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HIGHER EDUCATION AND RESEARCH IN INDIA

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ABSTRACT

With the fast pace of change and due to the impact of globalization, the role of the higher education institutions in furthering research and scholarship is becoming important. The term 'research and scholarship' usually refers to uncovering or generating new knowledge, or solving particular practical or theoretical problems. With its increasing importance, various definitions have been given to account for a wide range of activities and disciplines. While 'research' means systematic and rigorous enquiry leading to research outputs, 'scholarship' is seen as the means by which academic keep them up-to-date with changes in their own disciplines so that they can communicate the latest knowledge on the discipline to their students and peers. Research and development activities are aimed at making scientific discoveries and inventions that are commercially attractive the focus of this section is primarily, though not exclusively, on R & D activities.

KEYWORDS: Higher Education, Research, Globalisation, Teachnology,Development

Introduction

During the last century, knowledge has been a key factor in economic development, and societies that are able to produce, select, adapt, and commercialize knowledge have better chances of achieving sustained growth and better quality of life. Mcarthur and Sachs (2002) point out that of the three inter-related mechanisms- division of labour, capital accumulation, and technological innovation involved in economic growth, technological innovation is the most fundamental it is self-perpetuating and pushes economic growth on a continuous basis. Each new innovation triggers further innovation, in a kind of chain reaction that fuels long-term economic growth. Thus, in several science-based, technologically advanced economies, economic growth has continued for several decades without running out of dynamism, or even slowing down. This underscores the need for research, particularly scientific research in modern economy. Higher education plays an important role in supporting a nation's R & D efforts. It provides skilled human resources for the R & D system. It is often the lead player in public research arena. Academic research through universities forms an important component of the technological base of a country. In the USA that has the most vibrant and the largest R & D system in the world, higher education plays a vital role. This sub-section briefly explains some concepts. It outlines a few developments that define the role of innovation in economic growth and explores its linkage with academic research.

Pure and applied research

Research is seen as a primary and a vital function of a university and, therefore, of the higher education systems worldwide. There is often a conflict between pure and applied research, particularly in science. Though pure science may require no justification outside itself and its usefulness has no bearing on its validation, it is now widely accepted that the fruits of technology follow careful nurture of basic sciences. It is commonly held that pure science, applied science, engineering and technology follow one another in linear sequence. Therefore, pure science is not only important by itself; it also has an important role in laying the foundation for applied research that leads to innovation. Despite equal importance of both basic and applied research and blurring of the boundaries between them, various distinctions have been made between basic and applied research. The defines pure basic research as experimental and theoretical work undertaken to acquire knowledge without looking for long-term benefits; strategic basic research is defined as experimental and theoretical work undertaken to acquire knowledge in the expectation of useful discoveries; applied research refers to original work undertaken to acquire knowledge with a specific application in view; and experimental development is the systematic work, using existing knowledge gained from research or practical experience, directed to producing new materials, products or devices.

Technology transfer and commercialization

Substantial investments are required to transform abstract ideas from scientific Research into commercially viable products. It also requires the universities to be proactively Engaged with industry. Success in technology transfer efforts and commercialization of scientific research depends upon close and continuous engagement with the industry along with an effective intellectual property rights (IPR) regime.

Interdisciplinary research

Looking at the technology trends, it is seen that some of the most significant technologies of the future are likely to be at the intersection of disciplines that are now just beginning to flourish. Technology, unlike science, is a group activity; it is not based on an individual intelligence but interacting intelligence of many. Both these determine the manner in which academic research in the country should be organized. This requires the formation of inter-disciplinary teams within the higher education institutions. Such teams could also include researchers from other institutions and public research laboratories and also from the industry. Understanding of the linkages between pure and applied research, appreciating the need for an effective mechanism for technology transfer for its commercialization, existence of a proper IPR regime, importance of interdisciplinary research – all would help in providing a foundation for shaping public policy for supporting academic researching the country.

Research in India in the global context

As evident from the concepts and review of developments in the previous subsection, R&D covers a range of issues too complex and too broad to be defined by any single parameter. However, input measures, such as the number of trained personnel carrying out R & D work, the level of national expenditure on R&D and output measures, such as the number of scientific and technical articles published, patents filed, revenues from royalties and licenses, high technology

exports are indicators that reflect the technological capability of a country. At times, various combinations of these indicators are used to develop indices to depict the innovative capacity of a nation. In addition, several ranking methods have been evolved to show relative research performance of various higher education institutions. This sub-section analyses the present status of research in India in terms of various input and output measures. Comparisons with other countries have been used to benchmark India's performance. These comparisons are essentially within top-ten economies as per their GDP on purchasing point party (PPP). In some cases, a few other countries have been included in the comparative analysis to make a specific point. In many countries including India, a substantial share of R&D is carried out in institutions and organizations outside the higher education system. Getting disaggregated data on the role and the performance of academic research alone is often difficult; therefore discussion in this sub-section is on the R&D in India as a whole.

Expenditure on R & D

Until recently, research, particularly academic research, has been relatively isolated from the demands of economic utility. Research was considered to have high externalities. It was, therefore, largely publicly funded. However as the private benefits to individuals and firms started accruing due to the emergence of IPR, private investments in research began. It was realized that the producers of ideas respond to incentives: if they are granted no rights in their creations, they will create less, or not at all. Today, research is funded both from public and private sources. Expenditure on R& D by a nation is often used as a proxy to the importance given by a nation to develop its technological capacity. The share of R & D expenditure from private sources is a good indicator of the dynamism of the private sector. It shows as to how the private sector uses innovation to drive national competitiveness.

Research manpower and doctoral education

In terms of the number of researchers and technicians engaged in R & Activities', India has merely 119 researchers, whereas Japan has 5287 and the US has 4484 researchers per million of population. Even in absolute terms, the number of researchers in India is much smaller compared to the US, China, Japan, Russia, and Germany. The number of technicians in India is however not as small. It suggests that R & Developments in India have more technicians per researcher compared to most of the other countries the numbers of doctoral degrees awarded in science and engineering in India is little over 6000 doctorates, compared to 9000 in China and 25000 in the US. It increased rapidly from a little over 1000 in 1990 to over 9000 in recent years in China. In comparison, there has been a modest increase in India. The National Science Foundation (NSF) - Science and Engineering Indicators – 2002 show that in the US, about 4 % of the science and engineering graduates finish their doctorates. This figure is about 7 % for Europe. In India this is not even 0.4 %

Though there is an increase in the absolute numbers of students enrolled in science at the graduate and postgraduate levels, its percentage in overall enrolment has declined. At the undergraduate level, it has declined from 33.2 % in 1971 to 21.7 % in1997; and at the postgraduate level from 26.1 % in 1971 to 22.2% in 1997 .This percentage drop in students opting for science reflects added opportunities for (the better prepared) students in professional courses in engineering, medicine etc. Some students prefer commerce or law to science. This is

not unusual. In today's market driven social order, good students are rarely interested in taking basic science as their career. This trend is seen in almost all countries. However, unlike the developed countries, this would have a cascading effect in India.

Conclusion

Research subsidies education and education subsidises research. Most important it makes learning joyful and creative. Learners become achievement oriented. Teaching and research are found to be inseparable and mutually supportive to each other. Every professor is to be viewed as a scientists he should be given fund for research at the time of his appointment. Professor should one encouraged to build a research team consisting of junior and senior students along with lab assistants. The culture of institution must have to change in favour of research. Their performance should be measured in terms of what new they have discovered and patented and not how much they have memorized. They should make the college and source of new knowledge, new theories, and new technologies. Regions, cities and nations develop faster where the institutions lead in knowledge and technology . No society, region or nation prospers without good research. Research earns more money. More endowments, name and fame for collges. They attract endowments and funds for research.

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