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Editorial: Is the R&D World Flat, Hot and Crowded?

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Editorial: Is the R&D World Flat, Hot and Crowded?

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The recent books by Thomas Friedman entitled *The World is Flat*[1] followed by one with an even catchier title *Hot, Flat and Crowded*[2] have been remarkable in their incisive analysis of the positive as well as not-so-positive effects of globalization, widespread availability of the Internet, rapid development of the economically challenged parts of the world, implosion of population and stress this is causing on Mother Earth. While the industrialized world required almost 150 years to reach the developed world status with heavy reliance on fossil fuels for its phenomenal growth, it is clearly not possible for the newly emerging and very highly populated parts of the world to follow the same course. It is expected that the developing world wishes to enhance its quality of living which, unfortunately, is linked strongly to the nexus of energy, food and water, all of which are becoming increasingly scarce and hence expensive. The irreparable damage that uncontrolled greenhouse emissions can cause to the global climate is widely known and accepted but solutions to this problem remain controversial since they all adversely affect the ambitions of the emerging economies. Friedman correctly points out the fact that due to the ready access to information and knowledge afforded by the Internet, even the poorer and developing parts of the world can assimilate and utilize knowledge generated elsewhere and eventually make their own contributions as well. The mobility of talent, financial resources, and technologies across geopolitical boundaries has helped make the world "flat" although there are serious wrinkles if we examine the real situation closely. The fact that the globe is getting hotter (maybe warmer!) and more crowded does not need any further elaboration.

Most pundits agree that innovation is the solution to all problems. Innovation is driven by R&D, which in turn is driven by good governance and enlightened policies on education at all levels; technology development through R&D and industrial development are also added requirements. Higher education and nurturing of talents are keys to the success of R&D. Improved productivity will translate into better economics. A reward system that encourages higher productivity and innovation will lead to higher quality talents taking up productive professions as their career choices. It is important to improve science and mathematics education as these fields are fundamental to a successful engineering education. While basic research in sciences provides sound foundation to technological innovations, technology and engineering disciplines are the keys to real growth in national economies. Basic research is long term, often curiosity-driven and may yield large dividends in a matter of decades. It is also risky and such positive outcomes are few and far between. This is best left to the developed world who can "afford" it. It is very important and very critical for long-term health of the global economies. On the other hand, it is engineering that converts scientific breakthroughs into productive technologies, which are needed to improve the quality of life, create jobs and generally help large-scale and infrastructural problems the hot and crowded world increasingly and seriously faces. Efforts must be made to direct high-quality talent to this discipline.

While the globe is certainly hot, crowded and somewhat "flat," this is not the case with the R&D effort in general. It is noteworthy that some emerging populous economies have the talent pool needed to engineer technical developments, carry out sophisticated design and even high-end R&D. This is an asset to the globe as eventually the outcomes will filter to the whole world. Nevertheless, it is important for governments in all nations to encourage productive disciplines as their future economic health will depend on it. Even to absorb and utilize "free knowledge," countries will require highly educated technical manpower. This is why it is important for even the developing nations to devote serious attention and funds to support higher education, academic research and industrial R&D. Certainly in this respect, the answer to the rhetorical question, which is the title of this editorial, is simply that we need flatter, hotter and more crowded R&D around the world.

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