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University-Industry Consortia Needed To Enrich Research in India

Education is the key to the development of a nation and society, as it sets the direction and pace of economic growth, technological development, civic sense, ethos and culture.¹ The content being taught by the teachers and educators, the pedagogical approaches being adopted, and the institutional culture prevalent, along with the ethos being ingrained in the conduct and behaviour of the students acquire key significance in shaping the destiny of a society and nation through education.

India has an enrolment of 3.3 crore students in higher education², almost equal to the total population of Canada.³ So, the quality of education in our country is crucial for us. In today's hyper-competitive global knowledge economy, the quality of higher and technical education and research acquires key position as it has a major bearing upon the development of employment generating technologies. For instance, due to the paucity in our expertise in maritime engineering, India has less than 0.1 % share in world ship building, inspite of being the fourth largest steel producer in the world. Likewise, our share in world manufacturing is also mere 2.1 %, inspite of we being home to world's 16% population. Due to this poor state of industry, as well as of commerce, trade and agriculture, we have very low per capita income, poor tax-GDP ratio and consequent low spending on education, health and other heads of welfare and so on. To break this vicious-cycle, along with other measures, India has to enhance the quality of education and focus upon research and intellectual property creation for employment generating industrial commercial and agricultural activities. Looking towards a dismal provision of mere 0.88% of our GDP on R&D (viz a viz 3.8% of South Korea and 4% of Israel), India needs to augment its R&D efforts. Potential of higher education, in India can be effectively harnessed through university-industry collaborations, to foster job creating industrial and commercial endeavours. In this regard a consortium approach inter se the industry, university, public research institutions and the government can help us to overcome this vacuum. Otherwise, today India lags far behind in creating productive intellectual property, a crucial variable to nurture job creating industrial and commercial activities, for want of requisite research and innovations into various knowledge based and intellectual property creating subject areas. Therefore, inspite of being endowed with rich resource dividend, in terms of natural wealth and human capital, India has mere 2.9% share in the nominal world GDP on the basis of exchange rate, and just 2.1%⁴ share in world manufacturing, despite having more than 16% share in the world population.

Poor State of Research

India lags far behind in quality research and intellectual property generation. As is evident from the data released by the World Intellectual Property Organization (WIPO)⁴, India has even seen a drop in international patent applications to 1,423 under the Patent Cooperation Treaty in 2015, while the US has 57,385, Japan (44,235), China (29,846) and Korea (14,626), which figure in the top-10 list, and have registered a rise of 20%, 14% and 7%, respectively, from last year. India fared no better in terms of global trademark filings as well, under the Madrid System. It ranked 36th with only 150 trademarks filed in 2015, down from 153 in 2014, when it had seen a more than 70% increase in trademark registrations. It shows a very miserable scene on the front of new product and brand launches by the industry. Against such a paltry figure of 150 filings by Indian industry, the trademark filings of the US (7,340), Germany (6,831), France (4,021), China (2,401), Japan (2,205) are 14 to 48 times. Data from the aforesaid WIPO report reveal that even the IITs, though endeavoring to move ahead on research in nanotechnology over other Indian Universities with over 5,000 scientific papers and 14 patents since 1970, are miles and miles behind China, as the Chinese Academy of Sciences tops with 29,591 publications and 705 patent filings in nanotechnology. The country has a long distance to go in promoting innovation and research. The figure on comparing with China is embarrassingly low for the elite institutes, constituting an icon at home.

University-Industry Collaboration: Alternative Modes

Collaborative research with a consortium approach, inter se the academia, industry and government can prove to be a big game changer for breakthrough research and innovations⁵ in the country. A well facilitating eco-system for collaborative researches and innovations across a wide range of knowledge-based and intellectual property centric subject areas has to be cultivated to kick start development of job creating commercial products and services for absorbing the 1.2 crore youth attaining the age of employment every year (one million per month) in the country. Collaborative consortia, tripartite as well as bipartite, throughout the innovations' value chain and transforming such innovations and researches into job creating products and services may be fostered via 4 discrete forms of university-industry collaboration modes.

- (i) Industry Consortia i.e. Udyog Sahayata Sangh: Such full fledged consortia may be tripartite comprising industry, relevant university department(s) and the government, or bipartite- comprising the university and the industry. Industry clusters in different part of the country and the university (ies) can form such industry specific consortia.
- (ii) Technology Development Cooperative Associations: Such association of firms of any industry and university (ies) may come together for pursuing target oriented researches for current or future needs.
- (iii) Technology Development Cooperative Agreements: A memorandum of understanding or a legal contract may be signed for shared researches with well defined targets.
- (iv) University-Industry-Government-Round Table: Such Round tables can promote collaborative research.
- (v) University-Industry Round Table: Frequent knowledge sharing round tables or for identifying the mutual expertise, can be organized between industry and university (ies).

The aforesaid modes of university-industry collaborations can go a long way and can even invoke techno nationalistic interventions, crucial for developing homegrown innovative technologies. In US, Europe, Japan, South Korea, Taiwan etc, hundreds of industry consortia are active in pre-competitive research, technology development, market research, product development and brand promotions. In US, there are more than 1200 consortia for industries ranging from Photonic, Automobile, Technology, IT, Pharma, Energy, Agrochemicals, Biotechnology and so on. China has single mindedly pursued this path of techno nationalism and has moved towards techno globalism.

The Paradoxes to Take Care

Our share in world shipbuilding is mere 0.1 percent. South Korea, which accounts for less than 5 percent of the geographical area and population of India, and having far less than 70 percent of our GDP, today accounts for 40% of world-shipbuilding. Needless to say India, the 4th largest steel producer with a large pool of talented manpower, and a 7100 Km coast line can easily capture at least 10% of world shipbuilding, if proper policy, design, R&D and fiscal support is extended by the government. Overall, South Korea has been spending 4 % of its GDP on R&D while India spends less than 1 percent of its GDP on R&D, inspite of the government's repeated assertions to raise it to 2% of our GDP in the science and technology policy declarations being made since 2003.⁶ This constraint of poor funding can partly be overcome by promoting university-industry collaborative researches. Our pursuits in promoting quality education in pharmacology and IT have placed us in a leading position in the world. To the contrary, a single policy support to pharma sector extended in 1970 by replacing the provision of product patents with process patents in the Indian Patents Act of 1970 and quality education, India could acquire a record 10% share in the world Pharma-Manufacturing by volume. Besides, we have ushered in a new era in the area of Pharma Education and Research & Development just by virtue of this policy support. Though it is also now bound to erode with our reverting back to product patents since 2005, and our gradual succumbing to Euro-American pressure in the field of IPR.

Collaboration between academia and industry is an increasingly critical component⁷ for facilitating efficient national innovation systems. It is useful to examine the experience of developed countries to better understand the different types of university-industry collaboration, motivations and barriers to such co-operation, as well as the role of public policy in fostering such linkages. Developing countries and especially India face even greater barriers to such alliances, calling for a bold initiative to promote university-industry collaborations. Such collaborations between universities and industries are critical for several purposes viz (i) for capacity building and skills development via joint teaching and training, (ii) for the generation of new and fresh knowledge and to foster innovations through technology sharing, and (iii) for the promotion of entrepreneurship through incubation for start-ups and spin-offs, and also through R&D artnerships.⁸

More Miscellaneous Modes

Besides the aforesaid consortium approach, some other modes to promote university-industry collaboration and cooperation can also be evolved. Such modes may be like: (i) R&D incentives and grants (ii) Performance-based funding of universities and reward systems for researchers (iii) Intellectual property rights regime and technology transfer offices (iv) Science parks, spin-offs, and business incubators (v) Shared Education and training programmes⁹

Experiences from across the globe suggest that businesses can structure their relationships with universities in ways that can surely make them much more valuable.¹⁰ The idea of "gap between research done in academia and its translation into marketable products, is not new"¹¹ and successful partnerships are growing. Both academic institutions and companies are making rapid strides to bridge the gap.¹² The focus of all such collaborative research endeavors has also to be to invoke techno-nationalistic interventions to take a leap ahead in employment generating industry and commerce.

India can take a quantum leap with techno-nationalist focus in research and innovations, and the first step would be to identify the focus areas for the collaborative researches or co-ordinated studies, based upon the capabilities of the universities and the industry and the nation. The first step in this direction would be to break the ice through university-industry round tables to be organized at the locations of each of the 400 industry clusters in the country for brainstorming and identifying areas of strength and co-operation. Such round tables would help in pin-pointing the areas of common interest, relative strengths and scope of collaboration. Industry specific 'University-Industry' consortia or technology development co-operative associations and agreements would automatically follow. The Association of Indian Universities (AIU) being the sole umbrella organization of the academia can take initiative and move ahead in this direction to co-ordinate with the multiple industry bodies like FICCI, ASSOCHAM, CII, PHDCCI, Laghu Udhyyog Bharti and also to rope in the Union and state governments.

Notes

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