RESEARCH
Newsletter
of the Research & Publications Committee, IIMA
March 2009

Chairperson's Message

We wish all our readers a joyous 2009 !

We are thankful to Prof. Arnab Kumar Laha for accepting to take up the task of coordinating the Research Newsletter. At this juncture, we also remember about the wonderful job of coordinating the earlier two issues of Newsletter by Prof. Asha Kaul. Thank you very much Prof. Kaul for your efforts in rejuvenating the Research Newsletter.

In this issue we carry an interview with Prof. Kanti V. Mardia of University of Leeds, where he talks about future directions in statistics and interdisciplinary research, Synopsis of a study conducted on Dew Water Yields on Galvanized Iron Roof by Prof. Girja Sharan, D. Beysens & I. Milimouk, and finally two research summaries – The Fortune at the Bottom or the Middle of the Pyramid? and Customer Satisfaction and Service Quality Measurement in Indian Call Centres study conducted by Prof. Anand Kumar Jaiswal.

If you think that any of the research reported here might be useful to you for your professional work, do write to us. We will be glad to forward your request to the faculty concerned

We look forward to your feedback on this Newsletter so that we can improve upon it.

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In Conversation with Prof. Kanti V. Mardia . . .

"Statistics without science is incomplete,
science without statistics is imperfect" – K. V. Mardia

Prof. Kanti V. Mardia is Senior Research Professor at the University of Leeds – a position especially created for him. He was awarded the Silver Medal of the Royal Statistical Society in 2003 (the last recipient of Indian origin was Professor C.R. Rao in 1965!). The citation for the award reads "The Guy Medal in Silver for 2003 is awarded to Kanti Mardia for his many pathbreaking contributions to statistical science, including two fundamental papers read to the Society, his highly acclaimed monographs and his lasting leadership role in interdisciplinary research."

He founded the LASR Workshops in 1973, which have grown into international conferences. His recent research covers many fields.

Prof. Mardia was on IIMA campus to deliver a research seminar on "Holistic Statistics and Contemporary Life Sciences" on December 15, 2008. Shortly after the seminar, Prof. Goutam Dutta and Prof. Arnab K. Laha caught up with Prof. Mardia for a short discussion on his views on the future directions in statistics, interdisciplinary research and related issues. Here are some excerpts.

AL (Arnab Laha)

What do you foresee will be the main threads of development of statistics in the next 20 years?

KVM (K.V. Mardia)

It is not possible to exactly foresee what will be the development of statistics in the next 20 years. However I may make some predictions based on the developments that have happened in the last decade. In recent years, new methods of acquiring data have become available in many fields like medicine, genetics, engineering, management etc. and this has led to requirement of new statistical methods for analysis of these data.

In this context, I would like to share my experience of working on image analysis. When I started to work on image analysis, the images were very coarse. But over the time with improvement in the technology of capturing images, the images have become lot sharper. The analysis of images over the years has given rise to a large number of problems which required development of new statistical methods. For example, problems of object recognition, classification, and discrimination with image data have all led to development of exciting new statistical methods. For the purpose of object recognition shape is an important attribute. After Kendall and Bookstein gave initial ideas of how to quantify shape a lot of work has been done by me and others regarding the distribution of shapes and analysis of shape data. The Mardia-Dryden distribution is now regarded as an important probability model for distribution of shapes.

Another area of my recent interest is Proteomics. Very little statistical work had been done in this field before the turn of the century as there was very little communication between the biologists and statisticians. With better communication now, statisticians have been able to lay their hands on challenging problems and huge amounts of data–mostly multivariate and high dimensional–emanating from this field. Analysis of these data is again triggering development of new methods of statistical analysis.

In my opinion, data mining is still largely in the hand of practitioners and this field poses several interesting problems for statisticians which can lead to development of new statistical methods. I think the future trend in statistics will be a hybrid of model based statistics and algorithmic statistics.

Myself and Walter Gilks wrote an article entitled "Meeting the statistical needs of 21st century science" in *Significance* (a Royal Statistical Society journal), December 2005 issue which you may find useful in this regard.

GD (Goutam Dutta)

How do you foresee these developments will impact management as a discipline?

KVM

I am not so familiar with management to be able to exactly foresee the impacts of these in management as a discipline. Having said that,

I have also seen how the works of Taguchi in Design of Experiments and more recently the Six Sigma quality initiative have impacted quality of products and profitability of companies. I am quite confident that some of the new developments in statistics will substantially impact marketing and finance fields.

AL

Do you see a convergence of the fields of statistics and data mining (as we know them now)?

KVM

As I have said earlier, new ways of capturing data is leading to creation of huge data sets in many fields like genetics, medicine, engineering, marketing, finance etc. Analysis of these huge volumes of data is presently being done in an ad-hoc manner by practitioners of data mining. Data mining is essentially hunting for patterns in a data set. It has powerful applications in many fields apart from management, like in drug discovery where virtual screening is used to identify molecules having potential for becoming drugs. Over the time new statistical methods are being developed for accurately addressing the data mining problems.

AL

How do you think the recent developments in management will impact statistics and statisticians?

KVM

Real data arising in any field, including management, is often complex. They are difficult to analyze as they contain outliers, have multimodality, shows skewness, and is a mixture of discrete, continuous, ordinal and nominal measurements. Traditional statistical methods may not always be able to answer questions based on such data. It is, therefore, quite possible that some questions in the fields of marketing management or finance may lead to new developments in the field of statistics. Further, I feel statisticians should go beyond just writing mathematical papers– into development of algorithms, programs and software. They should try to make the new methods developed by them easily accessible to scientists and practitioners of other disciplines.

My paradigm of describing holistic statistics is: New Questions New Data New Methods. New questions raised in management or any other field of study will lead to new data being captured which in turn will lead to new methods of analyzing such data. In this way, other subjects like management will impact statistics and in turn will be impacted by it.

Box - I

Indian architects have produced many intricate geometric shapes from time immemorial. A recent example is of 15th century of tendril circling in varied but replicated forms of delicate tracery (ornamental Kalpavalli). The picture is of marble ceiling panel 4' x 4' of the Ranakpur Jain Temple (Rajasthan). These shapes had influenced me personally from a very early age. Sorry to say that the fractal equation of this particular figure is still eluding experts!

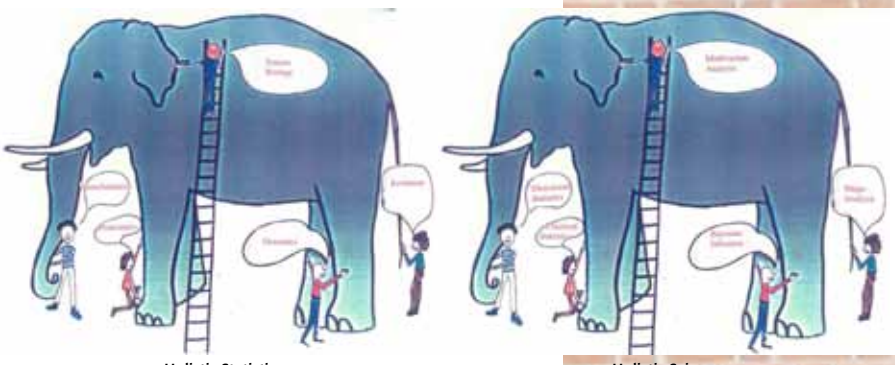
GD

How do you value interdisciplinary research? Should it be promoted? If so, how?

KVM:

I am the greatest believer of interdisciplinary research. I strongly advocate it. I have during the course of my own career have worked with scientists from various disciplines and have gained immensely from such association. The culture of interdisciplinary collaboration in statistics stems from the times of Karl Pearson and Ronald Fisher, both of whom had worked extensively with scientists from different disciplines. I believe interdisciplinary collaboration can greatly help a scientist in understanding the challenges being faced by the scientists in a different discipline and can spur new developments in his/her own field. However, interdisciplinary research takes time as both parties need to understand the language of the other which may not be an easy task.

Box –II



Holistic Statistics

Holistic Science.

The two elephants show the concept of holistic science. One is related to holistic statistics emphasizing that in researching any scientific problem, one should really use varied tools available to statisticians as well as be ready to go for new developments if the subject does not cover the particular aspect of the problem. Other elephant shows life sciences like other sciences is very vast with lot of sub-fields. Again one should see interaction among different elephants to produce a good holistic science. Knowledge could only evolve through cross-fertilization as it happens among a herd of elephants!

As the only second Indian to win the prestigious Guy Medal in Silver what is your advice to young researchers about pursuing their research and career goals?

KVM

They must do what they like best with full commitment. Creativity is important–one needs to think of one self as an artist. They should remember that interdisciplinary research is exciting and can give rich dividends. Finally, while choosing the problems for their research they should strive to go beyond the boundaries of their own discipline and try to look at the bigger perspective.

GD

How do you value teaching? How do you think top Indian institutions which are globally regarded for their excellence in teaching can develop and sustain a high quality research culture?

KVM

In Leeds University we believe in "teaching in an atmosphere of research and research in an atmosphere of teaching". Research and teaching should go hand in hand and both have to be of good quality. For this reason in UK we have both the RAE and TQA. RAE is for assessing quality of research while TQA is for assessment of quality in teaching. I think creation of well-funded research centres can help in fostering a research culture. This has been my experience in Leeds where the university administration has created several research centres like Centre of Medical Imaging Research, Centre of Statistical Bioinformatics etc. with adequate funding and this has greatly helped in producing high quality research work.

AL

What ensured the success of Leeds Annual Statistics Research (LASR) workshops? How has that contributed to development of research at Leeds University?

KVM

The success of the LASR workshops can be attributed to bringing together of world-class scientists and statisticians, encouraging cutting-edge interdisciplinary research, and development of workshop themes that are in some sense complementary to other conferences. Some of the recent workshops have addressed themes such as Systems Biology and Statistical Bioinformatics, Interdisciplinary Statistics and Bioinformatics, Quantitative Biology, Shape Analysis and Wavelets, Stochastic Geometry, Biological Structure and Images, Functional and Image Data Analysis, The Statistics of Directions, Shapes and Images etc. These have led to increasing awareness of new cutting edge areas for innovative statistical applications and methodologies among scientists and statisticians at Leeds University and elsewhere.

Reference

1. Mardia, K.V. and Gilks, W. (2005): "Meeting the statistical needs of 21st century science", *Significance*, 2, 162–65.
2. Mukhopadhyay, N. (2002): "A Conversation with Kanti Mardia", *Statistical Science*, 17, 1, 113-48.

Study of Dew Water Yields on Galvanized Iron Roof in Kothara (North-West India)

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Shortage of drinking water is chronic in arid coastal areas of North West India. The possibility that dew may also be a source of potable water was noticed in the year 2001. A three-year R&D programme led to development of devices that condense dew using radiative cooled plastic condenser surface. Up to 15 – 20 mm of dew water can be collected in eight-month dry season. Working installations have been made on large roofs and on open ground. It was noticed that many buildings in the area - fodder warehouses, factory sheds , cattle sheds - have galvanized iron (GI) roof, on which condensation occurs pointing to the possible use of these to produce water. However, no report existed on the condensation behavior of these. A study was therefore carried. Two roofs, each with 9m2 area, made of un-insulated GI sheet were erected at Kothara for study. During the study period, the cumulative dew yield on an 18 m2 double-sloped (30°) test roof was 113.5 L (6.3 mm). The west-facing side gave 35% higher water yields than the east-facing side. The use of thermal insulation and more IR radiative materials would have increased this yield by 40% (8.9 mm or 160 L). This is appreciable though lower than that from the plastic surface. Based on this finding, it can be recommended that the owners of large metal roof buildings in coastal areas could use these to–produce water by simply installing gutters and storage.

Sharan, G; Beysens, D.; and Milimouk, I., (2007) "A Study of Dew Water Yields on Galvanized Iron Roof in Kothara (North-West India)," *Journal of Arid Environment,* vol 69, Issue 2, April 2007 pp 259-69. Elsevier, Cambridge, UK.

The Fortune at the Bottom or the Middle of the Pyramid?

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C. K. Prahalad and Stuart Hart suggested in 2002 that instead of disregarding low income consumers as inaccessible and unprofitable, multinational corporations should view them as an unexploited business opportunity. However, I argue that the bottom of the pyramid (BOP) approach does not take a holistic perspective. Several weaknesses in the BOP theory often go unacknowledged. I offer an alternative perspective on the BOP concept. I argue for the facilitation of selective consumption by the poor by avoiding their undesirable inclusion and exclusion. Undesirable inclusion means marketing products to the BOP that are not likely to enhance their wellbeing or that they are likely to abuse. Exclusion means failing to offer them products or services that are likely to enhance their well-being. A framework is presented for assessing the appropriateness of large corporations' participation in BOP markets.

The paper also emphasizes the need to strengthen the role of the poor as a producers and providers. Production systems that create large employment opportunities help greatly in fighting poverty. The paper discusses the models such as Amul and Shri Mahila Griha Udyog Lijjat Papad which facilitate decentralized production by thousands of milk farmers and lowincome women contribute immensely to income generation by the poor. The paper also discusses other unintended consequences of BOP approach. It presents the view that BOP initiatives may also create serious problems. It discusses the case of the Coca-Cola's alleged involvement in groundwater depletion in Kerala in India. The paper also points out the role played of several factors or "BOP enablers" which are often overlooked and which facilitate organizations to serve BOP markets.

This paper was published in the *Innovations* in winter 2008 issue. *Innovations* is an MIT Press journal and is co-hosted at the Kennedy School of Government, Harvard University (Belfer Center for Science and International Affairs); the School of Public Policy, George Mason University; and the Massachusetts Institute of Technology (Legatum Center for Development and Entrepreneurship).

Customer Satisfaction and Service Quality Measurement in Indian Call Centres

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Most business organizations see call centres, services as a potentially effective way of keeping customers happy and satisfied, and gaining competitive advantage. However, it is widely argued that in reality call centres have failed to realize their actual potential in helping organizations achieve the goals of providing high levels of customer satisfaction.

The purpose of this research is to examine customer satisfaction and service quality measurement practices followed in call centres. The study uses qualitative methodology involving in-depth interviews. The respondents were senior managers belonging to quality or operation divisions in four large call centres in India. It is found that service quality management in call centres disregards customers. Customer orientation in assessing service performance is either low or absent in most call centres. The study shows that call centres managers overly depend on metrics comprising operational measures for service quality evaluation. Over-reliance on operational measures results in focusing on calls rather than call outcome as experienced by customers. Operational variables cannot provide a true picture of how customers perceive service quality. Most operational measures in fact only act as indicators of efficiency. Efficiency-driven approach can cause several undesirable consequences such as customer defection and loss of market share.

The study adds to our understanding of what makes a customer satisfied in call centre transaction. It shows that there is a gap in the literature – both practical and theoretical. The gap is that we assume that operational indices are a valid surrogate for measures of customer service. Further, this is the first systematic study that examines customer satisfaction and service quality measurement practices in call centres in India.

Anand Kumar Jaiswal, Managing Service Quality (2008, Volume 18, No. 4), an international journal published by Emerald Publications

Seminars organized at IIM Ahmedabad by Research & Publications (2008-09)

Topic	Speaker	Date
Performance Modeling of Web Servers under Overload	Dr. Varsha Apte	July 14, 2008
Carrier-Forwarder Contracts in the Air Cargo Industry	Dr. Diwakar Gupta	July 21, 2008
Developing Programmatic Research	Dr. Vinay K. Garg	November 11, 2008
Toy Recalls and China: Emotion Vs. Evidence	Dr. Hari Bapuji	December 11, 2008
Holistic Statistics and Contemporary Life Sciences	Prof. Kanti V. Mardia	December 15, 2008
What is the Value of Real-Time Shipment Tracking Information?	Prof. M.M. Srinivasan	December 24, 2008
The Impact of Social Contagion on What to Buy, How to Buy and Whom to Buy from: Evidence from High-Tech Durable Goods Market	Prof. Rakesh Niraj	January 2, 2009
A Multi-level Analysis of Organizational and Individual Determinants of Performance and Satisfaction of Frontline Employees in Service Organizations	Prof. Jagdip Singh	January 12, 2009
Value Chain Management of Globally Operating Companies	Prof. Niina Nummela	February 5, 2009
Public Sector Restructuring and Reform in the UK: Context and Labour Relations Implications	Dr. David Beale	February 13, 2009