

ISI Occasional Papers and Studies #4

The Moriguti Report on the Role of Statisticians
A Discussion

**THE MORIGUTI REPORT ON
THE ROLE OF STATISTICIANS:
A DISCUSSION**

Voorburg

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INTRODUCTION

At the 1993 ISI meeting in Florence, Italy, I chaired a discussion of the Moriguti Report by distinguished statisticians. Let me give some of their major points.

A.P.J. Abrahamse noted the need for statistical education of national decision-makers and the hazards of interpretation of statistical software programs. Ian Castles said statisticians must help measure how well public policy has achieved its goals nationally and internationally in government, business, academia, and research. Ivan P. Fellegi advised that although important series should be maintained, a statistical agency must be responsive to the inquiries of its funding sources to justify its support. Y. Franchet found that recent changes in Europe have led to greater needs for information and that we need to recognize that lack of statistical information can be much more costly than its collection. P. Garonna noted the increase in number of statisticians in Italy, the need for promoting statistical thinking, and the importance of the concerns expressed in the Moriguti Report. J.K. Ghosh emphasized the importance of the roles of the trained statistician in decision making and therefore in governments and parliaments, and the importance of integrating theory and applications by every statistician. Carlos M. Jarque outlined measures to achieve some of the goals of the Moriguti Report, including cooperation of ISI and National Statistical Societies, developing an inventory of statistical systems and programmes, creating alliances between statisticians and computer professions to cope with intensive use of information and knowledge. Zoltan Kenessey suggested international activities ISI could sponsor that would implement aspects of the recommendations of the Moriguti Report. William Seltzer emphasized the need for high ethical standards among statisticians and the desirability of more stimulating presentations of our work. Considerable discussion from the floor amplified these remarks and led ultimately to a vote supporting a Declaration about the Moriguti Report stated below.

Frederick Mosteller

LIST OF PANELLISTS:

Moderator: F. Mosteller (ISI President/Harvard University/USA)*

Panel:

A. Abrahamse (Director-General/Statistics Netherlands/The Netherlands)

I. Castles (Chief Statistician/Australian Bureau of Statistics/Australia)

I. Fellegi (Chief Statistician/Statistics Canada/Canada)

Y. Franchet (Director-General/Eurostat/Luxembourg)

P. Garonna (Director-General/National Institute of Statistics/Italy)

J. Ghosh (ISI President/Indian Statistical Institute/India)

C. Jarque (President/INEGI/Mexico)

Z. Kenessey (ISI Director/The Netherlands)

W. Seltzer (Director UNSTAT/USA)

* Prof. Mosteller was President of ISI at the time of the Discussion; now he is serving as Past President on the ISI Council

MORIGUTI REPORT: BACKGROUND

In 1988 the ISI set up an Ad Hoc Committee on the Role of Statisticians under the Chairmanship of Prof. S. Moriguti. The Committee was composed of the following members:

Sigeiti Moriguti (Japan) *Chairman*; Peter J. Diggle (UK), John C. Gower (UK), Katherine K. Wallman (USA), Wang Show Ren (China)

The Committee's mandate was:

- To catalogue the problems affecting the profession due to inadequate perception on the useful role and positive contribution of statisticians in modern society;
- To make an inventory of the significant national or regional initiatives which aim to ameliorate the problems;
- To advise on possible steps that the ISI might take as a contribution in this effort.

The Committee, working mainly by correspondence, eventually produced a report, "The Role of Statisticians" published in the *International Statistical Review* (1992), 60, 227-246. Its seven main recommendations were as follows:

- Recommendation #1: The International Statistical Institute should act as a focal point for promoting the understanding of the statistical system as a major part of the "information infrastructure" of the world.
- Recommendation #2: The International Statistical Institute should stimulate adequate actions to be taken by nations depending upon the level of development of their statistical system.
- Recommendation #3: The International Statistical Institute should promote the role of "statistical thinking" more than that of the role of statisticians per se.
- Recommendation #4: The International Statistical Institute should encourage alliances of statisticians with computer specialists.
- Recommendation #5: The International Statistical Institute should allocate resources to public relations, especially with respect to the mass media.
- Recommendation #6: The International Statistical Institute, in its publications, should use part of the space for promoting the general role of statistical thinking, the overall role of statistical methods, and the proper involvement of statisticians in various social and economic fields.

Recommendation #7: The organizations within the International Statistical Institute should adopt specific actions, as appropriate, along the lines stated in the above broad recommendations.

During the Special Meeting, held in Florence on August 25, 1993, on the occasion of the 49th Session of the ISI, the following general motion was approved by a large majority of participants:

Declaration:

We, the participants attending the 49th Session of the International Statistical Institute in Firenze in 1993, recognizing the comprehensive usefulness of quantitative information in the rapidly and drastically changing world, and the important role that statistics can play, by extracting relevant messages out of the vast amount of available data or by providing efficient design of experiments and/or data collection and guiding in proper analysis and interpretation of the results, which will be essential to good policy decisions, research work in various fields, and innovative actions in business and industries, believing that statistics is an important subject in education at all school levels and its continuation throughout people's lives, recalling our determination toward "integration of statistics", meaning close interplay between the "aesthetic aspect of the theory and the "utilitarian" aspect in various fields of application, as well as intimate contacts between statisticians in all countries, developed and developing, and remembering the "ethical code" we published in 1985, declare that we will do our best, individually, collectively and in cooperation with international and other related organizations, both to enhance our own capabilities and to promote the public recognition of the role of statisticians as mentioned above.

We means, strictly speaking, the majority of participants attending the Wednesday morning meeting on the Moriguti report on the role of statisticians.

Recognizing summarizes the important role which statistics and statisticians can and should play in the present world.

Believing stresses the point that statistics should be an important subject in education, from kindergarten up through all school-levels and also in continuing education.

Recalling refers to the Duncan-Durbin report on the integration of statistics, and adds the meaning of the word "integration" using two keywords used by R.A. Fisher and P.C. Mahalanobis in Tokyo in 1960.

Remembering refers to the "ethical code" published by ISI in 1985.

Declare describes, in broad terms, our determination to do something to promote public recognition of the role of statistics and statisticians as described under Recognizing.

SYNOPSIS OF PRESENTATIONS BY MEMBERS OF THE PANEL*

A.P.J. Abrahamse (*Director-General/Statistics Netherlands/The Netherlands*)

In his discussion, Prof. Abrahamse remarked upon the peculiar and ambiguous public attitudes that exist towards the statistical profession. In drawing comparisons with the medical profession, he pointed out that, while the general public was hesitant to consult the statistical profession in situations where such contact was wanting, contact between the general public and the medical profession was considered commonplace. He maintained that public ignorance of the statistical profession could be compared with public attitudes towards the medical profession, with the following qualification: *People are often ignorant of what medical specialists do, but this does not prevent them from consulting these specialists.*

Recognizing the importance that Prof. Moriguti's Report places on the classification of problems affecting the statistical profession and their potential solutions, Prof. Abrahamse related his personal experiences as Director of the Netherlands Central Bureau of Statistics and as former Professor of Statistics at the Economics Department of Erasmus University in Rotterdam.

Referring to the Report's recommendation that Government should increase its appreciation of the importance of gathering unbiased and suitably defined statistical information as a prerequisite of good government, he commented that, in the Netherlands, there was little cause for complaint as the Dutch statistical system was well developed, was allowed to operate on an independent basis, and had not suffered disproportionately from budget cuts. He explained that the Central Bureau of Statistics was regarded as an essential part of the information infrastructure of Dutch society to the extent that its maintenance was considered a public responsibility.

In comparison, Prof. Abrahamse explained that his experiences in an academic department were disconcerting and pointed out the deficiency of statistical education in the faculty of economics, which was responsible for the education of future political leaders and businessmen in the Netherlands.

Mentioning the Moriguti Report's statement that the ignorance of what statisticians do is one of the reasons why statistics is a favourite area for budget cutting, he stated that many people are not even aware of their ignorance in the field of statistics. He commented that many behavioural and technical scientists tend to overestimate their statistical insight and capabilities. Prof. Abrahamse stressed the danger inherent in "short-cut" statistical techniques, such as those generated by the availability of commercial statistical software programs: *I want to stress the danger that the easier some technical results can be obtained the less the necessity and difficulty of correct interpretation of the results are recognized.*

* This compilation, prepared at the ISI Permanent Office by Daniel Berze, is based on materials received from the authors and on notes taken at the meeting, but contains only selective references to each contribution.

Addressing the statistical courses available for professionals, he observed; *It is my experience that particular statistical courses for professional economists and engineers are seldom appropriate to repair insufficient previous statistical education. It appears to be very difficult to convince such people of the fact that statistical thinking should be a basic element in their daily professional work.*

Looking to the future, Prof. Abrahamse emphasized the need for statistical training in the education programmes of future researchers and decision makers, and maintained that statistical education should be integrated with subject matter.

Ian Castles (*Chief Statistician/Australian Bureau of Statistics/Australia*)

Mr. Castles reminded the audience of the motion passed during the ISI General Assembly in Tokyo in 1987, which identified a serious situation in relation to the recognition of the importance of statistical activities in industry, in research institutions and in universities. Although this problem was not seen to exist to the same degree in governments, Mr. Castles pointed out that in the 1980's and 1990's there have been significant constraints on government expenditures which most everywhere have impacted budget-dependent agencies, including statistical offices.

Mr. Castles suggested that the effects of contemporary austerity be placed in a historical perspective. He pointed out that one of the most significant transformations in human affairs, which has taken place in our lifetimes, has resulted in the recognition of the need for a quantitative or statistical approach to the study of a wide range of economic and social issues, and a perception "that the measurement of the extent to which the objectives of public policy had been achieved was a task in which statisticians have an important role to play".

Mr. Castles explained that the catalyst for this awakening recognition of the statistical sciences came during the outbreak of the second World War. Mr. Castles illustrated his point by quoting Sir Alex Cairncross, the distinguished British economist, who pointed out that before World War II, there were no statistics of the kind now taken for granted: ...no GNP, no index of industrial production, no balance of payments (except in very tentative form), no adequate consumer price index... What statistics there were appeared in obscure publications...that were hard to read and little read. It was not that there were no official statistics: there was a vast flood, particularly of trade and employment statistics. But these were not put together, added up, adapted for use, intended for use and published so as to invite use. It took the war to bring about the major change in presentation and use.

Mr. Castles referred to Prof. Moriguti's observation that "too much is like too little" in that a flood of data was as problematic as a drought of data.

Another element responsible for the dramatic transformation, according to Mr. Castles, was the emergence of disciplined thinking about quantities. For the first time national governments, and not only individual scholars, became interested in the measures of quantities which were most

relevant, the classifications which were the most serviceable, and the principles of classification which were the most robust.

Mr. Castles alluded to the comprehensive study of the history and development of national accounts "The Income of Nations" written by Prof. P. Studenski, who observed: *Before the war, finance ministers either dismissed national accounts as the idle speculations of academic minds and as having no practical utility whatsoever or, at best, referred to them merely as interesting information, for the accuracy of which they could not vouch. Now these same ministers, or their successors, used these estimates as a basis for their fiscal and economic programs.*

Mr. Castles emphasized that it was the wartime and postwar partnership between statisticians and economists that developed disciplined thinking about economic concepts and quantities, thus resulting in the most dramatic contribution to the evolution of the role of official statisticians. Mr. Castles observed that the rapid development of official statistics in recent times has created associations not only with economists, but also with mathematicians, accountants, sociologists, demographers, epidemiologists, information technologists and experts in management and public administration. He remarked that statisticians have been forced to recognize:

- the international magnitude of their work;
- the fact that disciplined thinking about quantities must necessarily embrace the capacity to make temporal and spacial comparisons.

Mr. Castles emphasized the importance of the development, maintenance and implementation of internationally accepted standards as having become an increasingly important part of the official statistician's work.

Mr. Castles concluded his remarks by stating: *The International Statistical Institute provides a structure within which statisticians involved in the increasingly multidisciplinary development of official national and international statistics have the opportunity for productive interaction with statisticians in business enterprises, universities and research institutions. The role of statisticians as such may have become more difficult to define and to explain, but in advanced societies it has also become increasingly more pervasive and more important.*

Ivan P. Fellegi (*Chief Statistician/Statistics Canada/Canada*)

Dr. Fellegi focused his presentation upon the need to enhance the relevance and image of official statistics and divided his comments into four sections; maintaining awareness of users' needs; attempting to meet priority user needs; generating a supportive public environment; and improving the chances of adequate funding.

Maintaining Awareness of Users' Needs:

Dr. Fellegi explained the importance of interdepartmental consultations, and stressed that, given their impact on the national policy agenda, government agencies were to be considered priority clients. Dr. Fellegi pointed out that, in order to maintain an effective central statistical service, member governments of the federation must perceive the central statistical service as being a national rather than a federal government service. Dr. Fellegi described several programmes that had been introduced at Statistics Canada which helped to maintain the awareness of users needs, such as:

- the introduction of fifteen expert advisory committees (in fields such as demography, international trade, national accounts, price measurements, etc.), together with the National Statistics Council, whose function is to advise the Chief Statistician, the secretary and other appropriate persons in Statistics Canada on broad issues of statistical policy and program balance;
- the re-evaluation of every programme, by external experts, every five years;
- the monitoring of policy initiatives to stimulate anticipatory planning;
- the liaison with other user groups such as trade associations, chambers of commerce, professional associations, etc.;
- specific programme consultations on the occasion of major programme designs;
- analytic feedback;
- market feedback.

Attempting to Meet Priority User Needs:

Dr. Fellegi suggested that the first challenge in trying to meet user needs is to ensure that statistics already collected are fully exploited. In order to maximize the usefulness of available information, Dr. Fellegi advocated the need for an extensive marketing programme, which becomes more effective if the resulting revenues are allowed to revert back to the statistical office. Dr. Fellegi explained the fundamental importance of having the statistical office use its resources to meet the highest priority user needs, and that it have a transparent internal planning process to ensure that it continues to do so. In times of budgetary constraint, Dr. Fellegi warned against the implementation of infrastructure cuts, explaining that although statistical output can always be reinstated in improved budgetary climates, intrinsic capacity can take years or even decades to rebuild. Dr. Fellegi illustrated the necessity to develop a strong capability for client sponsored surveys, as a particular success of Statistics Canada's effort to meet priority user needs. Relying

on their extensive infrastructure, Statistics Canada was successful in winning contracts on quality and price performance even though overheads were fully charged.

Generating a Supportive Public Environment:

Dr. Fellegi outlined the core practices required in order to engender a supportive public environment:

- legal protection of confidentiality;
- protection of privacy;
- use of sound survey methodology and quality assurance methods;
- an active policy to disclose errors and quality limitations;
- non-political objectivity.

In addition to these core practices, Dr. Fellegi elaborated upon several externally oriented approaches which helped to generate a supportive environment.

Improving the Chances for Adequate Funding:

Although it is in the public interest that statistics receive adequate funding, Dr. Fellegi explained that it was the statistical office's responsibility to improve the chances of this happening. To do this, the statistical office must:

- foster an awareness of critical information gaps;
- foster an image of excellence in management.

In his concluding remarks, Dr. Fellegi indicated that the improvement of the public image of official statistics was dependent upon a multiplicity of factors, and it is only when all of these factors come together that the full potential of the statistical agency can be realized, to the benefit of the country's population.

Y. Franchet (*Director-General/Eurostat/Luxembourg*)

Mr. Franchet emphasized the greater need for statistics in the present world climate. He explained that the world has become more unpredictable than at the beginning of the century, and cited events such as the fall of the Berlin wall, the collapse of the Soviet Union, the difficulties associated with the strengthening of the European Community and efforts to achieve a NAFTA treaty as examples of political events which have created new hopes and new uncertainties.

Against a backdrop of a world full of uncertainty, Mr. Franchet emphasized that official statistics were able to help by reducing uncertainty in the decision making process, and cited the progress made towards an European Community Union and the Maastricht Treaty as examples of this progress.

Mr. Franchet pointed out that closer links between Member States and the European Community has led to a greater demand for comparable harmonized timely statistics from the European Commission and Member States and indicated that as the European Union becomes a reality, citizens and businesses will need these statistics.

Mr. Franchet commented that the recommendations included in Prof. Moriguti's Report pertained to the situation existing in Central and Eastern European Countries: *A new Role for statistics is also obvious in those Central and Eastern European Countries which are moving towards democratic market societies. This includes the Republic of the former Soviet Union. In these countries, the demand for new statistics which reflect the market and enable the democracy to function is increasing fast. New statistical systems have to be built, new surveys launched, a new type of dissemination and data protection developed. Key elements to succeed in such circumstances are training and assistance from market economies.*

Mr. Franchet urged politicians to become more involved in discussions concerning their needs for adequate statistics in a time of uncertainty. While conceding that increased statistical collection results in increased costs, Mr. Franchet asked the audience to reflect upon the cost of "non-statistics", in which the absence of statistical information may result in incorrect decision making.

P. Garonna (*Director-General/National Institute of Statistics/Italy*)

Mr. Garonna focused his comments on two issues raised by the Moriguti Report:

- how the labour market is affecting the position of statisticians;
- the contribution that statisticians can give to cultural and scientific progress.

Examining the labour market's influence on the statistical profession in Italy, Mr. Garonna pointed out that, in an analysis of the Italian labour market (by profession) on the basis of Census data, statisticians figure prominently among the fastest growing professions. Quoting results from a special survey on university graduates, Mr. Garonna provided evidence of the much stronger labour market performance of statisticians. In a country such as Italy where the drop-out rate at the university level is fairly high, students in statistics show more than a regular pace of progress; in the last ten years, the number of graduates in statistics tripled while on the average, graduates increased by 32%. Although these figures provide a promising view of the future of the statistical profession, Mr. Garonna qualified his remarks by pointing out that the total number of statisticians

is still very small; less than 1% of all university students, a proportion that has not varied significantly since the 1960's.

Looking at the functions taken up by employees with a degree in statistics, Mr. Garonna expressed cause for concern, pointing out that these people tend to be under-represented in management and staff positions and over-represented in data processing and research positions. Mr. Garonna indicated that this seemed to substantiate a risk and a limit that has been clearly pointed out by the Moriguti Report, i.e. the position of unequal partnership, or even "subordination" and "periphery" of statisticians in the occupational structure. Summarizing the results of an Italian study which has revealed that only 38% of employees with a degree in statistics felt that their studies were important or satisfactory in relation to the skills required by their jobs (as opposed to 62% for employees with any other degree), Mr. Garonna commented that statistical skills are still strongly under-utilized or not adequately utilized.

Alluding to ISTAT, one of the largest employers of statisticians in Italy, Mr. Garonna remarked that although the number of ISTAT employees has diminished, the number of ISTAT employees holding statistical degrees has increased from 14% in 1984 to 20% in 1992. Combining the employees of statistical offices in the central government administration, in the public utilities companies, local health units, chambers of commerce and in regions and municipalities, a total of 4,000 people have been counted. Mr. Garonna stressed that this amount corresponds to only a small fraction of the number of offices that could be established in the future.

Mr. Garonna pointed out that the booming market for statistics in the private sector has resulted in one of the more promising, yet at the same time, threatening developments for statisticians. Promising, because it demonstrates a considerable increase in the demand for statistical information coming from not only policy makers and other governmental agencies, but also from business, the media, and the individual citizen. The increasing demand is proof of the increasing awareness of the importance of statistics for decision making, and of the need for timely, relevant, comprehensive and comparable data. Mr. Garonna indicated that the necessity for reliable and objective information was compounded by unstable social and economic environments. Although the instabilities present in daily life open up a promising outlook for statisticians, Mr. Garonna indicated that;

- an active policy stand is required;
- the skill profile of the statistician is profoundly affected;
- there are implications for career patterns that have to be carefully considered.

Mr. Garonna discussed the relationship between statistics, science and culture, and stressed the need to reaffirm that statistics was a science, and should be recognized as such. More importantly, Mr. Garonna pointed out the fundamental contribution that statistics can provide to bridge the gap between science and society, culture and politics.

Mr. Garonna maintained that the Moriguti Report had clearly indicated the way forward by stressing that "partnership relationships should prevail" and that one should aim at promoting statistical thinking rather than the role of statisticians. Mr. Garonna concluded his remarks by asserting;

- these (the Moriguti Report) recommendations can be reformulated in more ambitious terms, attributing to statistics and statisticians a leading role in bringing science closer to society, for the sake of statistical progress, and more broadly, in the name of the progress of science.

J.K. Ghosh (*ISI President-Elect/Indian Statistical Institute/India*)

ISI President J. Ghosh began by saying he would draw on his experience as a theoretical statistician in a developing country who has often interacted with scientists in other disciplines as well as official statisticians in the government. He said he would try to comment on general issues as well as some issues relating to developing countries.

Professor Ghosh pointed out that a basic fact, which has both positive and negative implications, is that the need for statistics is more visible than the need for statisticians. There ought to be two sorts of responses to two kinds of situations, which are described below. On the other hand there are obvious dangers inherent in the untrained use of contemporary statistical software and it has to be stressed that softwares are no substitute for a trained statistician. Indeed most organizations requiring data analysis should make use of the expertise of a statistician in much the same way that a chartered accountant would be utilized to deal with the complexities of financial analysis. On the other hand the statisticians should be pleased that their subject is being put to new use and advanced in new ways by computer scientists, meteorologists, people who make inference from satellite images and many others. The right response in this case should be one of reaching out to them and interacting with them in a fruitful way through joint meetings and joint projects. That is how statisticians have responded in the past to emerging sister disciplines like econometrics and demography.

A more general and more subtle issue related to the above is the question of identity of the professional statistician among professional users of information in an age marked by an explosion in information generation and transmission.

Clearly one key element in the role of a professional statistician in information processing will continue to be his ability to provide a single probability based paradigm for dealing with uncertainty and variability. A second related key element would be his contribution to standardization through standard solutions to many recurring specific problems. A third element might be the way a statistician will store data to ensure easy access for interaction with the data base for 'statistical' questions.

There is also a problem of image building for both statistics and statisticians. Both are perceived as auxiliary tools or people in the service of other disciplines. There is some truth in this, but often

wrong conclusions are drawn from this, namely, that statisticians are relatively unimportant and consequently dispensable when there is a budget cut. Such a wholly unjustified inference has to be countered on various fronts. It is here, but not only here that image building can help. In some forums one has to point out, with examples, what can happen, and how things can go wrong when there is no statistician to plan a survey, or design an experiment or contribute to risk assessment of a complex system. But generally at all forums statisticians must learn to sell themselves, possibly with the help of people who know these things well and point out that a statistician is as indispensable as an accountant. Such efforts will need to focus on the role of statistics and statisticians in the decision making process, particularly in the government sector. Attention must also be focussed on the relevance of statistics and statisticians in major scientific discoveries and applications as well as routine applications such as the clearance of new drugs. This issue is further discussed later in connection with budget cuts and how to cope with them in a developing country like India.

After discussing these general issues, Professor Ghosh spoke for some time on the scenario in developing countries.

He said one of the major problems there was that so many things which ought to be functional remained ornamental. After a great deal of effort, an apex national advisory committee for statistics was created in India to advise on emerging needs. For example, it was hoped that it would take an initiative in setting up information systems at the micro level of what is called a 'block' of villages, with the help of the Department of Science and Technology. But so far nothing has happened; the committee remains ineffectual.

A second problem is that of budget cuts. While this is also a recurring problem in developed countries, the consequences are far more severe in developing countries where the total quantum of support for science and technology is in any case very small in absolute terms. In particular this means libraries are starved, and the latest software or hardware is beyond the reach of most, if not all, institutions.

One consoling factor is that statistics has not been singled out for specially harsh treatment. On the whole the cut has been proportional to the existing budget. However, this does cause more problems for statistical organizations, like the Indian Statistical Institute, in that, unlike other more equipment dependent sciences, there is not much scope for saving on expensive projects and consequently expenditure on essential items, like journals and books, must be reduced.

The following strategy has worked to some extent for the Indian Statistical Institute and is in line with the idea of marketing one's skills and output to get a proper share of increasingly scarce resources. This was a strategy which is composed of three ingredients; first, the importance of what was going on was projected; secondly, opportunities in a changing scenario were seized - the Institute was able to get lots of funds for Total Quality Management in the context of meeting the specifications of ISO 9000 to enter the European market; finally, the negotiating machinery

must be used and one must try to reach the relatively high levels in the Government where decisions are made.

It would help if there were a statistical advisor to the government and one to the parliament. A unified forum for statisticians, integrating both theoretical and applied statisticians (including official statistics) is also desirable.

Professor Ghosh concluded his remarks by requesting participants to consider what concrete steps the ISI and the national societies should take to implement the recommendations made in Professor Moriguti's report. He suggested that such ideas be forwarded to the ISI Permanent Office. As an example he mentioned the possibility of holding a meeting on a topic of current general interest during a biennial session and promoting it with good press coverage.

Later he submitted in writing the following remarks made in response to comments from the floor received after the discussion.

Can one have a cost-benefit analysis to buttress the case for statistics in a research establishment? Professor Ghosh agreed that it is still difficult to quantify the benefits of research or a particular project even in the government sector. He referred to an interesting account of pitfalls in such an attempt in the ASA Presidential address of Professor I.R. Savage which was published in the *Journal of the American Statistician Association* in the mid-eighties. He also referred to his own experience at the Indian Statistical Institute. For specific projects undertaken by the Division of SQC & OR it was often possible to quantify the benefits to the industrial client, but the Division was unable to provide the cost or benefits of in-house TQM in an organization. Indeed Taguchi, one of the pioneers of TQM, but advises against such efforts because of the inherent difficulties. Certainly, this is an important topic by itself which needs more discussion.

Carlos M. Jarque (*President/INEGI/Mexico*)

Dr. Jarque expressed his pleasure in being involved as a panelist and applauded the efforts that had led to the conception of the Moriguti Report.

Alluding to the present world situation, Dr. Jarque pointed out that the population of the world had increased from 1,500 million people at the time of ISI's inception in 1885, to the present 5,500 million people. He indicated that, complementing this demographic scenario, economic activity has increased fourfold from 1885 to 1993. Strongly influenced by a growing tertiary sector, this increased economic activity has resulted in environmental degradation of a global dimension. Dr. Jarque emphasized the importance of the technological revolution, which has been one the ingredients for permitting the doubling of universal knowledge every seven years. Dr. Jarque quoted recent reports stating that "contemporary society is shifting from a post industrial world, to one characterized by an intensive use of information and knowledge".

... just as the founders of the ISI belonged to a mainly rural and agricultural society, we currently form part of the so called information society, and it is somewhat ironical that, in this information society, statisticians are faced with some elements of general uncertainty in their function, importance and usefulness...

Examining the various political and technological factors as well as present economic and social conditions, that have attributed to the present state of statistics, Dr. Jarque observed that some influences were beyond control of the statistical profession, such as:

- signs of stagnation in parts of the world economy, resulting in the adjustment of public finances and budgetary constraints affecting national statistical offices, research and academic centres, scientific agencies (such as ICSU) and the ISI;
- the bombardment of qualitative and quantitative information upon societies having modest statistical cultures;
- the increasingly frequent studies and surveys on political preferences, perceptions and electoral results, often based on political positions rather than scientific principles;
- the appearance of personal computers and the widespread availability of statistical packages, giving rise to the increase of improvised data analysis;

Dr. Jarque went further to describe additional factors endogenous to the statistical profession, which have also attributed to the present state of statistics:

- the lack of marketing skills supporting the promotion and merchandising of statistical services;
- the lack of information about the perceptions held by statistical users as well as the general public, about the activities that statisticians perform.

Dr. Jarque described the consequences of inadequate statistical work and explained how these consequences influenced the public perception of the statistical profession:

...unsound statistical work may negatively affect the democratic, legislative and executive life of a nation; that it may bear a negative impact on the social and economic wellbeing of people; that it may misguide us in the drawing of our future; and that it may delay scientific advancement. In contrast, good statistical work can bring us closer to free societies, to sustainable development, and to equality and justice.

In order to further the objectives of the Moriguti Report, Dr. Jarque proposed:

- the setting up of a special fund, to support the activities of a small professional group within the ISI, to study and follow up the recommendations of the Moriguti Report;
- that National Statistical Societies be invited to coordinate, in their own countries, the tasks which have been proposed at the Special Meeting and in the Moriguti Report;
- that within the ISI, some collegiate body, including representatives from each country, be allocated the monitoring and discussion of actions to promote statistical activity;
- that intense actions should be carried out, focusing efforts on groups or individuals with a broad decision making capacity, towards the creation of a greater awareness about the benefits of a proper and adequate use of statistics;
- that efforts be made to produce a qualitative inventory of statistical systems and programmes (including inventories of physical infrastructure, human resources, applied methodologies, training programmes and the image of the statistical profession held by both users of statistics as well as society at large);
- the encouragement of alliances between statisticians and computer professionals to stimulate the development of integrated information systems to include not only economic national account aggregates and micro regional data, but are also able to consider environmental aspects strongly dependent on geographic information.

Dr. Jarque concluded his remarks on a cautionary note;

...we cannot and should not delay our actions. There are clear consequences of ignoring the challenges we face. Let us move with confidence, since the measures to be taken are needed and will be beneficial. The ISI can be extremely useful in the modern world. It can make a truly positive contribution in the drawing of the new millennium, which is arriving 76 months from today. Let us not waste time and act, here and now, in this session, in the beautiful and hospitable City of Florence.

Zoltan Kenessey (*ISI Director/The Netherlands*)

Dr. Kenessey reflected back on the 46 Session of the ISI held in Tokyo, observing that the Moriguti Report was one of the many valuable and long-lasting products generated as a result of the success of the 46th Session.

Dr. Kenessey explained that the implementation of the recommendations contained in the Moriguti Report was dependent upon the ISI's ability to promote the role of statistics and statisticians on an international scale. As a result, ISI efforts required as wide a "reach" as possible. Dr. Kenessey illustrated the relatively narrow geographical reach that the ISI presently suffers from by pointing out:

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- total ISI membership of ISI at 1,728 persons;
 - 28 countries with 10 members or more supply 89% of the total membership;
 - 62 countries, with less than 10 members, provide only 11% of the total membership;
 - 90 countries now represented in the ISI compare with 110 countries and territories from which there are no ISI members at all;
 - among those countries with only 1 or two members, six countries have a population of more than 50 million people;
 - 14 other countries, having populations of 10 million or more inhabitants, have no ISI members at all.

Dr. Kenessey suggested that, in the majority of countries, there are statisticians whose candidacy is well worth considering for ISI membership.

In an ambitious effort to extend ISI membership in the developing countries, Dr. Kenessey explained that the ISI had recently instituted a new membership status, designated as extraordinary membership, for new members from those statisticians who are interested in membership but, due to financial reasons or foreign exchange regulations, cannot afford to pay ISI dues. Extraordinary members enjoy the privileges of ordinary membership, without having to pay dues for a five year period. Dr. Kenessey pointed out however, that due to the high cost of producing and distributing publications, Extraordinary members would only receive one publication, the new Annual Report on International Statistics, which will be produced with the assistance of INSEE.

Dr. Kenessey turned the audience's attention to the need to strengthen ISI's financial position, and explained that the implementation of the recommendations of the Moriguti Report was dependent, in part, upon the financial status of the ISI:

Prudent management of the resources available, and possible extension of funding from already enlisted and other sources, may make the execution of various new activities feasible. However, ISI is not immune to the world-wide economic difficulties of the time and thus the period of fiscal stringency cannot be deemed behind us.

Recognizing that a significant part of ISI activities takes place in the various Associations of the Institute, Dr. Kenessey indicated that the Moriguti Report was also of relevance to the ISI Associations. Efforts were being made to provide the Sections with the necessary administrative and accounting support. Acknowledging the complex and sometimes inequitable maze of membership dues and benefits presently existing between the ISI and the Associations, Dr. Kenessey explained that the ISI was working on a plan which would simplify present arrangements

and make the financial relationship as transparent and equitable as possible, thus providing for a stronger relationship between the ISI and the Associations.

Dr. Kenessey pointed out that certain categories of statisticians felt that their special interests were not being covered by the present ISI portfolio, and provided a description of the several new Committees which had been formed to provide those neglected areas of statistics with an appropriate statistical platform.

Emphasizing the importance of ISI publications, Dr. Kenessey explained that the implementation and dissemination of the ideas included in the Moriguti Report would be affected by the strengths and/or weaknesses of the ISI publication programme. Dr. Kenessey chronicled efforts to improve ISI publications such as the *International Statistical Review*, and presented the audience with plans for the newest ISI publication, the *Annual Report on International Statistics*.

Dr. Kenessey provided the audience with a description of several additional future plans, such as the September 1994 Conference on Long Term Perspectives on International Statistics being jointly organized by Eurostat, the Netherlands Central Planning Bureau and Statistics Netherlands and the ISI. This Conference will "scan the future" of international statistics for the next 25 years, taking into account the perspectives provided by the Moriguti Report.

Dr. Kenessey provided information about plans for the new Committee on the Certification of Statisticians, another new ISI initiative which will endeavour to determine how international requirements could be infused into national efforts to certify statisticians.

Alluding to past efforts to increase literacy around the world, Dr. Kenessey explained that it was being explored whether ISI could assist in launching a World Numeracy Programme.

There is no need to elaborate upon the relationship of this potential basic programme to the requirements set out in the Moriguti Report. Clearly, the economic, social, cultural and political advancement of developing nations, but the less well off strata of populations everywhere will much depend on the acquisition of suitable quantitative skills by the people involved.

Although present efforts are concentrating on the difficult problem of obtaining funds, future plans involve the production of a television series and of an "International Museum of Numbers".

Although still in the financial evaluation phase, Dr. Kenessey provided a description of the Life Expectancy Programme, explaining that, despite medical, social and economic advances realized in recent decades, the differences in life expectancy remain substantial around the world.

Dr. Kenessey summarized his remarks by indicating that the Moriguti Report set a number of goals for the statistical profession, including the ISI, and in view of these goals, the ISI has worked to introduce several organizational and programme measures, to serve the needs underlined by the Report.

William Seltzer (*Director UNSTAT/USA*)

In his address to the audience, Dr. Seltzer challenged statisticians to meet two objectives which would serve to advance the profile of the statistical profession.

Quoting former British Prime Minister Disraeli in stating that "there are liars, damned liars and statisticians", Dr. Seltzer challenged statisticians to observe the high ethical standards that are expected in the statistical profession. He indicated that some statisticians compromised their professional standards by producing statistics that were unreliable or influenced by political agendas. He stressed that efforts must be made to increase the credibility of statistics and statisticians as there was a great deal of misuse of statistical information and methodology for political purposes.

Dr. Seltzer also suggested the statistical profession exert an effort to present itself in a more dynamic image, as statisticians and statistics were often perceived by the general public in a negative light. He emphasized that statisticians must stop presenting their profession in a boring drab manner and suggested that the image of the statistical profession could be improved if it was presented in a more creative and colourful way.

NOTE

The views expressed are those of the panelists and do not necessarily reflect those of the institutions they are associated with.