

INDIA'S EXPERIENCE IN PROMOTING BUSINESS AND TECHNOLOGY INCUBATION*

India is the seventh largest and second most populous country in the world. A new spirit of economic freedom is now stirring in the country, bringing sweeping changes in its wake. A series of ambitious economic reforms aimed at deregulating the country and stimulating foreign investment has moved India firmly into the front ranks of the rapidly growing Asian and Pacific region and unleashed the latent strengths of a complex and rapidly changing nation. India's process of economic reform is firmly rooted in a political consensus that spans her diverse political parties. India's democracy is a known and stable factor, which has taken deep roots over nearly half a century. Importantly, India has no fundamental conflict between its political and economic systems. Its political institutions have fostered an open society with strong collective and individual rights and an environment supportive of free economic enterprise.

India's time tested institutions offer foreign investors a transparent environment that guarantees the security of their long-term investments. These include a free and vibrant press, a judiciary which can and does overrule the government, a sophisticated legal and accounting system and a user friendly intellectual infrastructure. India's dynamic and highly competitive private sector has long been the backbone of its economic activity. It accounts for over 75 per cent of its GDP and offers considerable scope for joint ventures and collaborations.

Today, India is one of the most exciting emerging markets in the world. Skilled managerial and technical manpower that match the best available in the world and a middle class whose size exceeds the population of the United States or the European Union, provide India with a distinct cutting edge in global competition. (See p. 119 for some of the key economic indicators.)

A. Policy framework related to S&T and SMEs

1. Science and Technology Policy – 2001

Science and technology have been an integral part of Indian civilization and culture. India's traditions in science and technology stretch over several millennia and have been founded on the principle of universal harmony and respect for all creation. In the half century since independence, India and its people have been committed to the task of promoting the spread of science and have recognized the key role of technology as one of the most important elements of national development. The Scientific Policy Resolution of 1958 and the Technology Policy Statement of 1983 enunciated the principles on which the growth of science and technology in India has been based over the past several decades and continue to inspire our endeavours even today. These policies have emphasized self-reliance and sustainable and equitable development. We stand today on the threshold of a new century, at a time when the advance of science is both tumultuous and spectacular. We live in a world where political, social and economic equations have been dramatically transformed in the last decade. It is therefore necessary for the Government and people of India to reaffirm their commitment to the growth of science and technology, which in turn must spark and fuel the march of national development.

Policy objectives:

Recognizing that science and technology are powerful instruments in the tasks of national reconstruction, economic resurgence and maintenance of national security, the Government of India, therefore, enunciates the following elements of its science and technology policy:

- To promote the teaching and practice of all disciplines of science at school and college levels, reaching out to all creative talent in the country, to foster scientific research in the universities and

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national institutions, which have a multiplier effect, and to emphasize the critical and essential role of science in the sphere of higher education.

- To encourage the participation of all sections of the population in science and technology endeavours and to ensure the creation of conditions that permits the full participation of women scientists and technologists in all areas of research and development.
- To ensure that academic and R&D institutions function with the greatest autonomy and accountability, so that an ambience for creative work of the highest order is encouraged and to build and maintain centres of excellence, which will raise the levels of work in selected areas to the highest international standards.
- To integrate the teaching and practice of science and technology with the widely prevalent and extensive knowledge acquired over the long civilizational experience of India, with a view to ensure the creative participation of large sections of our society in innovation and wealth generation.
- To harness modern scientific and technological advances so that rapid progress is made in the field of agriculture, to ensure food and water security, in a sustainable way and in the field of health, to bring modern health care to the people of the country.
- To encourage the highest level of innovation and research and development in industry and to promote close and productive interactions between private and public institutions in science and technology.
- To integrate science and technology with all spheres of national activity in order to enhance India's global competitiveness, to ensure continued development of national infrastructure and to safeguard national security.
- To exploit the full power of science and technology for the mitigation of natural hazards, particularly, earthquakes, floods, cyclones and drought.
- To use science and technology as a vehicle for international cooperation and collaboration and to promote the pooling and sharing of material and intellectual resources in order to achieve common goals.

The Government of India clearly recognizes that these objectives will be best realized by a dynamic and flexible science and technology policy, which can readily adapt to a rapidly changing world environment. It is the purpose of this policy, to ensure that science and technology, as practiced by our high calibre scientists and technologists, contributes to the economic and social uplift of our people, while maintaining our many traditional values. Through this science and technology policy, the Government reiterates India's commitment to participate as an equal and vigorous partner in the task of harnessing the advances in science and technology for the benefit of mankind.

(a) *Scientific and engineering research*

- Science and Engineering Research Council
- Intensification of Research in High Priority Areas (IRHPA)
- Integrated Science Olympiad Programme
- Kishore Vaigyanik Protsahan Yojana
- Programmes related to young scientist and HR development
 - Swarana Jayanti Fellowships
 - Fast Track Scheme For Young Scientists (FAST)
 - Better Opportunities for Young Scientists in Chosen Areas of Science and Technology (BOYSCAST)
- Earth System Sciences
- Seismicity Programme
- Utilization of the Scientific Expertise of Retired Scientists (USERS)
- National Science and Technology Management Information System (NSTMIS)
- Regional Sophisticated Instrumentation Centres (RSICs)

- Fund for improvement of S&T infrastructure in universities and other higher educational institutions
- Assistance to professional bodies and seminar/symposia
- Partial financial assistance for participation in conferences abroad

(b) *Instrumentation Development Programme*

Instrumentation is one of the major areas of S&T which makes a great impact on vital sectors of national activities such as education, scientific research, industry, agriculture, medicine and health, etc. The Department of Science and Technology (DST) has been promoting the area of instrumentation through its Instrumentation Development Programme (IDP).

(c) *Technology Development Board*

(See p. 147-149)

(d) *Science and society*

“Working for technological empowerment and sustainable livelihoods at the grass-roots levels”

Science and Society Division (SSD) has been set up under the Department of Science and Technology established with the broad objectives of providing opportunities to motivated scientists and field level workers to take up action oriented and location specific projects aiming towards socio-economic upliftment of poor and disadvantaged sections of the society through appropriate technological interventions especially in the rural areas. Under this programme efforts have been made to associate concerned National Labs or other specialist S&T institutions with each major programme so as to build-in expert input, utilize national S&T infrastructure and link it up with grassroots S&T interventions/initiatives.

(e) *Highlights and achievements of science and society schemes*

Following schemes are operational for action oriented, innovative and field based technology generation and adaptation programme/projects for specific targets groups:

- *S&T Application for Rural Development (STARD)*

STARD aims at facilitating development of promising S&T based field groups and innovative technologies related to rural development. It also has a unique programme to support selected voluntary agencies with a proven track record of innovative work in development and application of technologies for rural areas.

- *S&T Application for Weaker Sections (STAWS)*

This scheme is aimed at the development of economically weaker sections of the society in rural and urban areas. It focuses attention on specific S&T inputs for improvement of rural artisans, landless labourers, etc.

- *Women Component Plan (WCP)*

This programme is focused on women to increase their contribution to S&T and development. It also aims at promoting research, development and adaptation of technology, improve the life, working conditions and opportunities for gainful employment of women especially in rural areas.

- *Special Component Plan (SCP)*

SCP aims at promoting research and development under adaptation of technology to the needs of economically weaker scheduled caste/scheduled tribe communities in urban/rural areas.

- *Tribal Sub Plan (TSP)*

TSP aims at improving living conditions of tribal population with science and technological activities.

- *Young Scientist Programme (YS)*

The scheme is focused on young scientists who have adequate background of and training in fields of science and technology and show inclination to undertake action research projects, which are socially relevant and have application for rural development.

The Department is vested with the mandate to identify, facilitate, and promote international cooperation in the emerging and frontier areas of science and technology under bilateral, multilateral or regional framework. This has been achieved through a systematic attempt in promoting interactions between governments, academia, institutions and industries with specific focus on areas of common interests through a reciprocal arrangement that benefits both India and the partner country. India currently has S&T cooperation agreements with 57 countries.

(f) Programmes:

- Programmes with developed countries
- Programmes with developing countries
- Integrated long term programme
- Regional and multilateral cooperation
- Centres of excellence
- E-mail directory creation

2. National Science and Technology Entrepreneurship Development Board (NSTEDB)

(See p. 143-149)

3. Policy and facilitation framework for SMEs: mission for the millennium

Policy:

Create a sound policy environment to help the sector cope with the emerging challenges of globalization. Measures to include:

- Constitution of state level advisory boards
- Separate policy for tiny and micro enterprises
- Higher investment limit for ancillary units
- Special dispensation for sectors with high export potential
- Special thrust on modernization and technology upgradation of existing units
- Focus of reservation policy on enhancement of competitiveness
- Special package for promotion and development of small and village enterprises in north-eastern and hill regions

(a) Foreign direct investment:

Encourage FDI as a means to infuse additional resources, technology and modern management practices with a view to making the sector internationally competitive. Measures to include:

- Enhancement in the limit of foreign equity participation, subject to management control vesting with Indian shareholders;
- Placement of FDI in small-scale industry sector, under automatic route within the enhanced equity cap.

(b) Industrial legislation:

Simplify immediate measures to include:

- High-powered Committee for recommending single comprehensive legislation for SSI units;
- Simplification of inspection procedures based on self-declaration and post audit;
- Review Chair-Board Act and Khadi and Village Industries Commission (KVIC) Act in the context of emerging challenges.

(c) Administrative set-up:

Redefine the role of the existing machinery to make it more responsive. Measures to include:

- High-powered Committee to recommend the most appropriate organizational structure for SIDO and SSIs;
- Mechanism for participation of SSI associations and NGO's in the small and village enterprises development programmes.

(d) Credit:

Strengthen credit delivery system through:

- Credit guarantee scheme
- Earmarking flow of bank credit to micro, tiny and small enterprises
- Scheme for credit rating of small-scale units
- Exploring possibilities of securitization of guaranteed loans
- Exploring possibilities of strengthening viable state financial corporations
- Promoting venture capital funds and factoring services, exclusively for small-scale sector

(e) Delayed payments:

Facilitate timely payment through:

- Mandatory schedule in audited balance sheets for reflecting interest accrued under Delayed Payments Act;
- Special mechanism, including Industry Facilitation Councils at state level, for settlement of disputes regarding delayed payments.

(f) Rehabilitation of sick units:

Put in place an appropriate policy framework for addressing the problem of industrial sickness through:

- Strengthening of State Level Inter-Institutional Committee (SLIC) for timely identification and rehabilitation of sick units;
- Exploring the possibility of introducing statutory provision for the revival of viable sick units;
- Exploring the possibility of setting up of Debt Recovery Tribunals for facilitating recovery of SSI dues of commercial banks and financial institutions.

(g) Technology development:

Modernize small-scale enterprises through a multipronged approach including:

- National modernization plans for select sectors having high export potential
- National plan for technology exchanges
- High-powered committee to recommend linkages between R&D institutions, training institutions, technology banks and user groups

- Expand the scope and coverage of technology development and modernisation scheme
- Introduce standards for testing
- Efforts to introduce utility patent protection for small innovations

(h) *Marketing:*

Extend comprehensive marketing support through:

- Project subcontracting promotion policy
- Vendor development programme for linkages between small, medium and large industry
- Thrust on rural marketing
- Comprehensive policy for investment marketing brand promotion and overseas market access

(i) *Fiscal regime:*

Create an appropriate fiscal environment through:

- Rationalization of taxes and tariffs for small-scale industries
- Rationalization of subsidies to make them WTO compatible
- Organize WTO sensitization programmes for small-scale industries

(j) *Village industries:*

Focus through:

- Strengthening Prime Minister's Rozgar Yojna and Rural Employment Generation Programme;
- Strengthening National Rural Industries Programme;
- Strengthening rural artisan complexes;
- Modernization and capacity building in village industries;
- Special thrust on small agro-industries.

(k) *Infrastructure:*

Bridge critical infrastructure gaps through:

- Strengthening National Cluster Development Programme, including identification of critical infrastructure gaps on cluster basis;
- Functional industrial parks.

(l) *Entrepreneurship development:*

Strengthening National Entrepreneurship Development Board:

- Comprehensive plan for promotion of rural entrepreneurship
- Close linkages with premier institutions, engaged in management and entrepreneurial training
- Adoption of "turn-key concept" for entrepreneurship training

(m) *International cooperation:*

Strengthen bilateral and international cooperation through:

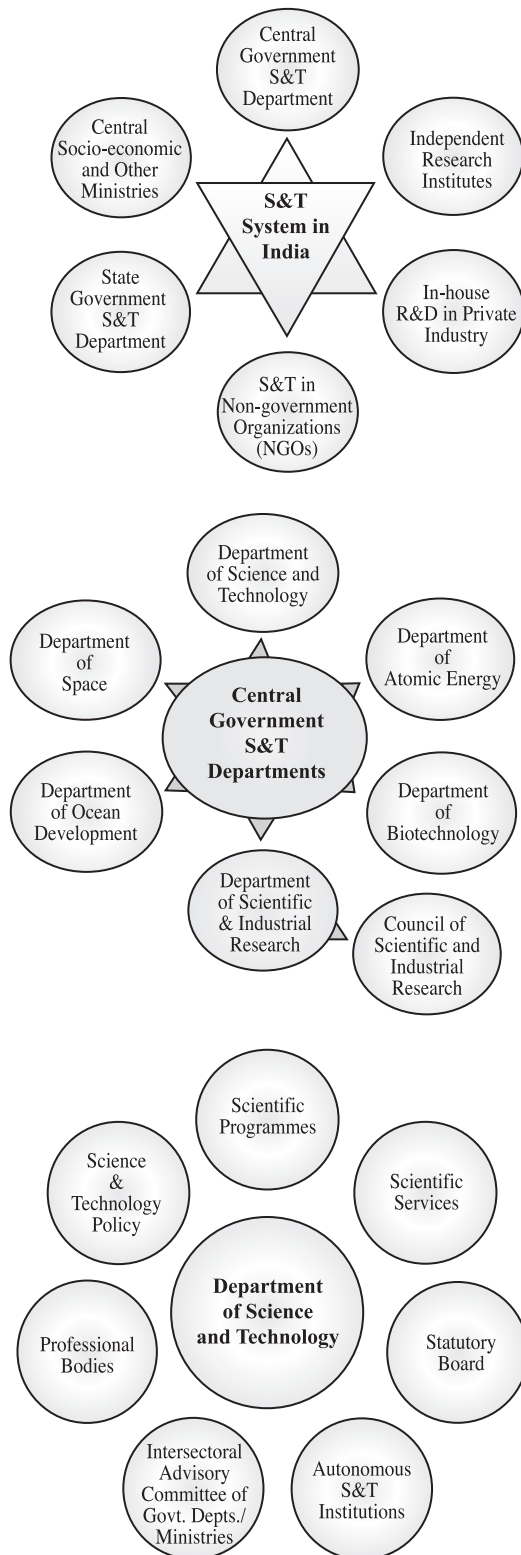
- Separate cell in the Ministry for International Cooperation and joint ventures
- Sector specific development programmes with the assistance of UNIDO and UNDP
- SME partenariat with various international and multilateral organizations

(n) **Information technology:**

Strengthen IT support:

- Master web site on small industries comprising information on policies and procedures, technology, products, etc. with hyperlinks to states and countries;
- Comprehensive plan for preparing small-scale industries for e-commerce, with appropriate electronic infrastructure support.

S&T System in India



4. Industry promotion policies

(a) *Policies classified according to specific promotional activities or focus area:*

- EXIM policy (*Central*)
- Civil aviation policy (*Draft*) (*Central*)
- Entrepreneurship development (*States*)
- Awards to meritorious entrepreneurs (*States*)
- Consultancy services (*States*)
- Environment and pollution control (*States*)
- Export promotion policy (*States*)
- FDI and NRI (*Central and States*)
- Financial infrastructure and services (*States*)
- Foreign investment policy (*Central*)
- Human resource development (*States*)
- Industrial parks, complexes, estates, development (*States*)
- Infrastructure policy (*States*)
- Industrial policy (*Central and States*)
- Information technology policy (*Central and States*)
- Land allotment (*States*)
- Labour laws and policy (*States*)
- Monetary and credit policy, 2002-2003 (*Central*)
- Natural resources and conservation (*States*)
- Port policy (*States*)
- Power policy (*Central and States*)
- Procedure and clearance to set up units (*States*)
- Public sector undertakings (*States*)
- R&D improvement in productivity and quality upgradation (*States*)
- Raw materials (*States*)
- Small-scale, rural and cottage industries (*Central and States*)
- Sick industries (*Central and States*)
- Simplification and streamlining of rules and procedures and administration (*States*)
- Single window (*States*)
- Special economic zones (*States*)
- Taxes (*States*)
- Technology upgradation
- Thrust areas (I)
- Transport (*Central and States*)
- Telecommunication (*Central and States*)

(b) *Policies classified according to sector or industry:*

- National health policy (*Central*)
- National water policy (*Central*)
- Agro and food processing policy (*States*)
- Biotechnology policy (*States*)
- Education policy (*Central and States*)

- Electronic policy (*States*)
- Forest-based industries (*States*)
- Film policy (*States*)
- Gas and downstream industries (*States*)
- Handloom and handicraft and cottage industry sectors (*States*)
- Hydropower policy (*Central*)
- Housing and urban policy (*Central and States*)
- Liquid fuel policy (*Central*)
- Medical and medical college policy (*States*)
- Development of mineral and mineral-based industry (*States*)
- Mining (*States*)
- National housing and habitat policy (*Central*)
- Pharmaceutical policy – 2002 (*Central*)
- Rice export policy (*States*)
- Road policy (*States*)
- Rural non-farm sector (*States*)
- Sericulture (*States*)
- Slum policy (*Central*)
- Tea policy (*States*)
- Telecommunication (*Central and States*)
- Tourism policy (*States*)
- Textile (*Central and States*)
- Web policy (*States*)

(c) ***Incentive schemes:***

- Airfreight subsidy (*States*)
- Backward area (*States*)
- Contribution to feasibility study, project report preparation cost (*States*)
- Drawal of power line and generating sets (*States*)
- Capital/State investment subsidy (*Central and States*)
- Electricity charges and water charges rebate (*States*)
- Employment generation (*States*)
- Exemption in central excise tariff (*Central*)
- Export promotion (*States*)
- Human resources and training (*States*)
- Marketing support (*States*)
- Margin money/seed money for SSI/tiny units (*States*)
- Modernization/expansion subsidy (*States*)
- Non-resident Indians and foreign investments (*States*)
- General incentives (*States*)
- Incentive scheme for modernization of jute industry (*Central*)/infrastructure (*States*)
- Information technology (*States*)
- Interest subsidy (*Central and States*)
- Land allotment (*States*)
- Non-conventional energy sources (*States*)
- Premier, pioneer, large industries and mega projects (*States*)

- Port (*States*)
- Price preference (*States*)
- Power (*States*)
- For quality, productivity and technology upgradation and pollution control devices (*States*)
- Research and development and patent
- Road (*States*)
- Sales tax concessions (*States*)
- Sick units (*States*)
- Small-scale, cottage and tiny industries (*States*)
- Stamp duty, octroi, and local taxes exemptions (*States*)
- Subsidy scheme for technology upgradation in SSI sector (*Central*)
- Subsidy on drawal of power line and generating sets (*States*)
- Subsidy on registration fee of promotion council, Indian standards institution, commodity board, Chamber of Commerce (*States*)
- Technical know-how subsidy (*States*)
- Transport subsidy (*Central and States*)
- Special incentives for women (*States*)
- Weaker sections and physically handicapped (*States*)

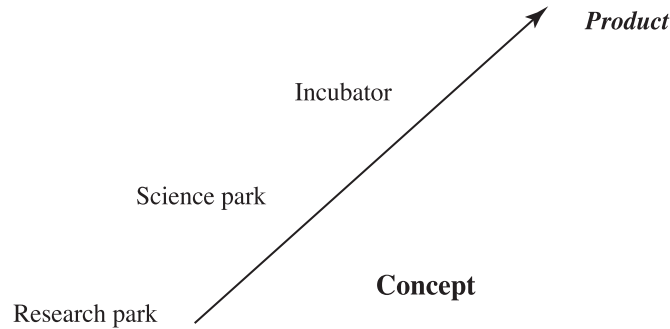
(d) *Industrial infrastructure facilities:*

- Industrial area, estates
- Integrated infrastructure development centre
- Growth centres and industrial townships
- Export promotion industrial park and zones
- Special economic zone
- Software technology park
- Hardware technology park
- Notified areas
- Sector specific park
- Science and technology entrepreneur park

**B. Speedy commercialization of R&D outputs:
role of interfacing mechanisms**

The universities and a few good academic institutions in the western world have undoubtedly been the leaders of the change. It has been established through number of studies that wherever the level and quality of research work is superior, the entrepreneurship has thrived. For taking research developments to the end-users in the form of products or services, the universities were pioneers in adapting to the entrepreneurial stances to a whole range of activities associated with the promotion and commercialization of faculty research. In the pursuit of revenue streams independent of the government support, universities themselves have started to function as an entrepreneur, striking a good balance between imparting education and generating revenues by optimally utilizing its resources. A competitive environment was set wherein once some universities altered their policies on IPR; others were forced to these efforts. This resulted in establishment of initiatives such as science parks, technology parks, and research parks, which were started in the United States in the 1950's. Subsequently, these initiatives gained acceptance world over as these helped in the promotion and growth of New Technology-based Enterprises (NTBEs) and in generation of additional avenues of gainful employment. These mechanisms (briefly explained below) also found to help in strengthening links between academic institutions and R&D institutions on the one hand and industries on the other. Figure below shows the various stages of these mechanisms.

Arrangement of technology park/incubator concept



Research park: Differs from a science park in the sense that it prohibits all manufacturing except prototypes. Various companies are welcome to establish their research centres in the park adjacent to a higher education institution. The research personnel benefit most from interaction with each other and with the academicians in the higher education institution.

Science park: An industrial complex close to the place of learning (Higher Education Institution). It is designed to encourage formation of knowledge-based industries in a high quality and pleasant environment. According to the United Kingdom Science Park Association (UKSPA), a science park is a property-based initiative which includes the following features:

- Has formal and operational links with a university, other higher education institution or research centre
- Is designed to encourage the formation and growth of knowledge-based businesses and other organizations normally resident on site
- Has a management function, which is actively engaged in the transfer of technology and business skills to the organizations on site

Technology park: An industrial complex where all types of facilities are provided for the growth and development of TBEs. However, a technology park need not to have formal links with a higher education institution and therefore the level of academic and entrepreneurial interaction is generally low.

Technology and business incubator: There is a notable difference between a technology park and an incubator, as the incubator incorporates a new feature 'graduation', which implies that a start-up firm attains certain level of maturity after a specific period of probation. While the technology and business incubator can be considered akin to each other, the major distinction is that the later caters to wide range of tenants not necessarily technology intensive firms. Certain similar initiatives such as innovation centre, business parks, technopolis, etc. are also being tried world over.

1. Evolution and growth of incubators

The concept of business incubation has evolved in the last 30 years. The 'first generation' of business incubators (1980s) were essentially offering affordable space and shared facilities to carefully selected entrepreneurial groups. Thereafter, the incubators started varying widely in key respects such as objectives, sectoral focus, and business modes, etc. In some countries the incubators were set up for empowerment, while in other for technology commercialization. Incubators were mixed type, focused on technology and in some places even kitchen and arts incubators were set up.

In the 1990s the need was recognized for supplementing workspace with counselling, skills enhancement and networking services to access professional support and seed capital, for tenants within the facility and affiliates outside; this led to the 'second generation' model, although most are still stuck in the original mode.

Starting in 1998, with the moves towards globalization, a new 'third generation' incubation model is emerging. A shift has also been experienced in the business mode of the incubators from the *not-for-profit*

incubators to *for-profit* incubators. The for-profit incubators are intended to mobilize ICT and provide a convergence of support towards creating knowledge-based ventures. Some of these in turn can expand rapidly and contribute towards economic growth. Virtual incubator or incubators without walls have also emerged recently.

2. Initiatives taken in India

India has made commendable progress in terms of the growth of scientific and technological culture. Today, India has a vast pool of S&T infrastructure with over 800 technical institutions including around 200 universities. The estimated annual out-turn of the engineering graduates is around 2.0 lakhs. In addition, it already has a critical mass of cutting-edge research through 400 national laboratories, over 1,300 in-house R&D units in the corporate and other sectors. However, the environment and support system are not congenial for the faster commercialization of R&D outputs. There exists lot of delay in commercialization of R&D outputs and in majority of cases the R&D outputs do not get commercialized for want of initial investment, the needed environment and the networking. In the recent past, the Ministry of Science and Technology, Government of India has been focusing its attention towards this and initiated a number of programmes in order to plug the gaps cited above. These programmes include STEP and a recently launched scheme on TBI, which are basically institutional mechanisms promoted by the Department of Science and Technology (DST) in and around the academic institutions of excellence and selected R&D institutions for offering the needed environment, networking and the linkages to promote techno-entrepreneurs. Other initiatives of the Department include Patent Facilitation Cell and Drugs and Pharmaceutical Programmes. Biotechnology parks are being promoted by the Department of Biotechnology (DBT). Various state governments and other agencies in private sector are aiming for establishment of property-based initiatives such as Info Park, Knowledge Park, Agro Park, Tidel Park and the incubators promoted by the private industrial houses.

3. Institutional mechanisms initiated by the Government for promoting techno-entrepreneurship

The STEP programme was initiated by the NSTEDB in 1984 in collaboration with the all India financial institutions (IDBI, IFCI and ICICI). STEP enables S&T person to cultivate entrepreneurship culture and fosters close linkages between universities, academic and R&D institutions on the one hand and industry on the other. STEPs are functioning in 15 locations primarily in the engineering colleges and the technical universities throughout the country. Some of the salient achievements of STEP include conversion of 750 S&T persons into job-generators by way of starting industries, capital mobilization of Rs 500 millions through promotion of new enterprises with estimated annual turn over of Rs 900 millions. STEPs have also been instrumental in development of 150 new and improved products and commercialization of 80 products. In addition, nearly 5,000 jobs have been generated through the units set up and about 11,000 additional jobs generated through imparting skill development training to the youth belonging to various sections of society.

4. Innovative financing mechanisms

While the institutional mechanisms help in the development and growth of TBEs by providing the requisite facilities and environment conducive for their development and growth, innovative financing mechanisms are equally important as these help in their development by providing timely and easy finance. Some of the innovative financing mechanisms promoted by DST for speedy commercialization of indigenous R&D efforts and for supporting innovative ideas include creation of a TDB in 1997 and initiation of schemes such as HGT under TIFAC. DSIR has initiated PATSER and TePP, a joint initiative with the TIFAC. Recently, DST has also set up a National Innovation Fund for supporting grass root level innovations. Financial institutions have also introduced funds such as SIDBI venture Fund; ICICI Venture Fund for supporting the knowledge-based start-ups. In addition, privately managed venture capitalists and the angel investors are also increasing their presence and playing active role in facilitating the financing of the start-ups having potential for faster growth.

5. Scheme on establishment of TBIs

As described in earlier paragraphs, world over TBIs have been found as useful tool for catalysing the development and growth of TBEs. Keeping this in view and also visualising that in India too, TBIs could

become important tools in establishing crucial link to techno-preneurship chain by catalysing the development and growth of knowledge-based start-ups. Recently, a scheme on TBI has been launched by the DST, since it is being felt that the TBIs would be playing an important role in the economic development of the country, it is being planned to implement the programme in a mission mode. One TBI has been recently promoted in the area of information technology. Many new proposals for establishment of TBIs are under consideration of the department. The Department is also being helped in its effort by the APCTT through the UNDP supported Technology Management Programme Support (TMPS) – subcomponent “Nurturing technological entrepreneurship through STEPs and TBIs”. Under the UNDP supported programme, two TBIs are to be established. (See p. 128-131 for more information of TBI.)

Benefits from TBIs

- *For tenants:* It enhances the chances of success, helps overcome market failures, and facilitates access to mentors, information and seed capital.
- *For governments:* The incubator serves as an economic development tool, promotes regional development, and generates jobs, incomes and taxes.
- *For research institutes and universities:* The TBI helps strengthen interactions between industries, promotes research commercialization, better use of lab facilities and gives opportunities for faculty/graduate students to enhance their capabilities.
- *For corporate sponsors:* The TBI can develop opportunities for acquiring innovations, supply chain management and spin-offs, and helps them meet their social responsibilities.
- *For the community:* Creates self-esteem and an entrepreneurial culture, as a majority of graduating businesses stay within the area.

Guidelines for successful launch of TBIs

Some of the suggested steps, which may help in successful launch of a TBI, are as follows:

- Select a location after careful evaluation with a clear mission and business plan.
- Sound financial support both from central and state governments and other related agencies.
- Structure the incubator to provide value to tenants and stakeholders.
- Careful selection of tenant firms with highest growth potential.
- Appoint a proactive management board for overall guidance and a dedicated team for day-to-day operations.
- Identify and develop a panel of professionals who provide critical support services for start-ups.
- Facilitate access to venture capital scheme and other innovative financing mechanisms.
- Effective networking with other R&D institutions for making the TBI a focal point for technology in the region.
- Be customer service focused with both tenants and stakeholders.
- Build an effective monitoring mechanism.

The TBIs, thus, should be managed by a professional team and run as a business itself with a clear mission of achieving self-sufficiency in a short span of time.

6. Real-estate development activities with modern facilities promoted by Ministry of Commerce and Information Technology, DBT, State Government, ICICI

- Software Technology Parks
- Info Park
- Knowledge Park
- Techno Park
- Industrial Park

- Tidel Park
- Agro Park
- Biotech Park
- Science and Technology Entrepreneurs Park

C. Conclusions and recommendations

1. Policy related issues

- Increasingly greater allocation of funds for S&T with the government redefining its role;
- Policy framework more in favour of capitalizing on the knowledge base built over the years;
- Emphasis on leveraging the traditional knowledge system;
- Industry orientation of S&T.

2. Institutional arrangements

- Huge reservoir of hardware, software and brainware resources in academic and R&D institutions to be untapped for venture creation;
- To create a multiplier effect of government support by increasing private participation;
- The Institution-Industry-Government model works the best and hence to be given greater thrust;
- Greater facilitation for IPR creation and protection.

3. Lessons that we have learned

- The Government's role will have to be that of a facilitator providing the right framework and impetus only;
- Academic (or) R&D institution-industry involvement is very critical;
- Each country will have to evolve its own model based on the level of S&T, core competitive advantage, cultural ethos, etc.
- The TBIs will have to be run with the right mix of business and technology orientation;
- Both sector specific and inter-disciplinary TBIs with requisite skill sets are required for commercializing technology;
- Newer funding mechanisms to be made available to the potential technopreneurs;
- Leveraging IPRs will be the key to wealth creation.