“NO JOB IS SMALL OR BIG, IT IS THE WAY IN WHICH YOU DO MAKES IT SMALL OR BIG”

B.S.K. Naidu

I was born in a middle-class family. I was schooled in small towns of old Madhya Pradesh. Initially I was admitted to Vidya Mandir, Akola where I was tested and found suitable for 2nd standard and subsequently I secured first position in the class, which proved their judgment right. Thanks to my mother who taught me the basics very early with her meager qualification of just primary education, where of course she was a topper.

My father, in the State Government service, was transferred to Mandla. I have fond memories of my childhood spent there. Once I was given an opportunity to deliver a lecture on *Goswami Tulsidas* representing the Primary school which fetched me a medal. I clearly remember the process of overcoming the stage fear in that big Town Hall packed with elders where I was feeling too small. I little realized then that it would be at the bottom of a long series of invited lectures and standing ovations at international forums in 5-continents including my lead speeches at United Nations, Global Environment Facility (GEF) and the World Bank etc. and a series of 24 awards.

Though I was schooled in district schools of insignificant towns of Madhya Pradesh, my parents somehow dreamt of making me an engineer. I did my engineering from the State’s oldest Government Engineering College at Jabalpur. I remember my Russian professor Mr. Tirechev very kindly. His popular catch phrase was “Full work, full marks, No work, no marks”. He was in- charge of Project Work in the final year of our 5-Year degree course in Mechanical Engineering. He allotted me a relatively insignificant project on *Calibration of Carburetor’s Jet*. Against several IC Engine projects, my project appeared relatively small. However, I did it with full attention and industry. My diligence and attention to minute details impressed him and he not only gave me 100% marks but also got my Project included in the list of Final Year Laboratory Examination of IC Engines. This made me think for the first time in life that “no job is small”.

I recall an interesting event of my fourth year studies in the Hostel. A chapter on Redundant Frames in Theory of Structures used to bother us. One day we accidentally evolved a very simple (though time consuming) method of solving the problems by step-by-step resolution of forces in mutually perpendicular directions. I became very enthusiastic and spread the technique in my entire batch. I

happened to visit my college after several years of my passing out and heard one of my junior colleagues say "Naidu's method is still popular and we are sure of getting min. 20 marks in that paper", making me think once again "no innovation is small".

Life continued through a Masters in Hydroelectric Engineering and a Ph.D. in Water Resources Management which I thought was a less significant discipline compared to Aeronautics, Nuclear Engineering or Information Technology. But again sustained efforts in my own field made Americans invite me twice to their country to bestow upon me the highest honors of their respective entities**;** in 1990 by the CULA, Los Angeles, Californiafor award of D.Eng.(Hon) in Hydro Power Engineering & Technology which I had the privilege to receive along with Hon'ble Nelson Mandela who received D.Lit.(Hon) in the same convocation, and in 2012 by the American Academy of Water Resources Engineers (AAWRE) for award of their highest honor "Honorary Diplomate, Water Resources Engineer", conferred upon me during the AAWRE's Bestowal Ceremony held at the "World Water and Environmental Resources Congress" in Albuquerque, New Mexico *in* 2012 before the august presence of America's who's who of Water Resources Engineering Profession including past and current Presidents of AAWRE, Dr. Jeff Bradley and Dr. Robert G. Traver. The above distinction and designation (Hon. D.WRE) was awarded to only 30 most eminent scientists in the world since inception of AAWRE. This journey from an insignificant Municipal school in Mandla to United States signifies a couple of things when I look back. One, no job (or discipline) is small or big by itself, it is the way in which you pursue, makes it small or big and secondly it is not the institution where you are schooled that matters but the way you position yourself in the school really matters.

In the year 1968, I was earmarked (*not formally selected yet*) by HE(I)L as a Post-Graduate Engineer and in the meanwhile I received a firm offer to join Machine Tools Corporation and deputation to Czechoslovakia for training. I ventured to meet Shri S. Swayambhu, Chairman of HE(I)L Bhopal (later merged with BHEL) to seek his advice. He advised me not to waste my PG qualification and take a chance to wait for HE(I)L's formal selection. Shri S. Swayambhu was a great Power Engineer and used to be our hero. He was the first head of CPRI in Bangalore. Later in the year 2000 when I took over additional charge of CPRI as Director General, my photograph found a place in line with him in the big Conference Hall of the prestigious institution**;** I felt his blessings coming from heavens and complimenting me for continuing as a Hydro Power Engineer. My 'Research and Testing' strategic initiatives at CPRI took the organization to new heights of distinction in internationally recognized research, testing superiority and peaking revenues. CPRI gave me a great sense of fulfilment where I instituted a Gold Medal in my father's name (*who made me an engineer*) for the best paper published during the year based on testing clues/data.National Perspective Plan for R&D in Indian Power Sector prepared by us in June'2002 gave a tremendous impetus to research activities in the following years.

During my early days in BHEL, I happened to publish a suggestive paper on Scope of research in air-injection techniques with reference to hydraulic turbine operating requirements in the Indian Journal of Power and River Valley Development, June 1975 issue. Later availing Confederation of British Industry (CBI) scholarship 1975-76, I went to UK as a Visiting Engineer and was posted to Boving & Co., London. One day my Chief Manager Mr. Keast came to my desk and congratulated me for having published an article in International Water Power and Dam Construction, London, February 1976 issue. I could not believe it and got a copy from him. I found that my Indian article was abstracted there. My surprise heightened when I was deputed to their collaborator's Laboratory in Kristinehamn, Sweden in the

month of May'1976. I was received by Mr. Gusthavson who took me to his section to show the entire set-up commissioned by him on the lines suggested by me in the above paper which he could source out on his own. I realized that the world was round and very small.

While in BHEL one of the prime assignments given to me was to design a Francis Turbine Runner from the first principles of Hydrodynamicsfor the first time in the country. It was more of a tedious research project with no internal guidance (*runners being totally imported*) and poor computing facilities of 1970's. When my design was model tested, its peak efficiency came out to be 87.5% against 90% + in the international arena. Though this work was later recognized at Hydroturbo'81 in Czechoslovakia and IAHR'90 in Yugoslavia, I was somewhat disappointed with the efficiency level achieved. At that juncture, I got a message from Dr. H. N. Sharan, Director (Engineering) BHEL Corporate Office Delhi that "Even if it was 60%, it would still be our own design". I had not seen him then but he left an unforgettable impression on my mind.

Similarly Dr. V. Krishnamurthy, Chairman, BHEL whom I had not met those days left an indomitable impression on my mind by sponsoring me for the CBI scholarship of one year advanced training in Europe (which I had won in an All India competition) and then historically sponsoring my visit back to India in the middle to present a paper at the World Congress of IWRA at Delhi, being an exclusive paper selected from BHEL. I had submitted this paper before going to UK utilizing an opportunity of hospitalization for my first operation. I was completing the synopsis of my paper when the nurse came to pick me up for the O.T. I remember, she asked me "Are you not afraid of the operation" I just smiled. Rest of the paper on Design and Manufacture of Pumped Storage Power Plants for *Indian* Requirements was completed by me in the post-operative period due to the dead line of submission. This paper only created an opportunity but it was possible to present it only due to an extremely positive outlook of our Chairman which was truly unmatched. It was quite an experience for me to address a World Congress at the age of 30! I may state here that I have undergone several surgical operations in my life and I remember to have always utilized my hospitalization time for some productive writing. When I was admitted to Escorts for my open heart surgery in 2003, I was clearing some important files of National Power Training Institute (NPTI) before going to O.T. It was either my passion for the job or my total faith on doctors, or perhaps a combination of both.

Later in BHEL, I remember once in 1981, Shri B.S. Kochar, Chairman, BBMB walked in requesting us to study the overload margins in Bhakra turbine-generators. It was entrusted to me as a small assignment. I took it rather seriously and expanded the dimensions of the study from signature analysis of the machines to material testing to vibration analysis to design margins to furthering power generating capacity of the machines by opting thinner and effective insulation in the stator slots and even changing the runner profiles to higher specific speed versions; little realizing that it was heading towards a New science of "Uprating & Refurbishment of Hydro Units". It became a pioneering and trend-setting study in Indiafetching me the Willie (a German Scientist) Memorial Award**.**

I shifted to NHPC in the year 1982. I remember the moment when I informed the General Manager (Electrical) Shri V.K. Sharma (*who was Chairman of the Selection Committee*) on stairs that I submitted my joining consent, he remarked "Yes we know at 1.00 pm today BHEL has become poorer and NHPC richer". I do not know how much richer NHPC could become but for the next decade I worked sincerely pouring my heart and soul. As Chief of Corporate Planning Department for the longest tenure, I was

instrumental in sanctions of projects worth 2265 MW involving an investment of Rs 5400 Cr., authorized share capital growing from Rs 800 to 2500 Cr., Corporation upgraded from "B" to "A" schedule, Five-Year-Plan exercises of NHPC attracting attention of IAS examination papers etc.When I started handling *Hydro-Environment Interface* (having created an environment cell in my department), no one was talking about positive impacts of Hydro, closing one eye of the decision makers. Our sustained efforts brought it on the assessment formats of evaluation matrix.

With the awareness of uprating potential of Hydro spreading across the power sector, during the Power Ministers' Conference held in Jan'1987 a resolution was passed that an All India study of Renovation & Modernization of Hydro Electric Power Plants would be conducted by NHPC and with the background of Bhakra study naturally it was entrusted to me. Assisted by Shri A.K. Tripathi, I did it with full vigor and dedication. Having become one of its kind first national study for a country of continental dimensions, we were invited to the First International Conference on Uprating & Refurbishing Hydro Power Plants" at Strasbourg, France during Oct'1987. I presented the study.This study taking the shape of the first ever made national master plan on Hydro R&M across the globe became a star of the show at the Conference. Mr J. Warnock, Managing Director of Acres International, UK chairing the Conference said in the midst of a standing ovation "Here is the first ever attempted comprehensive study of all the operating plants in a country of India's size dealing with all aspects from Civil Engineering to Electronics, which is going to become a forerunner of such studies by other nations."

I was confronted with another problem of silting in Hydro turbines, damaging their under-water components. I again took the problem seriously and not only worked on solutions in terms of repairs and preventions but also started looking at the design aspects little realizing that it was giving rise to new engineering practices in Renovation & up-gradation of silt prone Hydro Power Stations and a New science was emerging later labelled as *"Design of Hydro Turbines for silt laden flows"*, accepted for post-graduate studies and recognized internationally. I was invited to Europe (United Kingdom, Norway & Austria) and South America (Argentina) to share this specialized knowledge. When I was invited to Argentina by IMPSA for a lecture series on the subject for their design engineers, the Director of the Company, Engr. Roberto Maiorana welcomed me as a person most documented on the subject, once again proving the philosophy underscoring my life.

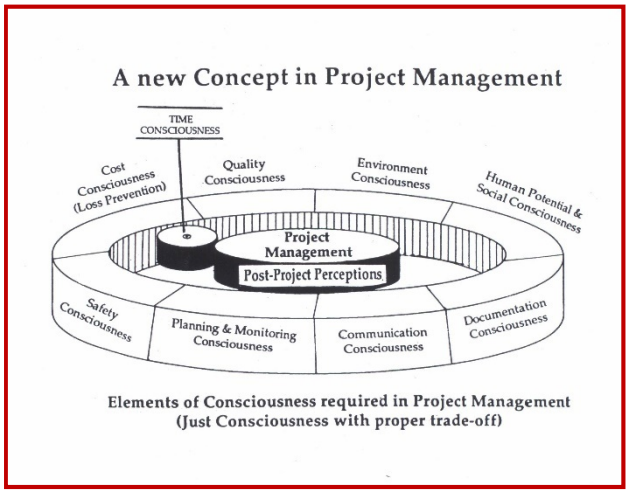
In view of my contributions (some of them stated above) CBIP's highest honor, their Diamond Jubilee award, was bestowed upon me in the year 1989 for my outstanding contribution to Hydropower development in the country. I was happy to get this life time achievement award **(**as the youngest candidate till then**)** from the hands of the then Energy Minister of India Shri Arif Mohammad Khan in the august presence of Shri Bahadur Chand,Chairman, CEAin a glittering function in New Delhi, incidentally attended by my mother.

Prof. Pradip N. Khandwalla of IIM, Ahmedabad approached me to contribute to a "*Study on Human Excellence*". The basic idea of this study was to understand why some persons are able to achieve so much, and others with comparable background and intelligence end up doing nothing of any consequence. I did contribute to his interesting study which was later published by him in a book titled "Fourth Eye-Excellence through Creativity". It reinforced my belief that the creativity can flourish in every job, even in seemingly smaller jobs.

Renewable Energy, when I entered the field in early 1990's, was in a nascent stage (kW scale) in India, far from any economies of scale. I took the responsibility for strategic interventions in the India's renewable energy sector by identifying barriers faced at macro & micro levels, exploring remedial options and strategic `niche' interventions with potential ramifications in terms of replicable models with multiplier effects. Today it has much higher share of nearly 36,000 MW (more than 6 times of Nuclear Power) and is being seen as the energy of the future. I played my modest role as Executive Director, IREDA, Director (Renewable Energy) Winrock International India and Director, MP Windfarms. In 1997, I was declared **"**Renewable Energy Man of the Year**"** by the National Foundation of Indian Engineers.

As Director, REC (A Navratna Company), I was involved in 1999 with UNDP/GEF project on "Optimizing Development of Small Hydel Resources in the Hilly (Himalayan and Sub-Himalayan) Regions of India*"*. Shri I.M. Sahai, Ex-Chairman, PFC was also a Mission member. When we went to submit our report to the UNDP office in Delhi, they very much liked our format and the findings. Later they informed us that UNDP Headquarters have directed them to keep our report as a Model sample for future projects. At REC, I also evolved a new concept on "Project Management*"* and presented it as a Key-Note Address at an International Conference at Singapore in November 1999.

Various failures and successes met with in real life projects with the same operating tools like OR/PERT/CPM/OAS/MIS/DSSetc. have time and again pointed towards one basic thing viz. Human mind is crucial to make conscious judgments on optimization of all tangible and even intangible variables influencing a project. The concept of making human being as the hub of management activities should logically lead us to 'Consciousness Concept Model', as it is the man behind the machine who matters. Ten (10) Consciousness Elements were comprehended as crucial ingredients of the 'mind-set' of a successful "Project Manager", pictorially depicted in the diagram shown.



Elements of Consciousness required in Project Management
(Just Consciousness with proper trade-off)

If the Project Management has to succeed on Indian soil, we have to develop the Project Management discipline as a Science of Consciousness. Suitable training packages would have to be evolved for the prospective project managers with exclusive modules aimed at generating 'consciousness elements' itemized above and more importantly the terminal modules aimed at bringing an equilibrium amongst them, appreciating the tradeoffs and inter-linkages involved. An appropriately conditioned mind so trained would possess 'just consciousness' capable of taking judicious decisions during project implementation. This would certainly add a new dimension to the Project Management and if pursued in right earnest, can bring results which would surprise many and Indian consciousness and ethos in Project Management would become a guiding light for the future generations, I believed.

On the above concept, I received appreciation from the then Cabinet Secretary to Govt. of India, Shri S. Rajgopal. Another dose of appreciation I got from Dr APJ Abdul Kalam, the then-Principal Scientific

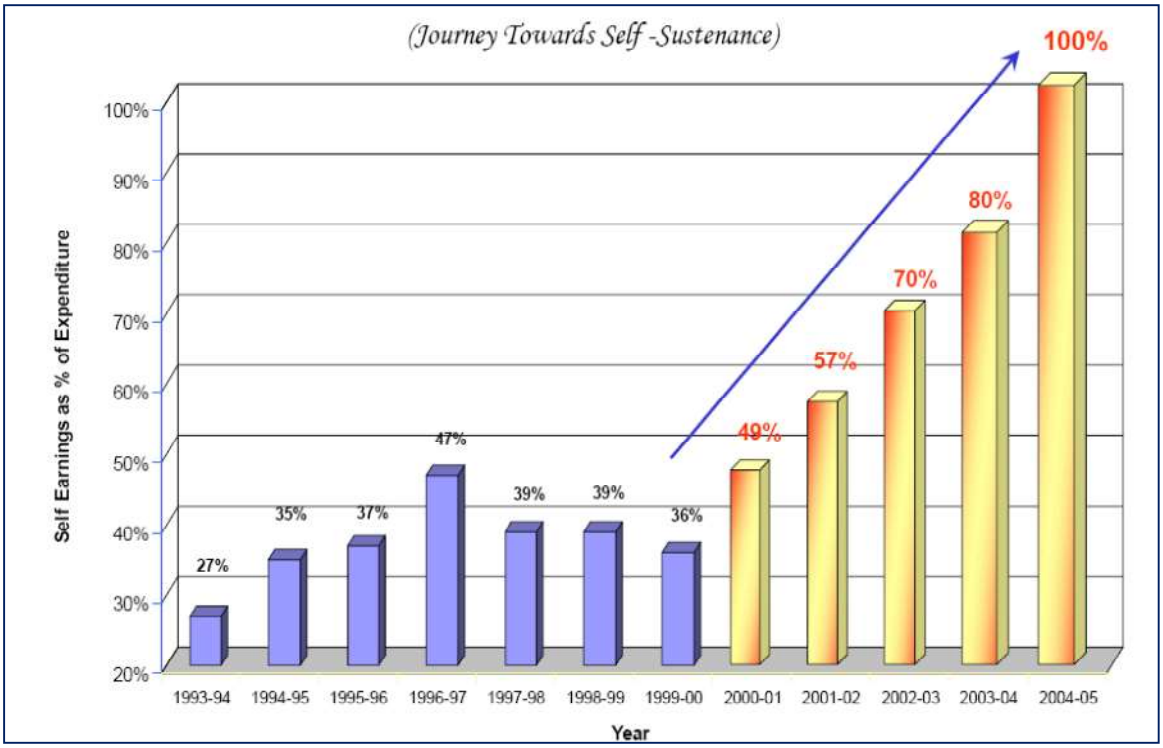
Adviser to GoI on my Institution of Engineers (India) awarded paper on "R&D Vision for 21st Century with special reference to Power Sector in India" in 1999. These are good memories.

When I took over NPTI as its Director General in the year 2000, I found that the performance graphs of this Apex Institution in Training & HRD of Power sector were continuously declining during the previous decade making it a sick organization in the bankrupt power sector. The real challenge was to make it self-sustaining. It needed out-of-the-box thinking for setting the gears right. We resorted to the following strategies:

1) With the permission of the Ministry of Power, we formulated a National Training Policy for the Power Sector **(**first time in the country**)** mandating 1-week training/ year compulsory for every one working in the sector and earmarking 1.5 to 5% of salary budget for training. The Policy was passed by the Parliament with theefforts of Shri Suresh P. Prabhu, the-then Union Power Minister. This policy when implemented all over the country in March'2002 generated 10,00,000 trainee-weeks of training load annuallybesides earmarking of funds for the purpose.

2) The above initiated flow of trainees but not the revenue earnings for NPTI on the plea that any cut on the budget is always on the head of training. Then we organized an All India conference of Regulators under the chairmanship of CERC and got a resolution passed that training expenditure would be a part of O&M expenses which are built into the tariff. The moment tariff is realized, cash is available for reimbursement to training.

3) All the processes involved in the steps-1&2 above took two years at the fastest pace but we were committed to self-sustenance from Day-1. We therefore pioneered unique programs viz. B.Tech./ B.E. *(*Power Engineering*)* and PGDC in specialized segments like *"*Power Plant Engineering", "Power Systems Engineering" etc. at NPTI. We offered the Art and Science of Power Management to the Reforming Indian Power Sectorby way of First Ever AICTE/UGC approved MBA Program on the subject, under the auspices of the Centre for Advanced Management & Power Studies (CAMPS) started by me. These programs have unmatched reputation in Power Sector. The product of all these courses not only got absorbed in the industry but also took a premier Training Institute NPTI to new heights of excellence across the globe. During my tenure, we expanded 4-Units of NPTI to 10-Units across 5-Power zones of the country making it the largest Power Training Institute in the world, with total self-sustenance within 5-years. The quantum jumps NPTI experienced in its operational parameters during mytenure (2000-2005) have made an unrepeatable history.



NPTI's Turn around in 5-Years

My professional life provided me a rare combination, 32-years of rich Industry experience in country's premier organizations with subsequent 15-years in Research, Training and Education creating the brains behind the country's power and energy sectors. I also have satisfaction of having documented my experience in 150-technical papers (80 in international fora) ending with 7-books on Renewable Energy including conventional Hydro (whose renewability comes out of nature's hydrological cycle) for PG studies. These are my choicest gifts to the younger generation.

My work at NPTI continued post-retirement through the Institute of Energy Management & Research (IEMR) later rechristened as the Great Lakes Institute of Management (GLIM) Gurgaon (as Founder Chairman) in the field of engineering & management education, providing me great satisfaction and recognition by the Higher Education Forum (HEF) through their First "Outstanding Academic Leadership Award-2014".

When I was elected Fellow of the Indian National Academy of Engineering (INAE) in 1993 I felt happy that I am among the luminaries of the country. My picking up so called small jobs in a conventional field on the way of my career and doing them as perfectly and as innovatively as I could, did not cause any setback against the Missile &Nuclear scientists, Information Technologists, or Industrialists of highest repute.

Lessons from my professional life are simply:

1. No job is small or big by itself, it is the way in which you do, makes it small or big.

2. When you take up a new challenge as an opportunity and proceed, you find so many hidden opportunities unfolding in a cascading manner that astonish and overwhelm you.

3. Self-esteem emerging out of original work motivates you more than any other external stimuli.

4. Anything you succeed in doing for the first time in any domain be it your organization, your sector, your country, your continent or the entire globe, gives you an awesome sense of fulfilment.

5. If you contribute in any sphere, it pays back if not immediately, in some years for sure.

6. Any original ideas and thoughts you generate at your end can be transmitted to the other end of the world, sometimes even without your knowledge, more so in the present digital world.

7. The wind may blow from any direction, but the direction in which you go depends on how you set the sails.

8. Engineering is not just application of science but genuine innovation while applying science and it can be philosophized for its influence on a larger domain.