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Review Paper

An academic-industrial collaboration for development of Engineering education in India

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Abstract

In this era of a technological facelift, where devices are becoming obsolete in 10 years or so. Our engineering education has not seen up-gradation for an extended period. The need of quality skilled based engineers is not being fulfilled. It is seen that collaboration of academic institution with industries can rectify this situation up to a large extent. Such partnerships can address global issues, accelerate research work, reaching to those who need them at affordable prices. However, why is it so that such partnerships are not seen everywhere and is not readily accepted? What are the hindrances in between such collaborations? In the given paper, we will try to address the issue and understand the advantages and hurdles between the academic-industrial collaboration.

Keywords: Industry-academic collaboration, Academic institutions, Skills, research, Internship, Industry collaboration.

Introduction

The unimaginably powerful industrial sector and the speedily evolving information-based service have put in an expanded interest for experts to deal with the industrial segment successfully. And India is seeing the beginning of another information induced society and headway in advanced education. Advanced education alludes to a level of teaching that is offered at schools and universities which grant scholarly degrees or professional accreditation[1]. There is a trend for an advanced education in the today's world since it serves different essential functions in our society. One of them being, production of proficient people who will provide services to our community. With globalization assuming control over, the occupation market has turned out to be more competitive. Presently, a man not just needs to vie for work with the general population from his group or nation yet in addition with the general population who originate from various countries.

There has to be something which makes one stand-out from the crowd. It is the skill which one masters in, knowledge, an professional degree and different declarations which makes him unique in relation to all others in the horde of contenders. Without a doubt, large portions of the Indian colleges and universities have neglected to satisfy this elemental purpose. They work with an idea, just to provide degrees and certification to the students which may have been sufficient earlier but not at present scenario. That is why out of the *fifteen hundred thousand* engineers who graduate each year, just 7% of them are ready to take the responsibilities for core engineering jobs (an examination directed by employment solutions company named *Aspiring Minds in 2016*). About 97% of graduating engineers need employments either in programming or core divisions. In any case, just 3% have legitimate skills to be employed in programming or product market, and no one but 7% can deal with core assignments[2]. Graduates these days are gathering their degrees in spite of not being sufficiently talented to be a gainful piece of the Indian economic system.

The colossal demand of the skilled and able workforce from the industrial sector are not at all being addressed. As an large section of graduates don't have the fundamental essential instinct and analytical capabilities required by the industry. These days, more significant part of advanced education organizers and educational institution, all through the globe, have been attempting to connect colleges and other research organizations with industries[3]. The university can boost the value of graduates in the form of technical knowledge and industries can supplement the cost of university in the form of funds. In spite of such a large number of endeavors made by the Government, academic industrial connection has neglected to demonstrate a promising advancement up till now.

What is Academic-Industrial Collaboration?

Academic-Industrial collaboration can be characterized as an interactive and collaborative provision between universities and industries for the accomplishment of mutually comprehensive objectives and targets. Small steps like provision of residence to industries within the campus so that they can have access to the equipment and laboratories making them directly involved in the research. At the same time it gives students and academicians direct access to the industrialists, thus formulating a beneficial relationship between them.

The academic industrial interface can be set up at several levels with different degrees spreading over from minor discussions or visits to fastidious scientists. There is a noteworthy requirement for change in the demeanor and approach of both the segments for acquiring commonly useful goals and objectives. This symbiotic framework is an outright need for financial plausibility and overall advancement of the country[4].

Need for Academic-Industrial Collaboration

The academic-industry collaboration is defined by the intuitive and collaborative program amongst universities and industries for the achievement of correspondingly useful purposes and missions. Relationship amongst academician and industrialists must be strengthened to satisfy need for advancement in their spaces.

Today, the educational institutions have realized the importance of "working closely with employers" for the following reasons: i. Growing complexity in the academic and industrial world and constant changing needs of the industries. ii. Expanding criticality of social capability in making and maintaining the competitiveness of the organizations. iii. Developing rivalry for placing the students and industry mind-share, with the fast development in the quantity of scholastic organizations and henceforth the industrial graduates. iv. Increasing pressure from industries to make their new inductees/fresher's beneficial from the very first moment to decrease the resulting training costs.

Barrier in Collaboration

In spite of the way that concerned offices have received the standard of the academic industrial interface in the previous decade or more, its maximum potential is a long way from being used because of the primary distinction in state of mind and impression of technological improvement among the partners.

Government perspective: The administration is not sufficiently adaptable when managing academic industrial cooperation as it is frequently not entrepreneurial by nature and vexed by monster government officials. A tremendous measure of reporting prerequisites combined with very less Information and Technology space knowledge further worsen such collaboration.

Academic perspective: Academicians have an absence of enthusiasm towards applied research, and they are hesitant to leave the comfort zone of pure teaching. Educational institutions are widely unaware of the real industrial and national needs and are unable to market its strengths to industries adequately. Other debilitating elements are an absence of suitable incentive to staff and specialized foundation (Research and development Lab), the absence of specific university industry communication cell on the campus.

On practical grounds, such collaboration need huge investment of mind, time, effort and dedication which is not profound in limited salary structure and mindset.

Industry perspective: Few industries believe in outsourcing their Research and Development department to learners and freshers. Be that as it may, different Ventures, by nature, are constantly inspired by targeted advancement. Amid its communication with the academic establishment, industry's coveted time periods are instant, and speculation is guided by endeavors that yield result-oriented solutions. While for rest, the costing structures are ordinarily coordinated to put resources into its inward Research and development which has either long haul or unclear output.

Structure for Academic-Industrial Collaboration

There is no generally acknowledged model to be taken after for organizing such an Academic Industrial collaboration. Unquestionably, the coordinated effort, all through the world, is very constrained. This just displays the criticality of the issue[5]. It is because academic industrial collaboration isn't something that can be very much clarified by some specified laws or by setting up a stable unchangeable model since it advances dynamically keeping pace with the nonstop changes in the academics and industries. And since both the parties have completely different missions, their own needs and a different timetable making it difficult to formulate a structure suiting everyone's needs.

There is a gigantic hole between the apace developing skill needs of Indian organizations and those gave by our advanced education framework. There is a developing acknowledgment among the administration, academic foundations, and the business, of the pressing need to connect these skill crevices[6]."Regular Academic-Industrial conferences which is required to collect the necessary funding from industries, and a branch whose core task is of restructuring the curriculum keeping in mind with the changing needs of the industry is missing in India[7]." Thus, to reinforce academic industry interface, the distinctive sorts of coordinated effort and communication that are conceivable among the partners especially in the Indian situation, are explained in here.

Encouragement of Efficient Work Flow: Provision of Exemption: To encourage academic-industry collaboration tax exemption for all expenditure on Rand D where industry and academic institution work together could be given, and any service tax coming out by transfer of technology by an academic research institution to industry could be exempted. This will heavily promote industries to merge with the universities at certain levels of research and development.

Reformation of Students Internships: Students' exposures to industrial practices through internships are to be made mandatory. The student internships are also to be made more meaningful with feedback mechanism and long term so that both students and industry are benefited. This would also facilitate the industry to plan and structure the internship programme keeping pace with the academic curriculum. And on

the other hand, the academic structure will enhance to be more career and skill oriented.

Celebration of Annual Science and Technology Festival: Advancements in science, technology, and engineering will help us to understand different issues and how best to manage them. The harnessing of knowledge through research and innovation will lead to economic prosperity and social progress, thus improving our quality of life. The Science and Technology Festival is a critical event in this context. It will stir the interest of understudies about Science and Technology and open their young minds to new information. By promoting an interest in science and learning among the students, it will open them to an abundance of opportunities in the coming future. This festival should be celebrated in all the academic institutions annually involving students, staff, and industrialists.

Alumni as Mentor of Students: Alumni with the technical background can act as a mentor for Indian students to provide guidance on improving employability skills, placements, knowledge of global business trends, overseas opportunities in business, and information of technological advancement, etc. by delivering lectures in their respective institute. Alumni can also raise a fund to support the entrepreneur skill among the interested students with feedback mechanism under special terms and conditions. They can also have an annual meet with their faculties where they can discuss the current needs of the industries.

Intensifying Collaboration in Research

Convergence of interests towards applied research: These days in the period of globalization, the Intellectual Property Rights has opened the entryway of participation in the zone of research. Research is a detailed study of a subject, primarily to discover new information or reach a new understanding. It should be considered as a fuel for harvesting knowledge. It must not be taken as a business or profit centered but as a long term investment, which helps the business to return more profits in a later phase. No one but research can quicken the capacity of an organization to adapt to the adjustments in innovation.

Acceleration of research interaction: Concerned individuals from both sides need to comprehend that uniting the two requires a considerable measure of meaningful communication. A leap for research communication can be provided if academic, and industry specialists can sit together and invest a high energy in the examination of industry's issues and current exploratory projects. The research work should be co-managed by the academic as well as industry scientist, and the whole conceivable outcome should go to their credit.

International academic cohesion and industrial collaboration: There is tremendous opportunity in promoting interactions among academic, industries, and governments through which India and collaborated countries can be enriched. The interconnection through research joint effort, consultancy administration, and expansion program are extremely critical for both scholarly and industrial advancement and also the economic prosperity of the partnered nations. This can be accomplished through a joint effort with foreign nations and welcoming remote organisations to venture into India.

Two-sided Programme of Mobility of Science and Technology Professionals

From Universities to Industries: Course and orientation programme for one month each can be arranged in the industry where academic faculty can participate. The lectures in the programme can be delivered by the professionals from the industry to provide up to date technical knowledge. The course would be intended to convey information in depth, while the orientation session would be made to familiarise the member with the interdisciplinary way to deal with the real issue.

From Industry to Universities: Intensive programs should be designed for regular visits of intelligent and resourceful persons from industry to address students, academic, and scientific staff and to involve them in teaching or research during their short stay in the Institute. Their feedback and suggestions will cater further development in the research work being done at the Institute.

Facilitating Flow of Technology from Laboratory to Industry

General Policy of Technology Transfer: There are various methods for the technology transfer of research and technologies invented by local universities and research institutions. At the primary level, this may just involve discussion of mutual benefit or get integrated into an undergraduate research project or offer a placement for a student to get the experience of the job. It then follows commencement of large-scale collaborations. There are a few different means in which company can support distinctive research action at the colleges. The other ways of cooperation are jointly organised new technology training and seminars, scholarships, collaborative research, and internship.

Formation of Research Park to Encourage Growth of Enterprise: Science and technology parks should be founded in the immediate surrounding area of academic institutions, where companies would be interested in establishing their Rand D sector, intending to have easy access to sources of high-quality technology and skilled workforce. The government should extend its hand in the availability of land near these institutions with several concessions like concessions in electricity tariffs, duty exemptions for imported equipment.

Handling Rural Issues and Reforms: There is an urgent requirement for constitutional amendments and reformation of administrative executions while keeping in view the issue of

coordinating a broad range of rustic advancements and related projects at different levels. The first step of this plan can be the identification of local rural problems by the local universities and state government followed by an industry invitation for technical support in the commercial arena[7].

Formation of Center of Excellence: Center of Excellence can be formed where the researcher, technical specialists and fresher can together collaborate to do extensive research in a particular field. Every member here can do a focused study which can show better results in a shorter duration of time while compared to Research and Development Labs.

Promoting Public-Private Cooperation

Areas for Association: Throughout almost all developed or developing nations, there has been a huge part of government in advancing Research and Development in little and medium enterprises[8]. In India, an association with the huge business venture is generally constrained to some vital areas like nuclear energy, defense and space research and development. There is a critical requirement for an arrangement system for public sector association with the huge commercial enterprises.

For Example, There is sufficient degree for improvement and more remarkable commercial enterprise in the field of Advanced Materials, Nano Technology, Smart Materials where people in public segment can't towards work both the up-gradation of Science and driving towards the development of items.

Regulations and Policies: The government can guarantee a smooth transformation of 'Information Process Outsourcing' amongst academic institutions and industries through its administrative bodies and strategies set by the administration. It can help with explicit conditions, where it ought to apply some prohibitions so the industrial society may not deceive the academic world.

Conclusion

Despite the fact that commercial enterprise and Institutions have different objectives, there is critical need to work in the community oriented and coordinated model to address the present difficulties. Aptitude and Skill advancement is the need of great importance. It must be recalled that the degree does not make a difference but rather the skill a student secures does. Few changes in educational policies are required where stress is also given to skill and practical knowledge, not just marks and theoretical knowledge. The perfect blend of these two will create more competent engineers in future[9].

The UGC (University Grants Commission) in their notice (D.O. No. F.1-1/2015) on January 9, 2015, have explicitly stressed on the inclusion of credit-based modular programme which will make the learner more compatible to seek employment. The action was taken after Ministry of Human Affairs at their meeting on January 6, 2015, decided to the introduction of Choice Based Credit System for the Skill Development.

With an objective to make India a international powerhouse in technological research and advancement, another extent of innovation and specialists are required to address the future difficulties being developed. India hence needs to trail forward on inventive collaborations amongst industries and universities through agreeable information creation and trade. The most essential perspective is that such tie-ups perceive and pick up on the relative qualities of the universities and ventures.

Other than industrial affiliations, the universities ought to likewise frame connections with government organizations which are very much endowed with industrial development exercises[10]. Regardless of a few deficiencies and repressing components on the academic business joint effort, the government should institute an incorporated strategy of scholarly industrial coordinated effort enveloping a few methodologies empowering such an activity to flourish in the nation's journey for technological leadership.

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