



Opportunities and Challenges for Sustainable R&D in India

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Abstract - The Research and Development (R&D) is an important contributor to economy of any country and hence growth and sustainability of R&D vital for nations. As the pace of technology is accelerating and newer technologies and processes are becoming important, R&D is becoming a crucial factor in success of the companies and economies in a globalised and competitive world. Companies that consistently and persistently invest in R&D outperform others. Though R&D is generally undertaken by industry and academia, the government plays a key role in developing policies that foster R&D and its sustainability.

India's economic growth in the recent years has been impressive due to government policies and acts including Science and Technology Policies increase in spending in R&D and tax incentives. With current government policies and acts, there are many opportunities for domestic as well as foreign companies to invest in R&D in India and establish the competitive position in domestic as well as export market. However, the opportunities that are encouraged by policies, spending and tax incentives are also accompanied by many challenges to create a strong and sustainable R&D.

This paper makes an analysis of opportunities available to industries and challenges faced by them in India for sustainable R&D.

Keywords: Innovation, Opportunities and Challenges, R&D, Sustainability, Tax Incentives

I. INTRODUCTION

Many definitions of R&D are given by various organizations. The UNESCO defines R&D as - 'R&D is any creative systematic activity undertaken in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this knowledge to devise new applications'. The United Nations statistics division defines R&D as - 'Research and Development by a market producer is an activity undertaken for the purpose of discovering or developing new products, including improved versions or qualities of existing products, or discovering or developing new or more efficient processes of production'.

Whatever the definition of R&D is, it is important for nations to increase their income and improve quality of life of their people. Hence, for R&D to grow and sustain, many countries offer generous grants, incentives and credits. To make the R&D investment cost effective for individual industries, there is a necessity for governments to step in and support R&D efforts in specific areas. These can yield significant benefit to the nation as a whole. The rationale for government participation in R&D may include the following:

- The innovation may lead to cost reduction of products and process for society.
- For some sectors such as national defence, railways etc. it is imperative for government to participate in R&D.
- In some sectors such as environment, eco-friendly products non-conventional energy etc. industry may not pursue innovations unless regulations or other policies mandate such requirements.
- R&D that is costly and has a high chance of failure may exceed the risk threshold of the private sector.
- R&D that has a long gestation period is likely to fall short of the private sector's requirement for a rate of return.

With globalization, many of the technology resources once limited to advanced economies such as U.S., Japan, and Europe are being indigenously developed in emerging economies such as India, China, Korea, Brazil, and Eastern Europe. These countries are now able to compete with the leading countries in R & D for development of the sophisticated and complex new products.

More than 30 countries offer specific R&D tax incentives related to development activities manufacturing process improvements, production trials, software integration and laboratory research. These incentives create an immediate cash benefit and reduce effective tax rates. The Indian government has taken

many initiatives through formulating innovative policies that are comparable to many nations to boost R&D in the country. These initiatives have created many opportunities for private sector and institutions to participate in R&D programs and increase their R&D expenditure. With new R&D policies, India is on the brink for a massive upsurge in economic and social growth and is on a path to becoming a technology driven superpower in the coming years.

II. GLOBAL R&D SCENARIO

In terms of R&D spending, United States is the largest of the global spenders on R&D followed by Japan and China. In Europe, the major spenders are Germany, France and the UK.

Table-1 shows a snapshot of the share of global R & D spending and R&D spending as a percentage of GDP for year 2012.

TABLE 1
SHARE OF GLOBAL R&D SPENDING

Share of Total Global R&D Spending			R&D Spending as % of GDP	
	2011	2012	2013	2013
Americas	34.80%	34.30%	33.80%	2.04%
U.S.	29.60%	29.00%	28.30%	2.66%
Asia	34.90%	36.00%	31.70%	1.79%
Japan	11.20%	11.10%	10.80%	3.48%
China	12.70%	13.70%	14.70%	1.65%
India	2.80%	2.80%	3.00%	0.90%
Europe	24.60%	24.00%	23.40%	1.88%
Rest of World	5.70%	5.70%	5.70%	1.77%

Source: Battelle, R&D Magazine

III. INDIAN R&D SCENARIO

The Indian R&D system is still in its nascent stage. As shown in Figure-1, around 80 percent of the domestic R&D is taken by the public sector, 20% by private enterprises and 3% by universities compared to 69 % by private enterprises, 18 % by universities, 10% by government R&D labs and 3% non-profit institutions in countries belonging to OECD.

Though the investments for R&D in India lagged behind that of China, the EU and the U.S until recently, the Indian government has made efforts to drive investments in S & T that is reflected in India's five-year plans. The government has plans to raise the overall spending on R&D to minimum 2% of the GDP by the end of the 12th Five-Year Plan (2012-2017). It has also felt the requirement of greater participation from the private sector.

The key driver of R&D activity in India is large multinational companies (MNCs). MNCs are setting up dedicated and

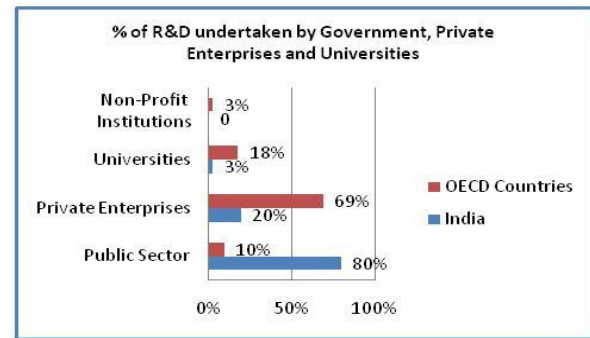


Fig. 1: % of R&D undertaken by various agencies

independent R&D centers for taking up R&D activities in new and emerging research in high tech areas. This is a major driving force behind India becoming an R&D powerhouse. The flow of foreign R&D is mainly concentrated in areas such as electronics and telecommunication, software, automobile, drug and pharmaceuticals, hardware and product design (Table-2). More than 300 MNCs have setup their R&D centres in India. Though many MNCs like GE, Astra Zeneca, Texas Instruments, Motorola, DuPont, Intel etc have set up R&D centres in India, the domestic players such as Tatas, Birlas, Biocon, Godrej, and others have also participated largely.

TABLE 2
R&D FOCUS AREAS BY MNCs

MNC	R&D FOCUS AREAS		
GE	Composite Material Design	Electromagnetic Analysis	Nondestructive evaluation technology
Honeywell	Next generation magnetic sensors	Image analysis and computer vision	Intelligent vehicle technologies
General Motors	Smart system modelling	Vehicle structure and safety	Chemical reaction modelling
Philips	Healthcare system technologies	Energy and lighting	Consumer lifestyle technologies
EADS	High performance computing	Avionics	Structures
Siemens	Decentralized energy systems	Embedded systems	S.M.A.R.T. technologies
3M	Abrasives/adhesives	Coatings	NVH materials
ABB	Manufacturing technologies	Communication technologies	Robotics

Source: Zinnov Research and Analysis

IV. OPPORTUNITIES FOR R&D IN INDIA

Many opportunities exist to carry out R&D in India for Small and Medium Enterprises (SMEs) and academic institutions not only for domestic but also international

companies. Following are the factors which boost these opportunities:

- Large and rapidly growing market for products.
- 100% foreign ownership and full repatriation of capital and profits.
- R&D programs under the chapter of trade in services of WTO
- Large pool of English speaking skilled manpower
- Telecom infrastructure comparable to that in many countries.
- Geographical location enabling 24x7 service offerings.
- Good regulatory framework.

Apart from the benefits listed above, many opportunities for R&D originate from the tax incentives and the Intellectual Property Rights (IPR) protection as detailed below.

A. Tax Benefits

Currently, India has a very favourable tax regime for R & D. The benefits provided in India can be categorized as super deductions for expenditure incurred, super deductions for contribution, customs duty benefits and various state government incentives. The rates of super deductions in India are comparable with those across the globe. India has over a period of time enhanced the super deduction to a whopping 200% that is on par with countries such as Singapore, Malaysia, Hungary etc. Table-3 summarizes the incentives offered to various industries and institutions.

The direct and indirect tax benefits are summarized below:

1) Direct Tax Incentives

There are a host of benefits offered under the Income Tax Act, 1961 for R&D activities carried out in India as well as contributions made towards R & D. The Act and the related Rules specify the eligibility criteria as well as process for availing these benefits.

The benefits available under the Income Tax Act can broadly be categorized into the following

- Benefits for expenditure on R & D for carrying out R&D activities related to business.
- Benefits for manufacturing entities carrying out R&D activities.
- Contributions for R&D.
- Accelerated depreciation.

2) Indirect Tax Incentives

Given the importance of R & D, in addition to the direct tax benefits, various incentives in the form of lower excise and custom duty are provided. These benefits could be available either for import of capital goods by the enterprise for specified purposes, or for carrying out R & D. The benefits are classified into the following sections.

Section I - Incentives for in-house R&D

- Export Promotion Capital Goods (EPCG) Scheme
- Customs exemption for import of specified goods for R & D
- Customs exemption for manufacturers in the Agro chemical sector

Section II - Incentives for carrying out R&D as a collaborative arrangement

Section III - Incentives for carrying out R&D for others

- Served From India Scheme (SFIS)²²
- Export Promotion Capital Goods (EPCG) Scheme
- Customs exemption
- Excise exemption

3) State Government Incentives

Apart from the direct and indirect tax benefits offered by the central government, many state governments have the incentives for various industries.

B. IPR Protection

IPR plays a key role in sustainable R&D and has become a crucial factor for investment decisions by many companies. The IPR Acts and regulations in India are at par with international standards. India is now TRIPS (Trade Related Aspects of Intellectual Property Rights) compliant which is an international agreement administered by the World Trade Organization (WTO) that sets down minimum standards for many forms of intellectual property (IP) regulations as applied to the nationals of other WTO Members. The very well-balanced IPR regime in India acts as an incentive for foreign players to protect their Intellectual Property in India.

TABLE 3
INCENTIVE OFFERED BY INDIAN GOVERNMENT

Type of institution	Incentives
Industries with in-house R&D centres	1. Write-off of revenue and capital expenditure incurred on R&D 2. No import duty charged on the import of certain specialty equipment for R&D, as specified by the Government, in pharmaceutical & biotechnology sector and agro chemical sector 3. No import duty on import of capital goods for R&D, for certain sectors as specified in the Export Promotion Capital Goods (EPCG) Scheme in the Foreign Trade Policy. For other sectors, there is concessional import duty
Industry/private sponsored research programs act.	1. A weighted tax deduction of 200% given under Section 35(2AA) of the Income Tax
Companies engaged in manufacture having an in-house R&D centre	1. A weighted tax deduction of 200% under Section 35(2AB) of the Income Tax act for both capital and revenue expenditure incurred on scientific research and development. Expenditure on land and buildings are not eligible for super deduction.
Investments on plants and machinery used for manufacture based on indigenous technology	1. Accelerated depreciation allowance given at 40 percent of written down value
Public Funded Research Institutions (Research Institutions where not less than 50% of the recurring expenditure is met by the Central Government, State Government or the administration of a Union Territory.) as well as other Research Institutions	1. Concessional import duty charged on import of equipment and consumables 2. No excise duty charged on the purchase of equipment and consumables
Universities, colleges, scientific research associations with the objective of undertaking scientific research, etc. Universities, colleges or other institutions carrying out research in social sciences or statistical research	1. Income tax exemption of 125% to 175% on donations made to these institutes
Technical, educational and research institute	1. No excise duty on excisable goods produced during the course of carrying out experiments or research
Any wholly Indian company	1. Excise duty exemption on goods manufactured based on indigenous technologies and patented in any two countries outside India, USA, Japan and any one country of the European Union
R & D projects funded by the Government of India	1. No custom duty levied on imports
Source: Deloitte Touche Tohmatsu India Private Limited	

V. CHALLENGES FOR R&D IN INDIA

Some of the challenges faced for sustainable growth of R&D in India are:

- There is mixed evidence about whether Indian companies are increasing the amount of money spent on R&D. Majority of the patents filed in India are owned by MNC's, less than 10 % is owned by Indian companies.
- The linkages between academia and private industry are still weak compared to Europe or America.
- Private research and development does not have a long tradition.
- Venture capital is a growing but underdeveloped sector in India.
- Indian education system is extremely diverse in standards and R&D in Indian universities is a very small part of innovation in India.
- Qualified staff is still a limited resource.
- Small Indian vendors have a limited international exposure.

- India has an estimated full-time equivalent R&D professional strength of only 150 professionals per million, compared to that of other countries as shown in Figure-2.
- Indian research is mostly skewed towards basic research and lacks in application oriented R&D. The vast majority of organizations would rather go for quick acquisition of technology rather than invest in internal R&D.
- Academic institutions and many public research centers focus on advancing the science, focusing on patenting and publishing, very little systematic attention is being spent in applied R&D.
- Inadequate enforcement of intellectual property rights (IPR). While India has improved its IPR regime, the protection of intellectual property remains weak in some areas owing to inadequate laws and ineffective enforcement.
- Despite the growing talent pool, Indian R&D remains globally non-competitive.

For the R&D to grow and sustain, many challenges such as the uncertainty, high degree of complexity,

difficulty in framing clear specifications, need for continual course correction, constraints of outsourcing process etc. need to be overcome, especially if the investments are high and anticipated return are low. Also, the investment in R&D may not always fetch returns immediately. The outcome as well as the path to be adopted may not be fully clear at the beginning of a R&D project, and hence varieties of challenges are encountered in every stage of R&D execution. A single solution may not be feasible for all the challenges. However, an integrated approach can help in overcome the challenges of R&D that will help brining the growth and sustainability to R&D.

VI. CONCLUSION

India is a strong contender in the field of Global R&D. For India to derive maximum growth and sustainability of R&D, its R&D fundamentals have to be strong and excellent. Currently, the India's spend on R&D is around 2% of the global spend (China spend is around 12%). Though the major MNCs have considered India as a favourable destination, India needs to have wider policies to attract more investments in this area. The Direct and Indirect tax benefits, though comparable to many countries, appear to be very limited as most countries provide for duty drawbacks, VAT benefits, wage benefits etc. for R&D.

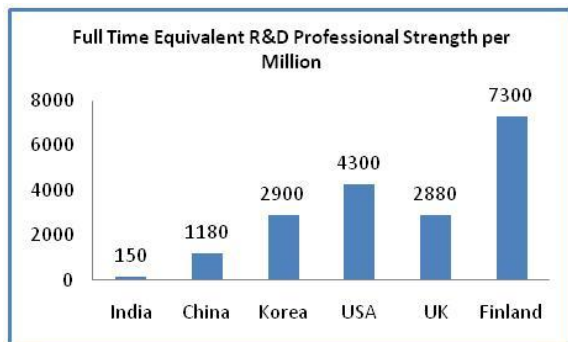


Fig. 2: Full Time Equivalent R&D Professional Strength per Million

To sustain high rate of growth of economy and to establish itself as a global R&D and innovation hub, India needs to pay serious attention to R&D. The Indian companies need to strengthen their in-house R&D and develop original products and technologies

to global standards. The linkages between industry and academia need to be made stronger. In the field of education, R&D and research based curriculum should start at early stages and more foreign universities should be allowed to enter. The industry needs to move away from the quick acquisition of technology and invest in internal R&D.

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