Mission-oriented higher education institution: some concerns

Grover[1] articulates the motivation for setting up a higher education institution (HEI) by a mission-oriented agency, and provides the example of the Department of Atomic Energy (DAE) that has implemented the integration of a university (Homi Bhabha National Institute) with a workplace. He provides an interesting account of the evolution of a dedicated university under the control of the Atomic Energy Establishment.

He argues that the interdisciplinary nature of nuclear does not lend itself to a silo-based approach, and that the specializations needed by DAE to meet its missions are unique and such resources do not exist in the university system. This may appear like a pragmatic solution to support the mission needs of DAE. However, an alternative option would have been to support strong centres of education and research in specialized nuclear research in universities, IITs, IISc, etc. to create a strong, vibrant constituency of academics and researchers with new ideas, new approaches and innovation. Some of these could be channelized and directed towards DAE goals. The resource personnel at DAE could be involved as co-guides, adjunct faculty, etc. DAE would then have the best of both worlds, have directed research yet have opportunities to integrate blue-sky research and benefit from cutting-edge research in seemingly unrelated areas. This will also enhance the engagement of faculty members on nuclear-related problems. The openness of a university provides an ideal environment for growth and evolution of new ideas. A HEI with focus on a restricted set of deliverables is likely to have a more restrictive culture and relatively less learning opportunities.

Since it is more than a decade after the establishment of HBNI, it would be worthwhile to understand its impact in terms of capacity building (employment opportunities and careers of its postgraduates), and to review the research linkages and synergies established with mainstream educational and research organizations in the country. DAE has been dependent on its workforce from its own training school, https://www.barc-onlineexam.in/science/info-training-schemes.html. It recruits graduates, trains them and absorbs them as officers. Lateral entry opportunities are limited. Has this changed with HBNI?

Several countries in the world have a different model with the nuclear establishment supporting and mentoring the growth of academic and research programmes in national universities[2–4]. In the US, there are more than 35 universities running successful nuclear engineering programmes[4] and there are several US university nuclear research reactors supported by the United States Department of Energy. In India too, there have been a few nuclear energy programmes (IIT Kanpur, IIT Bombay, Jadavpur University, etc.), but they are sub-critical.

In the context of the challenges of climate change and the supply variability of renewables, there is potential for nuclear energy to provide a greater share of the energy supply mix in the country, especially as we target a zero-carbon future. This is a challenge and an opportunity for the nuclear community. Integration of DAE's roadmap with supporting vibrant academic and research programmes on nuclear energy in good universities across the country is likely to help change the perception and reality of nuclear energy in the country. It may be worthwhile to rethink and revisit the structure of the new 'utilitarian' university model proposed.

1. Grover, R. B., *Curr. Sci.*, 2019, **117**(7), 1140–1147.
2. National Research Council, *US Nuclear Engineering Education: Status and Prospects*, The National Academies Press, Washington DC, USA, 1990; https://doi.org/10.17226/1696 (last accessed on 25 January 2020).
3. IAEA, Nuclear Engineering Education: A competence based approach to Curricula Development, International Atomic Energy Agency, Vienna, Austria, July 2014.; https://www.pub.iaea.org/MTCD/publications/PDF/Pub1626web-52229977.pdf
4. *Nuclear Science and Engineering Education Sourcebook 2018*, American Nuclear Society; https://neup.inl.gov/SiteAssets/FY2018_Documents/Nuclear.S_E.Education.Sourcebook.2018.pdf (last accessed on 28 January 2020).

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Researchable issues in livestock and fodder sector under COVID-19 pandemic and beyond

The livestock sector is crucial for the Indian economy with 27% contribution in the total value of output in agriculture and allied sector and 4.4% in total GDP at current prices. India ranks first in livestock population (536 million in 2019), milk production (187.7 million tonnes (mt) in 2018–19) and consumption[1]. The country earns over Rs 30,000 crores annually from the export of animal products, which includes major products like buffalo meat (Rs 25,168.31 crores) and dairy products[2]. This sector contributes not only to income, employment, food and nutritional security, but also provides the best insurance against any natural calamities[3]. The present COVID-19 pandemic has adversely affected the fodder and livestock sector, especially the input–output supply chain and thus, undermined the livelihood of millions of livestock keepers. This necessitated us to draw suitable short- and long-term strategies for sustaining fodder supply for managing livestock productivity during pandemics and beyond. We should also redesign our research priorities for the