Analysing patenting activity and investment in Science and Technology in India

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India has stressed development in Science and Technology (S&T) from the very beginning of the plan period. The paper highlights the S&T investment in the country since independence in comparison with a declining trend in patents obtained by Indians over the period. The paper analyses this disturbing statistics. It tries to find out the reasons behind such performance in the Research and Development (R&D) front in spite of hefty investment. Finally there are some suggestions for formulating a concrete policy boosting R&D to obtain competitive advantage through patenting.

A patent may be defined as a grant by a sovereign or state to an inventor or to his assignee giving exclusive rights to make, use, exercise and vend the innovation for a limited period of time in exchange of disclosing it in a patent specification. This gives the owner the right to exclude others from using the invention.[1] An invention is patentable if it is new, non-obvious with respect to "prior art" and it should be commercially viable. Patent is granted on art, process, method or manner of manufacture; machine, apparatus or other article; substances produced by manufacture, including any new and useful improvements of any of them.[1] Patents play an important role in our economy in encouraging private investment in new ideas and in the development of new technologies. Patents derive unique values from the legal rights they secure, namely the right to exclude competition in the patented technology. The value of the patent ultimately depends on the comparative breadth of legal rights it secures and the defensibility of those rights against validity challenges. But patents have long surpassed their use as only a legal incentive to innovation. Technological competitiveness among countries has brought in strategic use of various provisions in patent-related laws to prevent competitors from a possible early lead. The most developed countries are characterized by wealth creation based on pursuing high R&D investments and translating their innovations into commercial products. Among the developing countries, India has the potential to emerge

as a significant player in the global technology market, given its scientific and technological institutions of excellence, huge pool of S&T manpower and a long tradition of S&T. [2] But in reality the picture is different.

Current Scenario

It will be easier to explain India's current position in utilizing patent protection in the field of Science & Technology with the help of following statistics.

Table 1 Trend of investment in S&T over the plan period [3]

Plan period	Investment in S&T in crores	Percentage(%) Increase over each period
1st plan (1951-56)	20	-
2nd plan (1956-61)	27	35
3rd plan (1961-66)	144	433.33
4th plan (1969-74)	373	159.02
5th plan (1974-79)	1381	270.24
6th plan (1980-85)	3668	165.60
7th plan (1985-90)	8264	125.29
8th plan (1992-97)	17,529	112.11
9th plan (1997-2002)	25,529	45.63

Source: DSIR, Govt. of India, November 2000

Table 1 shows that investment over S&T has increased over the years. But percentage increase had been highest during the 3rd plan. Percentage increase had declined steadily 5th plan onwards.

Table 2 shows that patents granted on Indians in India had been erratic over the plan period. According to available data, the number had been highest around the 7th plan. It had been also high during the 4th and the 5th plan.

Table 2 Patenting trend during plan period [4]

Plan period	No. of patents received by resident Indians
1st plan (1951-56)	1802
2nd plan (1956-61)	1435
3rd plan (1961-66)	1496
4th plan (1969-74)	2434
5th plan (1974-79)	2533
6th plan (1980-85)	1784
7th plan (1985-90)	2770
8th plan (1992-97)	1841
9th plan (1997-2002)	>2447 (data inadequate)

Source: WIPO statistics

If the above tables are compared, the following graph (Figure 1) is generated. It shows actual investment in Science & Technology (S&T) by the Government of India in the plan period and number of patents obtained by Indians in India during that period.

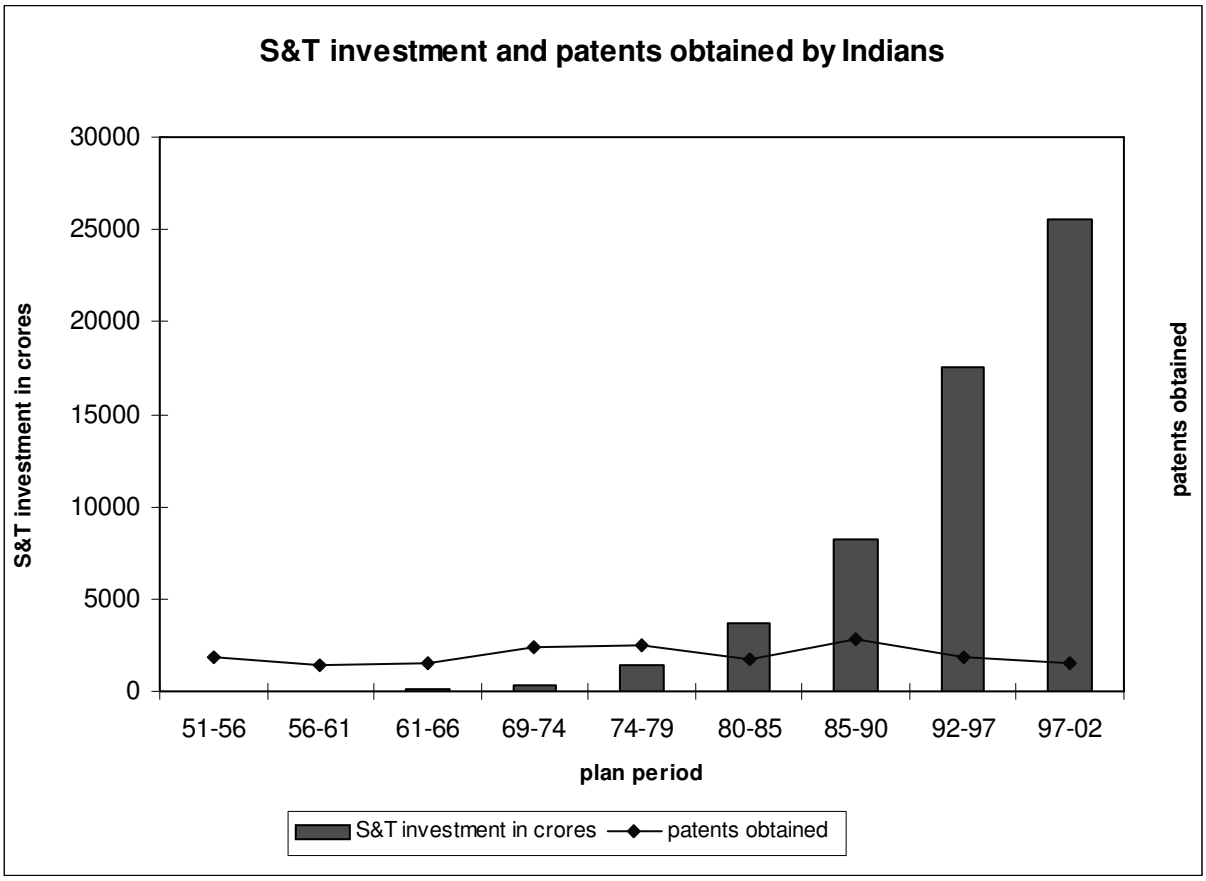

Figure 1

The comparison shows that investment in S&T increased quite significantly, over the plan period but it was not reflected in commercially beneficial terms i.e. in number of patents obtained. Though the increase in patents in

the 4th and the 5th plan may be accepted as a result of increased investment in the 3rd plan, the overall tempo of increasing investment was absent in case of patents. This proves that the expenditure incurred in S&T of which R&D is a significant part, was either in such areas where work has already been done or in such areas, from where no competitive advantage could be gained. Though the rise in prices has not been considered here, the trend shown by the graph more or less gives the real picture.

Patenting activity is an important indicator of technological competitiveness of a country. It is necessary to analyse India's dismal state of affairs in this regard. T.N. Chaturvedi, head of joint parliamentary committee, in his report on The Patents (Second Amendment) Bill, 1999, highlighted the fact that barring DGCSIR and a few scientists connected with CSIR, almost none of the Indian S&T professional societies and even her distinguished academics have taken pains to officially depose their view on S&T policy. The awareness is so inadequate at the decision making level that there is no concrete policy on behalf of the Government of India. Thus one gets concerned about the fate of the present S&T infrastructure as the new IPR regime is introduced without adequate preparation.

In India almost half of the patenting is done by CSIR during each year, patenting activity being distributed among most of its major laboratories. What should be noted here, is that the universities in India have negligible

contribution in the field of useful R&D. Research in Indian universities is primarily funded by a central body, i.e. the University Grants Commission (UGC) or by various central government research organizations like DST, CSIR, ICMR, DBT, DOD, ICAR etc. Every year, a substantial amount of money is spent in the process but neither the UGC, nor the central government organizations are concerned about the gain of the country from such activity.

Table 3 shows that the number of Indian patents in comparison with the foreign patents have always been significantly less. It indicates that the endogenous inventive activity has not been able to keep pace with the foreign technology.

Table 3 Number of patents granted in India [4]

Year	Indian	Foreign
1988	861	2593
1989	437	1549
1990	306	1305
1991	358	1214
1992	285	1184
1993	334	1217
1994	448	1287
1995	415	1198
1996	359	661
1997	907	Data inadequate
1998	592	1119
1999	633	1527

Source: WIPO statistics

What is needed at this hour is a concrete R&D policy and management, given the global scenario of tough competition for protection of intellectual

assets. First it should be realized that IP or Intellectual Property (including patents, trademarks, trade secrets, industrial designs, geographical indications and copyright) and patents in particular have economic value. Patents have economic value as they can:

⇒ Help generate revenues from product sales and licensing royalties

⇒ Increase Gross Domestic Product (GDP) and growth

⇒ Create employment, support educational and research institutions

⇒ Attract high-value foreign direct investment and joint ventures

⇒ Promote funding for R&D, which provides and enhances technologies and products.

Like other types of property it can be developed and managed so that it creates an economic return. [5] The following steps should be considered essential in formulating an R&D policy.

Essential steps

1 Clustering of target areas

For development and management of patents as asset, clusters or target areas in which the country has competitive advantage or which harmonise with national needs and capacities need to be selected.

2 *Taking stock*

A type of audit system in this regard permits a nation, a university, an enterprise or a research and development center to assess its existing stock of valuable intellectual property and human capital.

3 *Human capital formation*

Depending on the stock, human capital formation can be taken up. For this purpose a policy must be set up which is congruent with education policy. Many countries educate young, as well as adults, to develop and upgrade skills related to the clusters or target areas. Without the capacity to educate scientists, technologists and creators in key areas corresponding to the economic clusters, a strategic plan cannot be implemented in practice.[5]

4 *Areas of future research*

Various S&T departments of the central government and central funding agencies like the UGC, DST, CSIR, ICMR, ICAR, DBT, DOD should monitor and approve future research areas. For this purpose, extensive retrospection through consultation of patent documents should be indulged in before approving any applied research projects. Patent documents contain a vast amount of technological information that is not available in other published literature. This information can be an important source for identifying new topics of research. In absence of such knowledge, most

R&D organizations or universities either waste their efforts in duplicating what have been done or else lose competitive advantage. The maintenance of proper research records is an essential prerequisite for the protection of IP in both R&D organizations and universities. The primary purpose of recording research results is to prove that a particular person did a particular research at a certain time.[6] This helps in the next stage of obtaining patents.

5 Trying to obtain patents

The country at the national as well as regional level should encourage scientists for obtaining patents and should facilitate the process for it. The Patent Cooperation Treaty (PCT) provides a common facility to conduct international search for prior art for patent applications. The countries in which the application is filed may evaluate the patent independently or accept the findings of the PCT. The process gives great advantage to the patentees as it helps to assess the market potential of their patents in the different countries. In India similar work is done by PIS, Nagpur, NIC, New Delhi, Intellectual Property Management Division (CSIR), New Delhi.

6 Incentives

Incentives act as a source of encouragement. It may include tax incentives, and financial rewards in private enterprise for inventors and creators in

cluster areas. Incentives in the form of research facility grants, R&D networks, programs to support artists and cultural industry development, also work as part of efforts to attract and retain talented human capital in cluster areas.

7 Setting up infrastructure for commercial production

As far as India is concerned, for commercial exploitation of patented products suitable infrastructure needs to be provided. The initiative may come from the central or state governments or from Non-Governmental organizations (NGOs), otherwise private enterprise should be encouraged.

8 Marketing of the product

Finally, for marketing of the patented product sub-regional or regional cooperation should be taken into consideration. Strategic planning requires identification of the products, which will be developed and commercialized, and the region in which each is to be marketed.

In conclusion, it should be remembered, that, for gaining competitive advantage through proper IPR policy, it is necessary that research and development be encouraged in those fields where the nation has sufficient capacity and the national needs are served. But it should also be considered that research, particularly basic research, depends on the freedom of the researcher in selecting the field and his/her aptitude. Rigid guidance of

research items and methods may not produce desired results. History proves that significant inventions were made rather accidentally. Thus a balance should be reached between free research leading to wastage of R&D resources (in duplicating previous works, losing competitive advantage and in works, which does not commensurate with the national needs) and over-monitoring of research items along target areas.

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Abbreviations:

CSIR-Council of Scientific and Industrial Research

DBT-Department of Biotechnology

DGCSIR-Director General of Council of Scientific and Industrial Research

DOD-Department of Ocean Development

DSIR-Department of Scientific and Industrial Research

DST-Department of Science and Technology

ICAR-Indian Council of Agricultural Research

ICMR-Indian Council of Medical Research

IPR-Intellectual Property Rights

NIC-National Informatics Centre

PIS-Patent Information System

WIPO-World Intellectual Property Organization

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