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Agricultural Engineering Education

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A quarter of a century has passed since initiatives were taken in this country to establish a formal programme of higher education leading to the degree of Bachelor of Science in Agricultural Engineering. The first batch of the graduates of this programme at the Bangladesh Agricultural University entered their professional career in 1972, soon after the liberation of the country. It is about time for undertaking a review of the progress of that programme, its curricular evolution, its contributions, present problems and status and its future prospects in the context of the country's agricultural development and higher education system. The outcome of such a review can give us some needed foresight for the future when analysed in the broader perspective of the goals of national development. It is to be remembered that a profession oriented system of education cannot be properly planned or reviewed out of the context of the relevant profession's role and status in the society. So, while discussing agricultural engineering education, question regarding agricultural engineering profession will naturally arise.

Agricultural engineering as a formal discipline in the domain of higher education came into existence during the closing years of the last century. The University of Wisconsin in the USA is reputed to have produced the first batch of agricultural engineers in the early years of the twentieth century and many other State Colleges in the US land-grant system followed the example. Other Universities in Europe, Asia and Canada gradually introduced agricultural engineering courses in their programmes for either agricultural sciences or engineering degrees. Full-fledged degree programmes in agricultural engineering were established in many European, Asian and other regions of the world after the second world war.

In the Indian sub-continent, the agricultural engineering discipline made humble beginning as an introductory course in the curricula for the bachelor-degree in agriculture at such institutions as the Agricultural Colleges in Allahabad, Dhaka and Lyallpur. The Allahabad Agriculture Col-

lege also introduced further elective courses on agricultural engineering as well as a M.Sc Programme in agricultural engineering in the late forties. Things, however, took a quantum leap in the early sixties while the then Government of India and Pakistan decided to establish several agricultural Universities more or less in the pattern of US Land-grant colleges on recommendation of their respective educational and or agricultural commissions. Decisions were also made to include Agricultural Engineering as separate degree awarding faculty in each of these universities. As a result of such decision, this country got its Agricultural Engineering and Technology faculty in 1964, within two years of the formal establishment of the Agricultural University at Mymensingh.

The rationale of establishing formal education in agricultural engineering in the institutions mentioned above were generally expressed in two basic premises. These were (a) that the progress in agriculture could not be achieve without utilising some relevant aspects of engineering sciences and technologies and (b) that agricultural engineering curriculum needed inputs from various disciplines in the domains of basic sciences, agricultural and biological sciences along with a core of engineering courses implemented in an agricultural environment as expected to be found in an agricultural university campus. The new and emerging profession of agricultural engineering was contemplated to need cross fertilisation from both the engineering and agricultural sciences for the benefit of agriculture. The objective of the newly created agri-engineering faculties was to create skill manpower capable of helping advance agricultural production and productivity with the infusion of modern engineering technologies in farming practices. The scope of agricultural engineering education as well as an agricultural engineer's professional activities encompassed all aspects of food and agricultural production from tillage through processing of products and including many related activities like irrigation, crop protection, animal

housing, storage for grain and other produces, waste mangement, renewable energy resources etc.

Educational Programmes And Curricula

Topics related to agricultural engineering have been taught at the trade and vocational institutions in the country for several years. No comprehensive programme, however has ever been implemented for a sub-professional or trade level training course based fully on agricultural engineering technologies. A diploma level programme on Farm Technology was introduced in the Polytechnic Institutes but it became defunct due to inadequacy of training facilities and difficulties of placing its products.

The curricular contents of degree level education in Agricultural Engineering have always posed problems to the curriculum designers. Ideally, a curriculum must meet the needs of the society, match the merit and requirements of the prospective student and, in case of a degree programme, it should be upto the perceived academic standard appropriate for the degree in consideration. Furthermore, for a professional degree, it must be comprehensive, integrated and balanced with elements from various disciplines so as to enable the graduates to pursue an independent profession. In other words, an agricultural engineering curriculum must be sufficiently broad-based to impart needed insights into various branches of basic and applied biological, physical and social sciences while giving the graduates adequate specific knowledge and skills to perform as expert professionals. Fitting-in topics from the various branches of sciences, technologies and applied arts, keeping proper balance between theories and practices and implementing the curriculum within a rigid time-frame and course schedule are, to say the least, very tough tasks indeed. It is more tough when the perception of national needs and the possible future trends are not clear to the educators and planners. As a result, the designed curriculum often becomes more comprehensive and over-

stretched than it would be if the specific needs had been known.

The curriculum for the B.Sc. Agricultural Engineering degree in Bangladesh started with provisions for majoring in various sub-branches, such as, farm power and machinery, irrigation and water-mangement, food technology, agricultural production engineering, farm structures etc. This arrangement, not adopted hitherto in any other university of the subcontinent, was made to cater for the needs prevailing in the country in the early sixties. It enabled proper placement of graduates into the various development programmes in the agricultural and rural sectors at that time. The curriculum administration was also based on a semester system of some sort. But things began to change soon and the annual system was adopted in 1970 to keep conformity with the academic sessions followed by other faculties of the Agricultural University as well as to meet students' demands. The system of offering major fields at the undergraduate level became a debated point after the liberation of Bangladesh as the nature of the agricultural development programmes and the needs of the major employers of agricultural engineers gradually changed. More broad-based education with less specialisation seemed to fit the order of the day. So, at the initiative of the Agricultural Engineering Alumni Association, a curriculum sub-committee was formed in 1985 and a new and integrated curriculum gradually took shape in a series of meetings in 1986 and 1987. Finally, the new curriculum was approved by the University to be implemented from the 1987-88 session and the first batch of the graduate of this curriculum are expected to come out in 1992.

The curriculum for the post-graduate (M.Sc. and Ph.D.) programmes are, as expected, speciality oriented. The number of M.Sc. holders from the Agri. Engineering departments are yet too few to make a good sample for analysis. Diminishing job opportunities for the B.Sc. graduates are, however motivating more of them to pursue post graduate courses in the recent years. (to be continued)