various states by the Financial Institutions, provide a complete range of consulting services for SMEs, including modernisation / rehabilitation studies. During the year 1996-97, the TCOs completed 69 modernisation/ rehabilitation/ diagnostic studies. Further details on the activities of the TCOs are reported in a later section on “Consultancy / Project Appraisal Services.”

**National Productivity Council:**

60. The National Productivity Council (NPC) assists SMEs in modernisation / technology upgrading efforts, besides its core area of providing modern and superior productivity related services.

**Impact and Future Direction of Modernisation & Technology Upgrading Services:**

61. The SIDO and the SISIs are the institutions identified by the government as the most important facilitators of modernisation in the SSI sector. They are the field level institutions, with adequate reach, and a large complement of technical staff that can be deployed for this purpose. To be effective, however, they would need to identify industry specific technologists, and provide them adequate state-of-the-art technical training. Further, their general technical skills, would probably need to be complemented by the specific expertise of relevant industry specific technical institutions (for e.g. the Central Institute of Leather Research for Leather industry), which could jointly participate in the industry-cluster specific technology upgrading studies that are undertaken by the SISIs. The technological capabilities of the other premier public educational and research institutions (for example, the CSIR laboratories or the IITs) could also be harnessed for this purpose.

62. In spite of the phenomenal growth of SSIs in the last decade, the myriad manufacturers associations have not yet produced any worthwhile programme of self-help or service in this area. It is possible that these local industry associations are co-opted for these cluster-wide programmes, preferably on a part-financing basis.

63. One primary impediment to the technological upgrading of SMEs is their financial constraint. While the financial assistance provided to the small scale units under the Technology Development and Modernisation Fund (TDMF) of SIDBI has been instrumental in meeting this need, there is a need for more such schemes
5-I.9 TECHNOLOGY DEVELOPMENT, AND FACILITATION OF TECHNOLOGY ACCESS AND TRANSFER

64. India has numerous public institutions dedicated to R&D and technology development for industrial purposes, the most notable amongst them being the chain of around 40 CSIR laboratories. These complement the estimated 1,200 R&D departments of (usually large) industries, and around 500 non-commercial scientific and research organisations, in developing commercially viable indigenous technologies. Additionally, organisations like the CSIR and the National Research and Development Corporation (NRDC) act as repositories of the technologies developed by various government and public laboratories, and license them to industries. The CSIR, since its inception in 1942, has licensed out around 3,000 such technologies and processes to more than 6,000 licensees, 80 per cent of which are reported to be SMEs.

65. Despite these initiatives by the government and its institutions, the overall spending on R&D in India, at 0.9 per cent of GDP, is still low by world standards. This is mainly because of very low spending on R & D by private sector corporates in India. The preferred mode of technology access of this sector has been the acquisition of foreign technology through joint ventures, technology tie-ups, licences, etc.

66. However, foreign technology acquisition by SMEs in developing countries like India is difficult, due to lack of information on technology providers and sellers, their high cost where available. Besides, they often do not possess the skills necessary for adaptation of foreign technologies to Indian conditions. Towards this end, several initiatives have been taken by a UN-ESCAP body, called the Asia-Pacific Centre for Transfer of Technology (APCTT). Its activities include the establishment of contacts between technology suppliers and technology seekers, using its network of more than 1,000 partners in 70 countries, and assisting SMEs in technology acquisition, adaptation and upgrading, through its technology information/promotion services. In India, it has promoted the Technology Bureau of Small Enterprises (TBSE) for this purpose, jointly with the SIDBI. The specific areas in which the TBSE assists SMEs in accessing both domestic and international technology are:

(a) It offers a professionally managed system of partner search, which is particularly valuable in sourcing of technologies from SMEs of other countries.

(b) It helps in building confidence amongst prospective partners, assisting in the negotiation process.

(c) It provides a gateway to the international technology market through the internet and other channels.

(d) It carries out project appraisal, and depending on the cost of the project, undertakes financial syndication through SIDBI.

67. As of March 1998, TBSE had developed a client base of 326 SMEs, and initiated specific search for product and process technologies on behalf of 82 client enterprises.
68. The World Association of Small and Medium Enterprises (WASME) has also started a Technology Trade Promotion and Exchange Centre (TPX), which offers similar services like technology exchange and partner matching for SMEs.

Role and Likely Evolution of Technology Development and Technology Access Facilitation Institutes:

69. The network of government and public autonomous R&D laboratories (like those of the CSIR and the NRDC) are reported to possess state-of-the-art equipment and infrastructural facilities, and a large number of highly trained technical manpower. As such they have the potential to emerge as a leading provider of indigenous process and product technologies to the SME sector, supported by other premier organisations like the IITs.

70. However, there is a lack of awareness among the SMEs as to the capabilities of these institutions, and about the large number of commercially viable technologies that are already available for licensing with them. There is thus a need to develop awareness among the SMEs through interaction with industry associations, regional chambers of commerce, and financial institutions.

71. Also, the speed, convenience and cost of such technology access, has to be such that SMEs are motivated to use their services.

72. With regard to facilitation of international technology access, associating other technology support institutions with these efforts could possibly enhance the reach of activities of the TBSE and the TPX.

5-I.10 ENERGY CONSERVATION AND POLLUTION CONTROL SERVICES

73. Energy Conservation is a specific aspect of process and productivity improvement, which studies the various uses of energy in a manufacturing unit, and recommends process or procedural changes for reducing its consumption and wastage. A specific cell has been set up within the SIDO to offer assistance to small-scale units in this area, through the various SISIs. In the year 1992-93, 20 of the SISIs were reported to have undertaken studies in energy audit and energy conservation for various units. The SIDO also screens several video films on energy conservation in different industries (e.g. re-rolling mills, glass industry, ceramic industry, etc). Besides the SISIs, the other organisations reported to be offering energy conservation services are:

(a) The PPDC at Agra for the foundry and forging industries, and at Firozabad, for the glass industry.

(b) The PDTC of the NSIC at Rajkot.

(c) Four of the Technical Consultancy Organisations (TCOs) viz. - BITCO (Bihar), APITCO (Andhra Pradesh), KITCO (Kerala), and MITCON (Maharashtra).
(d) The National Productivity Council (NPC), which provides this service in addition to its core services of productivity and quality improvement.

74. In the past few years, environmental concerns and regulations have prompted the industry to making its manufacturing processes as well as manufactured products environment friendly. This has forced almost every industry to take a re-look at its processes and implement pollution control measures. Different support institutions are extending services to the SMEs in these areas, as described below.

75. The SIDO has undertaken a number of awareness programmes on pollution control with financial assistance from the Ministry of Environment and Forests (MoEF). Under this, 16 SISIs were reported to be involved in 1992-93 in creating awareness on pollution related issues and have also been providing consulting services to the SSI units for pollution control in their units. Some of the notable achievements of these Institutions are:

(a) Small Industries Service Institute, Chennai, in collaboration with industry associations, organised a seminar on Pollution Control in Foundry Industries at Coimbatore. The Institute also conducted a pollution control study in respect of sea food processing Industry.

(b) A study regarding pollution control in sodium silicate industry has been conducted by SISI, Trichur for the benefit of the SSI units.

(c) SISI, Cuttack has attempted a pollution control report on leather tanning industry in Orissa. The report suggests a typical process of tanning and also methods of affluent treatment and disposal.

(d) Training programmes on "Waste added-pollution prevention techniques" and "Duration and maintenance of effluent treatment plant" have been organised by SISI, Chennai for the benefit of small entrepreneurs.

(e) SISI, Trichur conducted a short-term educational programme on Industrial Pollution Control and Adoption of Clean Technology for the benefit of small industries in their area.

(f) SISI, Mumbai undertook a study on pollution control in Food Processing industries.

76. Besides, National Productivity Council along with its 14 regional offices provides technical services in (i) Pollution Prevention and Control, (ii) hazardous waste inventory, minimisation, and disposal, (iii) cleaner production techniques, and (iv) an integrated approach to environmental upgrading.

77. Moreover, the two cluster-specific PPDCs, affiliated to the SIDO, have also done notable work in the area of pollution control.
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(a) PPDC, Agra for Foundry and Forging provided a design for a wet cap to a unit in Agra. This system helps in stripping of air pollutants from the stack emissions.

(b) Another PPDC, a joint venture project in the name of Centre for the Improvement of Glass Industry at Firozabad has been set up with UNDP assistance, one of whose main objectives is environment protection.

The Role of Key Institutions and Future Directions:

78. In view of the high cost and serious shortage of energy faced by the economy, and the poor degree of environment friendliness of the operations of most SMEs, there is a need for persuading them to adopt energy conservation and pollution control measures, and for assisting them in these efforts. The institutions currently offering these services (like the SISIs, and the NPC) are focussed on other areas (or, as in the case of the SISIs, offer a broad range of technical services) and energy conservation and pollution control do not appear to be their priorities. Hence there is a need to have a cohesive and focussed approach to assist the SMEs in the field of energy conservation and pollution control. This may perhaps be best done by a dedicated national co-ordinating institution, which would formulate and direct specific schemes at SMEs in these subject areas. It may take the assistance of experts in these fields, and carry out field level implementation through SISIs, TCOs or industry associations.

5-I.11 CONSULTANCY AND PROJECT APPRAISAL SERVICES

79. The All India Financial Institutions in collaboration with State level financial and development institutions and commercial banks established a network of Technical Consultancy Organisations (TCOs) during the seventies and eighties to cater to the consulting needs of the small and medium industries and new entrepreneurs. At present there are 17 TCOs operating in various states, some of which cover more than one State. Besides, Karnataka has a state sponsored TCO, viz., Technical Services Organisation of Karnataka (TECSOK).

80. TCOs are reported to be extending a complete package of consulting services at reasonable prices to small and medium enterprises, individual entrepreneurs, Government Departments and agencies, various State level institutions, commercial banks and other institutions in their task relating to industrial development and financing. Though initially the TCOs focussed on pre-investment studies, they have since diversified their services to include:

(a) preparation of project profiles and feasibility studies,

(b) undertaking industrial potential surveys,

(c) identification of potential entrepreneurs and providing them technical and management assistance,

(d) undertaking market research and surveys for specific products,
(e) undertaking energy audit and energy conservation assignments,

(f) project supervision, technical and administrative assistance,

(g) taking up assignments on turn-key basis,

(h) undertaking export consultancy for export oriented projects based on modern technology,

(i) offering management consultancy services, especially for diagnostic study of sick units or of improvement in the existing units and their rehabilitation programmes, and

(j) conducting entrepreneurship development programmes and skill upgrading programmes.

81. During 1996-97, TCOs completed a total of 1,887 assignments. These included 1,137 feasibility studies, project reports and profiles, 117 project appraisals, 109 surveys and studies, covering industrial potential, 69 modernisation, rehabilitation and diagnostic studies, 6 functional industrial complexes and turn-key assignments, and 449 miscellaneous assignments. Besides, TCOs conducted a total of 191 programmes for skill upgrading and entrepreneurship awareness under the Self-Employment Scheme for the Educated Unemployed Youth (SEEUY).

82. Besides the above TCOs, SIDO through its SISIs and the Branch SISIs provides a comprehensive range of industrial extension services in the form of consulting services ranging from identification of a suitable line of production and market survey to consulting on plant & machinery purchase, and marketing assistance. On an average, every year SIDO claims to provide guidance and assistance on technical, economic, managerial and other general matters to over 200,000 SSIs. The officers provide on-site guidance in the premises of the industrial units, as well as to entrepreneurs visiting the Institutes. Besides, each SISI has been entrusted to prepare detailed project profiles every year, as a result of which, SIDO today has project profiles of over 2,500 products which are regularly updated. New profiles are added every year. These profiles are provided to the needy entrepreneurs on a chargeable basis.

The Role of Key Institutions and Future Directions:

83. Assistance in project selection, based on a thorough project appraisal, is a key need for many potential entrepreneurs at the pre-investment stage. Considering the high incidence of sickness in SSIs due to marketing problems, this is particularly important for new entrepreneurs, who would benefit largely from an objective assessment of their proposed ventures. Since the services of large private sector institutions and consulting organisations would be prohibitively costly for most small scale units, quality project appraisal services appear to be available to them mainly from the TCOs.

84. In this context, the number of feasibility studies and project profiles prepared by the TCOs – 1,137 in 1996-97 – appear to be too small to have an impact on the very
large number of new units that come up every year. Hence, efforts need to be undertaken to make this service more broad-based and accessible. Also, the SISIs, which entertain a large number of enquiries and visits from potential entrepreneurs could, in addition to providing their ready-made and generalised project profiles, promote the use of specific project feasibility assessment techniques. In such cases, they could refer the entrepreneur to providers of such services like the TCOs.