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Short Communication

Science entrepreneurship: Challenges and opportunities in India

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The rise of economy and information technology is fast transforming the intellectual property and technology commercialization in the developing world, particularly in India. absence of awarenesss, strong domestic pressure groups, lack of consortium of IP attorneys and scientists, biotechnology firms and private sponsored research coupled with increase in brain drain have tremendously affected growth of knowledge economy and value creation. With a new patent law of 2005 in place along with new regulation, which will allow Indian scientists to float their own companies, India is poised to overcome most of these challenges. Indeed, recent results show this is the case, reflecting the success India gained in developing computer technology just a few years ago. It is anticipated that this environment shall foster and facilitate new therapeutic approaches to devastating diseases, particularly chronic diseases of aging.

Key words: Wealth creation, research, commercialization, knowledge, economy.

INTRODUCTION

Historical overview- philosophical barriers

From 1 AD to 1700 AD, India and China had together commanded respectable share of world's economic assets (Prime and Kulkarni, 2007). In the subsequent years, particularly after the second world war, United States and Europe judiciously utilized the IPR regime as an instrument of economic progress enhancing their wealth by technological breakthroughs which India could not emulate. Representing a sixth of human resources, as fountainhead of 4 major religions and the largest democracy, India possesses rich ancient knowledge besides access to modern technology. It has given the number system to the world and several discoveries in fields of mathematics, physics and biology besides producing several thinkers, philosophers and noble laureates (Gup-ta, 1983). India has, however not optimally tapped the immense potential of its intellectual pool for enhancing its wealth. In this article some of these causes have been traced in order to understand this impasse. These challenges transcend mere access to or acquisition of technology to cultural, institutional and philosophical barriers in adoption of IPR regime and its commercialization as foreseen by WTO or TRIPS. Indians have always attached a lot of sanctity to knowledge and the deliverer of knowledge, the guru or teacher and the Goddess of knowledge, Sarswati as much as Lakshmi, the Goddess of wealth (Ankrl, 2000) . Some thinkers believe that the genesis of the problem of dissociation of wealth creation efforts from knowledge lies in the known relationship problems between Sarswati and Lakshmi. The idea of science entrepreneurship thus never visited the political thinkers, policy makers or the academicians until very recently. Majority of the research in India has thus continued to be supported by only public funds which owes its origin to existence of Gurukuls (free residential schools) because of which the licensing and protection of patents remained under bureaucratic control. Absence of strong domestic pressure groups and private sponsored research has simultaneously contributed to lack of interest and aware-ness about such issues. Coupled with an all-pervasive philosophy of Vishwa Kutumbukum (world is a single big village) the scientific patriotism could never acquire pro-minence among Indian scientists making it difficult for them to link their productivity with national benefit. Even the great Indian scientists like JC Bose or CV Raman re-frained from accepting financial gain from their research which served as a bad prece-

dent for others scientists.

Socio political factors

Politics in multicultural, multicaste Indian democratic society has further eclipsed the vast potential of talent by promotion of caste based reservations in professional education. http://www.frontlineonnet.com/fl1420/1420099.0.htm). Although there are benefits of reservation from the point of view of providing opportunites for disadvantaged sections of society the idea of addressing social inequality by reserving seats for technical jobs in present form is not beyond debate. There is a recent ruling by supreme court providing reservation immunity to IITs (Indian Institutes of Technology) and top some medical institutes. There are other factors that determine funding in medical research which are dependent on relative spending in other national priority areas. For example, with rise of terrorism, India is constrained to earmark a big share of its resources in defence and for fighting terrorism. This has been continuing for past 2 decades because of the R and D expenditure has never crossed 0.84% (Ankrl, 2000). As a result, many young and creative scientists from developing countries prefer to migrate to developed countries. When these scientists decide to return home, their right to claim the IP assets they created abroad is either lost or difficult to pursue. Therefore, the conesquent opportunity of revenue generation is also lost. Thus, there is need for global law that can address the issues of migratory population of scientists which is routine. However, only recently India has greatly increased investments in R and D which is evident by establishments of several new institutes in the country such as IISER, IITs and one Stem Cell Centre in Bangalore.

Academic challenges

An important challenge confronting the biomedical scientists is the lack of understanding of the linkages between investment in research and rationalization of medical treatment costs that has never been adequately highlighttted by science and health managers. As a result very few, if any, medical institute have a well established patent office, a business development office or an office of integrity to address issues that emerge from biomedical innovations. Such institutional and faculty support systems are important to complement the enhanced funding in R and D. One way of addressing this issue could create positions of directors of research within medical institutes who possess deeper understanding of drivers of research translation. Such a model exists e.g., in LV Prasad eye institute, Hyderabad, one of the leaders in vision research and clinical translation. Very recently the national institute of immunology, New Delhi has initiated a translational research institute. Such models have led to excellent integration of clinical and basic research ef-forts enabling the stem cell technology to become a reality. Such efforts can enable the stem cell technology translation at affordable costs. In order to optimize scientific productivity the existing authority patterns can be slowly replaced by teamsmanship in such organisations such that the performance and satisfaction levels of human resources are maximized for utilization in innovative projects for societal benefit. In this regard, India boasts of a far more liberal policy in stem cell research when compared to USA and hence there is an opportunity of rapidly acquiring leadership in this area. There is no philosophical barrier that restrains the stupendous advancement the country is making in stem cell technology but in order to acquire global leadership in this area the above mentioned socio-political, human resources and policy issues need adequate attention.

Controversies and promises

Human resource is one of the biggest problems in contemporary academics. Without a distinction between under and over performers the success for a innovation system to deliver is very little. The scientists are evaluated by the years of service than contribution alone, much like administrative staff. The recent proposal in India to allow scientists to share part of the patent money is a welcome breather in this direction. In this regard, Panjab University took the lead by announcing extra monetary reward for those publishing in high impact factor journals, highlighting the urgency to reward those who put that extra effort in academics. Seniority is another criteria often conveniently accepted as a good replacement for merit in Indian environment. The young faculty involved has to move up from sloganeering to real liberation, by involving them in scientific decision making processes such as task forces that decide funding of research projects, editorial boards of journals that decide acceptance or rejection of new research and inducting them into national academies or Institute bodies. If the bright and meritorious faculty is able to assert themselves in the academic platforms, the innovative systems will become healthy.

The advent of IPR regime and advancement of science has coincided with the entry of national leaders such as ex president scientist Dr Abdul Kalam and economist prime minister Dr Manmohan Singh. As the government conduct rules that do not allow holding of 2 simulta-neous jobs, forming of spin off company from new research until recently has been an impossible task. A mechanism of encouraging in-service scientists to form a company either by taking sabbatical leave or by providing consultancy services while working in these government institutions can change the landscape of innovative efficiency. Although CSIR and IITs have taken lead in these sectors, the medical institutes have been left far behind, ironically it is in such institutes where the stem cell technology has to flow from experimental hands of basic scientists to those of medical scientists including surgeons and finally to private sector. It is here where the need for technology

development can play a leading role such that the patients are not left to bear the financial burden of this futuristic treatment. Who will ensure that the technology is passed into private sector properly so that the patients are ethically served and health industry thrives? There are some private centres that have come up which either bank cord blood or provide putative cell replacement therapy and majority of them are devoid of scientist-clincian teams that lack adequate expertise in the field which could pose a threat to human health. A recent news item reported the government proposal, which would allow in-service government scientists to hold equity in a companies directed by them, much like the existing system in west. However, till now no further action has been taken on it. Such bold initiatives hold promises for supporting the new generation of scientists who are replete with ideas and entrepreneurship.

There are also complex global issues of intellectual property such as conception and reduction to practice, authorship and inventorship, plagiarism and protection, debate on live material etc that need to be revisited in the current patent law as this directly affects science entrepreneurship projects. A colloquium of lawyers, scientists, healthcare personnel and policy makers is a requirement that can strengthen the current innovation policy. An organised effort could attract the average participation of scientists in IP policy, its regulation, enforcement and eventual commercialization of research products. This can happen with the involvement of national research development council (NRDC) or technology development board (TDB) or with the recently initiated partnerships between department of biotechnology and private companies (BIPP and SIBRI programs) who are trying to create awareness about these activities. The goverment's policy to promote stem cell research in the manner that ensures safety and efficacy of stem cells is likely to facilitate the unparalleled growth of health industry, results of which are starting to make headlines in the world. Again, the absence of organized offices to oversee such efforts without involvement of basic scientists can derail the entire process, much like well advertised and hurried gene therapy trials in US that led to death of a boy after which the gene therapy trials took a never to return plunge. The situation at the medical institutes is particularly alarming where there is a need for integration of health and science policy for potential research. In medical Institutes the plea serve patients care is often justified as an excuse for neglecting the importance of research and innovation. As a result, the opportunity of working with a huge patient population, particularly the epidemiological aspects, is lost, often at the cost of separating clinical practice from research. The introduction of MD-PhD pro-gram, like the one initiated by NCBS, Bangalore can suit-ably resolve this major problem. Many people also be-lieve that lack of accountability is the heart of inefficiency of scientists and doctors alike. It is also pertinent to re-view the permanency of government jobs and enhance accountability through regular science and health record audits.

Conclusions

It is imperative to make the academic institutes financially autonomous by allowing them to generate and survive on their own funds, this will automatically lead to scientific output, rapid generation needs to be studied by the Indian polity of intellectual property and translational research which can be used for societal benefit. However, will this work out in a country like India with poverty levels to the tune of 48% needs to be evaluated carefully by Indian polity. The institutes will be able to share its profits with the faculty that helped it to become financially independent, as a result the merit will supercede seniority spontaneously and only the meritorious faculty will be able to lead such institutions and the respective departments. The rapid advancements in the area of stem cell research has the potential to make india as an international capital of stem cell banking and therapy, as also highlighted in the recent (2008) editorial by Prof Denis English, founding editor of stem cell and development. If equally rapid policy changes are not implemented, the huge world health care market will be lost forever directly affecting the cost of treatment for poor patients.

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