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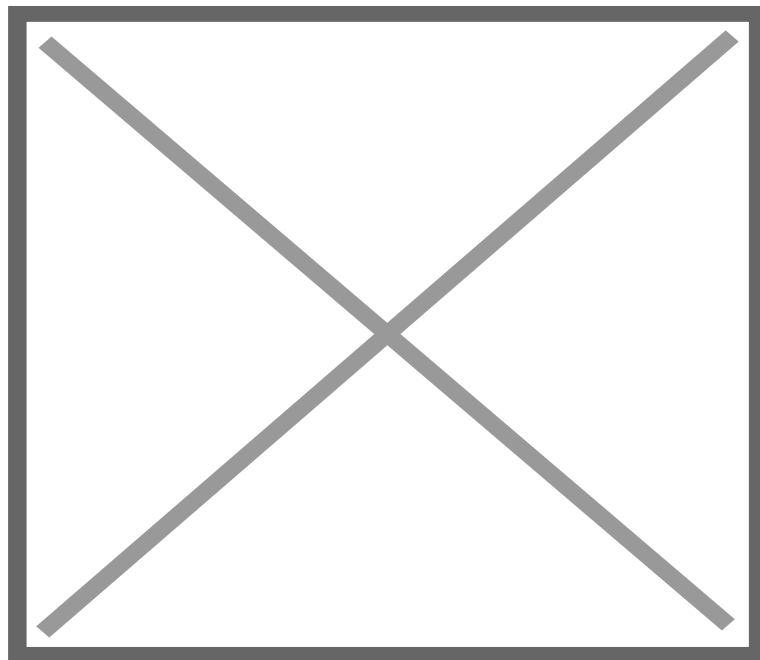
Bridging skills gap in biotech industry

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BioSpectrum presents a study conducted by IIM Bangalore on quantifying the shortage of quality manpower in Indian biotech and recommendations for an actionable agenda.



The Indian biotechnology industry recently breached the \$2 billion revenue mark and is projected to touch the \$5 billion mark by 2010 and \$25 billion by 2015. India is poised to become a major player in the international biotechnology industry and biotech could well become the next big Indian success story globally after IT. India's competitive advantage in this sector stems from strong bio-manufacturing skills and the availability of skilled manpower at relatively low costs.

The phenomenal growth in Indian biotech has meant that the need for quality trained manpower has also gone up and industry leaders are now complaining about facing a talent crunch. The study aimed at firstly quantifying the shortage of

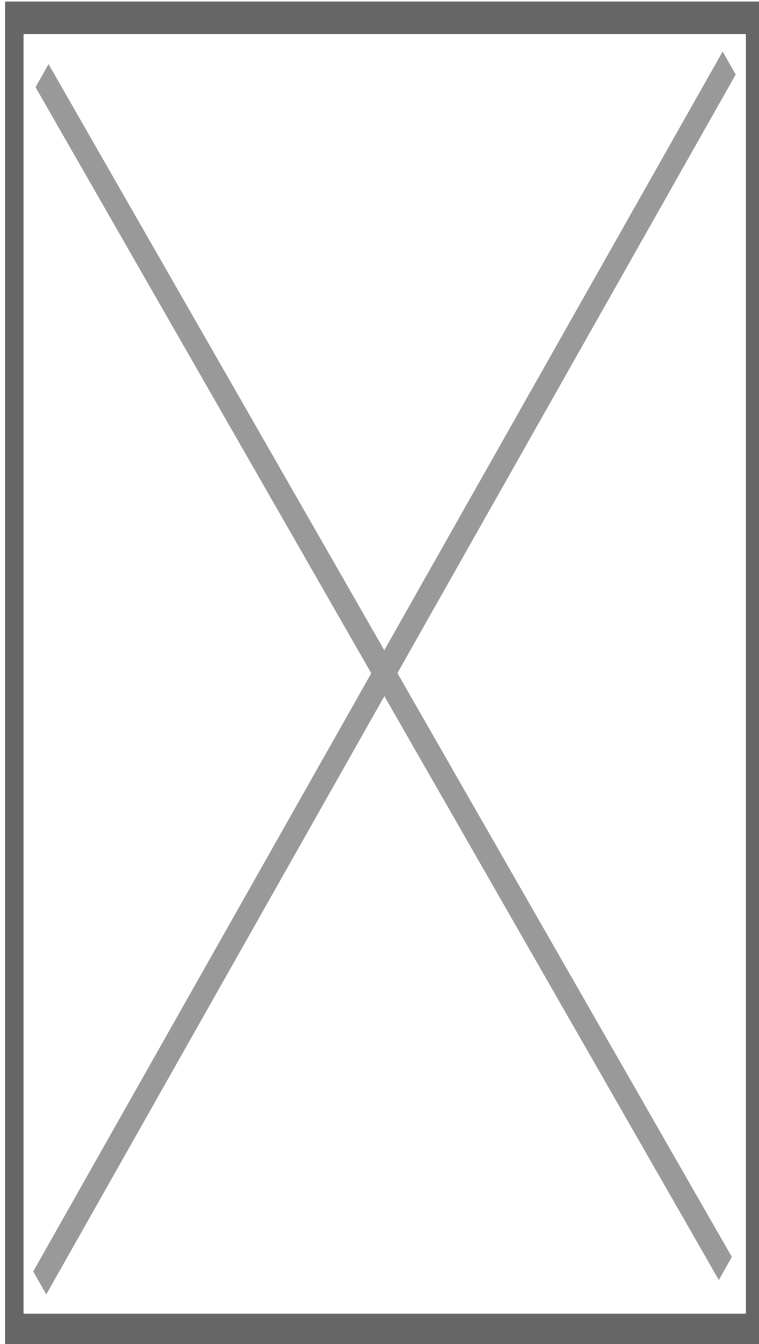
quality manpower in Indian biotech and subsequently recommending an actionable agenda for development of adequate quality human resources with the appropriate skills to ensure that the Indian biotech industry can capitalize on the opportunities before it.

Demand and supply of manpower

In India, over 250 colleges produce an output of over 10,000 students every year at the various undergraduate, postgraduate and doctoral levels. Over the past five years, capacity addition in the form of new colleges being opened and increased intake in existing universities has been occurring at the rate of about 20 percent year on year and the trend is expected to continue for the years to come. However, the supply levels indicated are those that are intended to serve the Indian biotech industry and not the actual levels. A detailed survey of 46 institutes offering biotechnology courses was undertaken by the authors with the help of BioSpectrum.

A significant finding of the survey was that on an average, 42 percent of all students passing out of these institutes opted for higher studies. The survey included institutes from both the publicly and privately funded domains and also covered over 80 percent of the institutes considered to be among the Top 20 in the country (both in the publicly and privately funded domains) by BioSpectrum. About 15 percent of the students were estimated to be permanently lost to the Indian industry as they pursued higher studies abroad and joined the workforce in the West. However, another important factor yet to be considered in all these calculations is the subject of employability of the output. For instance, for every 100 students applying for a job in the industry at the various levels, how many students are considered employable by the industry, both immediately or after some minor orientation and training programs.

Through interviews with various CEOs and HR executives in biotech companies, it was concluded that the average employability of graduating students in the country for the Indian biotech sector was about 25 percent only. There were many CEOs who lamented the fact that they had to conduct 100 interviews on an average to select a single candidate and there were also some who felt that the employability estimates were close to 40-50 percent. These significant differences in opinion can be explained by the inherent level of complexity of the business being run and the consequent complementary skill sets being sought by these CEOs in recruits. Thus while the intended supply of manpower is higher than the incremental demand for manpower every year, there exists a huge manpower gap in the Indian biotech sector on account of 42 percent pursuing higher studies and employability being about 25 percent. By 2010, it is expected to be as high as about 14,450 professionals.



Reasons for talent crunch

Let us first consider the reasons for the low participation rates of graduating output in the biotech sector. The nature of the biotech sector by itself is a major reason for this. The biotech sector being a knowledge intensive sector requires highly skilled manpower and the value for highly skilled manpower is at a premium. It is for this reason that graduating students feel the need to acquire higher degrees and acquire a specialization, as just a basic undergraduate or a postgraduate degree is not valued at all by the industry. This can be derived from the fact that the percentage of students at the undergraduate level being employed is just 28 while at the postgraduate level it is significantly higher at 71 percent.

A number of students not opting for higher studies join other industries like IT as the compensation levels are way higher, at times even 3-4 times what is being offered to them by top notch biotech companies. It was observed that most of the students in the country opted for engineering or medicine as a career and it was only those students who couldn't secure admission to these courses who opted for a course in biotechnology. Thus, as the input by itself was not on par with the best talent available, the quality of output was considered average. The content being taught at the various institutes was also found to

be obsolete and not in sync with industry needs. There was no national task force focusing on constant upgradation of the curriculum to meet industry needs.

In addition to the fact that many students lacked knowledge of the basics, another problem expressed was that even at the MSc level, students did not have specialized knowledge about a particular stream of biotechnology and possessed general biotech knowledge which was essentially an extension of what they learnt at the BSc level. When quizzed about this, some professors admitted that while this may be the case, it was because at the MSc level, even students with a basic degree in BSc Physics or Chemistry were admitted in addition to those admitted through the BSc Biotechnology route. Hence it became imperative that the same concepts taught at the BSc level were reiterated for the benefit of the students who had not studied these topics at the undergraduate level. Also, given the fact that different sectors within biotechnology are considerably different from each other, it is impossible to satisfy the needs of all the companies in terms of tailoring the curriculum to suit the field of work in which they specialize.

Faculty-student ratio

While the ratio of faculty to students (1:7) as well as the ratio of qualified faculty to students (1:10) are good compared to any other field of knowledge, the key parameters to note here are international publications per year per faculty (0.59) and patents developed per year by the university (2.02). This clearly points to the fact that even though the number of PhDs in the institute is more than half the total faculty, the quality of work being undertaken is not up to the mark. This can be attributed to the fact that the faculty has been unable to constantly stay abreast of industry happenings and practices. One of the biggest problems faced by both the industry and academicians alike is the fact that the equipment or infrastructure required in the biotech sector is extremely costly. The problem is that most institutes in the country today do not possess basic equipment for students to work on and practically understand the various techniques being followed in the industry. The contribution of the government in terms of aid to institutions was found to be an average of Rs 4.90 crore per public institution while the annual contribution of the industry was found to be about Rs 0.24 crore per institution. Thus, the private institutions which faced maximum difficulty in providing quality infrastructure to students neither had funding from the government nor did the industry adequately support them.

The institute-industry linkage was found to be poor, barring a few cases. An interesting problem faced by certain students who were technically sound was their inability to communicate well, both in terms of spoken and written language. This also inhibited them from actively participating in team activities to the best of their potential. A major problem expressed by the industry is also the absence of a regulatory scheme laid out by an accrediting body that helps certify the quality of institutes as well as the quality of students which would serve as an indicator for them in terms of recruiting for talent from the best institutes. The mushrooming of many new institutes since 2002 has only added to the confusion.

Finishing schools have been envisaged by the Vision Group in Karnataka. The students trained would be MSc and BSc graduates. In the first such initiative, soon to be launched with PES in Karnataka, around 100 students would be trained to make them industry ready within a period of one year. The concept is a stellar example of industry-institute collaboration, where the institutes provide the infrastructural support, while the industry provides expertise on latest techniques and more or less ensures absorption of these students in to the workforce.

It is highly effective as it ensures that people are immediately employed. This model should be replicated in other places also so that at any given time, a strong pool of quality manpower is readily available, which is readily deployable.

Recommendations

A basic five-step framework is proposed where the key steps would be to attract, educate, certify, deploy and retrain human resource to bridge the gap. Various measures that need to be taken are as follows:

The Association of Biotechnology Led Enterprises (ABLE) must set up a "Biotech Awareness Fund" with industry support and help increase awareness among the younger people. Women should especially be encouraged to take up careers in biotechnology.

Attracting expatriate talent is one of the possible means of developing high-end R&D talent in the biotech sector. Specific tax incentives and resettlement concessions would help make this shift more attractive to target professionals.

The number of postdoctoral fellowships offered by the department of biotechnology (DBT) should be increased. Grants for encouraging outstanding talent in biotechnology should be enhanced. Salary support, research grants, lab facilities and opportunities to attend international conferences should be made available.

The DBT must promote creation of inter-disciplinary Centers of Excellence (CoEs) with world class infrastructure in key areas. These CoEs must be used to run key advanced programs.

A five-year integrated program must be offered that enables students to acquire BSc and MSc degrees in five years. This integrated course should be launched so that an individual can develop domain expertise in a particular biotech area. Also, along the same lines, an MSc degree in applied biotechnology should be offered aimed at specialization in a particular biotech area with total industry focus.

Entrance exams for MSc testing basic biotech knowledge are essential for implementing the above and ensuring that the MSc program is a vehicle for specialization, as people from varied backgrounds enroll in such courses.

Course curriculum should be reviewed by a body (National Task Force) consisting of members of the UGC, AICTE and DBT in consultation with industry and research establishments. Standard e-learning modules should be developed for specific skill areas such as IPR and regulations. The curriculum should also be updated every two years with specific inputs from the industry on the kind of skills, practices and tools used. Hands-on exposure to MSc biotechnology students should be enhanced through industry internships as well as placements at CSIR and other national institutes.

A national task force should be instituted to formulate undergraduate and postgraduate curriculum keeping in view the future needs. This body would also be in-charge of performance testing of students and certification of their performances and accreditation of institutes based on some stringent criteria.

It would be the prerogative of this national body to strengthen regulatory mechanisms (legal) and strongly communicate the same to the various institutes and stakeholders. This central body should accredit the institutions based on parameters such as faculty quality, relevance of curriculum and infrastructure.

It would also be the prerogative of this body to evolve tests for the graduating students at the postgraduate level so as to certify their capability and maintain a database of their performances which can be shared with the industry helping them pick the deserving candidates. Two levels of testing are recommended. At the first level, common testing for all the graduating students is done to test them on fundamentals and general biotech subjects. At the second level, the test is used to measure competence in the field of specialization. At this stage, various firms can tailor the test according to their needs. This kind of central testing would help save recruitment and training costs for all the companies and reduce their search costs by tapping into the central database of students who have been evaluated.

Funding for R&D should shift from plan-based funding and utilization monitoring to project-based funding based on pre-selection of projects. This essentially means that the funding from the government should be a mix of a fixed funding component and a variable one. The basic funding provided by the government to many public institutions should be continued. In addition, an output

Note: All views expressed are solely those of the authors and do not represent the views of any other person or institution.