Memoirs – S. Wadhwa

Late Prof. Subhash Wadhwa made a significant contribution to the profession at large and the area of ‘flexibility’ in particular. His contributions to the flexibility research are immense. He had been a significant contributor to the *Global Journal of Flexible Systems Management* (*giftjournal*) as an author as well as in terms of his editorial contributions. He served as Co-editor-in-Chief of *giftjournal* for one term.

The research papers contributed by him along with co-authors covered a wide spectrum of areas linked with flexibility. The papers covered both the generic view of flexibility and the specific areas of applications. The generic view covered a proactive flexibility management view and a flexibility maturity model.

The specific areas of application included flexibility in supply chains, flexible manufacturing systems, knowledge management and healthcare management systems. Some peculiar applications were performance analysis of partial flexible manufacturing systems, impact of supply chain collaboration on customer service level and working capital, knowledge sharing in flexible supply chains, a KM focused competence of supply chain as a flexible system, flexibility and innovation in healthcare management systems and so on. The papers published by him in *giftjournal* received a lot of attention and have been cited in many leading journals.

His contributions to the area of flexibility and *giftjournal* will be a source of inspiration to all of us working in related areas. I take this opportunity to express my deep sense of gratitude to him. This special issue in his memory is a token of our respect towards his contributions to the flexibility research.

Sushil

On Professor Subhash Wadhwa

We miss Prof Subhash Wadhwa very much. His voice still lingers in my ears. Though more than six months have passed after his death, we are yet to come to reality. We feel that he is very much here.

It is with heavy heart that we are coming out with a special issue of *giftjournal* to remember Subhash and his immense contributions to the academic and professional world. This journal was his favorite forum to share contributions on flexibility and allied issues. He was a solid figure guiding Gift society and helping to establish a niche for the society.

Subhash had a multifarious and multidimensional personality. He performed his roles as teacher, researcher, consultant, administrator, and as a motivator seamlessly in his characteristic style.

Subhash joined IIT Delhi just before me. He was always ready to guide and give counsel on a variety of issues, be it academic, professional or personal matters. With his unique style, he established CIMS lab and also developed Industrial Engineering lab at IIT Delhi.

He generated interest and enthusiasm amongst innumerable students to take up work in this area. We at IIT Delhi owe a lot to him for making Industrial Engineering group a vibrant and dynamic entity.

Subhash was an excellent academician. He had unique style of teaching: teaching with numerous examples from practice domain of industry and business. He always expanded experience horizons of students and provoked them to go beyond the class room. As an amicable personality, Subhash used to intersperse his teaching with humor and wit.

As a supervisor, Subhash was literally a friend, philosopher and guide to his students. He always treated his students as part of extended family. He shaped the thinking process and motivated numerous young researchers to the exciting world of research in CIMS, FMS, advanced manufacturing technology, and flexibility through a variety of tools and techniques. Developing innovative frameworks was his forte. Simulation was his second name. Subhash had a creative and fertile mind and was able to visualize and conceptualize effortlessly. This is reflected in his work. I had the privilege of co-supervising with him. Our interaction meetings with students were full of fun, action and weighty insights. I have learned a lot through these meetings. As a member of Production and Industrial Engineering Group, Subhash was very much supportive to young faculty colleagues.

Extension and outreach is very important in today's academic world. Deeply driven by the passion of establishing institute-industry synergy, Subhash always attempted to work with industry so as to get a first hand feel of ground reality. He worked closely with leading organizations, such as Bharti Airtel, Maruti, RCF and numerous others. This helped in understanding issues. This also helped in establishing models which could be implemented in industry. Subhash used to demonstrate his frameworks and models to industry. Based on their feedback, he used to refine the models. This painstaking process

helped his research group in moving closer to “customer” and gaining the confidence of industrial clients. Through his innovative style, he established a virtuous cycle of “Teaching-Research-Consulting-Training-Teaching”. This is his novel contribution. He changed the perception about modeling and simulation. He established a new research paradigm based on active use of simulation as a valid methodology. His penetrating insights on “value-added versus non-value added activities” are valuable to both academia as well as industry. To drive the point, he used to give very interesting examples from RCF (Kapurthala) and other industry. This immediately used to catch attention of students and researchers. Thanks to his efforts, IITD was able to demonstrate power of simulation through many in-house developed types of software on simulation coupled with state-of-the-art softwares such as Arena and Witness. Using simulation as an experimental platform, he developed framework for quantification of flexibility through use of multi-attribute models. He used quantitative and qualitative tools (such as Petri nets, AHP, ANP) innovatively to model flexibility.

Subhash brought a new perspective on sponsored and collaborative research. He was very active in pursuing research through sponsored projects. Through agencies such as DIT, DST, AICTE, Subhash changed the sponsored research landscape of Mechanical Engineering Department in making the department vibrant. This is an immense professional contribution, especially during those days when IITD was quite conservative! Subhash established his academic leadership through sponsored research, extension, consulting and training programmes. Linkages with stalwarts such as Prof. Jim Browne and Prof. Stecke helped the department in gaining international recognition. Through POMS-99 international conference, we at IIT Delhi were able to consolidate our identity in the international arena.

Whether it was IIT Delhi or institutes such as Delhi College of Engineering, NSIT, Jamia, Indraprastha University, NITs, Subhash was always there on whom we could count for help and support.

Subhash personified Flexibility – the way he interacted with his students, industry clients and his colleagues. He demonstrated that through flexibility what gains could be achieved. Rather than a colleague, I would treat him at times as brother and many times as friend! He was ever ready to help and support. Through his witty style, he used to provide valuable insights on professional and personal matters.

This issue is to acknowledge immense contributions of Prof Subhash Wadhwa.

We miss Subhash a lot. This special issue is in memory of an outstanding professional whom we will miss for ever.

Deshmukh S G

Late Prof. Subhash Wadhwa – we want his knowledge to spread

Sad demise of Prof. S Wadhwa has closed one chapter of academics, research and consultancy contributions in the area of flexibility. As regular contributor to our Journal, he has extensively contributed in the core area of flexibility using simulation methodology as his approach to provide synergy towards academics and real life application.

As a tribute to his academic excellence we are publishing this special issue Volume 10 No. 3. This contains papers of his research scholars who were enrolled with him at the time of his illness and consequent demise.

First is a review paper wherein authors attempt to analyze integration of Flexible System, Total Quality Management and Supply Chain Management. This focuses on relatively unexplored categories and may help researchers. Conclusions are drawn from reviewed literature

Second paper proposes a generic model to enterprises engaged in product recovery process. An Enterprise system is viewed as flexible systems to facilitate flexible decision and information sharing functions in product returns.

Third paper presents analysis of results obtained through a generic simulation model under four different system load conditions of a Flexible Manufacturing System. Results show a continuous decrease in make-span with increase in routing flexibility under unbalanced load condition.

Last paper presents review of ERP enabled lean six sigma for achieving competitive manufacturing. It is envisaged that these four papers may provide necessary seed which may bloom into better quality research in the area of flexibility and would provide motivation to others to contribute into the niche area of Flexibility. With this we hope we can remember and pay tribute to late Professor Subhash Wadhwa.

Abid Haleem

Prof. Subhash Wadhwa as I knew him

The whole academic community was shocked with grief when they came to know the sad untimely demise of Prof. Subhash Wadhwa. I also could not believe when I got the information. With quick flash the time, moments of my association with Prof. started coming in my mind. I just could not imagine how he could go so early in his life (49 years). But it was the will of Almighty God.

My association with Prof. Wadhwa was for about 3½ years as a research scholar. During my stay at IITD, he always had good faith on me. He always used to rely on me for different kinds of works. He also used to call us ‘**BETA**’, which reflects how caring he was. He was good human being, not losing temper and also kept us at ease. He was always available for his continuous encouragement, help and feedback whenever needed.

His commitment, interest, and passion for the research have always been undiminished, and it is difficult to imagine how I would have completed my Ph.D. without his

continuous support. The numerous discussions in which ideas and opinions were heard and decision taken accordingly were held in a conducive environment. I also had the opportunity to attend his lectures. He had a peculiar way of starting his class. He used to crack some jokes in order to make students feel at ease and then make them pay attention to his lectures.

His contributions in the area of research work direction is immense. He worked in Europe for several years on prestigious European projects and a US Multinational before joining IIT Delhi. He extensively contributed to the development of generic simulators and expert systems for flexible systems. He was an active contributor to Global projects in the IT domain and has coordinated several workshops. He has been consultant /Contributor/National-Expert to many prestigious International bodies. He has also been chief consultant on several Industrial projects.

His interest included Flexible Systems, SCM, TQM, BPR, Knowledge Management, Simulation, Intelligent Systems, e-Biz/ e-Governance/ e-Education/ e-Healthcare etc. He was dedicated to the goal of bringing synergy between Academics, Industry and Research. And in my opinion he did succeed in his mission as reflected by his work in different domains. It is very difficult to find a person having such multidimensional facets.

At the end, I would like to pray to Almighty God that his soul be laid to peace.

Mohammed Ali

Prof. Subhash Wadhwa as I knew him

It was a great shock to all of us to know about the sad demise of Prof. Subhash Wadhwa and who was not only my Ph.D. guide but also was my guiding force. I express deepest sorrow for the same. My association with Prof. Subhash Wadhwa was short but significant.

I have been his student for 2 years and because of his motivation I am doing my Ph.D. He had a great knowledge specially in the area of Supply Chain Management, Flexible System Management, Knowledge Management, Total Quality Management, BPR, Simulation etc, but more importantly he was a nice person besides being an excellent teacher.

His demise, infact, is an irreparable loss to his family and community (both students and teachers). May Almighty God give his family strength to bear this shock and bestow upon the soul of the deceased peace and place in Heavens.

Fauzia Siddiqui

Prof. Subhash Wadhwa as I knew him

I was a doctoral student of Prof. Subhash Wadhwa at Indian Institute of Technology, Delhi from 2003 to 2008. During my research tenure at I saw or at-least hear him almost every day of the week and can assure you that the IITD has lost a wonderful professor. He was a magnificent teacher who cared about his students as “*beta*” and believed in challenging them to be their best. He made class entertaining by incorporating quick-witted jokes and stories and was a very engaging teacher. During my visit to Hong Kong, I saw him as a very kind, considerate and patient person. He was a brilliant professor, but he also had the ability to lecture and explain engineering flexibility concepts on a level that all of the undergraduate students in his class could understand. I learned not only from his teaching, but also from his strong and friendly character. Prof. Subhash Wadhwa was a brilliant professor, a great person, and truly an inspiration to me. Deep hearted condolences to his family for such an untimely demise. “He will be forever missed, and his students, past and current, will carry on his work as both a researcher and a role model”.

Jitendra Madaan