

A legend lives on –Homi Jehangir Bhabha (1909-1966)



Homi Jehangir Bhabha was a multifaceted personality - *scientist, visionary and institution builder*. He was born on October 30, 1909 in an illustrious family with a long tradition of learning and service to the country. His father was Jehangir Hormusji Bhabha, a well known lawyer and mother was Meheren. Bhabha was exposed to fine arts, music and painting, which moulded his artistic traits.

Bhabha was intelligent, hard working and sincere student. After finishing schooling, Bhabha's parents sent him to Cambridge University, UK for higher education in mechanical engineering. They had dreams of Bhabha becoming a successful engineer but, in 1928 he wrote to his father "*...I seriously say to you that business or job as an engineer is not the thing for me... I am burning with a desire to do physics... I earnestly implore you to let me do physics...*". In response, his father assured him to support for further studies in theoretical physics, provided he completed his mechanical engineering. In 1930, Bhabha completed mechanical engineering in first class and his father supported extended stay for the degree in physics. This is an example of the respect Bhabha had for his parents to pursue what they wanted him to do but, not compromising on his passion for physics.

After completing his degree in 1932, Bhabha continued his research at Cambridge University. His first paper appeared in 1934, based on theoretical explanation of shower production in cosmic rays. His name is associated with Bhabha scattering, which involves relativistic exchange scattering of electrons and Bhabha-Heitler theory, dealing with production of electron and positron

showers in cosmic rays. Thus, it was no surprise that at a young age of 31, he was elected as a fellow of the Royal Society, London. Bhabha rubbed shoulders with great physicists like Bohr, Pauli, Dirac, Cockcroft and others, who later became Noble Laureates. This period was crucial for Bhabha for capacity building and leadership qualities.

Bhabha was on vacation during 1939, when the second world war broke out and he could not go back abroad to continue his research. He then joined Indian Institute of Science, Bangalore as a Reader in Department of Physics, headed by Sir C. V. Raman and set up a cosmic ray research unit. Raman had great admiration for Bhabha and at Nagpur Indian Academy meeting in 1941, while introducing Bhabha, he said “... *Bhabha is a great lover of music, a gifted artist, a brilliant engineer and an outstanding scientist... He is the modern equivalent of Leonardo da Vinci...*”. It was from Bangalore in 1944, Bhabha wrote his historical letter to the Tata trust for support in setting up a centre for research work in nuclear science, which could play a central role in the development of nuclear energy. This was just two years after 1942, when the first experimental demonstration of nuclear reactor was made in USA. All the more so, the country was still under the British rule and industrially undeveloped. There was a clear similarity in vision between the great Jamshedji Nusserwanji Tata and Bhabha with respect to the need for education, scientific research and human resource development for economic prosperity. Based on this letter, Tata Trust supported him to set up a laboratory at Kenilworth, Bombay. Subsequently, Tata Institute of Fundamental Research was formed and large scale research in physics, chemistry, electronics and mathematics commenced. Thus, Bhabha had converted the difficulty of not going back abroad to a great opportunity of setting up of front ranking research facilities within the country.

Bhabha was instrumental for the formation of Atomic Energy Commission in 1948 and the Department of Atomic Energy in 1954 and he chalked out a focussed research and minerals exploration programmes for nuclear energy. He was such a visionary that he had realized the importance of nuclear power programme way back in 1950s and enunciated a three stage nuclear programme so as to meet the energy security of the nation. It consisted

of utilization of natural uranium, plutonium and abundant thorium resources in thermal, fast and advanced nuclear reactors with closed fuel cycle. He also had balanced perspective on the role of other energy resources such as coal, oil and solar. A significant factor that contributed for the growth of nuclear sciences and its applications was Bhabha's rapport with the then Prime Minister Pandit Jawaharlal Nehru, who reposed complete confidence in him. This was possible because Bhabha had the deserving credentials and his

Management of Science, People and Ethics

Being a scientist, Bhabha was always conscious of highest quality in all his endeavors, whether it was selection of people or programmes or research facilities. Further, he had the right exposure abroad to see how large scientific establishments were managed. He had enunciated a clear idea on scientific policy and industrial growth. In his address at Birla Hall, Bombay on January 7, 1966, Bhabha stated “...*The relative role of indigenous science & technology and foreign collaboration can be highlighted through an analogy. Indigenous science & technology plays the part of an engine in an aircraft, while foreign collaboration can play the part of a booster. A booster in the form of foreign collaboration can give a plane an assisted take-off, but it will be incapable of independent flight unless it is powered by engines of its own. If Indian industry is to take-off and be capable of independent flight, it must be powered by science and technology based in the country.*”. Bhabha had very unique work ethics. In his last letter dated January 23, 1966, which was addressed to Mrs. Lalita Lal Bahadur Shastri, Bhabha wrote that the staff of the Trombay campus as well as the TIFR campus had worked on Saturday, January 22, 1966, which was a holiday, as a fitting tribute to the memory of the late Prime Minister. Also, his standing orders for Atomic Energy Establishment, Trombay (AEET, which was later renamed as BARC) were very unique and reflective of his clarity how a research organization should be run. With respect to travel away from Bombay, he stated in the order dated Feb 26, 1962 “...*Senior staff of the Trombay Establishment are now on several committees under other Ministries... It is desirable, in national interest, that their participation should be made available on these committees, provided this does not cause a major interferences with their duties in the Establishment, which must always be given first preference.*”. In an order dated September 28, 1962, he informed “...*It is important that visitors who come here for talks with us should commence their discussions after acquiring a fair knowledge of what we have achieved so far and what we are planning to do in the near future. For this purpose, it is desirable that such visitors be taken round Trombay and also TIFR before anything else is done.*”. Bhabha was very choosy in selecting people of highest eminence and scientific quality. Having named them as leaders of respective scientific programmes, Bhabha gave them full freedom to evolve the programmes subsequently. He reposed full confidence in his colleagues and used to stand by them in all their decisions. His mantra was *the right man for the right job*.

passion matched with Nehru's vision of modern India. There was a great synergy in thinking between Nehru and Bhabha with respect to industrialization and scientific research, evolving hand-in-hand.



Nehru and Bhabha – Great visionaries

Bhabha gave utmost importance to the development of quality human resources. The commencement and continuation of BARC Training School for the scientific manpower over the last 50 years is a real tribute to Bhabha's foresight on quality manpower. Bhabha, a person of perfection, purpose and excellence, ensured these qualities in all his endeavours viz., research, management, buildings and environment. His total conviction, never-accepting mediocrity, never compromising on excellence, meeting the challenges head-on with confidence made him an unique personality. Bhabha was a great scientific manager and followed the mantra of right man for the right job.

Bhabha had received many prestigious national and international awards and recognitions. In 1954, he was conferred with Padma Bhushan award for outstanding contributions to nuclear science. In 1955, he was elected as the President of the first International Conference on the '*Peaceful Uses of Atomic Energy*', organized by the UN at Geneva.

Message for youth

Bhabha's life is an example of pursuing individual passion with a national perspective and purpose. If he chose, he could have gone abroad after the second world war and pursued his scientific research and perhaps, could have even won Noble prize in physics. But, he chose to stay back to serve the country. He channelized all his scientific pursuits to develop scientific institutes with an aim to serve the society. He blended his individual vision and passion with that of the Country. Today, we have world class institutes and the Departments like Atomic Energy and Space, thanks to Bhabha's foresight and vision. Thus, his life message to all of us is "*do pursue the passion of your life but with a vector or direction of serving the country and making it proud with your contributions*".

At a young age of 56, Bhabha suddenly passed away in 1966 due to a plane crash in Switzerland. A vibrant and robust organization, that he had left behind with many signal achievements in nuclear science and technology as well as a dedicated and talented pool of human resources, bears testimony to the visionary zeal of Bhabha. His life was an example for all of us, which stood for "*deserve, desire and demonstrate*".

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