

# CAPACITY BUILDING FOR INNOVATION: Role of IP Infrastructure<sup>1</sup>

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The paper discusses the role of IP Infrastructure and areas that are to be addressed in capacity building for innovation. The Indian experience is benchmarked to examine and augment the role of intellectual property infrastructure as a facilitator of innovation. According to the author, there exists a pertinent need to improve IP infrastructure in developing countries.

**Keywords:** Intellectual Property, Capacity Building for Innovation, Role of IP Infrastructure, Innovations, Developing Countries & IPR.

Innovations in science and technology are widely recognized as the engine that drives the economic transformation of developing countries. However, this recognition is only beginning to be featured as a part of national development policies.<sup>1</sup> Increasingly, the real innovation bottleneck is not the supply of new knowledge but external factors surrounding the process. The Indian experience is examined here to augment the role of intellectual property infrastructure as a facilitator of innovation.

Innovation was an integral part of Ancient Indian civilization and culture. India has made many contributions to the world covering many great scientific discoveries and technological achievements in various fields. The words of Albert Einstein, who once said: "We owe a lot to Indians who taught us how to count, without which no worthwhile scientific discovery could have been made"<sup>2</sup> stand as a testimony to this.

Indians overseas have made a formidable mark on global science and technology enterprises. While expatriate Indians working in a more nurturing environment have developed tetracycline, invented gene synthesis, discovered white dwarfs in the universe, created Pentium chips, and have dominated the IT industry, modern India is far from being a knowledge superpower as its intellectual resources are not being harnessed to its full extent.<sup>3</sup>

This is amplified in the "Knowledge for Development Program of the World Bank"<sup>4</sup> which benchmarks how a country's economy compares with its neighbours, competitors, or others it wishes to emulate, in which India's Knowledge Index is rated at a mere 2.44 in a scale of 0-10.<sup>5</sup>

Knowledge and its application, is now acknowledged to be one of the key sources of growth in the global economy. The increasing importance of knowledge has created both a challenge and an opportunity for developing countries. If properly adapted to circumstances and effectively deployed, knowledge can be a key driver of development. To create and sustain an effective knowledge economy, countries must put in place appropriate arrangements to stimulate, encourage and grow knowledge practices and to become more knowledge-competitive.<sup>6</sup>

The creation of an environment in which innovation can be effectively harnessed presents challenges at multiple levels and requires long-term innovation capacity building. Developing

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countries need more than just the minimum institutional capacities required to provide a reasonably smooth system for administration and enforcement of IPRs. Rather, they require a wider institutional framework.<sup>7</sup>

### **Key Factors for Innovation Capacity Building**

The key factors that need to be addressed in innovation capacity building are technology infrastructure, information infrastructure, legal framework, business support services, human resources and financial infrastructure. Commercialisation of innovation into new processes and products that can benefit the economy requires infrastructure such as universal standards, policy and guidelines, venture capital, skilled labour, organised alliances and networks. Equal emphasis will need to be given to the provision of these infrastructures to ensure that world-class research and its commercialisation can take place.<sup>8</sup>

### **Technology Infrastructure**

Looking into technology infrastructure it can be seen that many developing countries demonstrate selected technological capabilities, but their overall infrastructure has not matured to engender broad-based technology development. An important aspect of technology infrastructure is the creation of institutions or framework for nurturing or inculcating small businesses from laboratory results, referred to as Technology Business Incubators (TBI), Technology Parks, Small Business Technology Transfer Programmes (SBTTR), etc.<sup>9</sup>

Developing countries need to put in place national networks of well-equipped laboratories and workshops with facilities for standard tests/analysis and high level scientific and technical research work in various fields, including high technology, as these are important for all persons engaged in innovative and inventive activities.

To improve the efficiency of their economies, developing countries should invest heavily in innovation and technology infrastructure just as they would invest in roads, rail, water etc. This national technology infrastructure just as they would invest in roads, rail, water etc. This national technical infrastructure must reach a critical level or threshold to ensure absorption, assimilation, diffusion and adaptation of imported technologies, the development of indigenous innovations and inventions, the manufacture of quality products, the internalization of science and technology in the social cultural milieu and, with it, the demystification of technology and the assurance of national technological capability.<sup>10</sup>

India recognized the role of technology as an important element of national development and brought about 'The Scientific Policy Resolution of 1958', 'The Technology Policy Statement of 1983' and more recently 'The Science & Technology Policy 2003'. These policies enunciated the principles on which the growth of science and technology in India has been based over the past several decades.

Today, there is a sound infrastructural base for science and technology in the country.<sup>11</sup> For example in the field of information technology (IT) India has earned itself a reputation of an IT superpower. Software Technology Parks of India (STPI)<sup>12</sup> have played a seminal role in accomplishing this status. Today, STPIs all over the country are synonymous with excellent Infrastructure and Statutory support aimed at furthering growth of IT in the country.

STPI maintains internal engineering resources to provide consulting, training and implementation services. Services cover Network Design, System Integration, Installation, Operations and

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maintenance of application networks and facilities in varied areas ranging from VSATs to ATM based networks. In India as on date, 40 Centres have been set up under the aegis of STPI; fifteen more locations have been approved for implementation. This is a positive development accruable to government initiatives supporting technology infrastructure in India.

### **Information Infrastructure**

Information Infrastructure is an important entity in capacity building for innovation which must be disseminated effectively and widely to all involved. Although innovation in the field of ICT takes place in a number of developing countries, access is likely to be a greater priority than the promotion of innovation.<sup>13</sup> Automated information systems are key requirements for efficient administration of IPRs and an important indicator of institutional capacity.<sup>14</sup> Although some larger, higher income developing countries have fully automated systems for searching and application processing, a large number of countries still have manual, paper-based systems. This not only hinders efficient processing of applications but also greatly complicates collection of important statistical and management information.<sup>15</sup>

India is currently fostering its information infrastructure in relation to IPR to bring it at par with world standards. Projects relating to the modernization of patent information services and trademarks registry have been implemented with help from WIPO/UNDP. The Government of India is implementing a project for modernization of patent offices incorporating several components such as human resource development, recruiting additional examiners, infrastructure support and strengthening by way of computerization and re-engineering work practices, and elimination of backlog of patent applications.

### **Legal Framework**

The legal framework related to innovation brings about the important issue of intellectual property laws. Developing countries face arduous institutional challenges in implementing IP protection. At the same time, these nations need to ensure that their national IP regimes operate in public interest and are effectively regulated. The challenges include formulating appropriate policy and legislation, administering IPRs in line with international obligations, and enforcing and regulating IPRs in a pro-competitive manner appropriate to national levels of development.

In the Indian context, enforcement of IPRs is seriously lacking. India's Copyright Act has broad exceptions, which weaken protection of software. Piracy of copyrighted materials particularly software, films, popular fiction and certain textbooks remains a setback. Cable television piracy continues to be a significant problem, with estimates of tens of thousands of illegal systems in operation. Protection of foreign trademarks remains difficult due to procedural barriers and delays. Trademark owners must prove they have used their mark to avoid a counterclaim for registration cancellation due to non-use, thus making it difficult to enforce their rights. Inadequate and ineffective enforcement of patent laws, lack of effective enforcement against counterfeiting and piracy has put India among 14 countries on the 'priority watch list' of the US for shortcomings in enforcing intellectual property protection.

Judicial delays mean that cases can take up to 10 years to see resolution and payment of damages on IPR violations. Such delays springing up from issues like procedures involved in trial and conviction, lack of familiarity with new IPR laws amongst lawyers, the courts and the police. On the other hand, there are also examples of regions in India that have effectively increased IPR protection. In Chennai, where there is a separate Deputy Police Commissioner who deals with copyright infringement, industry reports a steep decline in film and music piracy in the city. This success could be repeated in other regions throughout India provided government and industry

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cooperate in dedicating sufficient resources to strictly enforce intellectual property rights. There are also some impressive private sector initiatives.<sup>16</sup>

The Indian government is responding to the need for development of IPR infrastructure. A major modernization program is underway for patent office operations and an Intellectual Property Appellate Board has been set up. India has also taken positive steps toward greater IP protection by bringing about amendments to its various intellectual property laws with even further amendments forthcoming.

Further to this India must also raise its intellectual property protection to world-class level, by doing so lay the foundation for further economic growth across all sectors of the knowledge-based economy.

### **Business Support Services**

One other important plank of innovation facilitators is that of business support services through appropriate Government Agency or Professional Association that forges and maintains a linkage between the inventors/innovators, research organizations and the SMEs with respect to sourcing of technologies, know-how, equipment, workshops and test laboratories for quality assurance, formulation of demand-driven research projects, and ready commercialization of inventions.<sup>17</sup>

At one end of the spectrum, India has an extensive system of broad public consultation, which includes public workshops on controversial topics such as protection of biodiversity & traditional knowledge and use of compulsory licensing, and on high-level expertise in the academic, business and legal communities. Even some civil society groups have intellectual property policy research and advocacy programmes, such as the CUTS Centre for International Trade, Economics & Environment in Jaipur.<sup>18</sup> These systems foster the effective use of IP systems by bringing about increased awareness.

At the other end of the spectrums are linkages often promoted by a deliberate Government policy on industrial location and incentives is that of development of sub-sectorial clusters of SMEs. Such clusters would have shared facilities, with common pool of information network on markets, venture capital, databases, etc.<sup>19</sup> Sustaining regional innovation clusters requires continual interaction between research centres, universities and local business leaders in order to sustain cluster growth and the development of new science-based industries.<sup>20</sup>

The Government of India through various ministries has set up nodal agencies that provide for entrepreneurial assistance, investor facilitation, processing all applications which require Government approval, assisting entrepreneurs and investors in setting up projects (including liaison with other organisations and State Governments) and in monitoring the implementation of projects. Further it has committed to ensure continued existence of an Apex S&T Advisory Body which will assist in formulating and implementing various programmes and policies and that the government will have appropriate representation of industry leaders, leading scientists and technologists and various scientific departments. These are steps to ensure that scientific and technological expertises are swiftly and efficiently converted into concrete social and economic benefits.

A prime example of such clusters and initiatives is the National Innovation Foundation (NIF). The Department of Science and Technology and the Government of India constituted the NIF with an aim to recognise and support the creative potential of innovators at the grassroots and harness their creativity to help make India self-reliant and a leader in sustainable technologies. NIF has been successfully providing institutional support in scouting, spawning, sustaining and scaling up

grassroots green innovations and helping their transition to self-supporting activities. There many such organisations in India like the Honeybee Network and Society for Research and Initiatives for Sustainable Technologies and Institutions (SRISTI), Rural Innovation Network (RIN), Gujarat Grassroots Innovations Augmentation Network (GIAN), etc. that have been scouting innovations at the grassroots level.

### **Human resources**

Increasingly, research, innovation, inventive activities, operation and maintenance of equipment and facilities, and indeed the management of industrial production, especially in the high technology sectors are becoming more skill demanding. Similarly, the production of quality goods that can compete in international trade with imported goods in the local market demands very high skills and expertise for the product design, the maintenance of sophisticated equipment, as well as the marketing of products.

There is a dearth of skilled manpower in most of the developing countries. A wide range of training programmes need to be put in place to ensure availability of adequate pool of trained manpower in various areas and levels of technology-research, design, manufacture, management, data computation and analysis, information technology, legal, IPR and trade-related matters.

Well-funded and well-equipped universities and technical colleges and schools with sound curriculum (developed in close liaison with industry and research laboratories), coupled with vocational training, post employment education and on-the-job training, must take a high point in manpower development programmes of each nation. Such manpower development programme would provide bedrock on which SMEs and national R&D organizations can blossom and be able to compete in the global market of the next millennium.<sup>21</sup>

It is clear that there have been some considerable achievements in the last 5-10 years in terms of modernising the IP infrastructure and developing the associated human resources in the developing world. Large numbers of people, from a variety of professional backgrounds, have received general and specialised training in IP subjects.<sup>22</sup>

India in comparison to other developing countries portrays a healthy figure in terms of researchers in R&D, availability of management education, university education meeting the needs of a competitive economy and flexibility of people to adapt to new challenges. While the number of scientists and technologists are large in absolute numbers, they are not commensurate with the requirement of other professionals like trained IP Attorneys, Enforcement Officers, patent examiners, etc. The demand is bound to increase in the coming years with more intensive activities involving science and technology. There is a need to progressively increase the rate of generation of high quality skilled human resource at all levels.<sup>23</sup>

Industry has a simple and clear-cut economic interest in assisting developing countries to build their infrastructure in areas that ultimately encourage the development of IP assets, particularly in the development of human capital, research and manufacturing capacities, and local enterprises. Developing this kind of infrastructure through training, funding of specific programs, or in kind assistance is complementary to the creation of strong IP institutions. Together these kinds of efforts help promote a healthy IP environment.<sup>24</sup>

### **Financial infrastructure**

A key issue for developing countries is the institutional capacity for commercialisation of research and knowledge.<sup>25</sup> Capital investment is vital for the development and operation of industrial

enterprises and R&D organizations as well as for transforming an invention or innovation into a product for the market. It is well-recognized that an invention becomes important only when it is put into use. In other words, an invention until it is commercialized is nothing more than an idea on paper which may just remain dormant and be of no service to humankind. Only when it is commercialized does its importance become manifested.<sup>26</sup> Financial criteria and short-termism dominate usual innovation practice and are institutionalised within enterprises, which are the chief custodians of R&D resources and play the leading role in technological innovation.<sup>27</sup>

Thus it is important to have programmes of investment and development which will provide (i) venture capital for new industries (or older ones seeking expansion/modernization); (ii) funds for collaborative research between industry and research laboratories; and (iii) funds for the commercialization of research results.<sup>28</sup> Equally important are financial support through fiscal incentives, such as, tax relief on R&D expenditures, excise duty waiver/exemption, import duty exemption for some machinery and equipment for research, tax holidays as well as other tariff measures aimed at assisting SMEs.<sup>29</sup>

## Conclusion

Innovation will become more advanced and diverse with significant influence on economies and the way people live. To harness innovation and to enhance the contribution of IP to the growth and competitiveness of developing countries, there exists a pertinent need to improve IP infrastructure. To sustain innovation, all countries need to continuously modify their institutional, information and innovation systems and provide incentives and a supportive environment for the human resources development.<sup>30</sup> High priority resources, initiatives are needed to establish the cycle of intellectual creation. In addition private and public sector interaction and collaboration needs to be institutionalised to share the cost, garner the research and commercialise innovation. The resources committed must be considered as investments towards capacity building for innovation.

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## References

<sup>1</sup> Global governance of technology: meeting the needs of developing countries, Int. J. Technology Management, Vol. 22, Nos. 7/8, 2001 629, Calestous Juma, Karen Fang, Derya Honca, Jorge Huete-Perez, Victor Konde and Sung H. Lee - Kennedy School of Government, Harvard University, Jimena Arenas - Fletcher School of Law and Diplomacy, Tufts University, Adrian Ivinson - Harvard Center for Neurodegeneration and Repair, Harvard Medical School, Harvard University, Seema Singh - Knight Science Journalism Fellowships Program, Massachusetts Institute of Technology.

<sup>2</sup> Plant Biotechnology: Need to Foster: Responsible Debate and Dialogue. The Hindu (Bangalore) May 6, 1999  
By Dr C. S. Prakash. [http://www.agbioworld.org/biotech\\_info/articles/prakash/prakashart/plant\\_biotech.html](http://www.agbioworld.org/biotech_info/articles/prakash/prakashart/plant_biotech.html)

<sup>3</sup> *Ibid*

<sup>4</sup> World Bank Institute's Knowledge for Development Program  
<http://www.worldbank.org/wbi/knowledgefordevelopment/>

<sup>5</sup> Data from Knowledge Assessment Methodology (KAM) Home Page of World Bank Themes: 2004 Knowledge Assessment Methodology <http://info.worldbank.org/etools/kam2004/>

<sup>6</sup> About the importance of knowledge: Knowledge Assessment Methodology (KAM) Home Page of World Bank Themes: 2004 Knowledge Assessment Methodology <http://info.worldbank.org/etools/kam2004/index.htm>

<sup>7</sup> Capacity Building For Management Of Intellectual Property Rights by Mart Leesti and Tom Pengelly

<sup>8</sup> Innovation and Technology Infrastructure, Department of Innovation and Information Economy, Queensland.

<sup>9</sup> Needs for establishing support services for inventors, innovators, SMEs and R&D organizations in African countries, Document prepared by Dr. D.A. Okongwu, Director, National Office for Technology Acquisition and Promotion (NOTAP), Abuja. WIPO REGIONAL SEMINAR ON INVENTION AND INNOVATION IN AFRICA organized by

the World Intellectual Property Organization (WIPO) in cooperation with the Government of the Republic of Côte d'Ivoire

Abidjan, September 1 to 3, 1999.

<sup>10</sup> *Supra Note 9*

<sup>11</sup> India: Science & Technology Policy – 2003, <http://www.tifac.com/news/policy.htm>

<sup>12</sup> Software Technology Parks of India (STPI), is a society set up by the Department of Communication & Information Technology, Government of India in 1991, with the objective of encouraging, promoting and boosting the Software Exports from India. <http://www.stpi.soft.net>

<sup>13</sup> Intellectual Property Rights: Implications for Development, UNCTAD-ICTSD Project on IPRs and Sustainable Development, Chapter 4, New Technologies.

<sup>14</sup> *Supra Note 7*

<sup>15</sup> Integrating Intellectual Property Rights and Development Policy, Report of the Commission on Intellectual Property Rights London September 2002

<sup>16</sup> India's Path to the Future -- Why Intellectual Property Rights Are a Key Component for Economic Success: Alan P. Larson, Under Secretary for Economic, Business, and Agricultural Affairs - Remarks to the Confederation of Indian Industry's IPR Luncheon Mumbai, India November 8, 2002. <http://www.state.gov/e/rls/rm/2002/15047.htm>

<sup>17</sup> *Supra Note 9*

<sup>18</sup> Commission on Intellectual Property Rights Study Paper 9, Institutional Issues for Developing Countries in Intellectual Property Policymaking, Administration & Enforcement; Mart Leesti, Independent Intellectual Property Consultant & Tom Pengelly, Policy Analyst, Commission Secretariat. This report was been commissioned by the IPR Commission as a background paper.

<sup>19</sup> *Supra Note 9*

<sup>20</sup> Building regional innovation capacity The San Diego experience, Mary L. Walshok, Edward Furtek, Carolyn W.B. Lee and Patrick H. Windham, INDUSTRY & HIGHER EDUCATION February 2002.

<sup>21</sup> *Supra Note 9*

<sup>22</sup> *Supra Note 15*

<sup>23</sup> Human Resource Development, Strategy And Implementation Plan, Science & Technology Policy – 2003, [http://www.tifac.com/news/policy\\_5.htm](http://www.tifac.com/news/policy_5.htm)

<sup>24</sup> Promoting Intellectual Property Growth for Economic Growth, Address by Her Excellency Ambassador Rita Hayes Deputy Director General of World Intellectual Property Organization, Vanderbilt University of Law School, February 12, 2003: Vanderbilt Journal of Transnational Law, Volume 36, May 2003, Number 3.

<sup>25</sup> Commission on Intellectual Property Rights, Workshop 9: Institutional Issues for Developing Countries in Intellectual Property Policymaking, Administration and Enforcement, 18 February 2002. The workshop focused on institutional issues regarding intellectual property policy making, administration and enforcement.

<sup>26</sup> *Supra Note 9*

<sup>27</sup> Capacity-building for sustainable technology development and innovation, STD programme and its experiences, extract from the book a review and evaluation, Dutch National Inter-Ministerial Programme for Sustainable Technology Development (STD).

<sup>28</sup> *Supra Note 9*

<sup>29</sup> *Ibid*

<sup>30</sup> ECONOMIC COMMISSION FOR EUROPE - COORDINATING UNIT FOR OPERATIONAL ACTIVITIES, HIGH LEVEL TASK FORCE ON VALUATION AND CAPITALIZATION OF INTELLECTUAL ASSETS, UNITED NATIONS, Economic and Social Council, OPA/CONF.1/2002/1, 2 August 2002.