Editorial

Globalization has become the *mantra* in all spheres of modern life. This has led increased competition in all spheres of the economies of nations. Indeed, in the field of knowledge generation and dissemination globalization occurred several decades ago. Although much of the knowledge in the old days was generated in the highly developed nations of the world, the results have always been openly available in the public domain for the entire world to access. In recent years the world is becoming "flatter" , and a larger region of the world is making contributions to the global pool of knowledge. In the field of drying the total pool of knowledge has grown almost exponentially over the past three decades after a long period of hibernation when little R&D was devoted to this operation as the extremely low price of fossil fuels did not justify R&D spending on drying.. It is interesting to note that most parts of the world are now making valuable contributions to this pool of knowledge. The global pool of knowledge has increased. However, there are distinctive changes in the geographic pattern of contributing countries to this pool. While during 80's and 90's the developed parts of the globe made major contributions to drying R&D (in terms of journal and conference papers devoted to drying and dryers) in recent years the contribution from emerging economies has increased significantly, and in some areas overtaken that from the developed economies.

This trend is not surprising. Drying as a unit operation is found in almost every industry. As emerging nations must focus on industrial growth and manufacturing processes they need to examine drying processes carefully since they involve high energy costs and they often control the product quality as well. Processing of most natural resources involves drying on mega scale. Thus the return on R&D for such processes tends to be highly favorable. In emerging nations much of the drying R&D focuses on D rather than R for obvious reasons. Their focus is on industrial and commercial needs rather than on understanding the fundamentals which is a goal of academic research. The two approaches are understandably different but each can benefit from the other.

It is well known that the objectives and methods of assessment of success are different for industrial R&D and for academic research. Universities are expected to educate and train researchers for industry, although they are expected to follow a different line of objectives once they are in the industrial sector. An obvious question then is: are universities doing a good job of meeting industrial requirements? Indeed, one may go further and question if academic research training can produce outstanding industrial researchers. My short answer to these questions is a definite yes, provided academics take into account the needs of industrial R&D and try to actively collaborate with industry when defining the goals of their research. Engineering research even in academia must have a medium to long term goal of a real application for societal good. Lack of such transferability to practice often leads tax-payers and granting bodies to question support of academic research. It must not be of purely "academic" interest.

As I have noted in an earlier editorial in this journal, I believe that one of the objectives of academic research should be to train researchers while the research output itself can be optimized as a valuable by-product of this training process.

University professors are expected to initiate graduates with no prior research training or experience and convert them into able researchers in a relatively short span of three to five years. This must also be done with very limited and continually shrinking financial and other resources. As the dynamic frontiers of knowledge keep expanding at an accelerating pace, this is a daunting task for both the research students and his/her mentors. Hence it is too much to expect that researchers-in-training can produce truly cutting-edge research that will make a major impact on the state-of-the-art. One should consider academic research to be successful if it produces outstanding researchers and useful research during this educational process.

Industrial and academic research approaches differ in several ways: industrial research is driven by the bottom-line of the company- the need to make profit by overcoming (even destroying) competition. Hence the time scale of R&D is shorter and it must be confidential to keep the competitive edge. The focus is on *know-how* and not *know-why*, which is the key focus of academic research. Academic research also must be in the public domain and peer-reviewed publication is central to recognition of such research and institutions where it is carried out. It is supposed to expand the global reservoir of knowledge while industrial R&D must aim at tapping this reservoir for economic benefit to the company concerned and eventually to the society at large. Originality and scientific quality, which are yardsticks to measure academic research, do not apply for industrial R&D.

Although the objectives and assessment criteria for academic and industrial research are understandably different, I believe that cooperation between the two is essential in engineering research in academia. Industry can identify generic problems requiring a fundamental knowledge base which is the ideal realm of academic research. Unless academics are made aware of current and future industrial problems in new areas, industry cannot reasonably expect to find trained researchers who can help them grow via innovation in the future. They also cannot expect to have someone develop the necessary basic reservoir of knowledge that is potentially useful to industry. Finally, if industry has a stake in the research they collaborate in then it is a true win-win situation for both academia and industry.

In the cross-disciplinary and multi-industry field of drying there remain formidable challenges in need to fundamental research. Industry can help identify them clearly and also support academics in their search for solutions in a generic manner. Without sacrificing the understandable requirement of secrecy, it is possible to help expand the knowledge reservoir that may be profitably tapped in the years to come. I do hope that we will see much more industry-academia collaboration in the coming years that will accelerate the development for drying technologies in all industrial sectors. A paradigm shift is needed in he design and conduct of R&D projects to make them more cost-effective.

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