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'Following your heart, essence of any entrepreneurial journey'

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I was always interested in science. Chemistry, in particular, was my favourite subject in school. I also recall many happy childhood hours playing with a home chemistry set, mixing different chemicals together and watching colourful reactions happen. By the time I was finishing high school, I knew I wanted a career in research, but I was very clear that it had to be industrially relevant and of some use on a broader context to India. So, I decided to follow my heart and make my own decisions.

I chose chemical engineering over chemistry and finished my undergraduate studies from IIT Madras in 1982. There, I became fascinated by biochemistry, so I did a postgraduate degree in Biochemical engineering and biotechnology from IIT Delhi. Graduating from an IIT opens up a world of possibilities and almost all of my graduating classmates went on to take up opportunities overseas-so, in the face of some strong family apprehensions, I decided to join Dr Kiran Mazumdar-Shaw, when she was still operating out of a garage in Bangalore and agreed to set up her R&D division. I liked Kiran's passion for science, her commitment to quality and her sense of aesthetics. Biocon was a great place to be and I was learning new things everyday-and so, before I knew it, I had spent nearly a quarter of a century at Biocon as the head of R&D (also dedicating spare time in the early days as the informal head of IT). I can say without hesitation that the time I spent at Biocon was some of the most exciting and formative years of my life. Starting from almost nothing, we built state-of-the-art research facilities and attracted some really good biotech talent (also from overseas) to work in Bangalore. Biocon today, is undoubtedly a technical leader in the biotech space in India. It feels good to have been a part of its growth.

The urge to do something more, beyond this, for India, surfaced again when, in 2009, Dr MK Bhan, the then secretary of the Department of Biotechnology asked me to become the CEO of the Translational Health Science and Technology Institute (THSTI), that was being set up in the national capital region as a part of the biosciences cluster there. I decided to go and work for the Government of India and the Department of Biotechnology. The timing was good-our children had just left home and so my wife and I could transplant ourselves to Delhi with very little disruption. Simultaneously, IIT Madras, also made me an honorary adjunct professor. That meant that I could also spend time to give something back to my alma mater, which was

a great opportunity and very close to my heart!

Sea6 Energy was an accident! It would not have happened if it were not for the opportunity to interact with the students at IIT-Madras. I first came in contact with the founding group of Sea6 when they were part of the i-GEM team, trying to put together a project for a competition to be held at MIT in Boston. As it turned out, they won a prize in the competition. The team and I started working together and then eventually decided that we would start a company to make biofuels in a very different way-one particularly relevant for India. All biofuels are made by converting biomass, which is a product of agriculture. When one tries to scale up biofuels, the increased demand for biomass begins to affect the food chain. India is particularly prone to this, since it is short on arable land and fresh water-which are the key components for agriculture. So we decided that we would try and develop systems to carry out scalable agriculture on the sea and convert it to biofuel. If we could do that, then we would have a scalable solution for biofuels that would be independent of the food chain! IIT Madras was an ideal place to do this. It had a department of ocean engineering, and a department of Biotechnology-and both facilities were accessible to us as alumni of the institute. The department of biotechnology (at that time headed by Prof. KB Ramachandran) decided to generously incubate us and provide us with laboratory space. Prof. LS Ganesh provided us with office space at the business incubator at the department of management studies and we were ready to get started! It was an exciting opportunity to really create a new paradigm in biofuels and which is completely relevant for India. By then, I had finished a year with the THSTI in Delhi and I explained to Dr M K Bhan that I really wanted to be part of this new paradigm. He was very supportive.

It has been two-and-a-half years since we embarked upon this journey called Sea6 Energy. We have spent a lot of time understanding the engineering and biology issues of carrying out cultivation of seaplants in the open sea. We have worked with local fishermen and fishing communities on each of our three coasts (Bay of Bengal, the Arabian Sea and the Indian Ocean) and with their help we have established test facilities using our specially engineered structures to grow the seaplants and generate data. We have an exploratory research collaboration with Novozymes to discover and develop novel enzymes for bioconversion. We won research grants from the Biotechnology Department of the Government of India to support our research - and our journey has only just begun!

The possibilities for the future are amazing! Seaplants are rich in minerals, micronutrients and phytohormones that can improve the productivity of many crops in land-based agriculture in a completely organic way-think of it as a way to recycle back to the land some of the nutrients that get washed out from our fields down to the rivers and out to the sea! The opportunities for employment that this technology can provide to coastal communities is enormous! Developing this technology to its full potential will not only improve our agricultural food production, and provide employment, but could also help us build energy independence in an environmentally friendly way!

Its no wonder my team and I continue to remain very excited. If we can pull this through within the next five years, it would be really fantastic. But, we are journeying into an unknown territory - the engineering and the biology challenges are enormous-no country has done this before and there is very little precedent, but then someone has to take a lead, especially when this is so important for all of us in India. After all, someone decided to put man on the moon first-before it actually happened! It is entirely possible that it will take longer than we think and be more expensive than we think-but the best part of this journey is the company of my fellow passengers-the team of committed and bright young people at Sea6 Energy who have decided to plunge in and take this worthwhile risk! After all, they are also following their heart! And that, in my view, is the essence of any entrepreneurial journey.