

# Patentmatics Monthly Bulletin, March 2018.

## Main theme: Economic Review 2017 – 2018 on “Transforming Science and Technology in India”.

**“If India knows how much India Knows,  
India will grow ten times faster!”**(Adapted from HP sources)

1. Economic Review 2017-18 has dedicated a full chapter on “Transforming Science and Technology in India” spanning over eleven pages, with summarized statements and Tables on budget allotment over the years and so on. To quote from its abstract,

**“.....India underspends on R&D even relative to its level of development. A doubling of R&D spending is necessary and the increase should come from the private sector ..... To recapture the spirit of innovation to propel it to a global S&T leader – from a net consumer to a producer of knowledge – India should invest in educating its youth in science and mathematics, reform the way in which its R&D is conducted, engage the private sector and the Indian diaspora, and take a more mission – driven approach in areas such as dark matter, genomics, energy storage, agriculture and mathematics and cyber physical systems. Vigorous efforts to improve the “ease of doing business” need to be matched by similar ones to boost the “ease of doing science”.**

Since this Review Report appears to be essentially a ‘stand-alone’ document in terms of the total problem, we would not dwell on it any further except to take its suggestion to bring in the private sector (what about the large PSUs?) also into the S&T development program.

**2. Many of us from the S&T community and their S&T policy counterparts have been highlighting for decades the essential need to make our industries actively involved in industrial R&D, either in their respective in-house Units or alternately jointly with the public R&D units/advanced educational institutions on their areas of commercial and futuristic interests. After all industrial R&D will only be essentially a pipe dream ultimately if matching industries are not involved. The February Bulletin has given the classic example of how even the then totally futuristic GM crops were developed in US by the MNC, Monsanto by late 1980s! It is unfortunate if not unbecoming of even our senior policy pundits in positions of authority in not yet being seemingly aware of the nuts and bolts aspects of industrial R&D and how to systematically promote the same among our at least major industries and repeatedly pointing fingers at institutions like CSIR for the malady!**

**3. Things have become doubly challenging since India has entered the WTO/TRIPS regime and had amended its Patent Act in 2005 to make it TRIPS compliant. An earlier article of mine published in Financial Express, 2004 is reproduced below for the use of readers.**

### **Industrial R&D Is No Longer A Cakewalk** **Dr. A. D. Damodaran**

In an interactive lecture-session for R&D (research and development) scientists of a major Indian industrial house over an year ago, I highlighted the following major issues confronting any unit seriously engaged in this task.

\* Thanks to a number of inadequacies in our policies and programmes of yesteryears, the technology gap between that in advanced countries and what we achieved in the past five decades has become wide and vast, be it in the fields of catal ysts and materials, biotechnology and GMPs (genetically modified products), drugs and specialty chemicals, electronic materials, components and control systems or even software.

\* Under the new TRIPS-compliant regime, the choice of new R&D programmes 'of possible industrial use' will have to be strictly

consistent with the detailed and quantitative IPR-audit, be it a new process, product, electronic systems or software.

\* Such IP-audited 'indigenisation' would place far greater demand on innovation/ invention in R&D, be it the government funding agencies or public funded/ corporate research institutions.

In essence, industrial R&D is no more any 'cake-walk'; it will need a total re-orientation with respect to both policy and financial investments.

Undoubtedly, we have much to learn from the lessons of the MNCs in organising industrial R&D in their countries and how they now plan to do the same in India through their subsidiaries!

The pioneering history of Du Pont's corporate R&D, the inventor of neoprene, nylon, kevlar, etc just to name a few major products, has recently been brought out as a monograph. (Ref: Science and Corporate Strategy, Du Pont R&D, David A.Hounshell & John Kenley Smith Jr, Cambridge University Press.)

Even a cursory reading of this monograph would highlight the great challenges which those veterans had to traverse to establish a vibrant and viable industrial R&D base integral with their corporate-commercial programmes. Stating that "founding research laboratories in 1902 and 1903 was probably the easiest decision Du Pont's leaders ever made regarding research and development, what followed were all of the difficult issues regarding the management of industrial research", some of the problems faced by the veteran corporation have been summarised by the authors as below:

\* Should research be organised in a centrally managed unit or along decentralised manufacturing lines of business?

\* Or should both avenues be pursued?

\* If both approaches were pursued simultaneously, how should the central research organisation relate to the decentralised research organisations?

- \* How much should the company spend on research (was 1 per cent of sales and 3 per cent of earnings “enough” in early years ? Was \$484 million or 3.6 per cent of sales and 68 per cent of earnings “too much” in 1980?)
- \* How should managers allocate their research dollars - toward short-term work in support of established businesses or toward longer-term objectives to develop entirely new products and businesses?
- \* What is an ideal programme to pursue along this allocation spectrum?
- \* How is the productivity of research or its return on investment measured?
- \* Should laboratory researchers aim to produce high-calibre scientific work or is some lesser form of science good enough given corporate objectives?
- \* Once costly research projects are initiated, how do research managers and corporate executives know when to either abandon or strengthen a particular project?

These were the issues Du Pont managers faced from the beginning of the company’s R&D programmes; they address the same problems today. With continuous efforts in optimising the policy-theory-practical experiences over the past century, Du Pont has assumed a very premier status in organising industrial R&D in the “MNC way”.

With innumerable research publications by Du Pont’s outstanding academics and over 11,500 US patents during the 1976-date period, the latest was US Patent 6,728,642 dated April 27, 2004 on “Method of non-linear analysis for biological sequence data” as applicable for proteomics-based GM technologies! With little experience or expertise in the field, the Indian corporate sector will have to face under the new IPR Regime even more serious and innumerable challenges.

It needs to be highlighted, even at the cost of repetition, that but for his great insight and understanding in organising “R&D of possible industrial use” and formulation of his celebrated “Growing Science” strategy for the Nuclear Technology Development Programme, Homi Bhabha and his able successors of department of atomic energy (DAE) would not have been able to make our country remarkably self-reliant in this field even under the extreme conditions of technology denial/ embargo. So also the successes of ISRO (Indian Space Research Organisation) under Vikram Sarabhai and his distinguished successors in launch vehicles, satellites and space related services and of DRDO (Defence Research and Development Organisation) under APJ Kalam in missiles technology, not at all to forget the pioneering Green Revolution under the celebrated development trio — MS Swaminathan, B Sivaram and C Subramaniam — all of them based essentially on similar science and technology strategies.

**It is certainly true that organizing industrial R&D for civilian commercial fields is far more complex.** More or less totally based on technology import and in-house R&D treated essentially as a 'decorative adjunct', the Indian public and private sector industries looked upon technology basically as a product available to them for purchase in the international market. Further under the protected market structures, there was hardly any compulsion on cost reduction through improved productivity. Obviously over the years, in-house R&D units were increasingly treated as 'decorative adjuncts', rather than integral parts of the corporate structures for effecting steady productivity and technological upgradation and also path-breaking innovation. Thanks to the near-total inadequacy of understanding and appreciation among the planners and those in authority about the fundamentals of industrial R&D, even the Central government came out with its technology policy only in the early 1980s! It was not that our gaps and deficiencies in industrial R&D was totally unknown.

In an excellent lecture on “Technology and Tapelis”, Subash K Bijlani, the then chairman, National Committee on Technology (CII) of Indian Machine Tools Manufacturers' Association, August, 1995, highlighted the issues as follows:

1. Competitiveness: Pre Liberalization consisted of (a) Get industrial licenses and permits and prevent entry of other players (b) Manage import licenses for manufacture and speedy customs clearances (c) Convince capital goods licensing authorities on indigenous availability to block imports — customer and supplier in adversary roles (d) Lobby with government on customs duties to seek end-use exemptions in the face of tariff walls (e) domestic pricing based on CIF value plus customs duty (usually above 100 per cent) and (f) Heavy cross-subsidizing of exports.

2. In the post liberalization era, there is (a) Inadequate understanding of “technology” (b) “Gold Rush” for technology, but in actual practice there is a more restrictive flow! (c) Companies with foreign equity coming in on their own, with the new IPR Regime providing good protection (d) The responsibility for technology development in our companies is going to be a pressing need.

He concludes that “From now onwards, technology supremacy is the key to success — through new products and processes and increased competitiveness.”

This can happen only only through a proper understanding of “Technology Values”, which itself can be on the agenda only by finding answers for the questions

(a) How many chief executive officers are there from the technology stream?

(b) By putting technology on the board’s agenda

(c) How many technologists are there in key positions

(d) Providing premiums on PhDs and M.Techs. as opposed to MBAs and last but not the least

(e) By elevating Technology Excellence as a managerial agenda. It was in the midst of such an industrial “laissez faire” that the central government decided to liberalise the economy, to become a full member of the World Trade Organisation and as a consequence also to opt for the new TRIPS-compliant IPR Regime.

Importantly enough, while all the above epoch-making events were taking place in the economic-industrial policy spheres, there was hardly been any new major initiative on technology and industrial R&D in actual practice. A very recent study by NS Siddharthan et.al of Institute of Economic Growth (Ref EPW Jan 31, 2004) concludes the following:

- a. In the post-liberalization period, total factor productivity did not contribute much to growth,
- b. The mean technical efficiency of foreign firms to be higher than that of domestic firms, both private and public sector enterprises,
- c. The main gainers have been the MNEs (multinational enterprises) and their affiliates which have better access to technology and other intangible assets,
- d. By and large, acquisition of technology seems to be the main vehicle of growth and domestic firms that enjoy better technological capabilities and a smaller productivity gap in relation to MNEs have benefited from liberalisation policies. But firms that are stuck with an earlier technological paradigm with large productivity gaps have lost out.

It is not incidental that even in industrial R&D, the MNEs and their affiliates have already gained the upper hand under the new TRIPS-compliant IPR regime as assessed by the fact that they have reportedly already filed over 1,000 patents with the US PTO from their Indian units, and with many more planning to outsource their R&D to the Indian shores. The added consequence of this type of outsourced R&D input is that whereas normally an imported technology may slowly get assimilated, these patent-protected R&D results need not even be available for national benefit, unless the specific MNE decides to market eventually the technologies based on the same here as part of its global plans.

*Perhaps a fresh and more rigorous version of the East India Company Syndrome in the offing!*

Courtesy: **Financial Express May 3, 2004**

**4. Last but not the least, many of us had been openly campaigning for a new S&T Policy matching with the New Economic Policy regime and the incumbent WTO/TRIPS regime. To quote from *Note submitted by Dr A D Damodaran, Director, CSIR Regional Research Laboratory, Trivandrum, as a nominated member of the CSIR team, for the pre-budget meeting held by Dr Manmohan Singh, Finance Minister, Government of India on January 15, 1993 at New Delhi*),**

**“.....Even now the funding pattern has followed by and large the same tradition, bulk being consumed by the three strategic sectors, DAE, ISRO and DRDO, with the civil sector being limited to only 30%. In essence, the investment in civil research, including agriculture, was all through sub-critical, I believe, twenty second in priority! Thanks to such prolonged neglect, may be benign one, things have come to such a sorry pass now that for institutions like CSIR , the total grant of the government is typically adequate only to meet its overhead expenses. Any further marginalization will only kill the goose, especially in absence of any alternate S&T capability in the non-government sector..... Obviously enough, a new strategy must be found to develop this crucial sector matching with the New Economic Policy of the government. It must be clearly understood that the open door policy of modernization will ultimately succeed only, and only, if the imported technologies are assimilated, innovated and made economically more competitive in the global market..... To quote Prof Ramachandran, Executive Director, UNCHS (earlier Secretary of the Department of Science & Technology and also DG – CSIR), from his Sixth CSIR Foundation Lecture, “those countries which hope to compete on the basis of cheap labor alone will soon find that they are at road’s end”. Whereas thus, like in advanced countries, the public funded S&T infrastructure must play a state-of-art, pioneering and consultative role, industries will have to play the primary role of assimilation, innovation and cost reduction through their own use-specific research institutions, leave alone the creation of proprietary technologies and products. Hence the need to formulate policies which will promote both public funded and industry-based research units in the country as part of the new initiatives of the government to modernization.**

**Public funded research centers must be modernized as ‘productively viable units’ for advanced research, collaborative-cum-sponsored research partners of industries and also to offer research support to government in its developmental-cum-control function functions. Budgetary support must be raised by 50% such that the fixed:research funds ratio comes on par with the general trend in advanced countries at least for another five years till sponsorship research by user agencies become a visible reality. 1% of the GNP must be earmarked for civilian research outlay, that for strategic sector being decided by the government depending upon the needs of the times. Appropriate parameters also must be fixed for evaluating the performance of the sector in quantitative terms on the lines practiced in advanced countries for**

*evaluating research centers.....* The role of industries for advancement of industrial research and technology needs adequate emphasis, again a trend well known in advanced countries. In fact the prime contributors of industrial research must be the industries themselves, either through their own in-house research efforts or by sponsorship/collaboration with public funded research centers. Once this is accepted, necessary policy may be initiated to encourage such a culture among the parties concerned. Thus,

- a. Every industrial unit must be under legal obligation for an annual statutory science and technology audit. A technology depreciation fund may be permitted essentially on the lines of the equipment depreciation fund, subject to the fact that the funds be spent under this head be targeted towards any of the well accepted elements of modernization, be it assimilation, innovation and productivity improvement, energy conservation, etc.
- b. Funds utilized for sponsored research may be totally exempted from income tax.
- c. Tax holiday for five years for indigenous technologies, similar to the facility given for export oriented units in the special economic zones.
- d. A maximum limit may be placed on the ratio between annual expenditure for technology import and in-house research expenditure, the quantum being decided sector wise jointly with the respective sectoral associations.
- e. R&D-cess imposed on foreign collaboration/remittances must be reinvested for promoting in-house research by the industry, the mechanisms for which to be worked out jointly with the institutions like CII.....". and so on and so forth.

***In essence industrial R&D is will remain more a "pipe dream" if the initiative does not come from industries themselves, since they only know what to do in practice to help to increase their productivity, improved quality, new products and processes and so on, with public funded R&D taking only a supportive role! WHEN OUR POLICY ADMINISTRATORS AND THEIR POLITICAL LEADERS REALIZE THIS CARDINAL ISSUE, India will steadily grow to a self-propelling industrial nation.***

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