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**International Centre for the Advancement of Manufacturing Technology  
(ICAMT)**

Final Report of the Independent Evaluation Team\*

Field mission: 13 to 25 February 2006

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This document has not been formally edited.

## **ACKNOWLEDGEMENT**

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## Map of India



## List of Abbreviations

BMTPC	Building Materials and Technology Promotion Council
CAD/CAM	Computer Aided Design, Computer Aided Manufacturing
CDOS	Centre for the Development of Stones
CII	Chamber of Indian Industry
CSF	Country Service Framework
CMTI	Central Manufacturing Technology Institute
CNC	Computerized Numerical Control
EMO	European Machine Tool Exhibition and Trade Fair
GDP	Gross Domestic Product
HQ	Headquarters
DICO	Dindiggul Cooperative
DIPP	Department of Industrial Policy and Promotion of the Ministry of Commerce and Industry
GTTC	Government Tool Room and Training Centre, Bangalore
ICAMT	International Centre for the Advancement of Manufacturing Technology
ICS	International Centre for High Technology, Trieste
IMAAC	International Materials Assessment and Application Centre, Brazil
IMTMA	Indian Machine Tool Manufacturers Association
IPR	Intellectual Property Rights
ITC	International Technology Centre
ITPO	Industrial Trade Promotion Office
MCI	Ministry of Commerce and Industry
MoU	Memorandum of Understanding
NIFT	National Institute of Fashion Technology
NID	National Institute of Design
NMCC	National Manufacturing Competitiveness Council
NSIC	National Small Industries Corporation
PM	Project Manager
PTC/IPT	Investment and Technology Promotion Branch of UNIDO
R&D	Research and Development
RTC	Regional Testing Centre
SME's	Small and Medium Enterprises
SISI	Small Industry Service Institute
SSI	Small Scale Industry, Ministry of Small Scale Industries
TDDI	Toy Design and Development Institute
TDSP	Technology Diffusion and Support Programme
UNDP	United National Development Programme
UNIDO	United Nations Industrial Development Organisation
USD	United States dollar

## Glossary of Evaluation Terms

<i>Conclusions</i>	Conclusions point out the factors of success and failure of the evaluated intervention, with special attention paid to the intended and unintended results and impacts, and more generally to any other strength or weakness. A conclusion draws on data collection and analyses undertaken, through a transparent chain of arguments.
<i>Effectiveness</i>	The extent to which the development intervention's objectives were achieved, or are expected to be achieved, taking into account their relative importance.
<i>Efficiency</i>	A measure of how economically resources/inputs (funds, expertise, time, etc.) are converted to results.
<i>Impacts</i>	Positive and negative, primary and secondary long-term effects produced by a development intervention, directly or indirectly, intended or unintended.
<i>Indicator</i>	Quantitative or qualitative factor or variable that provides a simple and reliable means to measure achievement, to reflect the changes connected to an intervention, or to help assess the performance of a development actor.
<i>Institutional Development Impact</i>	The extent to which an intervention improves or weakens the ability of a country or region to make more efficient, equitable, and sustainable use of its human, financial, and natural resources, for example through: (a) better definition, stability, transparency, enforceability and predictability of institutional arrangements and/or (b) better alignment of the mission and capacity of an organization with its mandate, which derives from these institutional arrangements. Such impacts can include intended and unintended effects of an action.
<i>Lessons learned</i>	Generalizations based on evaluation experiences with projects, programs, or policies that abstract from the specific circumstances to broader situations. Frequently, lessons highlight strengths or weaknesses in preparation, design, and implementation that affect performance, outcome, and impact.
<i>Logframe</i>	Management tool used to improve the design of interventions, most often at the project level. It involves identifying strategic elements (inputs, outputs, outcomes, impact) and their causal relationships, indicators, and the assumptions or risks that may influence success and failure. It thus facilitates planning, execution and evaluation of a development intervention. Related term: results based management.
<i>Outcome</i>	The likely or achieved short-term and medium-term effects of an intervention's outputs. Related terms: result, outputs, impacts, effect.
<i>Outputs</i>	The products, capital goods and services which result from a development intervention; may also include changes resulting from the intervention which are relevant to the achievement of outcomes.
<i>Recommendations</i>	Proposals aimed at enhancing the effectiveness, quality, or efficiency of a development intervention; at redesigning the objectives; and/or at the reallocation of resources. Recommendations should be linked to conclusions.
<i>Relevance</i>	The extent to which the objectives of a development intervention are consistent with beneficiaries' requirements, country needs, global priorities and partners' and donors' policies. Note: Retrospectively, the question of relevance often becomes a question as to whether the objectives of an intervention or its design are still appropriate given changed circumstances.
<i>Results</i>	The output, outcome or impact (intended or unintended, positive and/or negative) of a development intervention. Related terms: outcome, effect, impacts.
<i>Sustainability</i>	The continuation of benefits from a development intervention after major development assistance has been completed. The probability of continued long-term benefits. The resilience to risk of the net benefit flows over time.



## **Executive Summary**

This evaluation has been requested by the donor, the Government of India, with a view to provide information, based on which the future of the project “Operational Phase of the International Centre for the Advancement of Manufacturing Technology (ICAMT)” shall be defined.

### **Evolution and institutional standing of the ICAMT**

The International Centre for the Advancement of Manufacturing Technology (ICAMT) was established in 1999 in India with offices in Bangalore and Delhi as part of UNIDO’s network of International Technology Centres (ITCs). It has received UNIDO support through four consecutive phases: a preparatory phase (1998, feasibility study), a pilot phase (1999-2002) and an operational phase (2002-2006). So far approx. USD 2 million have been spent through UNIDO. These funds came primarily from the Indian Government.

While the original plans foresaw the establishment of a fully fledged international institution, the ICAMT today still can be described as a project rather than an institution and basically caters to the needs of Indian small and medium sized companies and institutions in the field of awareness raising, market development and technical assistance, while the international activities of the ICAMT are still at an incipient stage. Thus, so far the ICAMT has not established itself as an internationally recognized technology centre nor has it built up a clear competence in the area of manufacturing technology. However, due to effective assistance provided to Indian SMEs ICAMT enjoys high reputation in the business community in India and has established a network of partner organisation within the private sector.

### **ICAMT strategy needs a major revamp**

The ICAMT’s strategy is currently not sufficiently defined in terms of thematic focus, depth of technological expertise, geographical reach and organisational nature. It is also unclear whether ICAMT should continue to focus its activities on the first stages of the project cycle, i.e. to primarily identify and formulate projects and if not,

how far it should be involved in implementation (just quality control and monitoring or also technical assistance through in-house staff). Furthermore, the international activities of the ICAMT on one side and the sectoral projects geared to Indian companies at the other harbour significant potential for synergies, which are not fully exploited. To the contrary, there is a tendency to separate the ICAMT from the four UNIDO sectoral projects, which were formulated by the ICAMT during its pilot phase and were recently pulled together under the umbrella of the “Technology Diffusion and Support (TDSP)” programme, which covers toy, stone, lock and machine tool industries.

### **Effectiveness is high in awareness raising and low in technological upgrading**

Effectiveness in the different areas of support varies. It is highest in awareness raising and market development and lowest in actual technology upgrading. The reason for that being a lack of specific resources (staff) and of a clear technological focus; both elements which are required for effective technology transfer work. As a consequence, in the area of actual technology transfer, institution building has not been sufficiently achieved. Either the institutions are not geared towards the needs of SMEs (e.g. trainings are three months full time, SMEs cannot afford to send staff away for so long), or they lack the technological know-how to support SMEs in the upgradation of their technology.

However, in the area of general business support, the network of partner institutions of the ICAMT is appropriate, effective and sustainable. Partner organizations serve as catalysts for the development of the different industrial sectors supported by ICAMT and as focal points for activities supporting the development of industrial clusters (e.g. organize trade fairs, buyer-seller meetings, etc.). Similarly, the efforts of ICAMT in the area of funds mobilization for new projects and programmes were effective and covered public and private sectors. 65% (or USD 9.3 million) of the projects formulated by the ICAMT so far have been approved.

### **UNIDO opens doors but provides limited technological expertise**

UNIDO value added is very high in terms of getting the different sectors ‘started’ through exposure of companies to international competition or the provision of

general technical assistance, both of which had an ‘eye opening’ effect and helped a number of companies in their efforts to open up to foreign markets. In this context UNIDO acted as a ‘door opener’ by facilitating access to leading foreign companies. In some cases, this contributed significantly to an upgrading of technology at the company level. UNIDO was reported to have added value in a significant manner in the area of low cost housing (south-south cooperation initiatives) by facilitating access to other countries’ demand for technology (e.g. Venezuela, Tanzania, Brazil).

On the other hand, very limited contributions were made through the ICAMT from international experts and international subcontractors in terms of sector specific, or company specific international technological expertise. Also the value added from UNIDO at headquarters level consisted mainly in quality control of the projects formulated by the ICAMT and of the implementation of ICAMT resources, while at the technological level it was very limited.

### **Main Recommendations**

- The ICAMT should not continue to operate in the current form. But if major changes in strategy (see below) are implemented, the activities of both ICAMT and TDSP should be enhanced and strengthened. More resources should be allocated for both, and specific technological capacities should be built up. In order to fully exploit synergies between the two activities, they should be united under a common structure.
- Focus on sectors with a real technology need and/or an outward-bound technology-transfer potential. In this context, the potential of a focus on process technology (e.g. mechatronics, automatisisation) and/or on sectors with a potential for technological spill-over effects (e.g. machine tools, engineering) should be analysed.
- Increase sustainability and capacity-building effects by turning the ICAMT into a fully-fledged institution (longer-term orientation instead of project-by-project implementation, long-term staff including a director).
- In order to ensure the long-term build-up of capacity through the ICAMT as an institution, the financial structure of the ICAMT should be changed. The

financing should contain both long-term institutional funding as well as project funding. The institutional funding should be provided by the Indian government, and if possible, in the long run also by other stakeholder governments.

- The director and the permanent staff of the ICAMT should be appointed as soon as the overall strategy has been clarified. Candidates should be selected after a hearing on the part of a balanced panel involving DIPP, SSI, UNIDO and private sector representatives. The selection criteria should emphasize strong industry experience and expertise in technology transfer.

# **1. Introduction**

## **1.1. Purpose of the evaluation**

This evaluation has been requested by the donor, the Government of India, with a view to provide information, based on which the future of the project “Operational Phase of the International Centre for the Advancement of Manufacturing Technology (ICAMT)” shall be defined. Thus the purpose of the independent evaluation is to enable the Government of India and UNIDO to assess the relevance, efficiency, effectiveness, sustainability and possible impacts of ICAMT and its activities. Within this scope, emphasis was put on the issues of effectiveness and sustainability.

At this point it should be borne in mind, that UNIDO’s corporate strategy focuses all activities on productivity enhancement for social advance. It is therefore not mere economic growth that forms the key goal of interventions. This is especially evident in the case of a nation like India, that has been experiencing accelerated growth for the last decade. The ultimate yardstick for measuring the effectiveness of UNIDO interventions in such a context is the potential for poverty alleviation and for the inclusion of such sectors of the economy/population that are otherwise sidelined by market forces.

ICAMT forms part of the UNIDO Country Service Framework (CSF) for India, which is also due for evaluation in 2006. Thus the results of this evaluation will contribute to the overall evaluation of the CSF.

## **1.2. Methodology of the evaluation**

The team collected and analyzed background information and project-specific documentation. Interviews were conducted both at UNIDO Headquarters (project manager, regional bureau) and in the field (covering counterparts, a sample of

beneficiaries, donor representatives and the UNIDO officer-in-charge). Field visits were carried out in Delhi, Bangalore, Mumbai, Rajkot and Jaipur. A list of organizations and persons met is attached in Annex II. At the end of the mission, a debriefing meeting was held with representatives of the main counterpart organisation (DIPP and SSI) and UNIDO field office, in which the preliminary conclusions and recommendations of the evaluation were presented. This also provided an opportunity for receiving preliminary feedback on the findings of the mission. Debriefing meetings were also carried out at UNIDO Headquarters to ensure interaction on the findings of the mission with the current project manager, thereby facilitating follow-up of the recommendations of the evaluation with regard to the development of a possible next phase of the project.

The four sectoral projects implemented by ICAMT assisted a total of 405 enterprises including all types of assistance (participation in trade fairs, training, technical assistance, etc.). The evaluation covered 116 or 29% of this total through direct interviews, meetings with groups of entrepreneurs (Rajkot Machine Tool, Ludhiana Machine Tool, Mumbai Toy) or representatives of such groups. 9 plants were visited and in-depth interviews conducted with the entrepreneurs (4 toy, 3 machine tool, 1 stone and 1 lock companies). Two telephone interviews were carried out with entrepreneurs.

The field work was carried out from 13<sup>th</sup> to 25<sup>th</sup> of February 2006 by a team consisting of Johannes Dobinger (UNIDO Evaluation Group, Team leader), Alexandra Rammer (international consultant) and Narendra J. Sheth (national consultant).

## **2. The ICAMT and its context**

### **2.1. Purpose and scope of the ICAMT**

The ICAMT can be described as a project with certain institutional characteristics, which basically caters to the needs of Indian small and medium sized companies

and institutions in the field of awareness raising, market development and technical assistance. Its main functions have been:

- the development of and funds mobilisation for project proposals for the technological support to a number of industrial sub-sectors (in particular stone industry, toy industry, lock industry, machine tool industry and building materials industry) ,
- the support to the implementation of some of these projects mainly through the administration of subcontracts to local and international partners,
- identification of international and national expertise for the projects,
- support to south-south and north-south cooperation initiatives within the projects through the identification of partners and high level contacts,
- establishment and maintenance of a technology database.

ICAMT enjoys high reputation in the business community in India and has established a network of partner organisations within the private sector. International activities however, are at an incipient stage.

The ICAMT is a complex project cum institution. To better understand what it is, it is necessary to know what it was meant to be at the outset.

Efforts to establish the ICAMT started with a comprehensive feasibility study in 1997/1998. At that time the vision of the ICAMT was clearly that of an international centre at the service of developing countries at large; a “Global Centre of Excellence” within the UNIDO framework<sup>1</sup>. Also later, other international technology centres, such as the International Centre for Science and High Technology (ICS) in Trieste or the International Materials Assessment and Application Centre (IMAAC) in Brazil, were stated as references for the global nature of the ICAMT<sup>2</sup>.

However, along the pilot and operational phases, the ICAMT has developed into a project dedicated to the development and partially also implementation of

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<sup>1</sup> See: UNIDO, ICAMT – Feasibility Study (prepared by Mr. G Helliwell), January 1998

<sup>2</sup> see project document of the pilot phase

programmes and projects almost exclusively aimed at Indian institutions and companies.

The original plans to use India's contribution as leverage and to raise funds for the ICAMT from other developing countries like Mexico, Brazil and Malaysia were not implemented. An "International Partners Host Network", planned to be formed by international sponsors of ICAMT, was not established. Equally, the envisaged international delegates programme did not materialise. These factors explain why the staffing of the ICAMT never came even close to the initial plans of some 20 to 40 permanent staff (including delegates).

A second major deviation from the original plans is the reduced technology focus of ICAMT's activities. While it was clear from the beginning that ICAMT would not engage in own R&D or technology development, the focus of training, project development, awareness raising and networking activities was clearly planned to be on technology, in particular process technology<sup>3</sup>. The concept of "Advanced Manufacturing Technologies (AMT)" was to form the centrepiece of ICAMT's institutional identity. However, neither the in-house expertise of the ICAMT, nor the network of partner organisations and the projects formulated by ICAMT suggest that such a technology focus has been established. The nature of ICAMT's activities is rather general business support including, in some cases, technology upgrading.

A third difference of importance regards the organisational nature and structure of ICAMT. While the feasibility study and the pilot phase foresaw the establishment of an independent institutional non-profit entity, the operational phase of ICAMT did not contain this plan any more. Similarly, an element of the original concept which has not been established is the purely commercial subsidiary of the ICAMT (the "ICAMT Commercial Ventures Ltd." was planned to contribute to the financial sustainability of ICAMT).

Summing up, it can be said that while the ICAMT is a relevant partner for Indian manufacturing companies, so far it has not established itself as an internationally

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<sup>3</sup> see sections 4 and 5 of the ICAMT feasibility study



recognized technology centre with a clear competence in the area of manufacturing technology.

## 2.2. Financial summary of the ICAMT

UNIDO database shows four projects related to the ICAMT (see Table 1). This evaluation covers the operational phase (SFGLO02004) and the second pilot phase project (SFGLO99005). The preparatory project consisted primarily in the preparation of a feasibility study, which served as an input into the succeeding projects.

Table 1 – Financial Summary of the ICAMT

<i>Project Nr.</i>	<i>Project Manager</i>	<i>Unit</i>	<i>Budget (USD)</i>	<i>Spent (USD)</i>	<i>% spent</i>	<i>Implementation Period</i>	<i>Project Title</i>
SFGLO02004	KOZHARNOVICH VLADIMIR	PTC/IPT	\$1,748,435	\$939,703	54%	2/2002 – 3/2006	OPERATIONAL PHASE OF THE ICAMT
SFGLO99005	KOZHARNOVICH VLADIMIR	PTC/IPT	\$845,460	\$845,460	100%	11/1999 – 3/2005	PILOT ACTIVITY PHASE OF THE ICAMT
XPGLO99048	KOZHARNOVICH VLADIMIR	PTC/IPT	\$100,000	\$77,167	77%	9/1999 - 12/1999	PILOT ACTIVITY PHASE OF THE ICAMT
TFIND95001	KOZHARNOVICH VLADIMIR	PTC/IPT	\$151,665	\$151,665	100%	4/1996 –5/2003	PREPARATORY ACTIVITIES FOR THE ESTABLISHMENT OF AN ICAMT

Source: UNIDO Infobase

## 2.3. The context of ICAMT in India

### 2.3.1. Size and growth of the manufacturing sector in India

India is a two-tier economy, with a cutting-edge and globally competitive knowledge-driven service sector that employs the brightest of the middle classes on the one hand, and a sprawling agricultural sector that employs the majority of the vast and

poorly educated labour force, on the other. India's manufacturing sector has traditionally been poor, with a reputation for low-quality goods, although there are signs that this is beginning to change.

While the contribution of agriculture to the GDP decreased from 31.3% in 1991 to 22.1% in 2003, the contribution of services increased from 41.9% in 1991 to 51% in 2003. The contribution from industry had, however, remained stagnant around 27% of GDP between 1991 and 2003, which included the manufacturing component of about 17%. Manufacturing accounts for 12% of employment. The share of the manufacturing sector has shown only a marginal improvement from 15.8% in 1991 to 17% in 2003. The size of India's manufacturing sector compares unfavourably with other countries in Asia, for example with China, where manufacturing accounts for 35% of GDP, or Thailand (34% of GDP).

Nevertheless, manufacturing has seen unprecedented growth as an anti-export bias in economic policy has been reduced and more resources have been moved into labour-intensive industries. Historically, a policy of import substitution in the decades after independence encouraged the development of a broad industrial base, but a lack of competition contributed to poor product quality and inefficiencies in production. Several sectors have now been opened up to foreign participation under India's liberalising reform programme, contributing to a significant expansion in the production of durable consumer goods including cars, scooters, consumer electronics, computer systems and household electrical appliances. The opening up of the economy has led to an influx of foreign capital, technology and management skills, making India increasingly attractive as a base for medium and high value added manufacturing.

In the 1980s, industrial growth averaged 7.1% per year. It accelerated slightly to 7.6% per year in the first five years following the beginning of the economic policy reform process in 1991, which led to an investment boom, particularly in industry. In the second half of the 1990s industrial growth trended lower at around 5% per year. However, since 2002/2003 industrial growth has accelerated markedly on the back of recent strong GDP growth. Rising disposable incomes, easier access to finance

and the changing attitudes of India's rapidly rising middle class has resulted in a consumer lending boom. Industrial growth rose above 8% in 2004/2005, with consumer durables and non-durables showing exceptionally strong growth. Capital-goods production has been growing at double-digit rates since 2002/2003, suggesting increased investment in the industrial sector and the economy as a whole.

**Table 2: Industrial production in India, 2000-2005**

(fiscal years Apr-Mar; 1993/94=100, change year on year)

	<b>2000/1</b>	<b>2001/2</b>	<b>2002/3</b>	<b>2003/4</b>	<b>2004/5</b>
Basic goods	3.9	2.6	4.9	5.4	5.5
Capital goods	1.8	-3.4	10.5	13.6	13.3
Intermediate goods	4.7	1.5	3.9	6.4	5.9
Consumer durables	14.5	11.5	-6.3	11.6	14.5
Consumer non-durables	5.8	4.1	12.0	5.8	10.6
<b>All</b>	<b>5.0</b>	<b>2.7</b>	<b>5.9</b>	<b>7.0</b>	<b>8.2</b>

*Source: Central Statistical Organisation (CSO), India;*

#### **2.4. Persistent problems of the manufacturing sector**

Despite this outstanding performance, major problems still persist. Although reforms have reduced red tape and regulation, heavy industry is still dominated by public-sector enterprises. State-owned companies have accounted for the bulk of activity in steel, non-ferrous metals, shipbuilding, engineering, chemicals and paper. The government had pledged to reduce its holdings in non-strategic public sector undertakings to a maximum of 26% and to close down non-viable enterprises, but parliamentary opposition shelved this proposal. In addition, onerous labour regulations, as well as a shortage of cheap credit, limit opportunities for restructuring and so continue to restrain rates of GDP growth.

Also, it is still uncertain whether the boom in manufacturing will prove to be sustainable. Manufacturing carries the burden of increasing unemployment in the agricultural sector. With agriculture growing tepidly at an annual 2% and services growing by 8 to 9% on average, manufacturing growth of 11% to 12% is required to

lift the economy's growth path to around 8% to 9%. If growth in the manufacturing sector is below 12%, it will not be possible to create enough jobs to maintain the current level of unemployment in the country. In order to provide productive employment for India's vast and rapidly expanding pool of low-skilled labour, the Indian government needs to create the conditions for rapid growth in labour-intensive manufacturing.

Another problem is on the technology front: Although there has been a step-up in the growth rate of R&D expenditure by industry after severe policy restrictions on the import of technology and capital goods have been lifted, indigenous R&D has not taken up significantly and has remained more on the adaptive than on the innovative side. Fiscal incentives to support technology development are still inadequate, and a proper innovation culture is not yet in place at the state level. In addition, there are still several intra-firm barriers to technological innovation, which are especially poignant for SMEs:

<b>Problem area</b>	<b>Symptoms</b>
Non-strategic orientation	SMEs are often too busy 'fire-fighting' to address long-term development issues. Often resulting in them being too narrowly and locally focused
Lack of management skills	Weaknesses in areas such as strategic planning, operations strategy, marketing, finance, etc.
Lack of awareness	Insular and local focus means they may not see the need, direction or scale of change required. Little benchmarking, external comparison or continuous learning
Lack of finance	Most SMEs lack finance to make long-term strategic investments (e.g. in ICT infrastructure or modern machinery)
Lack of resources	Insufficient organisational 'slack' to enable proper management and innovation; difficulty in finding qualified personnel

In order to improve productivity and to sustain economic growth and employment creation in the country in the long run, the technological capacities of the manufacturing sector have to be upgraded. The National Manufacturing

Competitiveness Council (NMCC), an autonomous body created by the Congress-led government, has drafted the National Strategy for Manufacturing paper, released at end-September 2005. In this strategy paper, the council notes that it took two decades to raise the share of manufacturing in GDP by five percentage points to its current level of 17%. The NMCC has identified 12 sectors to start with which have immediate potential for growth and employment. These are:

Textiles and garments

Leather and leather goods

Food processing

Gems and jewellery

Handlooms and handicrafts

Chemicals

Pharmaceuticals

IT hardware/ electronics

Auto components

Human resource development relating to manufacturing

Capital goods industry and

Paper industry.

In order to achieve sustainable growth, the council has called for reform of India's rigid labour laws, a drive to improve infrastructure and increased investment in technology and innovation if India is to enhance its global competitiveness.

## **2.5. The current environment of the ICAMT**

Since there has been a paradigm shift in the policy environment in general from a prescriptive one to a facilitative / supportive one, the initiatives that the last couple of years have witnessed fall largely in the category of a facilitative regime (see also Annex III).

SMEs will be more and more exposed to foreign competition, be it in India or in the search for new markets abroad. The traditional policy to reserve a large number of products for production by SMEs is rapidly disappearing. This will result in an

increased need for technological support to those companies willing to face the challenge.

In this context the ICAMT as an institution with the mandate to support technological upgrading through international cooperation and technical assistance to SMEs is of increased relevance, both, in terms of policy and to the target beneficiaries.

### **3. Identification and formulation**

#### **3.1. Demand orientation & ownership**

From the review of documents it appears that the identification of a need for ICAMT originated in UNIDO. While this suggests a rather supply driven approach to identification, it is clear that for global initiatives UNIDO has a mandate to identify specific measures related to its global forum function. Furthermore the original idea has been amply discussed with representatives of the Indian Government, which led to the funding of a feasibility study.

The critical assumption in the identification phase was that many developing countries could benefit from support to the transfer of manufacturing technology through a centre owned and operated by developing countries themselves with a strong multilateral partner, UNIDO. The latter would facilitate access to available technologies in developed and developing countries. This assumption is considered reasonable since for many countries the establishment of such centres at the national level is not affordable; ICAMT was to provide the necessary critical mass for such an endeavour. Furthermore the promotion of south-south cooperation in the field of technology is surely at the centre of UNIDO's mandate.

Between identification and formulation a profound feasibility study was carried out. It used a combined deductive and inductive approach, analysing trends and models of technology in the international context and, at the same time, providing concrete examples for the relevance of ICAMT to several developing countries, which were

visited in the course of the study. The overall quantity and quality of evidence presented to support the need for the ICAMT justified the next move to a pilot phase of the ICAMT. However, at no stage countries other than India made financial or other legally binding commitments to the establishment of ICAMT.

Ownership and demand orientation therefore is not fully meeting the requirements of the ICAMT as a global project. While the ownership from Indian counterparts can be considered high at the identification and formulation phase, the absence of contributions from other developing countries indicates that from the beginning the international mandate of the ICAMT was not supported by a multinational ownership structure. However, it is important to note that it is not argued here that ICAMT should become an international institution in a legal sense. Ownership from other countries could have “light” legal character like MOU with Ministries or come from the private sector for example, through the endorsement of staff to the ICAMT. Unfortunately the initially planned delegate programme never materialised.

### **3.2. Logical coherence of programme (logical framework + strategy)**

The project documents of the pilot- and of the operational phase of the ICAMT established the same overarching development objectives:

- To build up/strengthen the institutional and technical capacity, and international framework for promoting technological advances (and innovations and encourage)<sup>4</sup> industrial investments in manufacturing sector of industries of the developing countries.
- To foster South-South and North-South cooperation and partnerships enabling the developing countries to enhance their manufacturing capabilities and benefit from the technological advances and innovations in sustainable development.

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<sup>4</sup> words in brackets have been added to the objective of the operational phase

These objectives are in line with the results of the feasibility study and point at the ICAMT's role as an instrument for the developing countries at large. However, the degree to which the immediate objectives (see Table 3), outputs and activities were in line with the overarching development objectives differs considerably between the two phases. While in the pilot phase a number of international activities were planned (training of decision makers from developing countries, partnership activities with other countries, etc.), the operational phase focuses on the implementation of existing and the formulation of new projects geared to Indian SMEs.

Table 3 – Immediate Objectives of the ICAMT

<b>Immediate Objectives</b>	
<b>Pilot Phase</b>	<b>Operational Phase</b>
1. Verify concept, lay basis for operations	1. Implement projects developed in pilot phase
2. Strengthen technical and institutional capacity in developing countries	2. Promote growth and competitiveness of Indian SMEs
3. Promote ICAMT and mobilise resources for operations	3. Promote business alliances through a technology database
	4. Enhance impact of ICAMT awareness and capacity building programme

Source: original project documents, summarised by authors

While the immediate objectives 3 and 4 of the operational phase did contain international outputs and activities, they were not designed to be the priority of the ICAMT as one would have expected from an international centre. Thus, the 4 immediate objectives of the operational phase (and their respective outputs and activities) did not fully reflect the type of interventions needed to achieve the development objectives of this phase.

The problems created by this lack of coherence are twofold. First, there is a gap between how the ICAMT presents itself to outsiders and what it really does, leading to a weakness of "branding". Many stakeholders interviewed do not really know



what the ICAMT's core business is. Second, the resources available in the project are not employed in a way that contributes to the achievement of the development objectives.

In the operational phase, the ICAMT's immediate objectives, outputs and activities included the implementation of other UNIDO projects. There are no provisions in the project document as to how the projects themselves and the ICAMT were supposed to share the responsibility for implementation. It is therefore not clear whether the ICAMT was supposed to do overall monitoring and quality control for the projects or whether it was meant to provide technical assistance directly through staff and consultants.

The logical framework was applied to formulation only partially. The project design does not include a description of expected outcomes and the respective indicators.

The description of the expected end-of-project situation contained in the project document of the operational phase refers more to the projects developed and implemented by the ICAMT than to the ICAMT itself. It does not contain a clear description in terms of capacity building of the ICAMT.

Finally, the assessment of risks contained in the project document of the operational phase does not really identify risks nor does it describe the effects of risks on the planned results of the project. While the project document of the pilot phase does highlight the risk of lack of funding for identified projects, the operational phase document fails to identify specific risks like limited ownership from international partners.

### **3.3. Results orientation and Monitoring**

As for the pilot and operational phases an important part of the objectives established in ICAMT project documents referred to the identification, formulation and implementation of new projects. In this context it is important to understand the

difference of this approach to projects aimed at achieving a direct impact on target groups.

In the case of identification and formulation work, the project documents themselves, their quality and the funds mobilised for their implementation are to be considered the result. Here the project document established a clear quantitative fund raising target of USD 5.4 million to be mobilised by the ICAMT (this target has been exceeded). However, a clear thematic focus or result targets (e.g. number of enterprises to be assisted, etc.) for the projects to be developed were not included in the project document of the ICAMT operational phase. Similarly no quality criteria for the formulation of new projects were established.

With regard to the implementation work of ICAMT no clear results were established to measure the effectiveness of ICAMT as a project implementation or project management agency. As a proxy for the ICAMT's effectiveness the results of the projects implemented will be looked at in detail in chapter 5.

With regard to the monitoring of project performance and results a steering committee was established. The active and proactive work of this committee has been documented in the minutes of a number of meetings. However, no clear modalities for the collection of data, establishment of baselines, etc. have been defined for the reports to be delivered to the steering committee.

### **3.4. UNIDO value added**

The specific value added of UNIDO as described in the project documents<sup>5</sup> consisted primarily in:

- the promotion of international cooperation,
- awareness building and providing access for developing countries in the area of new technologies
- provide an international forum for member countries
- build technological partnerships between developed and developing countries and between enterprises and institutions

- encourage new industrial investments

It is worth noting that neither the provision of technical expertise from UNIDO staff nor the identification of qualified international consultants is specified as a specific reason for UNIDO assistance in the project documents. This seems to be in contrast with the expectations expressed by local project partners during interviews.

## **4. Project implementation and management**

### **4.1. Overall Project Management (Advisory committee, director, TDSP)**

The advisory committee of the ICAMT is the strategic decision making organ. It is formed by representatives of the Ministries involved (DIPP, SSI) and high-level representatives of various public and private institutions in India. It reviews progress on an annual basis and decides on the work programme of the next period. While the advisory committee had played a very proactive role in steering the ICAMT during the first years of operation, this dynamism has been reported to have slowed down in the recent past.

The main driving force behind the ICAMT is its director. So far the ICAMT has had two project directors. The fact that original implementation period of ICAMT had come to an end and the future of the project was not clear did lead to a situation where the hiring of a director was not possible. Thus, for the last year there has been no director in place, which has made continued implementation increasingly difficult.

The relatively long absence of a project director and the reduced staff is to be seen also in relation with the pooling of the four sectoral programmes (lock, machine tools, toy, stone) under the umbrella of the “Technology Diffusion and Support Programme for Small Scale Industries (TDSP; SFGLO02013)”. The TDSP was

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<sup>5</sup> see project document of the pilot phase, “reasons for UNIDO assistance”

used as a common project for the four sectors and has a project director and one staff to support implementation in the same way as ICAMT had done before. While bringing the four sectoral programmes together made sense from a project management perspective and also from the donors point of view (the Ministry of Small Scale Industry is the main donor of all four programmes), the separation of the TDSP from the ICAMT generated mostly adverse effects.

While initially the implementation of the four sectoral programmes came under ICAMT's responsibility, the separation of the programmes into the TDSP umbrella created an "identity crisis" for the ICAMT, where the lack of strategic focus of the ICAMT in the sense of its original mandate (international institution) became evident.

#### **4.2. Funds mobilisation**

Funds raised for the operation of ICAMT came from the Indian Government through a UNIDO trust fund. The initial plan (see feasibility study 1998) to raise funds for the operation of the ICAMT from other developing countries was not implemented, since the main emphasis of ICAMT's fund raising activities was on the mobilisation of funds from Indian sources.

The ICAMT itself has been considering funds mobilisation as one of its core functions. It has formulated projects for a total amount in the vicinity of USD 14 Million. Funding for the implementation of the programmes and projects developed by the ICAMT has been approved for a total amount of USD 9.3 Million from different public and private sources.

While the total amount of the funds mobilised is impressive and proves the ICAMT's effectiveness in terms of funds mobilisation, only approx. 30% of the programmes and projects developed do fall under the original mandate of the ICAMT, namely international cooperation in the field of Advanced Manufacturing Technology (ATM). The remaining 70% cover projects geared to Indian industry.

### **4.3. Counterparts & ownership**

The biggest asset of the ICAMT is the broad network of counterpart organisations developed in India. This network consists of a number of business membership organisations and research and testing centres. The ownership of most of these counterparts has been clearly demonstrated through a cost sharing approach to project activities, in which frequently more than 50% of the activity cost were borne by the institutions or their members.

The central counterpart for the ICAMT project is the Department for Industrial Policy and Planning (DIPP), which is the nodal Ministry for UNIDO in India. Since this Ministry has provided the funding for the ICAMT, the ownership from the Government is strong. However, from the comparison of the initial plans and the current reality of the ICAMT it becomes evident that ownership of the idea of ICAMT as an international (mainly south-south cooperation) institution was rather limited throughout the operational phase.

### **4.4. Inputs used**

The bulk of inputs used by the ICAMT project were of Indian origin; either national experts or subcontracts to Indian institutions. In the operational phase of the ICAMT only two international experts were used and one international subcontract was given to a Spanish research centre in the toy sector to assist in setting up a toy testing centre in Delhi. The major difference between initial plans (budget) and actual expenditures is that a higher proportion of the budget was spent on national project staff on the expense of less subcontracts, equipment and training (see Table 4). Again, the focus of the ICAMT on projects within India serves as an explanation for the limited amount of international expertise used.

Table 4 – Budget vs. expenditures of the ICAMT

	<b>Budget</b>	<b>% of total</b>	<b>Expenditures (as of 10/03/2006)</b>	<b>% of total</b>
<b>International Experts</b>	91,000	5.20%	47,404	5.04%
<b>National project staff</b>	814,870	46.61%	554,702	59.03%
<b>Subcontracts</b>	466,537	26.68%	208,020	22.14%
<b>Training</b>	105,450	6.03%	15,652	1.67%
<b>Equipment</b>	98,067	5.61%	26,623	2.83%
<b>Miscellaneous</b>	172,511	9.87%	87,303	9.29%
<b>Total</b>	1,748,435	100.00%	939,703	100.00%

Source: UNIDO Infobase

#### **4.5. Self evaluation and monitoring**

Monitoring of the ICAMT's activities is not systematic. It is more structured with regard to the implementation of the four sectoral programmes. Here the review reports prepared by the project give an overview of activities and achievements at the sectoral level. The reports also contain information with regard to outcomes at the plant level, which the evaluation team found largely in line with the situation found during plant visits.

With regard to the other areas of ICAMT activities (international activities, technology database) there is hardly any monitoring information available.

The advisory committee is the ICAMT's supervisory body. It has been repeatedly mentioned that monitoring is done by the advisory committee. It is important to point out that monitoring is the responsibility of project staff. Monitoring, if carried out properly, provides the project director and the committee with the information they need for strategic decision-making.

The lack of systematic monitoring makes self-evaluation difficult. Consequently, it is not surprising that there is no evidence of any self-evaluation of the ICAMT since its inception.

#### **4.6. Coordination with other UNIDO activities in the country**

During the discussions with beneficiaries, stakeholders and project staff no evidence was gathered that significant cooperation activities with other UNIDO projects are ongoing. At the same time it was felt that in many cases the UNIDO activities in the area of cluster development, cleaner production and investment and technology promotion have a good potential for synergies with ICAMT. Beneficiaries repeatedly expressed that support in “match-making” (business to business cooperation) in the field of technological partnerships would be a highly appreciated service.

This issue of synergies and cooperation with other UNIDO activities in India, including the cooperation with the field office, will be analysed in more detail in the evaluation of the UNIDO Country Service Framework, which will be conducted in the third quarter of 2006.

#### **4.7. ICAMT resources and infrastructure**

ICAMT operational phase had an initial budget of USD 1,748 million, out of which USD 939,703 have been spent as of March 2006. The pilot phase, which had funds of USD 845,460, was stretched beyond the originally planned duration (1999-2002) until 2005. It can be concluded that the budgetary requirements were overestimated at the outset of the operational phase.

Government institutions provided the offices and infrastructure of the ICAMT in Delhi and Bangalore. The office in Bangalore, which is of considerable size, has been underutilized since its inception, which is highly inefficient. Currently it is used to host the Design School for machine tool design in cooperation with the Indian Machine Tool Manufacturers Association (IMTMA), which uses about 20% of the total space available. In addition some courses and seminars are conducted in the premises.

The office in Delhi is provided free of charge by the Building Materials and Technology Promotion Council (BMTPC). This office is small and currently utilized to a large extent by ICAMT professional and administrative staff.

The approach to maintain two offices of the ICAMT in in the north and the south of a country as big as India and with the bulk of the Government administration and international bodies in Delhi, is reasonable.

There is an unresolved claim of the host of ICAMT in Bangalore, CMTI, for reimbursement of expenditures for building maintenance and operational costs (amount approx. USD 116.000<sup>6</sup>). While the evaluation team did not have time to clarify this issue, it should be discussed with DIPP and resolved as soon as possible.

The ICAMT operates a Web-site which provides useful information on the activities and structure of the organisation. However, some of the information provided in the web site is out of date and does not reflect the ICAMT's current situation. This should be changed as soon as possible and the functions of the web-site reviewed from a strategic point of view.

## **5. The results of ICAMT**

In this chapter, the results of the activities of ICAMT will be examined. As the development goals stated in the programme documents for both the pilot and operational phase are very general and therefore difficult to operationalize, the results will be measured along the four Immediate Objectives which are enlisted in the project document for the operational phase of ICAMT:

- To implement projects already developed by ICAMT during the pilot phase related to the promotion of growth and competitiveness of Indian SMEs through

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<sup>6</sup> amount provided by UNIDO field office in India



technology-led interventions in the four sectoral programmes on toy, stone, lock and machine tools.

- To promote growth and enhance competitiveness of Indian SMEs in selected sectors of industry through the development of new projects
- To promote business alliances in the field of manufacturing technology through the development and operation of a dynamic database on technologies and support services using the framework of UNIDO ITCs, ITPOs and Exchange networks.
- To support the transfer and adaptation of new technologies and innovations in the developing countries through South-South cooperation.

Finally, the issue of sustainability will be addressed, and it will be examined whether ICAMT had any tangible impact beyond the direct beneficiaries of the various programmes, such as the long-term build-up of capacity or the overall improvement of competitiveness in the sectors in question.

### **5.1. Implementation of the projects developed during the pilot phase**

One of the main results of the evaluation, which will be discussed in more detail at a later stage of this report, was that ICAMT did not limit itself to interventions in the area of technology in the stone, lock, toy and machine tool sectors. Rather, it adopted a holistic approach to business development which in addition to technology upgrading included the improvement of business processes as well as the development of national and international markets. In the course of the evaluation, the following categories where impact has been attained emerged from the interviews:

Awareness raising

Market development

General technical assistance

Technology upgrading

In assessing the impact of ICAMT activities in these areas, the focus will be both on direct outputs of ICAMT interventions (i.e. participation in trade fairs or training activities) as well as on outcomes in terms of long-term changes of behaviour in the participating units. It will be examined whether ICAMT activities have been limited to stand-alone, one-time interventions, or whether a sustainable build up of capacity has been achieved.

#### **5.1.1. Awareness raising**

An area where the impact of ICAMT activities was substantial was awareness raising. Although the issue of awareness raising might sound rather trivial as compared to direct technological intervention, its importance is by no means to be underestimated. A common problem for SMEs is their lack of strategic resources as well as their lack of access to information, which frequently result in complete unawareness of both technological and market developments. For this reason, helping SMEs to raise their awareness on issues which are of crucial importance to them is very often the first step for a more in-depth and long-term upgrading of technological, management and marketing capacities.

The instrument which had the most effect on awareness raising were visits to national and international trade fairs, often coupled with visits to specific companies. Beneficiaries of all sectors reported that the outcome of these visits were very helpful to them, frequently resulting in a 'shock and awe' effect about how far the world around them had progressed. The visits provided them with an important baseline of where they stand with regard to their national and international competitors, and provided them with valuable insights in the areas of product technology and design, manufacturing technology or market potential. The visits even led some companies directly to upgrading their technology and in turn to participating actively in exhibitions.

Some examples for successful awareness raising through visits to international fairs are:

In 2003, a visit to EMO 2003 (Milan) was organized by ICAMT with the help of UNIDO HQ for 22 machine tool companies. For most of them, this was the first exhibition abroad. The outcome of this visit was greater awareness for CNC machines, as well as in the eventual technology upgradation of some companies in consequence. In addition, the visit to Milan prompted a large group of Indian machine tool manufacturers to actively participate in the 2004 Imtex fair, which helped to generate some business contracts.

In the toy industry, in 2004, a delegation of 19 toy units from New Delhi and Mumbai to the International Toy, Baby & Gift Fair at Shanghai and to Hong Kong International Toy and Gifts Fair has been organized. These fairs helped the beneficiaries to analyze their positioning with regard to their Chinese competitors. Shortcomings were perceived in the areas of designing, tooling and molding as well as packaging. In addition, 13 units visited the International Toy Fair in Nuremberg in February 2005. Beneficiaries reported valuable insights in the areas of product design and market development.

For the stone industry, visits in various fairs has been facilitated, the most important

**Case study 1: Lock unit in Gurgaon**

This unit can be considered a successful case study for awareness raising through visits to international fairs as well as subsequent technology upgrading. Before, the unit was manufacturing traditional locks and facing substantial competition from China which almost forced the company to go out of business. In 2002, they participated in a visit to the Cologne Hardware Show in 2002 as part of a 14 member Indian delegation. The objective of this study tour was to closely examine contemporary technology developments and innovations in the lock sector. The visit for this particular unit was 70% financed by UNIDO. The financing of UNIDO was not a necessary prerequisite, as the unit would have gone to Cologne in any case. Nevertheless, UNIDO managed to organize meetings with European lock manufacturers which helped the unit to understand that they need to invest in new technologies and move towards the production of pin - cylindrical locks in order to meet market requirements. The year after, the same unit participated in an Indian delegation to the China International Hardware Show in Shanghai, where again they were provided with the opportunity to meet individual manufacturers. As a result of the visit, a machine for the production of pin-cylindrical locks was purchased, which helped increase productivity by ten times from 200 to 2.000 pieces per day. In addition, the number of employees in the unit increased from 60 to 80.

ones being Stonetech in Nuremberg, Germany, and Carraramarmotec, Italy. At these exhibits, which are held in regular intervals, Indian stone units gathered valuable information and knowledge about new technology developments and value added products in the fair. Meetings were held with international counterparts of the industry.

Many of the beneficiaries involved would not have attended the trade fairs without support of the ICAMT. One reason was the lack of financial means to cover the travel cost. In addition, as many beneficiaries have never been abroad before, visiting international trade fairs seemed to be an obstacle which they would not have overcome without ICAMT. Finally, in many cases ICAMT, with the help of UNIDO HQ, provided for specific contacts, or even for visits to other companies by the beneficiaries. These visits were reported to be extremely valuable to beneficiaries, as they allowed for direct and personal insights into new manufacturing methods, designs and management capabilities. Without ICAMT/UNIDO mediation, these direct contacts would not have been established.

### **5.1.2. Market development**

Another area where ICAMT can be seen to have achieved substantial impact is the development of national and international markets for the sectors in question. For many beneficiaries, the awareness raising activities described in the previous chapter were the first step in presenting their products to a wider audience, as visits to trade fairs were frequently followed by actual participation in these fairs some time later. Beneficiaries reported a significant learning effect regarding the presentation and marketing of their products. In many cases the participation resulted in direct new business for the companies. Even if there was no quantitatively measurable effect, trade fair participation helped to put Indian products of the small-scale sector on the global map. The participation in trade fairs in India and abroad was facilitated for a number of companies in different sectors, as the following examples show:

Toy units participated in the New York Toy Fair in February 2002. At the outcome level, the participating units reported that they got exposure to the American market as well as knowledge on design and packaging. Some units reported direct export orders as a result from this fair.

For the machine tool sector in Rajkot, a joint participation was organized at the Engineering Expo at Ahmedabad in 2004. The primary objective of this initiative was to provide a platform to machine tool units to showcase their products in order to increase their market reach in India. Beneficiaries reported that this initiative enabled them to exhibit their latest products, machines, and equipment, and to source products and technologies from various Indian suppliers. In total, 25 machine tool units from Rajkot benefited from this intervention.

In the international stone exhibitions regularly held in both Bangalore and Jaipur, both producers of dimensional stones and artisans are able to present their products in an international setting and to raise the profile of Indian stone manufacturers on global markets.

Another activity which was reported to produce tangible commercial results were the buyer-seller meeting held for the stone industry in 2002 Bangalore, where 70 Indian and 42 foreign companies participated. The objective of these meetings was to facilitate the development of business relations between the buyers and the sellers. The meetings also provided a platform for Indian and overseas buyers to discuss their mutual challenges. Assistance was provided to various companies in entering into MoUs. A similar event was held in Jaipur in 2005. According to beneficiaries, the outcome of these meetings was substantial learning effects as well as the emergence of new business opportunities. The need for similar events in the future was voiced unanimously in the sector.

### **5.1.3. General technical assistance**

The term 'general technical assistance' refers to direct assistance provided to individual companies, which is centered around, but not limited to, the introduction and upgradation of technology and includes issues such as general business management, strategy, operations and marketing. So far, this type of assistance

has only been provided to the machine tool sector in the form of a single consultant. There has been no evidence that other consultants of the same type have been used, or that the assistance was extended to the other sectors as well.

Nevertheless, in the machine tool sector the echo was mostly positive, and the assistance of the consultancy services were highly appreciated by beneficiaries. The unit level interventions included assessment of gaps, technology mapping and benchmarking as well as interventions in technology and management processes. In addition, the units were assisted in visiting machine tool fairs in Milan, Bangalore and Taiwan. Overall, 39 units have been selected for these interventions. At the outcome level a result of this consultancy, some beneficiaries reported cost reduction as well as an increase in their production capability through more efficient use of their resources. For companies where no such tangible results were reported, the overall assessment of the company with the help of the consultant, which frequently resulted in an 'eye-opening effect', was judged to be helpful.

It is important to point out that this type of service seems to be more in line with the needs of companies on a rather low stage of overall development, where basic accounting practices or effective plant lay-out are not yet a matter of course. For this reason, this type of intervention raised more enthusiasm in the machine tool companies in Ludhiana and Rajkot than with their more advanced counterparts in Bangalore. For the former, this broad based technical support was a necessary accompaniment or even a prerequisite for the introduction or upgrading of technology.

#### **5.1.4. Technology upgrading**

The impact of ICAMT activities with regard to technological upgrading is much more uncertain than in the other areas and greatly varies from sector to sector. Contrary to awareness raising or market development through international exposure, the build-up of technological capacity is very sector-specific and requires the provision of highly specialized consultancy services as well as the establishment or strengthening of sector-specific institutions for technology transfer. Given the lack of both the necessary sector-specific expertise as well as overall personnel at

ICAMT, it is not surprising that the impact in technology upgrading was less evident than in the other areas.

The most obvious outcomes were reported in the machine tool sector in Rajkot, where visits to international fairs and technical and business consultancy significantly contributed to an upgrading from conventional to CNC machines. Out of 12 companies which participated in the ICAMT programme, five are currently selling CNC machines (CNC lathes, machining centers, cylindrical grinders, milling machines, and some more are expected to follow in the near future). In addition, many companies were able to outsource manufacturing and to focus exclusively on design, assembly, testing and marketing of their products. The take-off of the Rajkot units appears to be genuine, with growth rates amounting to 40%- 50% per year, causing the Rajkot enterprises to rapidly catch up with their more advanced counterparts in Bangalore. In order to further support the industry, design and

**Case study 2: Machine tool unit in Rajkot**

This unit, which was founded in 1985, started with the production of conventional lathe machines. However, soon the company was threatened to be left behind by technological progress and growing national and international competition. With the help of a consultant under the ICAMT programme, the enterprise was able to raise its conventional machines to modern standards and to present its products at the machine tool fair in Ahmedabad. In addition, a UNIDO-sponsored visit to EMO Milan in 2003 convinced the company to enter the market for CNC machines. As a consequence of the visit, in cooperation with the consultant a plant exclusively designed for the design and testing of CNC machines was set up, and the actual manufacturing of the machines was outsourced. At the moment, the company is targeting its old clients, many of which are first-time CNC users, thus contributing to the technology upgrading in a variety of sectors. For these clients, the company is providing complete solutions comprising technology upgrading as well as training. Today, the company produces 32 CNC machines per year and has set up selling offices across the country.

testing facilities are currently set up in Rajkot. At the moment, it is difficult to judge the appropriateness of these activities to the needs of the companies. At the moment, ICAMT is not contributing to any of these support measures. However, further technological and marketing support is needed in order for the growth to be sustainable.

In Bangalore, the impact of ICAMT activities on technology transfer is even less clear: The Design Institute, which has been set up at ICAMT facilities by the Indian Machine Tools Manufacturing Association (IMTMA), has been conceived as hi-tech training centre for machine tool designers, focusing on training in all aspects of machine tool design to engineers from the industry. Participants are taught to use CAD workstations as well as widely used design and analysis software. In this case, the contribution of ICAMT is limited to the provision of infrastructure, resulting in little value added on the part of ICAMT. In addition, the design school is judged by small-scale beneficiaries to be inappropriate to their needs, in that it focuses exclusively on CAD/CAM design instead of more hands-on machine tool design and training on the factory floor or assistance in production technology. Furthermore, attendance of the months-long training courses at the Design Institute is out of scope for small-scale enterprises, as they cannot afford to spare an engineer for such an extended period of time. For the moment, there does not seem to be an alternative source of help, as the Central Manufacturing Technology Institute (CMTI) in Bangalore, on the premises of which both ICAMT and the Design Institute are located, has equally been judged to be inappropriate for SME needs.

In Ludhiana, little more than awareness raising for basic problems related to business management and machine tool technology has been achieved so far. Visits of Ludhiana machine tool units to their more advanced counterparts in Bangalore resulted in increased awareness of the importance of CNC machines, but very few companies have to date upgraded their technology. On the contrary, the units themselves reported that their technology was not yet sophisticated enough to be exported to Europe. Rather, exports currently go to Africa and the Middle East, partly for historical reasons. The Ludhiana units still need substantial technology support, comprising areas such as foundry upgrading, production technology and machine tool design.

In Aligarh, lock units have profited from a visit to the Cologne Hardware Show in 2002 in terms of a greater awareness for the necessity to produce pin-cylindrical locks. However, actual technology upgrading has not yet happened as most companies in the area still engage in the production of traditional locks. For the few



companies which have switched to pin-cylindrical locks, a growth in productivity has not yet materialized as technologies in place are not appropriate and the cost of production is still very high in international comparison. The lock centre located at the National Small Industries Corporation (NSIC) in Aligarh is still in a very incipient stage, and the contribution of ICAMT has been limited to the provision of hardware for the centre. In order to achieve a turn-around for the lock units, substantial input in terms of high-precision pin-cylindrical drilling machines as well as technological know-how in high-precision lock production is required.

In the lock industry in Dindigul, technology transfer on a very low level has been achieved by introducing mechanized instead of manual production. Under the mechanization programme, a contract has been awarded to the Dindigul Cooperative (DICO), a cluster involving approximately 40 micro-sized lock manufacturers. With the money received through ICAMT, DICO has further allotted the work of design and fabrication of tooling locks to GTTC (Government Training and Tool Room, Bangalore). The mechanization of locks is expected to substantially enhance the productivity of the small lock manufacturers, enabling them to face competition from Aligarh and other regions. As the process of mechanization has not yet been completed, no impact on enterprise performance was reported thus far. However, even if the expected productivity growth is about to materialize, it still remains questionable whether a sustainable build-up of capacities in Dindigul has been achieved and whether the introduction of a simple mechanical tool for a rather old-fashioned product will be sufficient to sustain growth in the long run.

In the toy industry, the most visible progress has been reported with regard to design. In the Delhi and Mumbai regions, where a large part of the country's toymakers are located, toy design development facilities have been set up at Small Industry Service Institutes (SISIs) in order to facilitate the development of new toy designs as well as the build-up of capacity of the toy units for in house toy designs. These facilities have been established in cooperation with the National Institute of Design (NID) in Ahmedabad as well as the National Institute of Fashion Technology (NIFT), New Delhi. Cooperation with the design facilities on the part of beneficiaries resulted in the development of new toy design by some units as well as in the

design improvement of existing toys. For the sector at large, the awareness for design as an important element of competitiveness on international markets has been substantially raised, and for some units in house design capacity has been strengthened.

**Case study 3: Toy unit in Delhi**

The owner of this unit has been a toy trader until 2001. From his frequent visits to China, he realized that it would be more profitable for him to produce his own toys. Therefore, he started to assemble educational card board games and puzzles. The design centre in Delhi provided him with valuable help on new designs, resulting in a successful product which he now exports on a large scale. In addition, he now has his own in house design capabilities, and his share of exports has risen to 30% of turnover.

In order to further advance the design capabilities of Indian toy manufacturers, a common facility centre (Toy Design & Development Institute - TDDI) in Greater Noida in Uttar Pradesh is set up. This centre is planned to include facilities in the areas of testing, calibration, training, design, development and packaging. Experts from AIJU, Spain, a reputed international toys organization, have been hired for providing consultancy support for TDDI. The construction of a building in two phases, with a total covered area of 4.500 square meters has been approved. The first phase, consisting of facilities housing training, marketing and toy development facilities is expected to be operational by mid - 2006.

As the building for TDDI is still under construction, it is at this moment difficult to assess the impact of such a facility or even to predict its usage by individual units. The results of this evaluation, however, suggest that although design is still perceived to be a major need for toy manufacturers, most units prefer to build-up their own in house design capabilities after an initial kick-off from outside design experts. In addition, with regard to the design of tools – a competence also planned to be included in TDDI – it was reported that the emergence of private companies offering CAD/CAM designs of tools appears to reduce the importance of publicly sponsored facilities of the same kind. Also, more and more units are developing in house CAD/CAM – based tool development facilities.

Another area where specific technology-supporting measures have been introduced is toy testing, which has become a major requirement for the export of Indian toys to foreign markets. For this reason, testing facilities for both mechanical and toxicity testing have been set up at the Regional Testing Centre (RTC) in Delhi, which conform to the requirements of European Standards EN-71. The RTC has been set up in cooperation with experts from AIJU, Spain, an intervention which according to beneficiaries resulted in little value added. In Mumbai, a series of workshops on CE Certification were held. Toy units reported that these workshops enabled them to understand the requirements of European markets, where toys can only be imported if they carry this type of certification. So far, however, exports of Indian toys to European countries are still in an incipient stage.

For the stone industry, a Centre for Development of Stones (CDOS) is being set up at Jaipur. The objectives of CDOS encompass institutional support to the stone sector covering all possible dimensions, including issues related to trade information, trade promotion, organization of events, training of manpower, promotion of artifacts, upgradation of technology as well as testing. The land and building has been provided by the State Government of Rajasthan, and the procurement of equipments is currently under way. The contribution of ICAMT consists in the provision of imported specialized equipment through UNIDO HQ. The building construction work of the facility has been completed, and the centre is expected to be fully operational by December 2006.

Overall, the impact of ICAMT in technology upgrading in the stone industry seems to be minimal and largely reduced to the provision of equipment. Both the stone industry in Jaipur (marble) as well as in Bangalore (granite) did not report any significant input to technology upgrading in the area of processing so far, nor did the evaluation uncover a substantial technology need in stone manufacturing. For artisan manufacturers, the introduction of electronic hand tools has so far been of limited use, as artisans hold that such tools reduce the value of their artisanal products, which lies in the very fact that these products are made by hand.

In general, the main need of the stone industry is in marketing and export promotion, and representatives of the stone industry feel that there is still substantial room for improvement for the global positioning of Indian stones.

For this reason, it is questionable whether the massive testing and R&D facilities planned at CDOS meet industry needs. The permanent exhibition facilities also planned at CDOS are more in line with the requirements of the sector, but are hardly within the scope of ICAMT activities. The establishment of another such centre featuring substantial R&D, testing and exhibition facilities, which is required by the Bangalore units, should therefore not be considered by UNIDO.

One area where progress is reported is sandstone quarrying, where experts facilitated by ICAMT have helped to introduce non-explosive and environmental friendly technologies. More and more, the use of diamond wire based quarrying and cutting of blocks is substituting blasting techniques. Adoption of such techniques has resulted in the reduction of wastage and better yield as well as in greater compliance with environmental norms. In general, there seems to be growing sensitization about environmental problems related to quarrying, and a study by WAPCOS (Water and Power Consultancy Services, a private consultancy based in Delhi) has been conducted on the subject. Nevertheless, as quarrying can hardly be considered manufacturing, its inclusion into ICAMT activities has to be questioned.

## **5.2. The formulation of new projects**

Overall, the formulation of projects through the ICAMT can be said to be demand-driven, with strong inputs from the private sector, especially from industry associations. Industry associations involved in the four sectoral programmes have expressed their satisfaction about the responsiveness of the ICAMT to their needs in terms of programme formulation.

In addition to the formulation and implementation of the four sectoral programmes discussed above, ICAMT has formulated a series of new programmes on technological upgrading of SMEs in selected Indian industry sectors. In terms of

output, 19 such new programmes were developed, three of which are already operational (status December 31, 2005). These are:

- A programme for the development of the machine tool sector in India
- An inter-regional programme on capacity building for transfer of energy-efficient and eco-friendly technologies for low-cost housing
- The Technical Training and Assistance Programme for Regional Africa at UNIDO established technical training institutes in Bangalore and Punjab, which are supported by ICAMT.

To date, US\$ 14.407.600 have been mobilized from the public and the private sector, and US\$ 7.189.000 have already been approved. These new programmes are geared towards extending the programmes already in place (e.g. machine tools and stone), or address new key manufacturing industries (such as leather or pharmaceuticals), or aim at improving the legal, technological and regulatory framework for manufacturing (such as the promotion and management of IPRs).

With regard to the quality of the projects developed by the ICAMT a lack of results orientation as well as a lack of coherent application of the logical framework can be observed. Although the formulation of new programmes seems to be demand-driven, the criteria for the selection of new projects are not clear, and a coherent strategy and a thematic focus are lacking.

In addition, many of the programmes will be implemented by counterparts rather than by ICAMT itself. At the moment, however, it is not yet clear whether these counterparts dispose of the necessary know-how and resources to implement the programmes, and whether a sufficient monitoring procedure on the part of ICAMT will be installed. Even for those programmes which will be implemented through the ICAMT, relevant sectoral expertise is currently not available. In many cases, experts from UNIDO HQ have not been involved in the formulation of the programmes.

### **5.3. Development of a database to promote business alliances**

With regard to the development of a project database, some technology profiles of Indian companies have been put on the ICAMT website. While these profiles are well done and follow a common format, only a handful is available on the web. Furthermore, there are no interactive features which allow visitors to search and retrieve data in an interactive way. The link leading to technology offers from foreign countries to India does not show any data at all.

The 'technology database' also available on the ICAMT website contains a number of links to foreign technology sources, but does not explain how these sources could be best used by Indian SMEs. In addition, the list is by no means exhaustive, missing out on important institutions and links to EU technology programmes. Some data collected by ICAMT has also been put on the UNIDO exchange website. However, the last date of entry was December 2003 – no entries have been made after this date.

Given the scarcity of data on the ICAMT website as well as the limited data provided by ICAMT to UNIDO exchange, the impact of these measures is more than uncertain. In addition, the provision of databases, however complete and sophisticated, is not enough to promote technology or to foster business alliances. In order to bring technology offers from India in line with foreign demand, active brokerage services and continuous networking is required. However, at the moment ICAMT lacks both the commitment as well as the resources for such an endeavor.

### **5.4. Technology transfer to developing countries & south-south cooperation**

Although the transfer of technology to developing countries was the original mandate of ICAMT, it has received little attention in the operational phase and seems to have been sidetracked by concerns about the enhancement of technological capacity in India itself. The only area where South-South cooperation still features prominently is the low-cost housing programme, which aims at the

designing and manufacturing of low-cost building materials, mainly from agro-waste, for export to developing countries. Although a detailed assessment of the impact of these measures in the respective countries is outside the scope of this evaluation, it can be argued that these technologies are in principle relevant to other developing countries, and that a series of useful activities has taken place. For example, exhibitions on building machines for low cost materials have been undertaken in a variety of countries (e.g. Tanzania, Uganda, Nairobi, Venezuela, Brazil), and it was reported that these resulted in direct business for the Indian companies involved. In addition, training, capacity building and awareness building activities both in India and in the developing countries were conducted. In Bhutan, a demonstration centre with two or three demonstration houses is currently set up.

The 25 Indian building machine manufacturers which participated in the programme benefited as well from the low-cost housing initiative. Not only were they able to increase their exports, but they in general profited from the exposure to foreign markets in developing countries in that they are now part of an international network. In addition, the participating companies were able to increase their production of machines and have received technical help to upgrade their technology. For the low-cost housing programme, it was reported that the value added of ICAMT/UNIDO was considerable, in that UNIDO facilitated access to the governments and industry associations of developing countries. According to beneficiaries, UNIDO support should be enhanced and extended to larger number of developing countries.

Under the aegis of the four sectoral programme, activities related to South-South cooperation were relatively scarce and limited to a few stand-alone activities. For example, the locks manufactured by DICO and some Delhi units were exhibited in the Building Material Exhibition at Caracas, Venezuela in 2002. More than 100 lock samples of artisan locks were displayed in the exhibition. It was reported that some DICO locks were sold on the spot for their decorative design value. Among others, 50 locks were ordered by Australian buyers. In addition, the Chamber of Indian Industry (CII) is organising a support programme for companies in Mauritius with the help of ICAMT.

As with the low-cost housing programme, the impact of South-South cooperation activities within the four sectoral programmes on other developing countries cannot be assessed within the framework of this evaluation. Although some Indian SMEs in these sectors have clearly profited from South-South activities, it remains questionable whether a substantial and sustainable technology-transfer to other developing countries has been achieved. Without accompanying measures, the export of a final product is unlikely to lead to a long-term technology-build up in the recipient countries if the necessary absorptive capacity is not in place.

Nevertheless, the results of this evaluation suggest that there is potential with regard to South-South cooperation in the four sectors, which at the moment is not fully exploited. One example is the stone sector, where modern machines for stone manufacturing as well as non-explosive and environmentally sustainable quarrying techniques could be of use to other developing countries where mining and stone manufacturing is abundant. In addition, technologies and tools for lock manufacturing as well as machine tools could potentially benefit developing countries. The synergies between the sectoral programmes and activities in the area of South-South cooperation are thus apparent. In addition, it is possible that such potential is also to be found in other sectors, such as leather and footwear.

### **5.5. Sustainability and long-term impact**

The long-term impact of ICAMT is difficult to assess, as it is analytically hard to isolate the contributions of ICAMT from the multitude of other factors involved and to establish causal linkages between the activities of ICAMT and sectoral performance. It seems to be a fact that in the four sectors treated under the sectoral programmes substantial progress has been made in the awareness of both technology and markets, and that the performance of the sectors has in many ways improved. Today, all of the sectors feature some strong, export-driven SME companies which match the best of the world in their field.

Much of that can be attributed to the natural dynamics of the buoyant Indian economy and would undoubtedly have happened without ICAMT intervention.



However, it can be safely argued from the experience of this evaluation that valuable impulses were provided by ICAMT at a time where it was crucial for the sectors to step up their capabilities and to open up to competition. A series of companies profited from ICAMT activities, and there is evidence that both awareness and actual know-how spread beyond the confines of the beneficiaries to the sector at large.

One area where ICAMT was successful is the establishment of a network of reliable intermediary organisations, which act both as partners in defining sectoral needs and strategies, and as multipliers ensuring that the eventual benefits from ICAMT activities are spread amongst a larger number of players in the sector. These institutions, mostly business associations, were reported to have increased in number and strength in recent years, as awareness about challenges and opportunities in a newly liberalised and globalised economy has grown. In developing the sectoral programmes in close cooperation with the industry associations, ICAMT managed to establish these organisations as catalysts for the development of the sectors and as focal points of clustering activities. To further enhance the role of these associations as well as to build up new ones for future sectoral interventions certainly seems to be the way forward.

However, institution building has not been achieved in the same way in the area of technology. While business associations are generally good at defining the needs of their sectors, to formulate common goals and challenges and to lobby for the interests of the sector on the state level, they are not the places where actual technology transfer is achieved. Technology intermediaries, which capture technological know-how and adapt it in a way SMEs can benefit, are crucial if technology growth is to be sustainable, especially in a system where university – industry links are not yet sufficiently in place and where universities and research centres seem remote from SME needs.

In addition to dedicated technology-transfer institutions, business-to-business technology transfer through strategic partnerships or licensing agreements should

be strengthened. This has been repeatedly referred to by beneficiaries as the most effective mechanism of technology transfer at this stage of development.

So far, the establishment or strengthening of such institutions and the links with them has not sufficiently happened. This is especially true for the machine tool sector, where either the institutions do not fit SME needs (as is the case with the Design Institute or the CMTI, Bangalore), or are still in a very incipient stage of development (as the new facilities set up in Rajkot), or are not equipped with sufficient technological know-how to support their members (as the Institute of Machine Tool Technology, Ludhiana). So far, there has been little direct transfer of know-how through ICAMT, and the input provided by international experts to institution and capacity building has been minimal.

Overall, ICAMT has had substantial 'initiating effects' in the sectors, but has in most cases not worked towards a sustainable, long-term build-up of technological know-how. In some cases, companies have upgraded their technology as a consequence of the wake-up effect of international exposure, but whether long-term capacities to develop and/or absorb technologies have been strengthened, yet remains to be seen. Where technology upgrading has happened, it is mostly a result of both the rising entrepreneurial spirit in the companies and the increased availability of technology in India. In order to achieve sustainable technology upgrading, more efforts need to be invested in the long-term build-up of capacities.

## **6. ICAMT as a UNIDO activity (UNIDO value added)**

- ICAMT within the UNIDO corporate strategy

Technology diffusion figures prominently among the priority areas of interventions identified within UNIDO corporate strategy<sup>7</sup>. The importance of strengthening the technological skills of developing countries as well as improving their access to existing technology is the key to a successful integration in a globalised market

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<sup>7</sup> see UNIDO: Developing Industry: productivity enhancement for social advance, UNIDO's corporate strategy, Vienna 2003

economy. Thus, there is no doubt that the ICAMT is in line with the corporate strategy in this respect.

Most of the enterprises assisted by the programme are of direct relevance for the generation of employment for people affected by poverty. Effective technical assistance depends on the willingness and absorption capacity of the enterprises. Thus, frequently such enterprises were selected and participated that have the best potential for learning and implementation of improved manufacturing methods.

Little attention has been given to establish mechanisms of replication to ensure impact on the not so well prepared segments of the sectors. This is especially relevant in terms of UNIDO's mandate to contribute to such productivity improvements that lead to social advance. This implies that the ultimate goal of technical assistance is not so much the improvement of the performance of a small number of enterprises, but to demonstrate the viability of improved manufacturing to a wider sector of the economy. In this regard there is room for improvement.

- Use of UNIDO expertise

The use of UNIDO expertise (including staff as well as international consultants) in the ICAMT has been limited mostly to the UNIDO project manager and a few international consultants. International subcontracts were used in the toy sector (AIJU, Spain) and in the stone sector (Carrara, Italy).

Discussions with beneficiaries did not produce strong evidence that international expertise from consultants was a distinct value added from UNIDO. In many cases UNIDO's role was perceived as a financial support to activities rather than a substantive input. However, it was at the same time recognized, that the initiative for the activities stemmed from UNIDO and that without this initial push not much would have happened. Consequently it can be said that UNIDO/ICAMT actually played the "catalytic" role described in the project document as one of the main reasons for UNIDO assistance.

As far as the expertise from UNIDO headquarters is concerned two contributions have been made. First, the backstopping by the responsible branch (Investment and Technology Promotion Branch) provided effective quality control over the implementation process and established international contacts to facilitate visits of enterprises in a number of countries.

Second, in some cases technical branches (e.g. Agro-Industries Branch in the case of leather) did provide technical expertise for the formulation of sectoral programmes. However, this could have been done in a more systematic way, since in some cases (e.g. food industry) programmes were formulated without using UNIDO in-house technical expertise. It has to be noted however, that this is also a problem of UNIDO in-house capacity of technical branches, who frequently receive more requests for technical assistance than they can process. In some cases projects were formulated and implemented in areas where UNIDO in-house sectoral expertise does not exist (e.g. stone, lock, toy, machine tool). In so far as the assistance provided to such sectors is of a more general nature (awareness, market development, business upgrading) this is not a problem. But as a consequence and as has been pointed out in chapter 5, the effectiveness in the technological upgrading was relatively low. Thus, for a more direct impact on technological upgrading a stronger focus on such areas where UNIDO technological expertise exists (not only at HQ but also at institutions like ICS, etc.) is recommended.

- UNIDO as a “door opener”

Improved access for developing countries in the area of new technologies has been stated as the most evident value added in many interviews with beneficiaries. Especially in the case of trade fair participation and study tours to foreign companies the beneficiaries felt that without UNIDO these very effective exposure to foreign competitors and markets would not have happened. Trade fairs mostly did offer technical seminars and conferences, which were seen by beneficiaries as unique opportunities to gain insight into latest technological developments of their respective sector.

## 7. Conclusions

### ICAMT strategy & relevance

- Given the evolution of framework conditions for manufacturing and SMEs in India the ICAMT as an institution with the mandate to support technological upgrading through international cooperation and technical assistance to SMEs is of increased relevance, both, in terms of policy and to the target beneficiaries.
- While the ICAMT is a relevant partner for Indian manufacturing companies, it has not yet established itself as an internationally recognized technology centre with a clear competence in the area of manufacturing technology.
- The relation between ICAMT and TDSP needs clarification: while both strands of activity of ICAMT (North-South and South-South cooperation) and TDSP (technology diffusion in India) are relevant to stakeholders, the current arrangement of separating the four sectoral programmes from ICAMT and subsuming them under the umbrella of TDSP does not allow to fully exploit synergies between these two technology-transfer activities. In addition, stakeholders do not perceive these two as separate entities
- The strategic direction of ICAMT is not sufficiently defined and is perceived by stakeholders in different ways:
  - Thematic focus: Manufacturing technology in the narrow sense as process technology or technology in a wider sense (e.g. including product technology), technology upgrading versus general business support
  - Depth of technological expertise: General project management skills versus in-depth technological know-how
  - Geographical reach: India, North-South, South-South
  - Organisational nature: Institution versus project
  - Role along the project cycle: Project formulation versus implementation

## **Effectiveness**

- Effectiveness in the different areas of support varies. It is highest in awareness raising and market development and lowest in actual technology upgrading. The reason for that being a lack of resources and focus, which is needed for technology transfer work.
- In terms of market development, ICAMT very often initiated the participation in international trade fairs, which in some cases led to the establishment of commercial relationships and facilitated access to European markets.
- Nevertheless, many of these measures do not produce long-term build-up of technological capacities in the companies.
- A sustainable network of partner organizations has been built up in terms of general business support. These organizations can serve as catalysts for the development of the sectors and as focal points of clustering activities.
- In the area of actual technology transfer, institution building has not been sufficiently achieved. Either the institutions are not geared towards the needs of SMEs, or they lack the technological know-how to support SMEs in the upgradation of their technology.
- Replication of successful assistance has been given little attention in most cases.

## **UNIDO value added**

- UNIDO value added is very high in terms of getting the different sectors 'started' through visits to international trade fairs (which mostly included technical seminars and conferences) or the provision of general technical assistance, both of which had an 'eye opening' effect. UNIDO helped a number of companies in their efforts to open up to foreign markets.
- In many cases, UNIDO acted as a 'door opener' by facilitating access to companies. In some cases, this contributed to an upgrading of technology by providing good case examples.

- In terms of international technological expertise, be it from UNIDO staff, international experts or international subcontractors, very limited contributions were made through the ICAMT.
- The value added from UNIDO at headquarters level consisted mainly in quality control and facilitation of international cooperation (e.g. plant visits in other countries). At the technological level it was very limited. This was in spite of the fact that in some areas of project development (e.g. food industry) specific UNIDO HQ expertise exists. However, it was not always available because of UNIDO capacity constraints.
- In the area of low cost housing (south-south cooperation initiatives) UNIDO was reported to have added value in a significant manner by facilitating access to other countries demand for technology.

### **Management and operations**

- The supervision of the ICAMT through an active Advisory Committee (8 meetings with comprehensive discussions including reviews and previews, good participation) reflects a strong local participation and ownership.
- ICAMT links with other UNIDO initiatives in India (e.g. cluster activities, cleaner production, investment promotion) and world wide (ITPOs, ICS, etc.) are weak in some areas.
- The project identification and formulation in ICAMT lacks a strategic approach and clear thematic focus. In some cases projects were formulated without the necessary sectoral expertise.
- ICAMT and TDSP have no clear division of labor and are largely perceived by stakeholders as one entity.
- Monitoring of project implementation is not systematic. Some reports are of good quality but very few exist (one review report for the sectoral TDSP programmes in four years) and the quality of the data presented is unclear.
- Inefficiencies and lack of systematic approach in the selection of beneficiaries (e.g. trade fair participation) were observed in some cases.
- The ICAMT has implemented programmes with great flexibility and immediate response to new demands by industry.

- The ICAMT has currently only one staff member, which does not allow adequate operations. A director is not in place, which is a major weakness.
- The approach to selection of the ICAMT staff is not sufficiently private sector oriented.
- The efforts of ICAMT in the area of funds mobilization for new projects and programmes were effective and covered public and private sectors.



## 8. Recommendations

Recommendations	Responsible	Timeline
<b>Strategy</b>		
The ICAMT should not continue to operate in the current form. But if major changes in strategy (see below) are implemented, the activities of both ICAMT and TDSP should be enhanced and strengthened. More resources should be allocated for both, and specific technological capacities should be built up. In order to fully exploit synergies between the two activities, they should be united under a common structure.	UNIDO, DIPP, Advisory Committee	Third quarter 2006
In order to fully exploit synergies between the two activities, they should be united under a common structure.	DIPP, SSI	Third quarter 2006
Focus on sectors with a real technology need and/or an outward-bound technology-transfer potential. In this context, the potential of a focus on process technology (e.g. mechatronics, automatisisation) and/or on sectors with a potential for technological spill-over effects (e.g. machine tools, engineering) should be analysed.	Advisory Committee, PM	Third quarter 2006
While the holistic approach followed by the ICAMT is valid, it should be applied only as a means to increase facilitate technological upgrading. The ICAMT should not develop into a general business consultancy.	Advisory Committee, PM	-
Increase sustainability and capacity-building effects by turning the ICAMT into a fully-fledged institution (not necessarily but possibly own legal status, longer-term orientation instead of project-by-project implementation, long-term staff including a director).	UNIDO, DIPP, Advisory Committee, PM	Medium term (2007/2008)
The ICAMT should not be considered as a mere project identification and formulation entity. In those cases where ICAMT works on a project-basis, technological expertise should be built up in order to ensure effective project implementation.	Advisory Committee, PM	-

<b>Recommendations</b>	<b>Responsible</b>	<b>Timeline</b>
The network of local partnership organizations of the ICAMT should be strengthened in two ways. First, a number of technology providers (universities, research centres, tool rooms, etc.) should be linked to the ICAMT. Second, existing partner organizations with a lack of SME focus (e.g. IMTMA) should be strengthened in their capacity to cater to SME needs (e.g. appropriate design of training courses, etc.).	ICAMT Director	2007/2008
<b>UNIDO value added</b>		
UNIDO support to the ICAMT should focus on the positive experience during the operational phase in the facilitation of contacts with potential stake holder governments in developing countries and the awareness raising through exposure of entrepreneurs to international markets and technologies.	PM	immediately
In order to ensure maximum UNIDO value added, ICAMT should optimize the exploitation of technological expertise available at UNIDO headquarters.	PM	immediately
UNIDO should help to build up the ICAMT's capacity in the establishment of company-to-company technology cooperation.	PM	immediately
UNIDO should further provide overall quality control to ICAMT activities and projects in order to ensure international credibility of the ICAMT. Thus the cooperation with UNIDO should continue.	DIPP, PM	Second quarter 2006
More attention should be given to the replication of successful cases within the same sector. A corresponding strategy paper should be prepared by the new Director.	Director ICAMT, PM	Third quarter 2006
<b>Management and operations</b>		
In order to ensure the long-term build-up of capacity through the ICAMT as an institution, the financial structure of the ICAMT should be changed. The financing should contain both long-term institutional funding as well as project funding. The institutional funding should be provided by the Indian government, and if possible, in the long run also by other stakeholder governments.	DIPP, Advisory Committee	Medium to long term (2008/2009)

<b>Recommendations</b>	<b>Responsible</b>	<b>Timeline</b>
The director and the long-term staff of the ICAMT should be appointed as soon as the overall strategy has been clarified. Candidates should be selected after a hearing on the part of a balanced panel involving DIPP, SSI, UNIDO and private sector representatives. The selection criteria should emphasize strong industry experience and expertise in technology transfer.	DIPP, PM	Second quarter 2006
In order to exploit synergies and to avoid duplication, links with other UNIDO programmes in India (e.g. cluster activities, investment promotion) should be established. For this purpose, the UNIDO Field Office should continue the practice of convening regular meetings of project directors to ensure exchange of experience and mutual learning.	Field Office	-
A proper monitoring system (including adequate indicators at the enterprise and institutional level) should be installed in the ICAMT to establish baseline data of enterprises assisted, ensure a fair and transparent selection process of companies and to measure the performance of local counterpart institutions (e.g. diffusion of results within sectors, not only “big players” benefiting from assistance, etc.).	Director of the ICAMT, PM	Third quarter 2006
The Bangalore office of ICAMT is currently underutilized. While it might make sense to retain part of ICAMT staff in Delhi, the core team should be placed in Bangalore.	Director of the ICAMT, PM	Third quarter 2006

## 9. Lessons Learned

- UNIDO supports a number of international institutions in the field of technology and investment promotion. In some cases these institutions are designed to develop from a project into an institution after a pilot phase, but then remain to be a continuously extended project. This approach has serious drawbacks in terms of sustainability and impact of UNIDO assistance. If the transition from project to institution is not explicitly and firmly built into the initial design of the pilot project, after a few years of operating in the form of a project resistance to change will prevent the transition from happening.
- The set up of a truly international institution needs commitment not only from the host country but also from a number of other leading partner countries. The pilot phase of such institutions should be used to establish such a commitment by creating strategic partnerships through key projects with a number of countries.
- The experience gathered by UNIDO in the establishment, support and management of international technology centres should be analysed in the near future in order to ensure a more coherent approach to the assistance in this area.
- The relevance of technology oriented programmes in the light of the goal of poverty alleviation depends on a proper selection of sectors and enterprises. To the extent that technology upgradation leads to an improved insertion into a globalised economy, be it in the domestic or in foreign markets, technology upgradation in manufacturing industry leads to poverty alleviation effects.
- In such projects, where the expected UNIDO value added is to bring in technological expertise for a technology upgradation at the enterprise and sectoral level, such sectors should be selected, where UNIDO's in-house expertise and/or the existing network of consultants and subcontractors is sufficiently specialised and the necessary capacity exists to employ this expertise in the project.
- The UNIDO expertise in developing industrial development project proposals is normally vested in HQ staff. In this case, a project was created, the main function of which was the preparation of other UNIDO project proposals. This approach has created serious doubts in the case of the ICAMT because UNIDO

expertise has not always been drawn upon when formulating new projects. However, the idea of strengthening the capacity of beneficiary countries to formulate and promote industrial development projects is perfectly compatible with the fact that one of UNIDO's core competences is project development. There is potential for replicating this experience in an adjusted form in other countries. However, the field office or the regional bureau should be involved in the back-stopping of such projects in order to ensure a demand driven approach to identification of projects and to exploit technical expertise from UNIDO as much as possible. This could also be an innovative way of strengthening the role of UNIDO's field representation and regional bureaus in the development of new projects and programmes.

- The approach to project formulation in UNIDO could be more systematic. Objectives and expected results are frequently defined with a lack of coherence and ignoring the fact that assistance to a small number of enterprises can lead to impact only if demonstration and replication follows the direct technical assistance. To improve this situation a logical model of outcomes of UNIDO projects could be established and incorporated in the TC Guidelines as a tool to support results-oriented project formulation. Such a model could include the following aspects of results: direct results at enterprise or institutional level, demonstration results (which principle has been demonstrated and to whom?), multiplication results (how was impact achieved?).
- There is a strong trade-off between financial implementation targets within branches of UNIDO and the value added to individual projects by project managers. The larger the portfolio managed by one project manager, the smaller the amount of time to be dedicated to each individual project. This simple fact is not being given sufficient attention by UNIDO management. Instead of implementation targets even implementation ceilings could be envisaged to enhance the quality of project management. While this is an issue of general nature in UNIDO, it is especially relevant in the case of building up an international institution, where a lot of time should be invested by UNIDO HQ staff to liaise with potential partner governments and other international stakeholders in order to ensure that the initial strategy is implemented.

## Annexes

### Annex I - TOR

DATE: 20 of January 2005

#### **Terms of Reference**

*Independent evaluation of the following projects in support of the International Centre for Advancement of Manufacturing Technology (ICAMT), India:*

<i>Project Nr.</i>	<i>Project Title</i>	<i>Budget</i>
<a href="#">SFGLO0200</a> 4	OPERATIONAL PHASE OF THE ICAMT	<b>\$1,748,435</b>
<a href="#">SFGLO9900</a> 5	PILOT ACTIVITY PHASE OF THE ICAMT	<b>\$845,460</b>

#### **The independent evaluation**

*Independent project evaluation is an activity carried out during and/or at the end of the cycle, which attempts to determine as systematically and objectively as possible the relevance, efficiency, achievements (outputs, outcomes and impact) and sustainability of the project(s). The evaluation assesses the achievements of the project(s) against its key objectives, as set in the project document, including re-examination of the relevance of the objectives and of the design. It also identifies factors that have facilitated or impeded the achievement of the objectives.*

#### **Project Background**

The International Centre for the Advancement of Manufacturing Technology (ICAMT) is an International Technology Centre of excellence established by [UNIDO](#), in co-operation with [Government of India](#), located within the premises of the Central Manufacturing Technology Institute, Bangalore. Its **Mission** is to bridge the technology divide by promoting technology as the means to industrial competitiveness in developing countries. ICAMT is an integral part of UNIDO exchange. This enables effective networking with Government organizations, public and private enterprises, R&D institutions, international technology centres, universities, funding and investment agencies, UNIDO field offices and UNIDO investment and technology promotion offices worldwide.

The projects implemented by UNIDO with support of the ICAMT pursued the following main objectives:

- a) Implementation of four sectoral technology programmes (toy, lock, stone and machine tool industries) as well as other programmes and projects developed during the pilot phase related to promotion of growth and competitiveness of Indian SMEs through technology-led interventions.
- b) To promote growth and enhanced competitiveness of Indian SMEs in selected sectors of industry through technology-led interventions and development of new markets – New Projects / Programmes with funds mobilization for implementation.

- c) To promote business alliances in the field of manufacturing technology through the development and operation of a dynamic database on technologies and support services using the framework of UNIDO ITCs, ITPOs and Exchange networks.
- d) To enhance the impact of ICAMT awareness and capacity building programme focused on strengthening the institutional and technical capacity and manufacturing capability in the developing countries to support the transfer and adaptation of new technologies and innovations, thus encouraging industrial investments and fostering South-South and North-South cooperation.

### **Purpose of the Evaluation**

*The purpose of the independent evaluation is to enable the Government, UNIDO and donors:*

- *To assess the efficiency of implementation: quantity, quality, cost and timeliness of UNIDO and counterpart inputs and activities.*
- *To assess the outputs produced and outcomes achieved as compared to those planned and to verify prospects for development impact.*
- *To provide an analytical basis and recommendations for the focus and (re) design with regard to a possible continuation of the project.*

*The evaluation is conducted in compliance with UNIDO evaluation policy.*

### **Method**

*The evaluation will be carried out through analyses of various sources of information including desk analysis, survey data, interviews with counterparts, beneficiaries, partner agencies, donor representatives, programme managers and through the cross-validation of data. While maintaining independence, the evaluation will be carried out on the basis of a participatory approach, which seeks the views and assessments of all parties.*

*The evaluation will make use of the results of previous evaluations.*

*Reproduced below is the financial picture of the project(s) as of the day that the TOR were prepared:*

<b>Project Nr.</b>	<b>Project Manager</b>	<b>Unit</b>	<b>Budget (USD)</b>	<b>Spent (USD)</b>	<b>% spent</b>	<b>Implementation Period</b>	<b>Project Title</b>
SFGLO02004	KOZHARNOVICH VLADIMIR	PTC/IPT	\$1,748,435	\$1,157,877	66%	2/2002 – 3/2006	OPERATIONAL PHASE OF THE ICAMT
SFGLO99005	KOZHARNOVICH VLADIMIR	PTC/IPT	\$845,460	\$845,460	100%	11/1999 – 3/2005	PILOT ACTIVITY PHASE OF THE ICAMT

### **Main issues to be covered by the evaluation**

*1. Synergy benefits derived from coordination with related bilateral and multilateral programmes with special focus on PRSP/UNDAF and CCA.*

- *Describe type and extent of coordination and benefits derived, if any. Describe also the difficulties and shortcomings encountered.*

*2. Relevance and Ownership*

*The extent to which:*

- *The projects were formulated with participation of the national counterpart and/or target beneficiaries, in particular the industrial stakeholders.*

- *The counterpart(s) has (have) been appropriately involved and were participating in the identification of their critical problem areas and in the development of technical cooperation strategies, and are actively supporting the implementation of the project(s).*
- *The outputs as formulated in the Project Document are still necessary and sufficient to achieve the projects' objectives.*
- *Global best practices and technological advancements were adopted in order to become competitive.*

### *3. Effectiveness of the project*

*Assessment of:*

- *The relevance of the outputs produced and how outputs are used by the target beneficiaries.*
- *The outcomes, which have been or are likely to be realized through utilization of outputs. The evaluation of outcomes will include quantitative parameters (such as exports, sales, etc.) provided that relevant information is available.*

### *4. Efficiency of implementation*

*The extent to which:*

- *UNIDO and Government/counterpart inputs have been provided as planned and were adequate to meet requirements.*
- *The quality of UNIDO services (expertise, training, equipment, methodologies, etc.) were as planned and led to the production of outputs. This will include an assessment of the advantages of international - as compared to locally available - expertise.*

### *5. Sustainability*

*The extent to which:*

- *Benefits of the interventions are likely to continue after completion of the project(s).*
- *The future benefits are resilient to risks.*

### *6. Impact*

- *Identify what developmental changes (economic, environmental, social) at the target beneficiary level (industry) have occurred or are likely to occur.*

## **Composition of the evaluation team**

*The evaluation team will be composed of the following:*

- *Mr. Johannes Dobinger, Evaluation Officer, UNIDO, OCG/EVG*
- *International Evaluation Consultant (with background in technology transfer)*
- *National Evaluation Consultant well acquainted with industry-relevant institutional framework of the country.*

*Members of the evaluation team should not have been directly involved in the design and/or implementation of the projects.*

*All members of the evaluation team who are not staff members of UNIDO will be contracted by UNIDO.*



### **Time table of the field mission and final report**

- The evaluation mission will take place during the period 13-24 February 2006.
- UNIDO HQ, the UNIDO Field Office in New Delhi and the ICAMT offices in India will organize the field visit jointly.
- The evaluation team will be briefed at UNIDO HQ prior to the field mission and will provide a presentation of preliminary findings and recommendations to the Government and UNIDO at a date to be jointly agreed upon and prior to finalization of the report.
- The final report will be prepared within three weeks of completion of the field work and will be submitted to the Government of India and UNIDO HQ for follow-up on recommendations and lessons learned.

## Annex II – List of Persons interviewed

<b>Date</b>	<b>Time</b>	<b>Meeting Details</b>	<b>Venue of the meeting</b>	<b>Contact Person</b>
<b>14th Feb, TUE (DELHI)</b>	1030 hrs	Meeting with United Nations Industrial Development Organization (UNIDO) Regional Office	UNIDO, 55, Lodhi Estate	Mr. Sanjaya Shrestha, Officer In Charge
	1130 hrs	Meeting with Department of Industrial Policy & Promotion (DIPP)	Udyog Bhawan	Assistant Secretary DIPP, Director UNIDO Cell
	1300 hrs	LUNCH		
	1430 hrs	Meeting with Additional Secretary & Development Commissioner (SSI)	Nirman Bhawan	Joint Secretary SSI
	1600 hrs	Interaction with ICAMT /TDSP	ICAMT office	Mr. Kinra and Mr. Balani
<b>15th Feb. WED (DELHI)</b>	1000 hrs	Meeting with Former Project Director	Sanchar Bhawan	Mr. M Sahu
	1200 hrs	Meeting with Former Project Director		Mr. V.K Yadav
	1330 hrs	LUNCH		
	1430 hrs	Visit to Lock unit, Acme	Gurgaon	Mr. Ajay Bhasin
	1530 hrs	Meeting with Indian Machine Tools Manufacturers Association (IMTMA)	IMTMA office, Gurgaon	Mr. V.Anbu, Executive Director, IMTMA
	1630 hrs	Meeting with Confederation of Indian Industries (CII)	CII office, Gurgaon	Mr. Anjan Das

<b>Date</b>	<b>Time</b>	<b>Meeting Details</b>	<b>Venue of the meeting</b>	<b>Contact Person</b>
<b>16th Feb, THU (Bangalore)</b>	1000 hrs	Meeting with Dindigul Lock Workers Industrial Cooperative Society Ltd. (DICO)	Govt Tool Room & Training Centre (GTTC), Rajajinagar	Mr. Raja Bhaskar
	1230 hrs	LUNCH		
	1400 hrs	Meeting with All India Granite & Stone Association (AIGSA)		Mr. Munover Basha, President, AIGSA / Mr. Vinay Poddar
	1700 hrs	Meeting with Mr. Shailesh Sheth, Machine Tool Expert	ICAMT, CMTI Campus	Mr. Shailesh Sheth
<b>17th Feb, FRI (Bangalore)</b>	1000 hrs	Meeting with President, IMTMA, Bangalore	ICAMT, CMTI Campus	Mr. A. Mukherjee / Mr. C. P. Rangachar
	1130 hrs	Meeting with Director, Central Manufacturing Technology Institute (CMTI)	CMTI, Tumkur Road	Mr. B.R Satyan, Director
	1300 hrs	LUNCH		
	1400 hrs	Interaction with Director, Design Institute	ICAMT, CMTI Campus	Mr. S.B Kamath, Director
	1500 hrs	Meeting with Bangalore Machine Tools Manufacturers Network (BMTMN)	ICAMT, CMTI Campus	Members of the cluster
	1600 hrs	Visit to 1/2 beneficiary machine tool units	Industrial Area	President, BMTMN
<b>18th Feb, SAT (Mumbai)</b>	1100 hrs	Meeting with The All India Toy Manufacturers Association (TAITMA)	TAITMA office	Mr. Ashok Jain, Secretary
	1200 hrs	Visit to first Toy units		
	1330 hrs	LUNCH		

<b>Date</b>	<b>Time</b>	<b>Meeting Details</b>	<b>Venue of the meeting</b>	<b>Contact Person</b>
	1430 hrs	Visit to second Toy unit		
<b>19th Feb, SUN (Mumbai)</b>		Free Day		
<b>20th Feb, MON (Rajkot)</b>	1030 hrs	Meeting with President, Machine Tool Manufacturers Association (MTMA)		Mr. Rupesh Mehta, President
	1130 hrs	Visit to 2 beneficiary units		
	1330 hrs	LUNCH		
	1500 hrs	Interaction with Machine Tool units	Rajkot Engineering Association (REA) Building	
<b>21st Feb, TUE (Mumbai)</b>	First half	Report Writing and Internal discussions		
	1400 hrs	Visit and Interaction with Regional Testing Centre (RTC) -Western Region, Mumbai	RTC Office	Mr. N. Nayak, Director
<b>22nd Feb, WED (Jaipur)</b>	1030 hrs	Meeting with Centre for Development of Stones (CDOS)		Mr. R.K Gupta, CEO
	1200 hrs	Meeting with Indian Institute of Crafts & Design, Jaipur		Mr. Rajesh Jain
	1300 hrs	LUNCH		

<b>Date</b>	<b>Time</b>	<b>Meeting Details</b>	<b>Venue of the meeting</b>	<b>Contact Person</b>
	1400 hrs	Visit and interaction with 1/2 Stone units		
<b>23rd Feb, THU (Delhi)</b>	0930 hrs	Meeting with Toy Association of India and Interaction with 1/2 Toy units		Mr. R.K Verma / Mr. I.F Agarwal
	1230 hrs	Visit and Interaction with RTC (Northern Region)		Mr. A.K Gogia, Director
	1330 hrs	Lunch		
	1430 hrs	Meeting with Ludhiana Machine Tools Makers Association (LMTMA) & Institute of Machine Tools Technology (IMTT)	ICAMT, India Habitat Centre	Mr. Kripal Singh, President / Mr. Sukhdial Singh / Mr. Paramjeet Singh, G.M, IMTT
	1600 hrs	Meeting with Building Material & Technology Promotion Council (BMTPC)	BMTPC office	Mr. R.K Celly, Executive Director
<b>24th Feb, FRI (Delhi)</b>	1030 hrs	Wrap up meeting with DIPP and SSI	DIPP office and SSI office	Secretary DIPP and Assistant Secretary DIPP, Joint Secretary SSI, Director UNIDO Cell

## **Annex III – Policy Initiatives for SMEs in India**

### **POLICY INITIATIVES ON SME**

- [1] Formulation of Small & Medium Enterprises Development (SMED) Bill 2005 approved by the Cabinet in May 2005 (Not yet passed by the Parliament) designed to provide Unified Central Legislation covering all aspects relating to the establishment & operation of SSI units.
- [2] Establishment of National Commission for Promotion of Enterprises in Unorganized & Informal Sector.
- [3] Establishment of the “International Centre for Cluster Competitiveness & Growth” focused on small industries at the Entrepreneurship Development Institute, Ahmedabad, under the Small Industries cluster Development Program (SICDP).
- [4] Formulation of a new scheme at building a Strategic Alliance between SIDBI (Small Industries Development Bank of India) & those of the Commercial Banks in 50 identified SSI clusters for core financing of SSI Term Loan & Working Capital.
- [5] ISO 9000 / 14000 certification of SSI units subsidized to the extent of 75% of the cost.
- [6] Cost of credit-cum-performance rating of SSI units aimed at reimbursement of 75% of the fees charged by Rating Agencies launched on 6th April, 2005.
- [7] Technology Upgradation Fund introduced for Small & Medium Size (SMS) Enterprises (administered by SIDBI).

### **THE MANUFACTURING SECTOR IN INDIA : POLICY INITIATIVE ON SME**

- [1] Launching of SEZ Policy Framework under the SEZ Act, 2005 & the SEZ Rules, 2006, framed therein to provide for world class hassle-free business environment conducive to enhancing manufacturing competitiveness.
- [2] Entry Regime into large number of manufacturing sub-sectors freed from licensing controls (only Defense & Sensitive sectors constitute exception).

- [3] Foreign Direct Investment (FDI) Regime / Environment significantly liberalized to permit manufacturing investment by Foreign Enterprises in a vast range of manufacturing sub-sectors.
- [4] Integrated Infrastructure Development Scheme introduced to provide for cluster development.
- [5] Technology Upgradation Funding Scheme introduced for the Textiles Industry.
- [6] Fiscal incentive extended to R & D expenditure under section 35 of the Income Tax Act, 1961.
- [7] Amortization provision for technology transfer / acquisition cost provided under section 35AB of Income Tax Act, 1961.
- [8] Preferential Industrial Policy granting complete exemption for excise duty as well as Income Tax Holiday to new manufacturing investments made in specified regions in the country introduced. Such specified regions cover the seven North-Eastern States, Himachal Pradesh, Sikkim & newly constituted states of Uttaranchal, Jharkhand & Chhattisgarh.
- [9] National Manufacturing Competitiveness Council (NMCC) established in the last quarter of 2004 under the Ministry of Commerce & Industry.