

IUPJAE INTERVIEW

# AN INTERVIEW WITH PROFESSOR K L KRISHNA

*Interviewed by GRK Murty, IUP Publications*



Over the last six decades, Professor Kosaraju Leela Krishna, popularly known as “KL” or “KLK” among his fraternity, ardently pursued his teaching and research interests in the fields of Applied Econometrics, Industrial Economics, Economics of Productivity and Regional Inequality and Empirics of Trade and wrote research papers on a variety of themes. He has been leading the India KLEMS Productivity Project, as a part of the World KLEMS Initiative since 2009. He has edited/co-edited five books, of which *Econometric Applications in India* (1997) is still used by all those econometricians engaged in model building to study the major fields of economics.

Dr. Manmohan Singh, former Prime Minister of India, writing to the organizers of the Conference that was held to honor Prof. KLK on December 20-22, 2000, said: “Prof. Krishna has made a significant difference to the lives not only of the innumerable number of Master’s degree students that he taught ... but also to the large body of research scholars and colleagues.” No surprise he is ranked amongst the most distinguished economists based in India.

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As a teacher of Economics at the Delhi School of Economics (DSE), he taught Econometrics and Industrial Economics for over six decades with no piece of paper in hand and yet expounded “fundamentally profound stuff” by filling the board with a series of equations, a feat which made him so dear to the student fraternity that one of his old students, Omkar Goswami described him as a “truly great teacher”. Indeed, he is and also a humble and caring humanist: he generously grants time to legions of students from around India, passionately discusses their research pursuits and ardently guides them by offering his intellectual and moral support. He has guided formally 24 PhD scholars and 20 MPhil students. In addition, there are “a number of researchers outside doctoral and MPhil programs and spread over different parts of the country and even abroad whose work has got enormously enriched by the guidance, encouragement and patient listening that they received from KL.”

As the founding Managing Editor of the *Journal of Quantitative Economics*, he edited it for over a decade and a half, which exhibits his devotion to the promotion of scholarship. He was also the President of The Indian Econometric Society in 1996-97. KL, a product of Chicago University, presently, Chairman, Madras Institute of Development Studies, was honored with the maiden PJ Thomas Foundation Economist of the year award 2015-16. Earlier, in 2015, he received the distinguished service award from the University of Delhi, for his contribution to teaching and other academic activities throughout his career. He has received many other awards on different occasions for his professional contributions.

At the young age of 80 plus, when every other professional prefers a quieter life, KL is actively engaged in teaching, researching and even traveling abroad to participate in seminars and share his knowledge with other researchers in his field.

This interview was conducted at the Visiting Scholars’ Guesthouse, CESS, Hyderabad on June 25, 2019. KL has a unique personality which has been aptly described by Ramachandra Guha, the celebrated writer, thus: “a quiet, self-effacing yet celebrated teacher of Econometrics ... a man who in character and intellect and institutional commitment exemplifies the best kind of University scholar”. And this phenomenon, we are sure, you would experience all through the following pages....

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**GRK:** At the outset, I wish to thank you Leela Krishna garu, for sparing your time and attention for the interview. We may begin it by talking about your childhood and early education.

**KLK:** I was born in 1935 as the seventh and last child to Nutakki Rajaratnam and Kosaraju Lakshmayya in Unguturu village of Krishna district, AP. After studying in the village primary school for four years and attending a tutorial school in the village for one year, joined the Municipal High School in Gudivada town in 1945, completed my 12<sup>th</sup> standard with good marks in 1950, pursued the intermediate program in Sir C R Reddy College, Eluru, with English, Sanskrit, Mathematics, Physics, and Chemistry as subjects during 1950-52, and fared well. I studied BA Mathematics during 1952-54 in SRR and CVR College, Vijayawada.

During the first 19 years of my life, 1935-1954, I received valuable guidance and advice from my parents, eldest sister Manorama and her husband Surapaneni Sobbayya (Sobhana Rao), elderly cousin Kosaraju Anjaneyulu with a BA degree, and maternal uncle Nutakki Ramaseshaiah with BA and BL degrees settled in Rayagada, Odisha. Ramaseshaiah was a member of Lok Sabha during 1952-57 and Health Minister in the Government of Odisha in the 1960s. He was highly respected for his benevolence.

My second sister Tulasi and her husband Surapaneni Ramadasu with whom I stayed in Eluru during 1950-52 and my eldest brother Radha Krishna Murty and his wife Shashikala with whom I stayed in Vijayawada during 1952-54 deserve to be mentioned for their loving care and hospitality for extended periods. All my siblings and their spouses bestowed much affection on me as I grew up. The lonely surviving sibling is Ramakrishna living in Hyderabad. My father's younger brother Ramayya and his wife Pullamma were very hospitable whenever I visited them in Unguturu, after my father's death in 1952.

My greatest benefactors and guides were my sister Manorama and her husband Sobhana Rao. Manorama, through self-study after her marriage, qualified for the MA Degree in Hindi and taught Hindi at the High School and College level. Sobhana Rao went to a Sanskrit college and became a scholar in Sanskrit and Telugu. He served in the Municipal High School, Gudivada. I was his student in Sanskrit in that school. Sobhana Rao was well known as a rationalist and social reformer. A well-known social reformer and atheist of mid-20<sup>th</sup> century Gora of Vijayawada was among his friends. Manorama and Sobhana Rao, the childless couple, with an altruistic and reformist outlook opened their house to about ten youngsters, boys and girls, for their high school education. These included my two brothers and myself. I was the youngest and the last to be mentored by the couple.

**G:** What prompted you to join BA Mathematics?

**K:** Though I fared well in Intermediate (1950-52), I could not get a seat for engineering in any government college. So, I joined bachelor's degree course in Mathematics

with Descriptive Statistics as one of the papers, in SRR and CVR College, Vijayawada. I stayed with my elder brother's family and my mother. Math teaching in the college was good. I had the aim of going for a Master's program in Maths or Statistics. I worked hard and performed very well. The college had dedicated Maths teachers. One of them Dr. Perayya Sastry later became Professor of Statistics in Sri Venkateswara University, Tirupati. Another teacher, Dr. M M Rao, migrated to the US and researched in the probability area. I scored high marks in the examination held by Andhra University in 1954.

**G:** In the 1950s, students from Krishna delta of Andhra used to mostly go to universities in North India such as BHU, Allahabad for postgraduate studies, but you went to Thiruvananthapuram. What led you to Thiruvananthapuram? Also, what was the idea behind your decision to shift from Mathematics to Statistics?

**K:** In those days, admissions into statistics program of Andhra University was available only after completion of Master's in Mathematics. Accordingly, I had applied for admission to Mathematical stream, and looking at my good performance in BA, the university admitted me into second year (Honors) (Mathematics). I also applied for Masters course in Statistics in Kerala University, Thiruvananthapuram and got selected. On the advice of Prof. K Nagabhushnam, Professor of Statistics in Andhra University and a teacher of Prof. C R Rao, I accepted the admission in Kerala University and joined the program in June 1954.

It was a class of about 20; except two, all them from Kerala. Since hostel seats were very limited, I had to stay with one of my classmates, Easwaran Kutty, in a neighborhood near the university college in central Thiruvananthapuram. It took time for me to get used to the change in type of food and overcome the indigestion problem.

Five dedicated teachers, including Prof. U S Nair, a highly respected statistician advising the Kerala government, exposed the student group to different branches of statistics, including complex calculation exercises on hand-operated Facit calculators. I worked hard after getting hostel admission and fared well in the University examination at the end of the second year in mid-1956. I was placed in the first division with second rank. My result gave much satisfaction to all my elders and well-wishers. Easwaran Kutty and T R Venkatachalam were my best friends during 1954-56. Venkatachalam joined the RBI in Mumbai and rose to be Director in the credit cell.

**G:** After post-graduation, you had undergone professional training in Statistics at the Indian Statistical Institute, Kolkata for two years. How did it happen?

**K:** At the instance of my uncle Ramaseshaiah, I took the All-India entrance exam for admission to the Advanced Professional Training Program in Statistics conducted by ISI, Kolkata. I was admitted directly to the second year of the three-year program with a seat in the student's hostel. There were about 25 bright students from all parts of India, and proportionately more from the South. Prof. P C Mahalanobis, the architect

of the Indian Second Five-Year Plan was the Director of ISI. Prof. C R Rao was the Head of the Research and Training School (RTS). He, Prof. D Basu, Prof. R R Bahadur, Prof. T P Chaudhury and several others taught a variety of courses in Theoretical and Applied Statistics. The content of the course in Econometrics, however, was rather rudimentary. Haavelmo's Approach to Econometrics (1944), which was the bedrock of the Cowles Commission contributions to Economics, was not covered in the course. The only well-known available textbook was by G Tintner, but its approach was far from modern. The monograph authored by Valvavanis was not easily accessible.

During the Silver Jubilee celebrations of ISI in 1956-57, many world-famous statisticians such as R A Fisher, E S Pearson, Edward Deming, Kolmogorov, JBS Haldane and prominent Indian statisticians in ISI and others such as V M Dandekar and V G Panse, participated in debates and discussions. It was a memorable experience for the budding statisticians.

In the final year of the training program, in 1957-58, a three-month course in Indian Official Statistics was organized in the Central Statistical Organization (CSO) in Delhi. This was followed by internships in National Sample Survey Organization (NSSO) located in ISI, Kolkata, the Perspective Planning Division (PPD) at the Planning Commission in Delhi or in the Statistical Quality Control (SQC) division of ISI located in Mumbai. I was an intern for about four months in PPD, headed by Pitamber Pant. I was asked to work on a report on manpower under the supervision of an ISI employee, G V L Narasimham, a friendly person.

From February 1958, I was an intern in the NSS Survey Design unit in ISI, Kolkata, headed by Dr. D Lahiri. Dr. M N Murty, Dr. V K Sethi and Ms. Nanjamma assisted Dr. Lahiri in the unit. It was a fine opportunity to work under them for about three months on NSS sample design issues.

The two-year period training period at ISI was very rewarding not only professionally, but also socially. The ISI fraternity is a large body spread over all parts of the globe. I used to meet Prof. D Basu and Prof. R R Bahadur in Chicago during my student days. Prof. Bahadur was a Professor in the Department of Statistics. Prof. Basu was a visiting professor there for one year. I called on Prof. C R Rao at College Park in Pennsylvania on my way to Washington, DC from Chicago.

I renewed my contact with Prof. C R Rao when he as President of the Indian Econometric Society (TIES) took keen interest in organizing workshops on data issues in the early 1970s and in the establishment of the *Journal of Quantitative Economics (JQE)* in the early 1980s. A special issue of *JQE* was brought out in the 1990s, when Rao turned 75.

**G:** A logical progression of this training should have been doctoral studies. But that didn't happen. Was there any particular reason behind it?

**K:** The ISI training emphasized applications of Statistics. There was a separate program for theoretical research in Maths and Statistics with fewer seats.

When the three-year program ended in June 1958, job opportunities were inadequate. I applied for a post of Assistant Statistician in DSE, where S Sivasubramonian, the now well-known National Income expert, was the statistician. I was selected and joined it in early August 1958. I was attached to the Agro-Economic Research Centre in DSE. I was invited to teach Mathematics for Economists as a part of the MA Economic Statistics Program. I was found to be an effective teacher and was encouraged to apply for the post of Lecturer in Economic Statistics in DSE, University of Delhi, got selected and became lecturer in August 1959. R Natarajan, my junior in ISI, was selected for a leave vacancy. He and I became good friends. In July 1959, the task of teaching the second year course in Econometrics was assigned to me. V Pandit was among the 20 bright students in the class. In the absence of a suitable textbook, I used to depend upon Cowles Commission monographs. The other courses taught by me were on population studies, index numbers, sampling theory of surveys and the National Sample Survey (NSS) designs.

During 1962-63, I taught a one-year course on Theoretical Statistics to MA Economic Statistics students and also a one-year course on Indian official statistics to MA Economics students and MA Economic Statistics students. The regular teachers in these courses went on foreign assignments.

The Master's program in Economic Statistics, devised and launched by the visionary, and Founder-Director of DSE, Prof. V K R V Rao in the mid-1950s, attracted bright students from all parts of India. Every student was required in the second year to conduct a field survey and prepare a project report. V Pandit, H D Vinod, Suresh Tendulkar, J Mahender Reddy, Potluri Rao, Baldev Raj, Swarnajit Arora, Khetrpal, D B Gupta, and K R G Nair, among many others, were products of this program. They all distinguished themselves in their future careers. I thoroughly enjoyed my five-year pre-doctoral teaching stint at DSE. My foundations in Statistics and Econometrics gained strength. I began my work as Assistant Statistician in 1958, giving statistical advice to members of the Demographic/Population unit headed by Asish Bose. The unit soon became a part of the newly founded Institute of Economic Growth (IEG), along with a few other units originally located in DSE. I worked under the guidance of S Sivasubramonian, the Statistician in DSE.

T C Varghese, a PhD student of Prof. K N Raj used to seek my advice on statistical matters. He was working on land tenancy issue in Kerala. He introduced me to Dharm Narain, another student of K N Raj. He too consulted me occasionally during the 1958-63 period. Dharm Narain later joined IEG and moved on to IFPRI in Washington,

and Varghese worked in FAO, Rome, until his retirement. During 1958-63, my advice on statistical issues was sought by several doctoral students working at IEG and DSE. A revitalized PhD program was launched. C H Hanumantha Rao joined this program in 1958 along with several others. He completed his thesis within four years. I stayed in Gwyer Hall on the Delhi University campus for two years. I came to know Andre Beteille there, a sociologist lecturing in the newly opened Department of Sociology at DSE with Prof. M N Srinivas as the Head. Andre was working on his doctoral thesis in the early 1960s. He later became a celebrity in Sociology.

- G:** How did the idea of going to the US for PhD sprout? Also, what prompted you to shift from Statistics to Economics for PhD in Chicago?
- K:** Having taken up teaching in DSE, I wanted to strengthen my foundation in Economics through rigorous course work, followed by a thesis in Quantitative Economics.

When I became eligible for study leave from Delhi University in 1962, I applied to US Educational Foundation in India (USEFI) for graduate admission with financial assistance and for travel grant. I was selected on the basis of a written test and interview by a Selection Committee by early 1963.

I was awarded the Golodetz Foundation Scholarship for two years and the Fulbright travel grant. The University of Chicago agreed to admit me in its graduate program in Economics beginning in September 1963. This was another milestone in my journey. All Fulbright scholars travelled to the US by ship with a one week stopover in France and the Netherlands. That was a wonderful experience. The group went through an orientation program for about two weeks at Yale University, New Haven.

- G:** Please tell us about your Chicago days: experiences of relocating yourself in the new world; particularly, launching yourself into Economics—How easy was the transition?
- K:** In my first year at Chicago, I took courses in Microeconomics (Price Theory) taught by Harberger, Econometrics taught by J Dreze, father of Jean Dreze, well-known social activist in contemporary India, Mathematical Economics taught by Donald Bear and H Uzawa. I was ahead of the class in Econometrics, and Prof. Dreze exempted me from attendance and exam. I was given the 'A' grade. Harberger, Dreze and Uzawa were great scholars and teachers. Dreze introduced the students to Bayesian Econometrics, which was an upcoming area in Econometrics. Bayesian methods are being widely used these days. Dreze and Arnold Zellner did pioneering research in Bayesian Econometrics.

I qualified in the two optional fields, Econometrics and Mathematical Economics in the comprehensive exams held in summer 1964. I cleared the comprehensive exam in Economic Theory (micro and macro) in March 1965. Qualifying in the three comprehensive exams in 18 months was regarded as quick progress.

At Chicago, I came to know well three Indian post-doctoral fellows: Vinod Kothari of Baroda University, V M Rao of Bombay University and C H Hanumantha Rao of IEG. Interactions with these senior scholars were very rewarding. Suraj Bhanu Gupta, a doctoral student of Friedman, completed his thesis in 1964. Gupta later became my colleague in DSE, where he taught Macroeconomics and Monetary Economics until his retirement in the 1990s. Damodar Gujarati, whose textbook on Econometrics has been popular for several decades, was in the final stage of his doctoral thesis in the Chicago Business School, during 1964-65. Raj Krishna, G S Sahota, and G S Maddala belonged to earlier vintages of Indian students. During my Chicago days, I used to interact with Mallampally Sarma, Padma Mallampally, S V Sethuraman and Potluri Rao who were at different stages of their doctoral studies in Economics. My close friend V N Balasubramanyam (Baloo), once a student of DSE with Prof. Ganguly/Prof. Bhagwati as guide, was pursuing his PhD at the University of Urbana, Champaign, Illinois, was an occasional visitor during 1965-66. Baloo taught later at the University of Lancaster in the UK. He edited volume *Writings on International Economics* by Jagdish Bhagwati, in 1997. He had several other books on a variety of themes in Development Economics. In 2001, Palgrave Macmillan published his book, *Conversations with Indian Economists*, based on his interviews. His Introduction lucidly covered Controls, Public Sector, Agriculture, Education and the 1991 Reforms.

Another friend and well-wisher in my early days in Chicago was P Srinivasan, a junior colleague of Dr. K S Krishnaswamy of the Indian Planning Commission. Srinivasan was doing his Master's degree in Chicago. He and I stayed in the International House on the Chicago University campus during 1963-64. That was his second year. His advice on choosing the right courses in the first quarter at Chicago proved valuable.

During the first three years of my stay in Chicago I had the benefit of auditing the courses taught by Henry Theil, Arnold Zellner, Zvi Griliches in Econometrics, Monetary Economics by Milton Friedman, Industrial Organization by George Stigler, and International Economics by Harry Johnson.

When I was in the final year of my doctoral studies at Chicago, my sister Manorama and her husband Sobhana Rao arranged my marriage with Tripurneni Indira of Angaluru village. Indira qualified for the PhD degree in Physiology at Annamalai University. After marriage in June 1966, Indira and I lived in Washington, DC, near the Brookings Institution, for one year, she as a researcher in a project headed by Dr. Lavenbook at the National Institute of Health (NIH), Bethesda, and myself as a Doctoral Thesis Fellow at the Brookings Institution.

**G:** How did you choose the problem "Production Relations in Manufacturing Plants" for thesis work?

**K:** I approached Prof. Zvi Griliches, a J B Clark awardee, and active researcher in productivity, R&D, and patents for advice in choosing a thesis topic. He had supervised



the thesis of G S Maddala who went on to teach in the University of Rochester in 1963. Griliches encouraged me to work on the estimation of production functions from plant level data, with a view to studying the important theme of Returns to Scale. Very little econometric evidence was available on the theme. He accepted my thesis proposal and put me in touch with the US Bureau of the Census for the requisite data for selected manufacturing industries in the US. I was selected for the Ford Foundation Doctoral Fellowship for the year 1965-66 for my work on the Bureau of the Census data. Production function parameters for three four-digit industries, Blast Furnaces and Steel Mills, Steel Foundries, and Hydraulic Cement in the US were estimated from panel data for plants for the years 1957 to 1963. "Fixed Effects" for plants and years were introduced in the regressions. The Bureau of the Census released matrices of second order moments for the dependent and independent variables of interest for regression analysis. Individual plant level data was not made available.

On account of unavoidable delay in the processing and release of data for my thesis, my progress was slow during 1965-66. For the fourth year, 1966-67, I was awarded the Doctoral Dissertation Fellowship by the Brookings Institution in Washington, DC. This fellowship considerably facilitated my econometric estimation and dissertation writing. I worked hard, and saved time for commuting long distance.

The thesis sought to exploit an unusual but potentially appropriate type of data to estimate production function parameters by conventional econometric methods. Short-run (time series) and long-run (cross sectional) estimates of the parameters were computed and compared. The substantive issue of economies of large scale production was singled out for special study. On the whole, the data yielded "sensible" estimates, thus demonstrating that micro-economic data, in spite of the "noise", can fruitfully be used to measure the micro-economic concept of the production function. The approximate equality between the income share of a factor of production and the output elasticity for the factor, observed in many of the aggregate production function studies, was not confirmed by this study. The departure from competitive equilibrium and errors of observation may have accounted for this divergence. Two of the three industries studied displayed modest degree of economies of scale, while the third showed slight diseconomies. The results indicated that the degree of economies of scale differed between the groups of smaller and larger plants. The hypothesis of unitary elasticity of substitution between capital and labor could not be conclusively rejected for any of the three industries. The two-stage least squares estimates of a complete model consisting of the production function and demand functions for production and non-production workers were found to be not plausible. Finally, the thesis found some evidence in support of the "embodiment" hypothesis.

Prof. Griliches, the Chairman of my thesis committee was most supportive and helpful. Before the end of June 1967, my thesis was approved by the Committee. I defended it in an open presentation attended by faculty and students.

Thus this exploratory study threw considerable light on a variety of issues in the realm of production. Griliches and Ringstad (1971), a frequently cited study, extended the work reported in the thesis. In recent decades the estimation of returns to scale has received a great deal of research attention as a possible determinant of measured productivity growth.

I returned to Delhi in early July, after spending one week in England, the Netherlands and France along with my wife Indira and re-joined DSE fulfilling the conditions of my four-year leave.

- G:** Having returned from Chicago School of Economics to DSE, a shift from neoclassical economics to an environment governed more by Nehruvian economics of central planning, how easy was it for you to adapt to the changed tenets of economics at DSE? Share how you and your wife finally relocated to DSE.
- K:** Chicago university professors, Milton Friedman, Harry Johnson and Arnold Harberger, who visited DSE for presentations in the early 1960s were of different political economy ideologies. Such plurality was very much in evidence in Chicago, particularly in terms of the composition of the faculty, although Friedman and George Stigler were the dominant members belonging to the free enterprise school of thought when I was a student there during 1963-67.

Around the time of departure for the US in July 1963, a major strengthening of the faculty resources was initiated at DSE. Prof. Amartya Sen was appointed as Professor of Economic Theory in the vacancy caused by Prof. V K R V Rao's becoming the Director of the Institute of Economic Growth (IEG) founded by him in 1958. A few months later, Sukhamoy Chakravarty was appointed as Professor of Mathematical Economics. Jagadish Bhagwati was appointed as Professor of International Trade in the temporary vacancy caused by B N Ganguly's joining the DU administration as Pro-Vice Chancellor. Dr. A L Nagar was appointed as reader in Econometrics in the same year. Nagar was Theil's PhD student in Rotterdam.

When I rejoined DSE in July 1967, Prof. Amartya Sen was deputizing for Prof. K N Raj as the Head of the Department. It was a very pleasant experience for me to interact with Sen and watch his conversations with Sukhamoy Chakravarty, another prodigy on economic issues, theoretical and developmental. Raj, Sen and I lived in the same quadrangle near DSE during 1967-68. Sen and I played badminton game occasionally. Mrinal Datta Chaudhri (MDC), who moved from ISI to DSE in 1968, played with us when he visited Sen. MDC and Sen were friends in Presidency College, Kolkata. Prof. Sen was very friendly and hospitable. I sought his help in getting appointed as temporary Reader in Econometrics. This appointment was confirmed by a selection committee within one year. Prof. Sen left for London School of Economics in 1971. At about the same time, Prof. Raj left for Thiruvanthapuram to establish the Centre for Development Studies, and Prof. Manmohan Singh became an advisor in the Ministry of Commerce, Government of India. DSE experienced a

big void. However, in spite of joining the Planning Commission, Sukhamoy continued to teach in DSE, stay on the campus and use the RTL in the evenings. His continued association with DSE was a morale booster to junior colleagues like me and students. Over the years, he became a family friend. Most unfortunately, he passed away in 1990 at the age of 56. That was a great loss to the economics profession in India.

Sukhamoy Chakravarty Memorial Trust was formed in 1992 with Ambassador G Parthasarathy as Chairman and Lalita Chakravarty as Secretary to promote academic and developmental activities dear to Sukhamoy. I was one of the members of the Trust. A Study Room was set up in RTL in the name of Chakravarty, and Chakravarty Memorial Lectures were organized. Recently after the very sad and premature demise of Prof. Charu Sita Chakravarty, Secretary, at the suggestion of Dr. Manmohan Singh, Chairman of the Trust, the Trust was merged with the Indian Econometric Society (TIES) Trust, chaired by Prof. V R Panchamukhi. TIES organized in January 2019, the Sukhamoy Chakravarty Memorial Lecture, delivered by Dr. Vijay Kelkar on the theme 'Towards India's New Fiscal Federalism'. Owing to Prof. Panchamukhi's indisposition, I, as Vice-Chairman of TIES Trust, presided over the Lecture in Mumbai.

Mrinal Datta Chaudhuri (MDC), a student of Paul Samuelson and Robert Solow at MIT, was another well-read and widely respected unifying personality in DSE. He retired in 1999. A L Nagar, a theoretically oriented Econometrician, Dharma Kumar, Economic Historian and Raj Krishna, Public Policy expert were my other senior colleagues in DSE in the 1980s and 1990s.

A major restructuring and modernization of Master's level programs was undertaken in the mid-1960s under the leadership of Raj, and active involvement of Sen, Chakravarty, Bhagwati, Nagar and others. The semester system was introduced. The Economic Statistics Program was merged with the Economics Program. Statistics and Introductory Econometrics were made compulsory in the first year. Two optional course groups in Econometrics were introduced as part of the Economics Program.

Group E: Theoretical Statistics and Econometrics with six semester-length courses.

Group L: Econometric methods with two courses in the sequence.

In July 1967, soon after my return from Chicago, I was assigned the Group L sequence of two courses and two courses in Group E. For Group L, I had only two students in 1967-68. In 1968-69, about 40 students enrolled for this option. Amitava Bose, Ashwani Saith, Vinod Vyasulu, Puran Mongia and Chiranjeeb Sen, who made a mark in their professional careers later, were in the class. In 1970-71, the batch had B Goldar, Pulin Nayak, Usha Ramachandran (Thorat), among others.

During this period, I joined A L Nagar and others to teach Group E students. I taught Probability Theory, Statistical Inference and Multivariate Analysis. Ashok Lahiri and Sureh Aggarwal were my students in Group E during 1972-73. Partho Shome, who became an expert on taxation at IMF, was my student during 1971-72. Both Lahiri

and Shome served as Directors of the institute NIPFP, Delhi, founded by Prof. Raja Chellaiah. They have become luminaries in their fields. I had the distinction of teaching Theoretical Statistics and multivariate analysis to many well-known Indian economists, working in India or abroad.

During the period, 1967-75, my five PhD students in diverse areas obtained the degree. Several others were at advanced stages. I advised informally a larger number of PhD students from DSE and elsewhere without being a formal supervisor. The total academic load was quite heavy. I did not get enough time to prepare papers out of my own thesis for publication. This made my supervisor Griliches unhappy.

After about eight years of heavy academic responsibilities, I craved for some relief and took up a visiting assignment as senior lecturer in Monash University for the year 1976.

My wife, Indira sacrificed her scientific research career for the sake of the family and took up a teaching position in 1968 in Kalindi College, Delhi University, and made a name for herself as a dedicated teacher. She retired in 2001. Most unfortunately, she died prematurely in 2006. She was an ardent believer in female empowerment and she inculcated such values in our two daughters Kavita and Mamata.

- G:** One of your students, Omkar Goswami, lauding your teaching style, wrote: KL “walking in without a scrap of paper, [would] teach fundamentally profound stuff, fill the blackboard with a series of equations ... doing so day in and day out”. Contrasting this with today’s educational technology initiatives such as flipped classrooms/blended learning, ppts, etc., how do you rate the current status of teaching, particularly in disciplines such as Econometrics?
- K:** In recent years, I have taught courses in Econometrics at DSE for MPhil/PhD students, at JNU for MA and MPhil students and IIFT, Delhi, for MA students, using the black board or white board. This method of instruction gives more time to the students to grasp the nuances of Mathematical Derivations. Students seem to prefer this method.
- G:** When did you become Professor of Economics in DSE and what was your immediate feeling on elevation?
- K:** While I was holding a visiting assignment at Monash University in Australia in 1976, I was selected for a professorship in DSE along with the well-known public policy specialist Prof. Raj Krishna. I felt delighted for being selected in absentia, in recognition of my contributions in regard to teaching and research guidance. I joined the professorship in February 1977, after returning from Monash University. During 1977-82, five research students of mine working in different areas earned their PhD degree. Three of them, B Goldar, M N Murty and V L Rao, did very creditable research in later decades.

Delhi University introduced the two-year MPhil Program in 1977-78. Students were encouraged to pursue this program after MA Young scholars with MA degree in Economics got admitted with greater ease to MPhil compared to PhD. Five students, including Adi Bhavani, Mahendra Dev and Nagesh Kumar, worked with me for their dissertation in the late 1970s. At the same time, I continued to supervise several PhD students in different areas of Applied Economics.

In regard to teaching, while the option econometric methods taught by me continued to attract a large number of students, the option Theoretical Statistics and Econometrics taught by A L Nagar, myself, V Pandit, Balvir Singh, R K Das and A Lahiri attracted very bright students. Dilip Abreu, Dilip Mookherjee, Vijay Krishna, Kala Krishna, Arunava Sen and T C A Anant among others, chose this specialization. Some of them are occupying professorships in leading American Universities. One of the factors for the increased preference for this specialization was perhaps the absence of good offerings in Economic Theory and International Economics.

Owing to the depletion of faculty resources and some disenchantment worldwide with Econometrics as a discipline, thanks to lack of robustness of empirical econometric evidence on economic propositions, the six-course optional group was not continued in DSE since the mid-1980s.

During the 1970s and 1980s, I taught courses in Industrial Organization theory and Indian Industrialization, which attracted a large number of students. Suresh Tendulkar sometimes shared the Industrialization course.

- G:** On becoming the Head of the Department or Director of DSE, you must have been loaded with lots of administrative work, which must have come in conflict with your passion for teaching and research. How could you manage these conflicts?
- K:** In spite of having to accept the responsibility of headship of the Department of Economics and Directorship of DSE for several years, I continued to participate fully in teaching and research guidance.

During the 1980s and 1990s my contributions to teaching and research supervision continued. Some 16 MPhil dissertations and eight PhD theses on a variety of themes with my active involvement were completed. I lectured in a number of all-India level refresher courses for college teachers conducted in different parts of India. These courses were sponsored either by the UGC or the US Educational Foundation in India (USEFI). Many of the teachers who attended these courses sought my guidance later in their research work. For me these interactions were a learning experience, and I derived much satisfaction.

During my directorship of DSE in the early 1980s, Prof. V K R V Rao, founder of DSE, accepted my invitation, and addressed the students, staff and faculty on the Annual Day, November 14, in the Vivekananda Hall. He recounted the hard work he had put in for translating his dream about DSE into reality.

In the mid-1980s, as a member of the postgraduate course committee, in the UGC-sponsored Curriculum Development Centre (CDC), with Prof. Ranganath Bharadwaj of the Bombay School of Economics as Coordinator, I participated actively in the deliberations, and played a major role in designing courses in Quantitative Economics and Industrial Economics. The report of the CDC was finalized and submitted to the UGC in 1988. Unfortunately, the valuable recommendations of the CDC were not given due attention, with the result that outmoded curricula were continued in most parts of the country. I have not kept in touch with recent developments.

In the DSE, the MA Economics program was thoroughly revised in the 1990s. Students were introduced to the use of desktop computers and econometric software. Internal assessment became part of overall evaluation in a course. The tutorial system of instruction was continued and strengthened. Teachers at the professorial level too participated in tutorial instruction. Most of the younger colleagues cooperated with enthusiasm. I enjoyed interacting with compact groups of students for tutorials, until my retirement in 2000.

In the early 1990s, the Centre for Development Economics (CDE) was set up with funding from the Ministry of Finance, Government of India, supplemented by a Ford Foundation grant. The main objective of CDE was to augment the facilities and financial resources for research. Kaushik Basu played a leading role. Several teachers including myself supported Basu's efforts. The Ratan Tata Library (RTL), established by Prof. V K R V Rao when DSE was founded, too received a generous grant from the Ministry of Finance. These grants made a big difference in regard to academic infrastructure. I was Executive Director of CDE for one term.

The Director of DSE was in charge of RTL, a part of the Delhi University Library System. The directorship claimed a lot of my time, having to deal with a difficult University Librarian, who had personal rivalry with the Librarian of RTL.

During this period, I had to shoulder the heavy responsibility of chairing the Standing Committee on Industrial Statistics for several years. One major task of the committee, with representation from the ministries concerned and a few state governments by rotation, was to oversee all work related to the Annual Survey of Industries. I was the Founder-Editor of the journal *Sarvekshana* for several years. I was not too happy with the achievements of the Standing Committee on data issues. There was much delay in implementing the recommendations of the Rangarajan Commission on data issues. Fortunately, the Indian Statistical Service became more attractive to bright young statisticians.

I was a member of a four-member Search Committee for the first National Statistical Commission. The Committee was chaired by Dr. Montek Singh Ahluwalia. Prof. Suresh Tendulkar was the first Chairman of NSC. Dr. Pronab Sen was the first Chief Statistician of India.

The Ford Foundation in collaboration with the National Institute of Public Finance and Policy (NIPFP) funded and administered a Post-Doctoral Research Program, initiated in 1989 and completed in May 2001. I was on the Selection Committee of five experts for the first seven annual rounds beginning in 1989 along with four other senior Indian economists. Dr. Raja Chellaiah, and Dr. Amaresh Bagchi, or Dr. Partho Shome chaired the Selection Committee. About four scholars were selected every year during 1989-1997. A total of 38 promising young economists with PhD degree were selected through open competition for one-year study at a university in the US or the UK. The program was reviewed by Dr. I G Patel who found it to be imaginative and well-conceived. As a member of the selection committee, I had the responsibility of mentoring every year at least one scholar and guide his/her post-doctoral research. Many of the grantees are now occupying important positions across the country.

Some of the research studies completed under the NIPFP-Ford program were put together in a volume, *Trade and Industry: Essays by NIPFP-Ford Foundation Fellows* (2001) edited by Ashok Guha, K L Krishna and Ashok Lahiri.

- G:** As a celebrated teacher of Econometrics/Economics for more than four decades, are you happy with the way the subject is being taught today? What is your opinion about introducing new dimensions of learning Econometrics across Indian Universities?
- K:** Very recently, I contributed an essay “Historical Perspective of Econometrics” to a volume *Pluralist Economics and Its History* edited by Ajit Sinha and Alex Thomas (2019). In this essay, I devoted one section to “Progress of econometrics teaching and applied practices in India”. The establishment of the Indian Econometric Society (TIES), the founding of the *JQE*, awards administered by the TIES Trust are discussed. In recent decades, TIES, apart from organizing Annual Conferences where about 300 scholars present their research papers, has conducted refresher courses in Econometrics across the country. The progress is tremendous and the quality of applied econometric research is improving. However, the penetration of the subject in the country as a whole leaves much to be desired. It is hoped that the efforts of the UGC, higher educational institutions in the public and private sectors, such as ICFAI University and TIES will result in the necessary improvement.

Prof. V R Panchamukhi, as chairman of the TIES Trust, Dr. R B Barman as Executive Trustee, Prof. N R Bhanumurthy as Secretary of TIES and Shanmugam, as Treasurer of TIES have contributed much to the expansion of the activities in Quantitative Economics in India in recent years. V Pandit and K R Shanmugam (Eds.) (2008), *Evolving Themes in Quantitative Economics, Academic Foundation*, is a very informative volume on the progress of the subject in India.

- G:** On returning from the US, you have, in the very early phase of your career in DSE, guided two research scholars on topics such as: “Role of Real and Monetary Factors

in Income Determination” and “Fiscal Policy in India”—a clear shift from Micro to Macroeconomics. Please comment.

**K:** In Washington, DC, I became friends with K Krishnamurty of IEG, who, as a student of L R Klein, estimated a macroeconometric model for India for his PhD, in the early 1960s. He joined IEG as a researcher. He and V Pandit, another student of Klein in the late 1960s, continued work in this area for several decades as the IEG-DSE team. The team joined the World Link Project led by Klein. I joined this duo occasionally in their venture. Pami Dua of DSE and N R Bhanumurthy of NIPFP, Delhi, are now attending to this modeling work.

My second PhD student B B Bhattacharya worked on a macroeconometric model for India. Prof. A M Khusro, as a macroeconomist and co-supervisor, played an equally important role. My focus was on the econometric aspects. Bhattacharya was bright, ambitious and enterprising. He worked independently on a variety of issues after getting his PhD degree in 1971. He was on the faculty of IEG for about three decades, served as Vice-Chancellor of JNU for about six years. He passed away prematurely a couple of years ago. His junior colleague in IEG, Prof. Arup Mitra edited a volume of essays, in his memory, *Economic Growth in India and its Many Dimensions* (2018) published by Orient Black Swan.

The traditional approach of macroeconometric modeling associated with Jan Tinbergen and L R Klein was pursued with gusto until the end of the 1970s in different countries including India. The verdict on this approach was far from positive. Since the 1980s, other modeling approaches, such as VARs, cointegrated VARs, DSGE models have been pursued. This literature has become too vast to be covered here.

My colleague in DSE, T Mathew, older than myself, as my third PhD student, got registered with the topic “Some Aspects of Fiscal Policy in India”. He worked on the issue of incidence of corporation income tax. I had no time to pursue this line of research. Mathew shifted to North East Hill University (NEHU) in the mid 1970s. Although I supervised theses in diverse fields in Applied Economics at DSE, my primary interest was in Industrial Economics, and several of the MPhil and PhD theses were in this area.

**G:** Incidentally, somewhere in the 1990s you have, with a few others, reviewed the research in macroeconometric modeling in Asia. From that perspective, do you consider policy modeling, particularly, the way expectations are factored into models by the academia in India today is keeping pace with the changing policy perceptions and macrotheoretic paradigms?

**K:** In my essay “Historical Perspective of Econometrics” included in *Pluralist Economics and Its History* edited by A Sinha and A Thomas (2019), I have attempted a review of the recent developments in Macroeconometrics, drawing attention to the relevant



chapters in *The Handbook of Macroeconomics*, Volumes 2A and 2B, edited by J B Taylor and H Uhlig.

I should now refer to relevant chapters in *Some Issues in Macroeconomics: A Quantitative Approach*, edited by B Kamaiah, S V Seshaiyah and G R K Murty (2014). This Festschrift in Honor of Dilip Nachane, contains 31 chapters, classified into five broad areas: Monetary Economics, Banking and Insurance, Financial Economics, Development Economics, and Economic Theory and Econometrics. This rich collection, with a Foreword by Dr. C Rangarajan, will be used extensively by Indian scholars working in different areas.

**G:** Your prime area of research was Industrial Economics. How did you get into this field? Also, while pursuing this line of research you must have encountered problems of availability of data and its reliability. Please tell us how you tackled these teething problems.

**K:** My PhD thesis used data for American industry. While working on my thesis, my familiarity with literature on various aspects of Industrial Economics became extensive. Industrialization of India has been a dominant theme after independence. Soon after my return to India in 1967, I succeeded Dr. Arjun Sengupta as the doctoral supervisor of Asit Banerjee for his thesis, “Capital Intensity and Economic Efficiency Indian Industry”. In the early 1970s, B Goldar started his doctoral thesis on “Productivity Growth in Indian Industry” under my supervision and completed it in 1978. In the late 1970s and the early 1980s, I got exposed to the literature on industrial stagnation in India. In the early 1990s, Dr. Isher Ahluwalia consulted me while working on her influential contribution, “Productivity and Growth in Indian Manufacturing”. The findings of Goldar and Ahluwalia differed on some aspects. My supervisor Griliches, when he visited India for two weeks in the early 1980s, came to know about the differences and suggested to me that I should try to pay special attention to this problem. Since I advised both of them individually, I wrote in 1987 an article “Industrial Growth and Productivity in India” attempting to reconcile the two sets of results. This was published in a volume edited by Brahmananda and Panchamukhi (1987).

Several of my PhD and MPhil students at DSE worked in the broad area of Industrial Economics. I am proud of my students. They were indulgent to my perfectionism. I am quite happy with the overall quality of work on Indian industry. I helped and guided a very large number of MPhil and PhD students. I did not expect or claim joint authorship from any one of them.

Prof. D U Sastry of IEG joined me in supervising two doctoral dissertations and a few MPhil theses. One of the PhD students was K V Ramaswamy, now in IGIDR. Recently, he edited a volume of essays on Labour and Employment. DSE and IEG collaborated actively for about four decades in administering the doctoral research program. My long association with IEG, where several of my former students have been faculty members, was noted in my short piece in IEG at Fifty (2008).

Prof. N S Siddharthan and I supervised the PhD theses of Aradhna Aggarwal and K Narayanan. Both have been very successful academicians.

- G:** Did your research on productivity growth reveal any shift in the production frontier of post-reform India owing to technological innovations/research? And if found, is it across the sectors or more confined to any specific segment/s of the economy?
- K:** Growth accounting is the most common approach to productivity measurement. Since Robert Solow's 1957 paper giving Total Factor Productivity Growth (TFPG), as output (value added) growth minus weighted sum of growth rates capital and labor inputs, several improvements in the methodology have been suggested and implemented. The literature is rich and voluminous. The KLEMS approach proposed and implemented by Jorgenson, Gollop, and Fraumeni and implemented for the US economy in 1987, has been adopted by the OECD in 2001 and the World KLEMS Initiative in 2010. India KLEMS project is part of the World KLEMS initiative.

In the India KLEMS project, the economy is divided into 27 sectors. Data on output, (Gross output/Value added) and inputs, capital (K), labor (L), energy (E), materials (M) and services (S) have been generated using National Accounts Statistics (NAS), Input-Output (IO) transaction tables and other official data sources, for each of the 27 sectors annually for the years 1980-81 onwards. Data updating on an annual basis has been undertaken. Data on factor shares have also been constructed.

The India KLEMS datasets along with the Data Manual are on the RBI website. The project was originally located in ICRIER during 2009-13. Subsequently the project was shifted to the CDE at DSE. Members of the research team have produced research papers every year on different themes, presented them at World KLEMS and Asia KLEMS conferences. B Goldar, K L Krishna, S C Aggarwal, D K Das, A A Erumban and Pilu Das (2017), "Productivity Growth in India Since the 1980s: The KLEMS Approach", *Indian Economic Review*, Vol. 52, November 1-2, December 2017 provides productivity growth estimates of considerable interest. I owe much to Prof. Goldar and Dr. Deb Kusum Das, for their roles as Advisor and Coordinator, respectively.

The main findings on productivity growth are:

- TFPG during the 35-year period 1980-81 to 2014-15 was of the order of 1.2% per year, compared to 6.2% Gross Value Added (GVA) growth. The contributions of capital stock, persons employed, capital composition and labor composition (quality) were 3.1, 0.82, 0.33, and 0.73 percentage points (ppts), respectively, implying that capital deepening was the most dominant factor in Indian economic growth. The contribution of labor quality was almost as high as that of labor quantity.
- TFPG accelerated over the two sub-periods, 1980-93, and 1994-2014, from 0.79%, to 1.84% per annum. The most recent sub-period, 2003-14, with the contribution of TFPG to GVA growth at 24%. However in this sub-period, the contribution of labor quantity to GVA growth was the least at 0.55% ppts.

- At the broad sectoral level, electricity, gas and water supply sector and non-market services sector achieved the highest TFPGs of 1.23% and 1.06%, respectively. The construction sector was afflicted with negative TFPG of -1.81% per annum. Agriculture fared best in the sub-period 2003-14, with TFPG of 1.00%. TFPG being negative at -0.25% in the sub-period 1994-2002. Market services and manufacturing sectors performed best in the post-2002 period.
- With regard to the contributions of intermediate inputs to gross output growth, Materials (M) input was the most dominant source, exceeding even that of capital stock. Services (S) input too was very important.
- Factor reallocations across the 27 industries made significant contributions to growth of labor and capital productivity growth, especially during 2003-14.

**G:** Although your research stayed focused on Industrial Economics for long, you did visit International Economics: guided two scholars for PhD on topics such as ‘exports determinants’ and ‘terms of trade’, the topics that became quite relevant as India is getting more and more integrated with the global economy. But you have not pursued those lines of research that intensely as much as Industrial Economics. Please comment.

**K:** V L Rao started his thesis on Determinants of India’s Exports around 1970, with Dr. Manmohan Singh and myself as supervisors. He could not work full time on the thesis because of his job outside Delhi University. Dr. Singh was gracious enough to continue as supervisor even after taking up important full-time Civil Service assignments in the central ministries and RBI. Rao submitted his thesis towards the end of the 1970s. I devoted much time to this thesis. He held several important positions in Trade Development Authority and RIS, Delhi.

Surajit Deb worked on Sectoral Terms of Trade and Trickle Down Mechanism in India for his MPhil with Prof. Sukhamoy Chakravarty and myself in the late 1980s, and Multi-Sectoral Analysis of Terms of Trade for his PhD in the late 1990s with myself and Prof. T C A Anant as supervisors. Surajit was quite innovative in his work. He was bold enough to explore new approaches of analysis.

I could not find time to engage myself in the areas pursued by V L Rao and Surajit Deb.

At JNU, as visiting professor recently in Centre for International Trade and Development (CITD), I was co-supervisor for three PhD theses in the international trade area. Prof. Manoj Pant was Supervisor for two theses and Prof. Alokesh Barua was supervisor for the third. I gave a lot of my time to the students.

At JNU, I co-supervised the thesis of T P Sinha on ‘Black Income’. Prof. C P Chandrasekhar was the Supervisor. I focused on the econometric aspects of the thesis.

**G:** You have also focused on agricultural productivity. Narrate your experiences in this area, particularly your experiences with regard to the quality of data and the econometric tools that you have to design/redesign to overcome such hurdles.

**K:** I have not focused on agricultural productivity research. I contributed one chapter on agricultural productivity to a volume in honor of Prof. C H Hanumantha Rao edited by Profs. Radha Krishna, Mahendra Dev, and S K Rao. That review chapter covered international aspects too.

Soon after my return to DSE in 1967, I devoted much time to the PhD thesis of G R Saini working in the area of Agricultural Economics under the supervision of Prof. A M Khusro, and some time to that of D P Chaudhury working on Education and Agricultural Productivity under the supervision of Prof. Amartya Sen. My advice was on econometric issues in such cases.

**G:** “Evaluating, critiquing and interpreting the findings of several research papers to synthesize the current state of knowledge in the subsets of a discipline is more demanding than writing an original paper”, said my professor once. What is the motivation behind your writing several such review papers?

**K:** Being an intrinsically perfectionist, I am not easily satisfied with my own independent work in applied econometrics. Obtaining definitive and robust results requires more effort and time. I derive some satisfaction in sympathetic evaluation of the work of others and offering suggestions for improvement. This type of evaluation has helped younger researchers.

**G:** On your formal retirement from DSE, your colleagues arranged a conference “Industrialization in a Reforming Economy: A Quantitative Assessment”. Please comment.

**K:** The CDE, at the DSE, organized a conference in my honor during December 20-22, 2000 on the theme: Industrialization in a Reforming Economy: A Quantitative Assessment. The organizing committee was chaired by Late Suresh Tendulkar, my colleague and close friend.

The conference was funded by at least eight organizations. It had 12 sub-themes conducted in different sessions, in addition to the inaugural session at which Dr. C Rangarajan gave the inaugural address. Prof. Deepak Nayyar, Vice-Chancellor, presided over the session. Dr. Robert Evenson of Yale University delivered the keynote address. Several delegates from the US, the UK and India presented about 70 papers on the 12 sub-themes. Kaushik Basu of Cornell University gave the valedictory address.

The conference was a great experience. Many academic peers and dozens of young researchers took the trouble of presenting research papers. I had interacted with many of these young researchers earlier and commented on their work. Other young scholars, I met them for the first time at the conference. Selected set of papers were published by the Academic Foundation in 2006. The editors of the volume were

S D Tendulkar, Deb Kusum Das, Arup Mitra and K Narayanan. I owe a deep debt of gratitude to CDE, DSE, the organizing committee and the four editors of the Conference volume. Jai Mohan Pandit, now with IGIDR, as Manager in CDE, contributed immensely to the success of the Conference.

**G:** Retirement for people like you might have been a nightmarish experience. How did you handle it?

**K:** I retired formally in August 2000. I continued to teach the courses in Econometrics till December 2000. In an honorary capacity, I have been teaching the optional MPhil/PhD course in Econometrics, whenever there are students opting for Econometrics. The demand ceased after 2016. In most years, I shared the course with regular faculty.

I have been a co-supervisor for two PhD theses submitted recently. One student qualified for the PhD degree.

When I was about to retire in 2000, Prof. Isher Ahluwalia, then Director, ICRIER asked me to be a senior consultant in ICRIER. I was earlier associated with her research on Indian industry. I was in ICRIER for about two-years as part-time consultant. I made myself available to researchers for advice. Several of the researchers were my former students.

At ICRIER, I wrote the working paper “Trends and Patterns in Inter-State Disparities in India”. This was published in a volume in honor of Prof. U Sankar, Former Director, Madras School of Economics.

The CITD at JNU invited me to teach the Advanced Econometrics course, after Prof. A L Nagar gave up teaching there and I taught the course for five years.

I was a visiting Professor in CITD for two years. In CITD, I was co-supervisor for three PhD theses. Prof. Manoj Pant was supervisor for two and Prof. Alokesh Barua for one. The CESP in JNU invited me to teach econometrics for one semester a few years ago. I was co-supervisor for a PhD thesis in CESP with Prof. C P Chandrasekhar as the supervisor.

In 2004, I was invited to a National Conference in honor of Prof. K N Raj held at his birth place Thrissur, Kerala. Raj, the founder of CDS, Thiruvanthapuram, had retired from CDS. He was Professor in DSE from 1953 to 1971. It was during his leadership of DSE that Amartya Sen, Sukhamoy Chakravarty, Jagadish Bhagwati and several other luminaries were attracted to DSE. Apart from presenting a paper at The Conference in Thrissur, I accepted to edit the volume of essays along with Prof. A Vaidyanathan. The editing was done at DSE. The volume, *Institutions & Markets in India's Development: Essays for K N Raj*, Oxford University Press was released in Thiruvanthapuram in 2007.

In recent years, I devoted much time to writing papers and book reviews. The papers are “The Saga of the Delhi School of Economics: A Sketch” (2017), “Glimpses of the

Literature on International Inequality and Catch-Up” (2018), and “Historical Perspective of Econometrics” (2019).

- G:** Post-retirement from DSE, you are leading the India KLEMS Productivity Project of the World KLEMS that was funded by RBI since 2009. What prompted you to undertake such a gigantic project?
- K:** On the advice of Prof. Dale-Jorgenson of Harvard University, India KLEMS Productivity Research Project was launched in ICRIER in 2009 with funding from RBI. A comprehensive report covering the period 1980-81 to 2008-09 was submitted to RBI in 2013. This project has become part of the world KLEMS initiative launched at Harvard University in 2010. The project is now located at the Centre for Development Economics. I attempted a detailed answer in connection with an earlier question.
- G:** Given the constraints such as wide industry variations in productivity growth, also variations between periods, non-availability of data pertaining to non-registered manufacturing, and employment and unemployment surveys by NSSO being available for benchmark years only, how adoptable you think the datasets being presented by KLEMS initiative are?
- K:** Please see the detailed account of our research attempted above. We have in collaboration with a Chinese scholar, compared the productivity growth performance in China and India over the 30-year period 1981-2011. It was found that India performed better than China in regard to TFPG, although China was ahead of India in GDP growth.

We are now attempting a comparison of productivity levels at individual industry level. We have some preliminary results.

- G:** The hallmark of the new framework for productivity measurement is said to be the concept of capital services, including the services provided by Information Technology (IT) equipment and software. What is your opinion on the current state of such studies in India? And, how the KLEMS Productivity Project headed by you is addressing this issue?
- K:** Some members of the India KLEMS research team are studying the contribution ICT capital to output growth. Data on ICT capital is scanty. The India KLEMS project has used capital services as a measure of capital input. The labor input has two components, quantity (number of persons employed), and composition, based on age and education.
- G:** With your active association with research in the field of productivity dynamics in India’s service sector, how do you view the impact of the growing fervor for nationalism across developed countries on India’s service sector? And what kind of structural changes it could cause in employment in India?
- K:** I have not given enough thought to this aspect, although productivity in the market services sector has been analyzed in our research.

- G:** Economics being concerned about understanding economic behavior and the implications of such behavior for economic policy, how do you rate the usage of production datasets brought out by KLEMS by the policy makers of the country?
- K:** Some well-known policy analysts, such as Nitin Desai and Sudipto Mundle, have made use of the India KLEMS datasets. Researchers in RBI and elsewhere are making use of the KLEMS data sets constructed by the India KLEMS team for research on a variety of issues.
- G:** Since reforms were launched, India has been witnessing consistently high growth rate vis-à-vis rest of the world. Yet, it is often lamented that growth in employment is not picking up momentum. What, according to your research studies, could be the underlying reasons for such mismatch between growth in GDP and employment growth?
- K:** We have commented on this aspect in our research papers using India KLEMS data sets. It was observed that “employment grew at 2.1% per year during 1980-1993 but it fell to 1.6% during 1994-2002 and further to just 1% during 2003-2011. The growth in persons employed during the entire period of study, 1980-2011, is led by construction and the services sector, possibly due to less labor regulations, followed by the secondary sector-consisting of manufacturing, electricity; gas and water supply and then agriculture. There has been a structural shift of employment from agriculture to construction and services, especially market-based services.

The plausible reasons for slow growth in employment have been low labor force participation rates, especially by females, low labor intensity, and use of high capital intensive technology in production. The quality of labor in India is characterized by the poor among the employed, low share of persons employed with skills (employed persons with education level “above higher secondary” was only 10.2% in 2011 in the total economy), low growth rate in educational attainments, high proportion of persons employed as casual labor and a very high share of unorganized sector employment.

Though the Indian economy is supposed to enjoy the fruits of demographic dividend and achieve high growth rates but the recent trend of falling employment elasticity (just 0.07 during 2003-2011) paints a very disappointing employment scenario. Even the sustainability of the service sector to provide jobs in future is in doubt because of its falling employment elasticity in recent years.”

- G:** What is your opinion on the current status of quantitative research in the sphere of public policy in India? What are your suggestions for bettering it?
- K:** I have not found time to pay much attention to public policy issues. I will make a few observations. Since the days of P C Mahalanobis in the mid-1950s, economic planning and public policy in India has benefitted from the advice of economists with quantitative

orientation. B S Minhas, Sukhamoy Chakravarty, A Vaidyanathan, Y K Alagh, Vijay Kelkar, Suresh Tendulkar and Raj Krishna Montek Ahluwalia have advised the Government of India. In recent decade, almost all the Chief Economic Advisors, Nitin Desai, Ashok Desai, Deepak Nayyar, Shankar Acharya, Arvind Virmani, Ashok Lahiri, Kaushik Basu, Raghuram Rajan, Arvind Subramanyan and Krishnamurty Subramanyan with excellent quantitative skills have rendered policy advice. RBI governors, Rangarajan, Bimal Jalan, Y V Reddy *et al.* advised the government. There has been no paucity of policy advice. Political economy considerations are important for the government.

- G:** Looking at the kind of ongoing controversies being heard about the relationship of a scholar and guide from universities, what kind of yardsticks you think an academicians should follow to pick up a scholar and to identify a topic for thesis writing?
- K:** This is an important issue. It cannot be answered in a few words. The chemistry between the guide and the student plays a big role.
- G:** How important are integrity, research conduct and ethics in economics research?
- K:** There cannot be a second opinion on the importance of integrity, ethics and commitment in economic research.
- G:** Currently you are heading Madras Institute of Development Studies as its Chairperson. Would you please elaborate on the kind of role you are playing and the research activities you are overseeing in it?
- K:** I have been chairperson of MIDS since August 2013, succeeding Prof. R Radhakrishna who brought about peace and stability in MIDS. I was able to identify worthy scholars for the directorship of MIDS in 2014 and in 2018. A restructuring of the Faculty so as to infuse young blood and enhance the economics component has been undertaken. The Career Advancement Scheme (CAS) as approved by the governing council and ICSSR has been implemented from 2015. A Blueprint for MIDS as a Centre of Excellence in Social Sciences (COESS) has been prepared. A lot of credit for these achievements in MIDS goes to the Director Prof. S Bhide who displayed unusual dedication and commitment. The Board of Trustees (BOT) and the Governing Council of MIDS greatly appreciated the progress achieved in recent times. MIDS has a new director, Prof. P G Babu, who was earlier in IGIDR, Mumbai. I am optimistic that MIDS will scale new heights in the coming years. The vision of its founder Prof. Malcolm Adiseshiah will be realized as MIDS approaches its Golden Jubilee soon.
- I would like to record my deep sense of appreciation to the members of the Search Committees for their sound advice and cooperation in identifying Prof. S Bhide in 2014 and Prof. P G Babu in 2018 for the directorship of MIDS.
- G:** Before that, you also worked as Chairman, Centre for Economic and Social Studies, Hyderabad. Please explain the kind of research activities that you have overseen in the CESS?



- K:** I was a member of successive search committees for the Directorship of CESS. I was a member of the governing council for some years until 2007. I was Chairperson of CESS for two three-year terms, 2007-10, and 2010-13, in a purely honorary capacity. CESS had established healthy traditions since its inception. Highly respected social scientists and civil servants have been members of the governing council. I received much support from them. As Chairperson, I ensured that academic standards were maintained and appointments/promotions were based entirely on merit. This of course meant that I did not please everybody. CESS has had very decent scholars as Directors. They inspired confidence among the faculty and administrative staff. The Government of Andhra Pradesh extended much support to the activities of CESS.
- G:** Before winding up the interview, permit me to raise a few questions of personal nature. Who are your favorite econometricians and economists, both from within and outside the country?
- K:** Several econometricians abroad have won the Nobel Prize in Economics. There are about one dozen of them. In addition, Zvi Griliches, Dale Jorgenson, G S Maddala, William Greene and Arnold Zellner from the US have been my favorites.
- G:** During the last six decades, you have worked on a variety of topics. Yet, are there any topics that you would have liked to have worked on but could not pursue? And going back 40 years, is there anything in your research that you think you would have done differently?
- K:** As I got exposed to diverse areas in supervising/guiding MPhil and PhD theses, I became interested in various areas. But my capacities are limited. I have had very little time to pursue new areas on my own. I should not do a job superficially.

At a personal level, I feel appalled by the poverty, social and economic inequality, and superstition in India. Mahatma Gandhi is the Father of the Nation. But his values are forgotten, or receive lip service. There is little progress in cultivating a scientific bent of mind. Fortunately, there are several social activists highlighting the misery of the masses. But politicians pay scant attention to the virtues of honesty, fairness and simple living. Let me end this interview with the hope that there will be good progress towards the attainment of the Sustainable Development Goals (SDGs).

I am grateful to you for your patience in conducting this prolonged interview. ❖

**Books Edited/Co-Edited by Prof. K L Krishna**

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