

## **Invention, Innovation and the creation of Wealth**

Dear friends:

It is a great privilege to be delivering the Kamath memorial oration and I thank you for the invitation. In one way or the other all of us here are in debt to Professor Kamath. Indeed, since he was my PhD mentors' teacher I can claim to derive my scientific pedigree from him. However, my indebtedness to Professor Kamath has a rather more personal flavour. I was the recipient of his beneficence on at least two occasions. Firstly, he provided the recommendation letter which helped me get a placement at NCL, Pune. Later, in 1975, when my loan application to the IDBI came up for review he was one of the members of the review committee. I remember a tongue-in-cheek comment from the chairman of the committee "Professor Kamath says he does not know you", to which I replied "he enjoys pulling my leg and this is one such occasion." Auspiciously, I got the loan and that marked the beginning of my entry into the world of business and industry. I will always remember Professor Kamath with gratitude, respect and admiration.

The subject of today's talk -- invention, innovation and the creation of wealth would have appealed to Professor Kamath. Although an academic, he was always seeking practical applications for his knowledge and work. I believe that 'invention and innovation' represent the core values that determine the long term success of any organization. Before I proceed I would like to clarify the distinction between an invention and innovation. An invention is the actual idea for a new product or method while innovation is the translation of the idea into practice. Thus, in a business sense, it is the innovator who makes things happen. He is the entrepreneur who champions the idea and brings it to the marketplace. Without him inventions will remain dry and useless things.

'Innovation' is a defining trait of successful organizations. When I think about organizations that are innovative the example of the 3M corporation of the US springs to mind. 3M's product portfolio is not particularly exciting -- the most well known being the 'Scotch' tape. In fact the name 3M, which stands for Minnesota Minerals and Mining Company, comes from the initial business this company entered, a business that almost immediately ended in failure. Since then this company has evolved so rapidly, that it has become a leading innovator of products, ranging from the mundane to the breathtakingly complex. This has come about because of a conscious orientation within the company to encourage risk and the entrepreneurial urge in its employees. Take the example of the simple 'post-it' notepad that is so ubiquitous nowadays. It started off as a failed experiment at making a better adhesive. If you are a company in the business of making adhesives then when you are faced with an adhesive that does not bond very well the immediate instinct would be to shelve the product as a bad 'invention'. In the case of 3M this is not what happened. An employee with imagination thought up the brilliant idea of using the poor adhesive to make easily removable note pads - the 'post-it' notepad. Nothing like it had existed before. But today the 'post-it' notepad is such a wildly successful product that it has literally become the icon for the modern office. The CEO of 3M, William McKnight, built a company where tinkering by employees is encouraged and accidents are allowed to happen. What is more important is that the ideas generated by this tinkering are championed by the management into products that meet real human needs. A book on 'visionary' companies has called 3M a "mutation machine". This term is particularly apt for a company that uses innovation to drive its own evolution.

The second example, that of Glaxo (now GlaxoWellcome), points to how an innovative approach to drug development led to a dramatic reduction in the time it took to bring a drug to the market. In 1978, Glaxo was, believe it or not, a minor player in the international pharmaceuticals business. At that time SmithKline had just introduced the histamine receptor antagonist cimetidine for

the treatment of peptic ulcer. Cimetidine was hailed as a revolutionary advancement for this disease. Realizing the market potential for this class of drugs Glaxo took on the challenge of developing a safer and superior version of cimetidine. Soon they had a candidate -- ranitidine. With cimetidine well entrenched in the marketplace, and the possibility of Merck and Lilly coming out with their own versions it was critical that Glaxo bring ranitidine to the market as fast as possible. A late introduction would have meant, at best, a 10% market share. So the Glaxo researchers knew what they had to do -- bring ranitidine to the market fast. Most of the time taken in drug development is on long-term toxicity studies, done sequentially in 2 or 3 different species of laboratory animals. The Glaxo researchers decided to compress the time taken by running the toxicity studies in different species in parallel. Normally this is not done because of the possibility of the drug failing one of the toxicity milestones in which case all other studies become worthless. Instead of following the traditional paradigm the Glaxo researchers took a calculated risk. They innovated the process of drug development. Ranitidine made it through the pipeline in a record time of 5 years, when the industry average was 12. This put it well ahead of products being developed by Merck and Lilly. When it was time to release the drug Glaxo unleashed one of the most aggressive marketing campaigns ever known. The rest is history. Ranitidine became a blockbuster drug for Glaxo eclipsing the success of cimetidine, and today Glaxo ranks No:2 among the pharmaceutical companies of the world.

My third example is from biotechnology, which is rapidly becoming an important source of therapeutic products. In 1973, the technique of gene cloning had just been announced to the world. Herbert Boyer was one of the scientists who invented it. Robert Swanson a biochemist turned venture capitalist recognized the latent opportunity in the invention. He realized that the gene cloning technique could be used to artificially insert genes into bacteria to make them express proteins -- human proteins like insulin. In effect bacteria could be used as factories for an unlimited supply of scarce human proteins. Most

scientists scoffed at the possibility of the idea becoming reality in the near future. Swanson discussed it with Boyer and convinced him to join forces to start a company, Genentech, that would commercialize it. Exactly five years later they succeeded in getting bacteria to produce human insulin. On the day of the announcement Boyer's \$500 investment in Genentech was worth \$80 million. The success of Genentech has spawned an entire industry in the US. Boyer, left to himself, may never have conceived of putting his invention to practical use. It took a savvy entrepreneur like Swanson to innovate the technique to its fullest potential.

The three examples I just cited exemplify different routes to innovation. In the case of 3M it is organizational values that encourage the entrepreneurial instincts of the employees to exploit every idea however trivial or outlandish they may seem. In the case of Glaxo it was an innovative process -- the shortening of drug development times through parallel drug development, that established an early advantage for Glaxo's product over its rivals. In the case of Genentech it took a venture capitalist to dream the possibilities in a laboratory technique. In all three cases the common thread is of someone with vision who saw a different way of doing things. Indeed this is precisely the path of innovation -- DOING THINGS DIFFERENTLY.

Moving from corporations to nations let us for a moment dwell upon the case of Japan. Rising like a phoenix after the end of the second world war this small country has miraculously transformed itself into one of the most formidable economic powers in the world. Today its companies are powerhouses of innovation taking nearly 50% of all patents filed in the US. How do they do it? Unlike India they do not have cheap labour, a large domestic market or abundant natural resources. Ironically, that is precisely why they have become such great innovators. They have to be. If you are a small island nation, with limited options, then you had better be an efficient and innovative producer of goods. Otherwise you will end up not being able to pay for the food that you have to

import. And if your exports are vital for your survival then you had better be the finest producer of goods in the world. If you are Japan you have no choice but to innovate. Unfortunately, India had the choice, and we chose poorly -- we closed our economy and sheltered our industry which then repaid us by producing third-rate goods for a captive market. In the 60's our industrial capabilities compared favorably with that of Korea. Today that comparison may seem too far fetched.

But times are changing and Indian companies had better change too. We can no longer count on a large and regulated market and low cost manpower to shelter us in the 21st century. The only thing we can count on is our ability to innovate; to make better products. Can we rise to this challenge? I believe that the answer is resoundingly in the affirmative. We have seen within the last decade the rise of numerous business leaders who have demonstrated great innovative spirit in the way they have organized and run their businesses. Not far from here is the empire of the Ambani's who can truly claim to be one of the few world-class business houses of India. They have courageously taken on their detractors by building world-scale capacities when they could have been content to be bit players. Their innovative relationship with their shareholders has given them the strength to withstand the buffeting winds of competition. They may not have made a single product of their own invention but they have shown the true spirit of innovation by daring to do things differently. They are mavericks in a market where businessmen have tended to behave like sheep. There are numerous other examples of Indian businessmen who have dared to explore uncharted territory and I am sure you are all well aware of them. Clearly, there is no dearth of the innovative spirit in India.

But innovation without invention is like a tree without roots. This is why it is imperative for us to envision a future in which the inventive spirit of our scientists will be married to the innovative spirit of our businessmen. Undoubtedly we have some very good scientific and technological institutions. The Indian Institute of Science in Bangalore and our IIT's produce world-class scientists and engineers. These are people who command respect wherever they are. The liberalized

economic environment provides a wonderful opportunity for Indian business to capitalize on the availability of this brainpower and transform themselves into product innovators. Amar Bose of 'Bose speakers' fame and Vinod Dham of 'Intel' are inspiring examples of the fact that some of the best things in the world are designed and developed by Indians. It is time now for Indian companies to provide the nurturing environment needed for innovation to take root here at home. The music conductor who glides his baton, as he conducts the orchestra, does not tell the musicians which notes to play. All he does is inspire them to play well, and to play together. That is the spirit of leadership required for innovation to flourish, and that is the spirit that is required of those of us who are business leaders.

In encouraging innovation the government also has an important role. I have already cited the example of Japan's innovation-based story of success. But the story as I have told it is incomplete. The Japanese patent system, as it exists, is almost identical to that in force in the US. This is no mere coincidence. The Japanese realized, early in the game, that the strong protection of intellectual property was what gave the sinews to the innovative power of the Americans. Therefore, if they wanted to achieve the same success, they had to have a similar patent regime. Indeed, today, the success of a nation can be measured quite accurately by knowing the number of patents its inventors file. In 1991, for the 17th year in a row, Japan was the leading foreign nation to file patents in the US. In the period 1984 to 1991 the number of patents received by Japan more than doubled while the share of US patents issued to US inventors declined. In 1994 the companies awarded the largest number of patents in the US were as follows - IBM (1298), Canon (1096), Hitachi (976), Mitsubishi (972), GE (970), Toshiba (968), NEC (897), Kodak (888), Motorola (837) and Matsushita (771). Six of the 10 companies I listed are Japanese. And let me remind you, this statistic is for the U S patent office, not the Japanese patent office. This was the same period during which Japan attained status as a leading

economic power and began to challenge the US for this position. There can be no denying the role played by strong IPR in spurring innovation in Japan.

Indeed, the economic success of companies can also be measured in terms of the patents they generate. Products that are so commonplace that we no longer find them remarkable, were commercially successful only because someone could patent the idea. Let me give you a sampling - the elevator (or the lift) - patented by E.G. Otis in 1861; the instamatic camera - patented by Edwin Land the founder of Polaroid Corporation, photocopying technology - patented by Chester Carlson who licensed it to the Xerox Corporation. Without the patent system these original inventors would not have had the incentive to disclose their inventions to others who could commercialize the inventions and 3 great US corporations, Otis, Polaroid and Xerox may not exist. Recognizing the importance of patents the US government has championed the patent system in that country. In 1991 the US patent office issued the 5 millionth patent and marked the occasion by stating - "a strong patent system fosters innovation and creativity and thereby industrial and technological progress...the protection of America's intellectual property both in the US and abroad continues to be of enormous importance to all of us".

The situation in India is a little complex. While we had a patent regime upto 1970, that allowed product patents we introduced a new patent act in 1970 that did not allow product patents to be filed. This enabled our industry particularly the pharmaceutical industry to bring patented products to the masses at affordable prices. All this has changed now and we have signed GATT agreement and joined WTO. Although we have accepted membership of the WTO we have still not fulfilled our obligation to introduce a strong patent regime in India. Our parliamentarians remain caught up bickering over ideology. I believe that legislation approving the introduction of a strong patent regime could constitute a landmark. A landmark that will lead to the reversal of the tide of ideas and products flowing from overseas. Once this happens ideas generated

here and the products made from those ideas will flow out to capture the world. And our inventors will rightfully be compensated for their creations. There is no doubt that there is a high level of patent awareness in India - witness the recent furore over neem, turmeric and most recently the unfortunate Ramar Pillai episode. Our newspapers carried banner headlines that dealt with the patent issue - something that even caught the admiration of Westerners who did not see this level of awareness in their own countries. It is clear that the nation is ready to respect its innovators and give them the tools that are necessary to commercialize their inventions. I foresee that introduction of a strong patent regime will revitalize our creative energies and launch a surge of the innovative spirit such as this nation has not experienced since independence.

I would like to digress briefly at this point to say a few words about my experience in fostering innovation at Dr. Reddy's Research Foundation. When we had originally planned this investment in a pharmaceutical R & D facility there were no dearth of detractors - the comments ranging from - "it is too expensive" to "it is not possible to match the innovative skills of the MNC's". The decision to go ahead was made easier for us by the new economic environment and the signing of the GATT. If we wanted to become a significant player in the world we had to innovate products that the world would buy from us. In 1993 DRF became operational. To start with we had 60,000 Sft of laboratory space and about 50 PhD's covering a range of disciplines in chemistry and biology. From the beginning we intended to create infrastructure of uncompromisingly high standards. This was coupled to a recruitment policy designed in such a way that scientists with complementary skills were brought together to form natural teams. We focussed on a few areas ensuring quality and not quantity. Today, only two and a half years later, we are starting to see the fruits of this investment. We have filed 10 patents for new chemical entities (NCE's) discovered by us in the USA and expect to be in clinical trials with our first compound late in 1997. This is a remarkable accomplishment given our relative inexperience in this endeavour. Our experience is encouraging and bodes well for the future. It

validates my conviction that innovative research is possible here in India. At DRF we are committed to the goal of putting our first invention on the world market around the turn of the century.

Even as we enjoy the heady emotion that comes from the liberalization of the economy we need to introspect on our final destination and the path that will take us there. The trajectory of innovation is unpredictable and there is risk involved for those who undertake this journey. It takes courage and vision to look beyond today's vicissitudes and find hope. But if we do not seize the moment and challenge our capacities we will remain pygmies in this world of giants. The future belongs, not to those who merely seek opportunity, but to those who create it. Let us have the courage to DO THINGS DIFFERENTLY. Thank you very much.

