THE INTEGRATION OF STATISTICS: PHILIPPINE SETTING[1]

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1. Introduction

1.1 What is the science of statistics? Is it also an *art*? What is a *Statistician* or what is the *Statistical Profession*? Are there gaps within and outside the profession? If there are, what are the ways and means of bridging these gaps? What is the role of the Philippine Statistical Association (PSA) in the integration and rationalization of statistics at the national, regional and international level which is in accordance with the objective and purpose of the Association? How can the Statistician, through the PSA, enhance the importance and prestige of the profession? Statistics must be made more visible to be identified as an accepted discipline.

1.2 PSA, as the cream of statistical profession, enjoys an unique position in the development of the profession in a holistic framework.[3] The Association provides numerous opportunities toward the integration of the profession and in the rationalization of statistics by serving as a communication link within the profession and with other professions. The PSA serves as medium in the improvement of the educational processes in statistics and as a training link to the other sciences, business, industry and engineering. It is a forum for the establishment of career structures for applied and theoretical statis-

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[3]As of December 1983, there were 110 life and 511 individual members or a total membership of 621. The number of institutional members was 25 by end of 1983 but this had grown to 30 by end of July 1984.

cians.[4] PSA had and will continue to provide noticeable impacts upon government activities, both statistical and otherwise. Conflicts in the use of concepts, definitions and methodology as applied to important indicators for measuring the level, pace and direction of impact, or benefits of developmental efforts are resolved through the possible intercession of PSA. This aspect will include the apparent gaps in the data series produced by the statistical system (the producer) and identified by the users of the information. The respondents, households, firms or establishments, must be considered in the dialogue between producers and users of statistical data. Above all, statistics must make itself more visible through aggressive action as a partner in decision-making at all levels of management hierarchy.

2. *Statistical Science and the Statistical Profession*

2.1 *Statistical Science.* R. A. Fisher (1951) defined statistics as the science which deals with population, variation and reduction of data. The original thinking on the important principles of randomization and replication was ascribed to him.

> (i) Statistical science made great progress through the initial work of R. A. Fisher in the 1920's. At about the same time, the classical theory of probability was developed. The marriage of these two developments brought about an exposition of the mathematical theory of modern statistical science (an example is H. Cramer, *Mathematical Methods of Statistics,* 1946).
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> (ii) The science of statistics, as distinct from the raw materials (data) with which it is intimately associated, is an all-embracing branch of the scientific method. Its broadest interpretation is almost the scientific method itself. We find statisticians at work in every field or facet of the social, economic, political and cultural life of the people where quantitative evidence is available and applied statistics embraces, under a single discipline, a range of subjects which pursued independent courses for centuries. M. G. Kendall (1972) traced this history to include devel-

[4] It appears that Statisticians have been recognized as one of the Professions in the Scientific Career System now under implementation by the NSTA. This system is independent of the Executive Career System being implemented by the Civil Service Commission.

opment of life tables, modern descriptive statistics, theory of probability and the emergence of modern statistical development. The American Statistical Association (ASA) was founded in 1839[5] while the International Statistical Institute (ISI) was born in 1861.

(iii) The year 1890 could be regarded as the starting point of the modern statistical development and the names of Karl Pearson (founder of *Biometrika* and author of *The Grammar of Science*), R. A. Fisher, F. Y. Edgeworth and G. U. Yule are associated with the early decades of this development.[6] The concept of sampling, theory of testing hypothesis (Bayesian and non-Bayesian approaches), multivariate analysis, theory of time series (stochastic processes) including queuing theory, inventory control, manpower studies, statistical computing, simulation and many others are examples of these floodgates of statistical development.[7]

(iv) Statistics is a young discipline. Most of the modern statistical development were generated during the last 60 years; randomized, experimental designs in the 1920's and 1930's, sample surveys in the mid-30's, statistical quality control (SQC) in the mid-40's. Statistics was introduced as a discipline at Iowa State University in 1913 (G. W. Snedecor). It grew rapidly in the 60's and continued to grow in the 1970's. As a result, statistics now occupies a considerably more prominent place among mathematical sciences than it did a decade ago (D. S. Moore and I. Olkins (1984)).

(v) From the short history of statistics in the Philippines, a similar growth pattern is observed. From a handful of MS in statistics prior to 1960, the number had grown to more than 150 in 1984. With no Ph.D. in statistics in the early 1950's the number

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[5]It is interesting to note that ASA after 145 years of existence had periodic review and assessment of its operations. See for example an article on the subject published in *The American Statistician*, Vol. 37, No. 4 – Part 1, November 1983.

[6]It was said that Karl Marx became a statistician at the close of his life time and so did Florence Nightingale.

[7]The ISI Proceedings in 1978 included topics on probabilities on catastrophe, statistical methods on environments, ecology, policy making and law, earth sciences, etc.

of Filipino doctoral holders in statistics has grown to be about 15 and could easily reach more than 20 by 1986.

(vi) Data-oriented or science-oriented basic research in statistics often appears to be unsupported by mathematical rigor. However, these ideas are gradually translated into some form of mathematical structure, explored analytically and judged by users on its applicability. On the other hand, innovations proposed by mathematical statisticians may appear initially as too complex for practical use and/or devoid of a model in the real world. Eventually, many of these innovations will pass the scrutiny of practical usefulness and would enter the realm or repertoire of standard statistical methods (Moore and Olkins, 1984). This is a continuing integration process which is also observed in the Philippines.

(vii) There are controversies in statistics and the origin of these controversies is given for example by Kempthorne (1972). The divisions in statistics resulted almost completely from differences in attitude of whether operating characteristics of data analysis procedures are important or not. The essence of statistical science and of data collection appears to be that operating characteristics of procedures are important. The same view holds true of data interpretation. The process of interaction with data must be fully described and illustrated. Reference must be made to the fact that models have been determined from the data and from experiences with data situations similar to that under consideration. The future of statistical methods lies in the appreciation of the investigator-data interaction process and the implementation of this process by means of the modern computer. Closer familiarity of the properties of data generated by the investigator is badly needed under Philippine conditions. On the other hand, lack of sophistication in methodology could be made up by acquiring more data and processing by computers using less efficient procedure. Either way, both require the skill and experience of the statistician.

2.2 *Statistics and the Statistical Profession: Philippines.*

(i) The early 50's could be said as the starting point of

modern statistical development in the country.[8] The Statistical Laboratory at the Central Experiment Station, College of Agriculture (now U.P. Los Baños) was organized by the author in 1952. At this early state, there were already efforts toward integration of statistics through continuous consultations between the Statistician and applied research workers in the other professions. Research outlines and completed research outputs from these applied fields were required to seek the approval of the Statisticians on the design and analysis of experiments and surveys and related statistical techniques before the research is formally approved by Management. About the same time (June 1952 or about 32 years ago), the Philippine Statistical Association (PSA) was born, the University of the Philippines Statistical Center (UPSC) was started in cooperation with United Nations Development assistance, and the Office of Statistical Coordination and Standards (OSCAS), National Economic Council (now NEDA) was established, assuring a decentralized Statistical System with a central coordinating agency in OSCAS. The PSA had a direct hand in the establishment of the UPSC and OSCAS/NEC, breathing a new life in the statistical development in the country through: (a) training of professional statisticians, and (b) the effective and efficient running of a decentralized Statistical System.

(ii) As the new profession of statisticians was recognized due to the entry of university trained experts in the field (BS Statistics, MS, MAS and PhD degrees) mostly from University of the Philippines (UP) and abroad, a new problem emerged. The intensity in terms of rivalry for leadership in the profession became quite apparent and reached its peak around the mid-60's between the university-trained statisticians (the academicians) and the data specialist and subject matter analysts who have been in the government statistical services long before the academic-trained statisticians came into the picture. The intensity of this rivalry had apparently subsided in the 80's due to the continuous dialogue between the academic-trained statistician and the specialists

[8]It must be mentioned that censuses have been conducted in the Philippines as early as 1900, but statistics as basis of the statistical profession started only after World War II.

and analysts, and the training programs on statistics at all levels of statistical personnel (low, medium, professional) in both the public and private sectors.

3. Gaps or Links Within and Outside the Profession

3.1. *Within the Statistical Profession.* There is concern about the gap between the theoretical (from the academe) and the practical or official and government statisticians. Since 1952, PSA was instrumental in bridging these gaps for better integration of theory and application. Theory must improve the quality and efficiency of applied work while applications must be the testing ground for statistical theory and methods and must provide the motivation for further advances (Kish, 1977). Workers on the practical side of statistics view with disdain the superior attitude of the theoretician while, on the other hand, the academician feels that the practical work done in government, business and industry is simplistic, devoid of theory and improperly developed. There is a need to narrow this gap and PSA must serve as medium for this interaction and dialogue.

3.2. *Categories of Statisticians.*[9] Two levels of categories are available: (i) principal, and (ii) taxonomic.

(i) *Principal classification.* Three categories of statisticians have been identified, namely:

(a) *Academic Statistician.* The area of interest will include mathematical statistics (probability theory and stochastic processes), statistical inference, models (construction, fitting and testing), multivariate analysis, time series, design and analysis of experiments, sampling theory and others. This group is easily distinguished from the other two categories and is involved essentially in teaching and research in these areas of concern.

(b) *Statistical Data Specialists.* This category is interested in precise definitions and concepts, techniques of measuring and collecting data, use of sampling and census methods,

[9]Durbin and Duncan. (1979). This report considered a number of issues related to the integration of statistics at the national and global bases.

presentation of data, organization and setting of standard for national and international comparability. This category is found in industry, government, and research agencies.

(c) *Subject Matter Analysts.* This is a very diverse group and is found in many specific disciplines (hard and soft sciences). The areas of interest of the Analysts are similar to the Data Specialists but much of their work are highly specific to the particular discpline. It is sometimes difficult to distinguish between the "Specialist" and the "Analyst." Many academic statisticians are also involved in varying degrees in the application of the theory to the real world. In fact, K. Pearson and R. A. Fisher are distinguished statistical theorists but they were also highly and deeply involved in applied work. This example illustrates a marriage of statistics as a *science* (theory) and statistics as an *art* (application and its ramifications). The different versions in the interaction of statistics as a *science* and as an *art* can be handled through the use of two points in a fulcrum as follows:

Statistics as

Science (Theory)		Art (Application)
(xxx)	Δ fulcrum	(xxx)

All possible versions will generate a matrix of categories.[10]

(ii) *Taxonomic classification.* The ISI Committee on Integration of Statistics developed a list consisting of 15 categories of statisticians but only 13 are described below (students and consultants were not included in the enumeration). This taxonomy could be applied to actual conditions in the Philippines. There

[10]The author tested this matrix and its usefulness with the graduate students at U.P. Los Baños and NCSO/PUP. The participants considered themselves at the low stage of the theoretical science and also at the lower stage of application. They traced the possibilities of where they intend to go with the use of matrix, if they consider statistics as the science of their profession.

are also variations within each category (differences in theory and applied).[11] There may be vertical and horizontal integration within a given category of statisticians:(a) Academic (including university, college, institute, center, school); (b) Business (including actuarial, marketing, economic, econometric); (c) Government (including regional, provincial, municipal, barangay); (d) Industrial (including operations research, quality control, reliability work, physical, engineering, transport); (e) Practitioner (including specialists, data analysts); (f) Research (including applied, methodological, theoretical, mathematical, probabilistic); (g) Biometric (ecological, agricultural including livestock and fishery, forestry); (h) Medical (including biostatistics, health, epidemiological, pharmaceutical); (i) Social (including demographic, political, judicial, criminal, behavioral, psychological and others); (j) Administrator (including manager, policy formulator, planner, forecaster, auditor); (k) Computational (including simulator, computer programmer, package writer); (l) Survey (including pollster); (m) Others (including sports, numerologist). The categories given in (i) and (ii) illustrate the gaps between principal (simple) and the taxonomic classification of statistics or the so-called gaps between the *theorists* and the *applied statisticians.*

3.3 *Gaps Within Theoretical and Within Applied Statisticians.* In addition to the gaps between the theoretical and the applied statisticians, there also exist gaps within the various methodological approaches used by both theoreticians and the practising statisticians. The controversies among the theorists were summarized by Kempthorne and Kendall (1972), the most formidable is the debate between Bayesian and non-Bayesian. On the other hand, the "Specialist" tends to emphasize a particular subject area or discipline. To remedy the gap(s), teachers and discipline must strive to be tolerant and must emphasize the best features of the main competing schools of thought (say, inference), rather than to set out and recruit followers for systems of thought (inference) they may personally prefer.[12]

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[11] This list represents one of the many variations which could presented. One may wish to prepare his own enumeration.

[12] ISI Committee on Integration of Statistics, 1978-79.

(i) *National Convention on Statistics.* Sponsored by NEDA in 1978, 1980, 1982, the Conventions encouraged the presentations of papers from the public and private sectors which may or may not necessarily be involved strictly in statistical work.[13] Using the taxonomy in Sec. 3.2. (ii), the papers were distributed to the categories by year. The trends given in Table 1 indicate the areas of concern for integration of statistics with the use of the Convention papers. Although administrative and social categories appear to dominate the scene, research, surveys and business are very close behind. Thus, during the last three Conventions the emphasis had been in these five areas of categories. Perhaps, PSA should generate more attention and interest on statistical techniques in the other concerns. What a person does may not necessarily conform with what he writes although, generally, what one does is usually reflected in his writings.

(ii) *The Philippine Statistician.* This journal was first published in June 1952. Articles in the recent issues of *The Philippine Statistician,* PSA official journal, indicate the trend for more emphasis on methods, theory and surveys, with applications to many fields including household activities. On the other hand, specialists and analysts have also contributed papers on some fields or discipline where statistical techniques were applied. *The Philippine Statistician* is therefore serving as medium for dialogue between the principal and/or taxonomic categories of statisticians. PSA should encourage this dialogue or link and could set up a more substantial fund for contributor's and reviewer's fee for papers presented for publication in the PSA journal. The *PSA Newsletter* was started in 1974 and complements the technical papers presented in *The Philippine Statistician.* The Newsletter covers the activities of members as well as activities and programs of the Association. It is also serving as a vital link in the dissemination of information for the integration of statistics.

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[13]PSA sponsored the National Statistics Week in 1954 and in subsequent years. To bring about continued statistics-consciousness in government officials and management groups, PSA must continue to exert effort toward similar endeavors which could assist toward integration of statistics in the country. This effort will make Statistics more visible and easily identified as a unique profession.

Table 1. Classification of papers presented at the National Convention on Statistics by category: 1978, 1980, 1982[14]

Category	*1978*		*1980*		*1982*		*TOTAL*	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
Business (actuarial, marketing, economic, econometric)	5	14	4	7	8	13	17	11
Government (regional, provincial, municipality, barangay)	2	5	3	5	4	7	9	6
Industrial (operations research, quality control, reliability work, physical engineering, transport)	4	11	2	4	2	3	8	5
Applied/Analytical	2	5	2	4	4	7	8	5
Research (methods, theoretical, mathematical, probability)	6	16	6	11	7	12	19	12
Biometrics (ecological, agricultural, fishery, forestry)	3	8	4	7	6	10	13	8
Medical (biostatistics, health, epidiomological, pharmaceutical)	2	5	3	5	3	5	8	5
Social (demographic, political, judicial, criminal, others)	3	8	14	25	3	5	20	13

Table 1. (Continued)

	1978		1980		1982		TOTAL	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
Administrative (management, policy planning, forecasting, auditing)	6	16	4	7	11	18	21	14
Computational (simulation, programming, packages)	1	3	2	4	3	5	6	4
Survey/polls, etc.	2	5	9	16	8	13	19	12
Other/sports/ numerology	1	3	3	5	2	3	6	4
	37	100[r]	56	100	61	100	154	100

[14]There were observed apparent overlaps specially research and some of the other categories. The category with the heavier emphasis is given the choice in the classification.

[r]rounded.

(iii) *Research Gaps: Statistics and Other Disciplines.* A review of the statistical literature will indicate an abundance of theoretical findings and results which are available for application in many fields of endeavor. Some areas of major concern are summarized as follows:

(a) *Design and Analysis of Experiments.* The level and variability of important characteristics used in research stations and laboratories in biometry, medicine, industry and related fields have not been pursued on a more regular and rigorous basis. Even for the 30 commodities or so under intensive study by the Philippine Council for Agricultural Research and Resource Development (PCARRD), the results for each commodity are not readily available. What are the sampling procedures for each characteristic by commodity? How does one handle the analysis and transformation of data to attain additivity in the effects and for errors to be independent, with common variance and normally distributed? What are the interactions of methods, location and seasons on the level and variability?

(b) *Design and Analysis of Surveys.* An R & D Section in each statistical agency could be organized[15] and the Staff could establish the links with the academic statisticians to follow-up research and studies on:

(i) Survey Design related to the improvement of precision and variability. The issue on descriptive and analytical types of surveys, point and frequency distribution estimations, are relevant.

(ii) Questionnaire and System Design to look into biases and accuracy and costs (economic) through operations research, field organization, EDP applications for generating data on a timely basis.

(iii) Interaction between (i) and (ii) to bring some focus on Mean Square Error Analysis. PSA could develop and integrate the program or proposals and establish the links within the profession and outside the profession.

[15] An example of some approaches is given in an article by David (1983).

(c) *Other Theoretical Applications.* An example will be given to illustrate the gap. The Statistician (academe) must provide the contact or link with the hydrologists or engineers at the National Hydraulic Research Center for partnership in the use of appropriate statistical techniques (stochastic processes, Markov chain, etc.) to problems in hydrology.[16] NCSO, along the issue of free access to information, could make available data files for use of the academe, business and marketing firms. However, the issue of confidentially must be insured and the credibility of NCSO data must be upheld.[17]

3.4 *Statistical Profession and the Other Sciences*

(i) *Link role of PSA and PSSC.* Statistics is the only science which could qualify as a part of the hard (natural) sciences and also as a discipline of the soft (social) sciences. In the National Research Council of the Philippines (NRCP), a statistician could join the Statistics/Mathematics/Physics group and/or the Social Science Section. An academic Statistician was directing the S/M/P Section at NRCP and also the Institute of Mathematical Sciences and Physics (IMSP) at U.P. at Los Baños. PSA has a discipline representative at the Philippine Social Science Council (PSSC) which consists of about 14 disciplines in the social sciences. These exposures would attest to the *versatility* of the statistical profession, in the *sciences* and in the *art.* PSA has not fully capitalized its link role with PSSC. Perhaps, the statistics discipline representative from PSA could articulate this role as an important dimension toward integration of statistics in the country – statistics and the social sciences.[18]

(ii) *Statistics in the Science Councils.* Studies in the various journals by the various Science Councils including those by

[16]This example was suggested by Dr. F. Lansigan, UPLB. Other links could be identified during the discussions of the paper at the PSA Conference.

[17]This issue is contained in the proposed Statistics Act (1984).

[18]An initial effort in this direction was a paper by Mijares (1981) which served as link to some problems of economists from the academe.

NSTA , NRCP, PCARRD and others indicate the need for closer rapport between Statisticians and the professionals working in these Councils in order to enhance the proper use of statistical methods and techniques to these fields. Although some efforts are made in the form of training programs on statistical methods and design of experiments by Statisticians from the academe in some of the Councils, it appears that a closer and continuous contact may have to be exerted in order that the training efforts will have a more direct impact in the institution building on the scientific approach as exemplified by the design and analysis of experiments and surveys and the use of other techniques. PSA could sponsor workshops/seminars in cooperation with the UPSC and IMSP/UPLB and with the researchers in these Councils as participants. One of the possible outputs is a more permanent form of consultation between the Statistician and the Research Worker in the design and analysis of these experiments and surveys. This relation could be done on a more continuing basis or if possible a Section/Department of Statistics could be organized within NSTA and/or each of the Councils. In fact, an Agricultural and Resources Statistical Research Department or Institute could be organized within PCARRD. These possibilities could be instituted as a future work program of PSA.

(iii) *Statisticians and Business, Engineering and Industrial Communities.* PSA is the professional society consisting of statisticians from the academe, data specialists and subject matter analysts. This link role of PSA with these communities had been a part of its program in bringing into the fold about 30 institutional members of PSA from the business, engineering, industrial and governmental sectors. Seminars/workshops/courses of current interest have been conducted in many fields such as descriptive statistics, economics statistics, sampling surveys, forecasting and lately the Balance of Payment (BOP) methodology. PSA may wish to look also into the following dimensions:

(a) *Technical and Educational Direction for Product Control* (Marquardt, 1984). With limited foreign exchange and with re-emphasis on higher productivity in certain subsectors of industry, there is a need for new technology and

educational emphasis in the management of product control. It is widely recognized that most product quality problems are related to business philosophy, management and technology systems. But these technology systems require new directions and emphasis in statistics, software engineering and other disciplines in order to be cost-effective. Most important is education in the statistical tools (sampling concepts, analysis of variance, time series analysis and models, experimental designs for process calibration and modelling, and analysis of data with outliers) and interactive systems, computer graphs and software engineering. The PSA and the appropriate Societies can undertake jointly this leadership role.

(b) *PSA and Business and Industry.* PSA can serve as link to bridge the gap, say, between the academic and the business and industry statisticians. PSA as intermediary could request Industry to communicate who they are, what they do and how the academe could assist in the educational direction mentioned in (a). In turn, the Academe could stimuate discussion and interaction by suggesting how Industry could aid in the educational process, by offering degree programs, and short courses/workshops/seminars for Industry and by encouraging companies/business concerns to use statistics in areas where they have not already been used.[19] PSA could sponsor the initial seminar/workshop to solidify this partnership.

4. Gaps in the Statistical System

4.1 *Within the Statistical System.* There are many gaps within the Statistical Sytem.[20] Examples are given to illustrate the problems and PSA could provide the leadership in locating the important gaps and through its meetings/seminars find ways and means to remove or remedy these gaps.

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[19]Snee (1984). PSA is doing some elements of this concern but on a very limited and highly informal basis.

[20]There are numerous gaps which could not be presented. One important aspect is related to research and development (R & D).

(i) *Integration of Household Surveys* must include production in agriculture and non-agriculture, labor force and employment (Mijares, 1981). This integration could provide a good profile of other agricultural activities not only from the point of view of the farm but also as a whole household. How about the role of the landless rural worker? There are gaps in the Electronic Data Processing (EDP) systems for Integrated Survey of Households (ISH), establishment surveys/censuses. These gaps must be remedied immediately. Establishment surveys/censuses are having difficulties in obtaining data on financial, investment and debt data. Firms will not divulge the amount and sources of these funds. Attempts have been made to integrate the labor force and employment surveys of NCSO with the crop (palay/corn, etc.) survey of the Bureau of Agricultural Economics (BAECON) but with apparently little success. The BAECON has different ideas about integration since there is an urgent need for more detailed data on agriculture and food which could not be generated through the ISH of NCSO. The pros and cons for this integration could be the subject of a PSA forum.

(ii) *Establishment Enquiry System.* The problems and issues have been identified by Samson (1982). Too elaborate and ambitious program of annual and quarterly enquiries to cover all sectors of the economy had resulted in the following constraints: (a) *poor response rate* due to failure of the system to process data on time for use in turn by responding firms, *too detailed information* required by questionnaire, and *duplication* of collection of similar information by BIR (income tax); (b) *large sample sizes* reaching about 200,000 establishments for the censuses and about 28,000 for the annual surveys (region or domain) and 16,000 for the quarterly surveys. There had been changes in the 70's on the relative sizes of samples but these figures give an indication of the problem associated with the collection, processing, tabulation and release of data on a timely basis; (c) *lack of integration between census and annual enquiries* due to different groups handling these enquiries introducing discontinuity in the use of standard concept/definitions, coverage, procedures, etc., lack of an updated sampling frame, and high turn-over of EDP

staff; and (d) *inadequate financial support for establishment enquiries.* To solve these problems, proposals were forwarded for the integration and rationalization of the Sytem of Establishment Enquiries in the Philippines. The PSA could serve as the appropriate forum for this integration of statistics and any recommendations could be forwarded to the Batasan Pambansa for appropriate allocation of financial resources to develop and institute the new proposals.

(iii) *Impact Monitoring and Evaluation (M & E) Systems.* The role of Agriculture as the basis of economic growth and as the tor which will generate the savings which in turn could be used as investment in the industrial sector have been emphasized in the New Plans. Without an integrated statistical framework for M & E nobody will be able to say whether the investments (capital), employment and benefits are foregone (Oñate, 1984a). Doubts have been expressed on the real impacts of the KKK, Sariling Sikap and the Pag-ibig Fund projects. In addition, the ₱500 million which was set aside for the farm campaign, and, in general, the impacts of agricultural productivity (including IRRI seeds and technology) at the national and project level must be monitored and evaluated closely and effectively so that capital (investments), employment and benefits are not foregone or lost foreever. What are the impacts of the US$26 Billion Debt? Without an independent and efficient Benefit Monitoring and Evaluation Sytem (BMES), nobody knows about the sources and appropriate uses of funds and the impacts of these development efforts toward the improvement of the social and economic well-being of the Filipino. PSA could lead the way for the initiation, development, institution building and maintenance of BMES through the effective use of the infrastructure of the Philippine Statistical System (Oñate, 1984b, c, d, e). PSA must convince government to establish and support a truly viable, efficient and effective statistical system for Impact or Benefit M & E and Analysis:

4.2. *Dialogue Between Producers and Users.*[21] PSA served as forum for interaction between producers and users of statistical information. The users will generally articulate what they need while the producers will respond on what they can offer, subject of course to the limitation of financial resources, manpower availability and other infrastructures. Data produced must have certain standards of quality such as precision and accuracy, relevance and consistency, and the timeliness for use of government, decision-makers, planners, business and industry, academe and others. Sometimes, the user will require data of such detail and of a much higher level of comparability (international) that the national statistical system would refer to these needs, say, of macro-economists, as highly *esoteric.* Most recent gaps in the Statistical System (the producer) as seen by users have been identified[22, 23, 24, 25, 26, 27].

5. *Educational Role of PSA*

5.1. PSA could provide the links toward standardization and integration of curricula in degrees for statistics, teaching of statistics, and general transfer of statistical technology.

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[21] Oñate (1980). The dialogue should include not only the producers and users but also the respondents – households and establishments. The Project Benefit M & E System (PBMES) developed by the author (1982, 1983, 1984) will allow for this type of dialogue through the participation/observation type of information.

[22] U.P. School of Economics. An analysis of the Philippine economic crisis. Workshop Report, Appendix 2. June 1984.

[23] How can the problems in the design of household surveys include the question on basic needs? This question was raised by Mangahas (1981).

[24] TWG on the Review of Labor Force Concepts. The Philippine Labor Force Survey: A Critique on the Use of the Quarter as the Reference Period. 3rd National Convention on Statistics. PICC. December 1982.

[25] Other gaps exist as identified in past Workshops on National Accounts sponsored by NEDA.

[26] Large amount of money were spent to pay the fees of these foreign consultants on statistical problem, but they missed to comment on more serious problems. The assessment of these problems is given by a senior NCSO staff for free (no cost) to the Philippine government.

[27] It must be emphasized that there are numerous inter-agency technical committees which deal with many facets of statistical series, concepts, definitions, methodology and classification systems. The Chairperson/Members of these committees will be requested to respond to the issues and queries raised in any section of this paper.

(i) Standardization of contents/structure of the BS and MS (MAS) degrees in Statistics in the U.P. Complex and in private universities. A PhD program is now offered at the U.P.

(ii) Ensure that competent statisticians are hired in the teaching of statistical courses.

(iii) Encourage the writing of statistical text, handbooks and lecture materials for use in schools, colleges and universities which reflect the conditions in the real world under Philippine setting. The Statistical Act (1984) maybe used to implement this suggestion.

(iv) Standardization of the symbols that are used for these purposes.[28] This situation is referred to as the readibility of statistical literature. There are many varieties of notation and terminology used and there is a need to standardize their use not only universities but also in other agencies, both private and public.

(v) Serve as link role with the Ministry of Education, Culture & Sports and NEDA for the implementation of (i) to (iv) and with NSTA for the Scientific Career System and with the Commission on Civil Service to assist further the profession of the statistician to a higher career level with the appropriate government examinations given to other professions such as those for medicine and law, engineering and allied services. PSA had a direct influence in the institution of civil service examinations for statistical clerk and Statistician. There is a need to assess the current situation in order to update the level of expertise of the profession on the basis of the taxonomic categories, i.e., career structure for both applied and academic statisticians.[29]

5.2. In addition, PSA may continue to sponsor conferences, symposia, workshop/seminars and meetings on many aspects on the reduction of the gaps mentioned in various parts of the paper. These activities could serve to narrow the gaps through (a) communications

[28]There is utter confusion in the use of symbols and related representation in Statistics. A good example of the trends to prepare compact symbolic representation in each taxonomic category is the suggested standardized system for survey designs prepared by Murthy (1980).

[29]Some sectors are opposed to any form of licensing in the statistical profession. See footnote 4 for additional points of view.

links, (b) education activity, (c) activities with the other sciences, engineering, business and industry, (d) impact on the government sector (Leone, 1979). This effort is referred to as the transfer of statistical technology or methodology (Tauber, 1979) and maybe implemented at the *horizontal* and *vertical* levels at each taxonomic classification mentioned in Sec. 3.2 (ii).

6. PSA and Training of Statisticians

6.1. *Demands for Statistical Services.* As a country modernizes, as it tries to be more specific in the facets of decision and policy making, and as it attempts to measure the level, pace and direction of benefits of developmental efforts to the rural poor and urban disadvantaged citizens, there appears to be no end to the demand (and also criticisms) that will be generated for the services, objectivity, competence, integrity and sense of independence of the statistical community.

6.2. *Gaps in Statistical Training.* The gaps in the supply and demand of statistical personnel have been adequately presented (Pineda and Francisco, 1980; Reyes, 1980; SCO, 1981; Mijares, 1984). The demand completely outstrips the supply. The PSI study estimated (SCO, 1981) that total statistical requirement (demand) for 1981 was 9,410 where 6,280 would be for the public agencies while the rest would go to the private sector. In 1991, this requirement will total 33,580 and 22,390 or two-thirds would be for government. Total incremental supply which could be generated (BS, MS, PhD) from academe from 1982 to 1991 is only 6,130. The estimated manpower supply shortage is 4,240 in 1984 alone, and will reach 17,910 in 1991. The PSI project is envisioned to accelerate, to some degree, the production of statistical manpower in order to reduce the gap in the number of qualified statisticians in the country. PSA should be able to solicit comments from its membership, study the recommendations and come out with the needed support for the establishment of the appropriate mechanism to solve the problem either through the PSI and/or strengthening the consortia with resources, both financial and moral, in order to narrow this tremendous gap in statistical manpower. This high demand for Statisticians should eventually make the profession more visible.

6.3. *Training/Education in Statistical Agencies.* Regular and periodic in-service training programs are conducted in many, if not most, of the statistical agencies such as BAECON, NCSO, NEDA, etc. In addition, training of supervisors, field force and EDP personnel is held for every quarterly or annual surveys and censuses. These efforts provide the means to narrow the gap on a *vertical* integration basis (within the agency concerned). On the other hand, the training/seminar on statistical methods and experimental designs provided by UPLB to PCARRD researchers is an example toward *horizontal* integration between the academic statisticians and other scientists from the agriculture and resources fields. PSA, in cooperation with UPSC, NCSO, CB, NEDA and other agencies, had exerted similar efforts toward *vertical* and *horizontal* integration of statistics within and outside the statistical profession. *The Philippine Statistician,* official journal of PSA, is used as medium toward the integration of statistics through the presentation of quality articles of interest to the academe, analyst and specialists. PSA conferences, meetings, workshops/seminars and short courses, must be guided, among others, toward the objective of integration of the gaps and nationalization of statistics. These concerted efforts would result in added prestige and importance of the statistical profession.

6.4. *Exchange Arrangements.* Institutional exchange arrangements between statistical offices, universities, business and industry could be developed and these exchanges if followed through may provide an initial start for the dialogue. In fact, senior and middle level staff from the BAECON and other government corporations involved in sugar, coconut, tobacco, etc. have been allowed to undertake advanced graduate work in statistics at UP Los Baños, but the other exchange of posting academic Statisticians to these government agencies has not been started. PSA may serve as broker to accelerate these and similar exchanges.

7. Release of Conflicting Statistics: Role of PSA

7.1 Important indicators of the economy including inflation rates, employment and unemployment, importation of rice, international reserves, etc., are released to the public by individuals and/or

agencies. Some examples which result in duplication and confusion are as follows:

(i) The Center for Research and Communication (CRC) released in July 1984, inflation rate of 52% for June 1984. Other data were released on GNP growth for 1984. It is not clear what concepts and definitions were used for these data. Are these consistent with what the NEDA Inter-Agency Committee on Prices and Indexes recommended? If not, what are the new concepts and definitions, say, on inflation? Did CRC use the same 644 items and substitutes from NCSO? If not, what are these CRC items? Did CRC use the weights (Wi) derived from NCSO family income and expenditures surveys? If not, where did CRC get its weighing pattern? What was the base year (1978 or another year)? How were the price data collected?[30] Or did CRC use "quick and dirty" methods? CRC appears to be quite secretive about these questions. In view thereof, PSA should study and investigate the concepts/definitions, methodology, data sources, etc. of CRC and NCSO, so that PSA could come out with its own evaluation which could be passed on to the public and concerned agencies for their information and reference. This move by PSA will minimize the confusion on the release of these types of data.[31]

(ii) Similarly, the Development Academy of the Philippines (DAP) released employment/unemployment data for Metro Manila. This release(s) had brought about utter confusion to many interested people and offices. In the same vein, PSA should mount a study to see how these DAP statistics would differ from the concepts, definitions, methodology used by NCSO. Is DAP equipped to mount regional or national sample surveys on a quarterly or semestral basis? How would DAP continue releasing these data? PSA could give statements clarifying the issues for the information and reference of all concerned.

(iii) The Presidential Adviser on Food was quoted by news-

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[30] See for example Oñate (1971).

[31] Employment situation after May 1984 was released by a staff of CRC using statistics from many sources including a "recent random survey" of CRC in June 1984. PSA must take decisive action on this confusion.

papers as saying that there was no rice shortage and that the government was recalling its rice exports to beef up the rice supply. After a week or so, large importation of rice (150,000 metric tons) was splashed in the newspapers and that such imports were apparently "recalled" from Thailand and the People's Republic of China. This confusion had reflected, in no small measure, on the *independence, objectivity,* and *integrity* of the Statistical System and therefore on the Statistical Profession. In the past, the NEC (now NEDA) Inter-Agency Committee on Rice and Corn was commissioned to study the supply and demand of the rice grain and was empowered by a Republic Act (R.A.) to certify (through OSCAS/NEC) on the shortage and importation of rice. What happened to this R.A. and the role of the Statistical System in the minimization of manipulation of data on rice supply and demand? The PSA, as the personification of the Statistical Profession, must get into the bottom of this confusion.

(iv) In view of the economic and social crisis, everybody became "instant" experts on BOP and International Reserve (IR) Statistics. As we know there is an IMF Manual on the preparation of the components of BOP which in turn indicate the changes in the IR position. In spite of this IMF Manual, member countries would generally deviate from these international recommendations.[32] How did the statisticians at Central Bank (CB) deviate from these recommendations? Were the changes done by the Statisticians (in the Statistical System) or were they done by policy makers or other consultants at CB? PSA must again clarify the issues on this important subject so the public may know the truth.

7.2 There are other issues under the subject of release of conflicting statistics. PSA may also include in its studies and recommendations possible procedures which must be followed by government in the release of key indicators on inflation, employment and unemployment, position and importations of rice and wheat, BOP

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[32]See for example, ADB (1982). Pages 66-68 deal on International Reserves as defined by IMF and how member governments may differ with this IMF recommendation.

and International Reserves and others so that the *independence, objectivity* and *integrity* of the Statistical System and the Profession are maintained and preserved. The author prepared a paper entitled, "Information Control and Corruption Economics", in late 1984.

8. Draft of Statistics Act (1984): PSA's Views

8.1 This Act proposes to promote the orderly development of an efficient and effective process of coordinating and integrating the government's statistical system and services (Chap. I/Sec. 3 of Act). Previously, nothing was said about the development of the statistical system outside the government which comprises an equally important sector of statistical activities.

8.2 PSA should study the Act and come out with its own comments, suggestions and recommendations. Whenever relevant, some issues raised in this paper could be included in this proposed Act.

9. Regional and International Relations

9.1 As a professional group, PSA could easily communicate with its counterparts in ASEAN and/or the ISI. This move is a higher stage or plane in the integration of statistics. The first example is integration and exchange of experiences on transfer of statistical technology or methodology between countries in ASEAN. This initial dialogue could result into the formation of an ASEAN Statistical Society, a purely private endeavor. This is a form of *horizontal* integration which reaches out beyond the boundary of nations. The other aspect will be an international level dialogue between PSA and ISI. In fact, PSA is now an association member of ISI and this Annual Conference on "The Integration of Statistics: Philippine Setting" is a follow-up or consideration of the recommendations of the ISI Committee on the Integration of Statistics (1978/1979). The concepts of *horizontal* and *vertical* integrations maybe applied within each taxonomic group.

9.2 Division of labor and specialization is the trend in most statistical services. This specialization had led to the growing isolation from each other and had also led to some form of prestige ranking. There is need for openness to new ideas and challenges (before com-

plete isolation dominates) as a necessary condition for effective communication links between types of specialists (taxonomic approach). PSA must be militant so that complete isolations of one category from the main group would not happen. PSA may consider the contents of the Survey of its Statistical Membership conducted in 1983 in order to identify the members by principal and/or taxonomic categories. Each sub-group will be requested to study the problem of vertical and horizontal integration.

10. Summary and Conclusions

10.1. It appears that the experiences and conditions in each country are quite different. Thus, PSA will have to handle the areas of concern for integration in more specific terms as reflective of the Philippine setting. The transfer of statistical technology in terms of contents maybe similar in some respects but the procedures that will be developed and applied must be endemic to local conditions.

10.2. PSA should give more credence to Filipino statistical experts who are not only knowledgeable about the problems of its own statistical agencies but have better understanding of the social, economic, political and cultural matrix which must also be considered in the solution of the technical problems in the statistical field.

10.3. Statisticians must not allow, through complacency and default, other professions or firms to perform the functions of the statisticians which, if allowed, would generally bring about disastrous results. On the other hand, PSA should encourage its membership to be more aggressive in the performance of their calling and functions to the extent that they become partners in decision-making, initially in indicating the areas of concern (social and economic) of the strategies to be taken for national recovery and the monitoring and evaluation mechanisms to ensure adherence to the plans, targets and possible accomplishments.

10.4. In this new direction, the Statistician must maintain and preserve the basic guidelines of the profession, namely: *independence, objectivity,* and *integrity.* PSA, through its membership, will also generate a new standard of morality into the governmental and private management hierarchies in the use of untrammeled, objective

and unbiased information for use of the general public. The credibility of government and the business sectors will then be enhanced by this new morality. In accordance with its By-Laws and Constitution, PSA could serve as broker (consulting firm) and offer its services toward solutions of many gaps in the statistical sytem. PSA could then distribute the projects to its members through the principle of equity.

10.5. PSA is the cream of the Statistical Profession. A study of its taxonomy will imply that the Statistician is not only competent in the theory (science) and application (art) of Statistics but in view of the constant dialogue outside the profession, the Statistician has also become knowledgeable about the workings of the other sciences. Because of the nature of his/her calling, the Statistician is considered as a unique and very versatile profession. His/Her theoretical foundation and intimate knowledge of the weaknesses and strengths of data bases which are generated by the Statistical System will allow the Statistician to be an excellent judge of the level, pace and direction of impacts and benefits of components of the development efforts, at the micro and macro levels. This unique position of the Statistician should allow him/her to expand the vision of the Profession into new areas, directions or initiatives, namely:

(i) provide decisions on assumptions, targets, and paths of the developmental efforts (plan/proposal) of both public or private sectors, and

(ii) assist and influence, to a considerable degree, decision and policy making at all levels of management hierarchy with the use of objective and unbiased information.

10.6. Guided by the principles of *independence, objectivity,* and *integrity,* the Statistician, through PSA, should be in a good position to render a real picture of the state of the Philippine economy. This participation will give true meaning to these new initiatives.

10.7. With these moves, PSA will be able to enhance the identity, visibility, prestige and importance of the Statistical Profession as a pillar and partner in development and nation building for a free, democratic, and better-informed Filipino.

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