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GUEST EDITORIAL

## Statistics in India Today – Past Perfect, Future Tense!

Today we are all used to the idea of young Indian techies travelling all across the world providing IT solutions and services. But hardly anyone knows that a similar trend started 50 years ago. What? You ask incredulously. But there were no computers then, let alone PCs. Very true. Those techies were statisticians, helping many nations, some free and others still in colonial bondage, in their attempts at development. How did this come about? To answer such a question, we have to trace a little bit of history.

Statistics is a young discipline, barely a hundred years old. It came to India as Professor P. C. Mahalanobis travelled home from England after the First World War and discovered that a journal named *Biometrika* of this fledgling discipline had many things potentially useful for India. Perhaps the first Indian to get formal education in this subject was P. V. Sukhatme, who completed his Ph D in statistics from the University of London in 1936. He settled down in Delhi as a founder leader of a small statistics group within the Imperial (later, Indian) Council for Agricultural Research. Soon his work became well known and in 1956 he was appointed Director, Statistics Division, Food and Agriculture Organization, UN, Rome. There was a general awareness that progress in agriculture needed research, which in turn needed statistics. But a trained statistician was a rare breed. The new chief knew of one source of manpower. ICAR Delhi. The rest, as they say, is history.

1933, the year in which young Sukhatme joined the University of London was also the year in which Mahalanobis founded the Indian Statistical Institute (ISI). He launched a series of statistical researches concerning critical social issues of the time such as management of floods, assessment of yields of jute and other crops, anthropometrical analysis of ethnic elements of Indian society. ISI attracted an outstanding pool of talent and soon became (by an act of Parliament) an institute of national importance. Associates of Mahalanobis such as S. N. Roy, R. C. Bose and C. R. Rao dazzled the world by their contributions to theory of statistics. By 1960, India began to be counted in the top league of nations in the field of statistical theory and practice. The league consisted of UK (where modern statistics flowered), USA and Russia.

Today, the discipline of statistics in India can boast of a separate ministry in the central government (Ministry of Statistics and Programme Implementation), a separate arm of bureaucracy (Indian Statistical Service), a world class set up for information gathering called National Sample Survey Organization, several specialized research institutes (ISI, Indian Agricultural Statistics Research Institute, Institute for Research in Medical Statistics), nearly a dozen journals, about 100 educational centres that offer training at Master's and Ph D level and perhaps a thousand or more colleges with degree programmes. In this age of outsourcing, many pharmaceutical industries have established centres for statistical analysis of their data, in Mumbai. Similar centres for business intelligence use statisticians for analytics (stock market, retail sales management, etc.). This is a very creditable list for any country.

And yet, all is not well. Is the statistics community able to face challenges arising from problems of development? Regrettably, the answer is far from a resounding yes. There are many problems. Some of these may be common with other fields of science while some may be peculiar to statistics. Among the common problems, we face low demand for seats and low quality of entrants, small number of Ph D awards, a shortage of researchers and a great variation in the quality of training and output. In addition, one major problem I see is failure to respond to current needs such as in insurance and drug research. Considerable activity in these fields has led to greater demand for statisticians but universities have paid little attention.

Not only has the educational establishment been unresponsive to changes in the business world, there is a lack of response to the changing technology scene as well. We need to develop new statistical tools to analyse satellite imagery as well as medical images such as MRI. To my knowledge only a couple of statisticians work on problems of interpreting such images. Use of micro array chips in genetics and related fields is on the rise. Again very peculiar statistical problems are involved in interpretation of these measurements. In the absence of good statistics, conclusions drawn (e.g. genes selected for further work) may go wrong more often. Again no thrust has been developed in this area. Lack of purpose and focus is apparent in the fact that even in areas of traditional strength,

fact that even in areas of traditional strength, our grip is loose. A good example is sample surveys.

Mahalanobis and Sukhatme – two founding fathers of statistics in India – both recognized and emphasized the role of statistical sample surveys. India became well known for achievements in theory and practice of sample surveys. The situation has changed a lot since then. Most experts in the field have retired and the number of new entrants is miniscule. There is hardly any serious research being done in the country on survey methodology. The Ministry of Statistics and Programme Implementation is running out of names to be included in advisory committees.

What is the situation on the institutional front? The Indian Statistical Institute, the jewel in the crown, continues to get full support from the Central Government. It is still looked upon as the main source of expertise and advice. But one sometimes wonders if the institution is gradually losing its focus. For the last many years, scientists who are not statisticians hold Directorship of the institute! In fact the position should always be held by an eminent statistician. New academic programmes started by the institute are in areas other than statistics. The number of statistics teachers/scientists in the institute is on the decline. Lastly, a record of the institute working with industry is not satisfactory.

The Indian Agricultural Statistics Research Institute is another apex body. It leads all statistics groups in agricultural universities and ICAR institutes. This entire community is rather insular. They have their own society, their own journal, and their own conferences. They rarely write in other journals or attend other conferences. I suspect that it leads to isolation. The principle 'larger the lake, larger the fish' works against such exclusive clubs.

Research institutes such as IISc, CCMB and NCL need to develop their own statistics groups. There is lot of discussion about drug discovery and drive to get patents. But many CSIR institutes (with some exceptions such as CDRI Lucknow) carry on merrily with hardly any inputs from statisticians. This is in stark contrast with the fact that in the three major medicine markets in the world (USA, Europe and Japan) a new drug approval application without strong statistics component is inconceivable.

However, there are some indications of growth. The number of places offering postgraduate training has gone up gradually and today there may be around one hundred such places. But the number of teachers at a place may be small. Indeed I know some Universities where the number is just one! There is of course great variability in terms of the quality of training given. I have already pointed out the need to keep syllabi abreast of current societal re-

quirements. As far as style of teaching is concerned, it is dominated by formalism, theorems and proofs. Emphasis on independent work, reading of journals, problem solving, giving seminars, etc. is low. There is hardly any connect with real life problems and current practice of statistics. A course on design of experiments involves no experiments and a course on sample survey theory requires no first hand experience of participation in a survey. The so-called practicals are anything but that. There is little interaction with users and hence low appreciation of practical difficulties or inadequacies of current theory. The culture of collaborating with colleagues in other disciplines needs to be nurtured among students and teachers.

If people do not go to their colleagues next door, going to an outside industrial concern seems even more unlikely. My guess is that most statistics teachers have never seen the inside of a factory as a statistician. Of course one may argue that it takes two to tango. Indian industrial concerns have shown precious little enthusiasm for use of statistical tools to enhance quality or productivity. Their profits came, not from better production but from adroit management of licenses and permits. There was little incentive in a seller's market to improve performance. There is more than a proverbial grain of truth in this argument. But now our frontiers have opened up. There is a lot of international competition. Shortages have disappeared. Some companies face a crunch because cheaper and better imports are available. So, survival instinct forces such units in distress to look for help. Other companies have become ambitious and want to sell their produce in the world bazaar. But buyers in the West often lay down stringent quality specifications and statistical norms. All this should be music to the ears of a statistician. This turn of the tide in favour of statistics remains to be exploited but gives hope for future.

One area where we see clear growth is publication of statistics journals. One or more journals get published from Bengal, Assam, Uttar Pradesh, Gujarat, Maharashtra, Kerala, etc. Department of Statistics, Kolkata University is home to three journals. This surfeit of numbers has expected consequences. The number of submissions is low as is rejection rate and quality. Some of these publications serve only one purpose namely making many people editors and associate editors. Major consolidation is needed here.

One can only hope that the community of statisticians in India will shed its isolation and sloth, rise to the challenge of the new era and in the process bring success and prosperity to their parent institutions and students. Posterity will judge them harshly otherwise.

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