NBSIR 73-275

Report to AID on an NBS/AID Workshop on Standardization and Measurement Services in Industrializing Economics

Michael B. McNeil

Office of International Relations
National Bureau of Standards
Washington, D. C. 20234

Held May 4 – 18, 1973

Prepared for
Agency for International Development
Department of State
Washington, D. C. 20523

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U. S. DEPARTMENT OF COMMERCE, Frederick B. Dent, Secretary
NATIONAL BUREAU OF STANDARDS, Richard W. Roberts, Director

FOREWORD

The staff of the Office of International Relations of the National Bureau of Standards desire to thank the Agency for International Development for making this Workshop possible, and to thank those persons at NBS and elsewhere who so freely gave of their time and knowledge to made it a success.

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Report to AID on the NBS/AID Workshop on Standardization and Measurement Services in Industrializing Economies

For several years, the U.S. Agency for International Development and the National Bureau of Standards have had a cooperative program designed to facilitate the industrialization of various countries by helping them to develop a measurement and standards infrastructure. On the part of AID, this is handled through the Office of Science and Technology and, on the part of NBS, by the Office of International Relations.

This program of cooperation contains several elements; two of the most important are the measurement surveys and the workshops.

NBS, under AID sponsorship, acts to help industrializing countries improve their standardization and measurements services by making surveys of their requirements for such services in selected countries; these surveys are generally carried out by a team of experts both from NBS and from other industrializing countries which have overcome problems similar to those believed to exist in the country surveyed. Also, NBS invites representatives of standardization and measurement organizations in industrializing countries to attend workshops held annually in the NBS facilities at Gaithersburg, Maryland, in which these visitors see what NBS does for the United States and how it interacts with other governmental agencies and with various elements in the private sector.

This report covers the second of these workshops, the first not intended to be followed by surveys of the participating countries. The other previous Workshop involved largely countries which either had just been surveyed or were just about to be surveyed, whereas most of the countries involved in the Workshop described here do not fall in these classes.

The Workshop was attended by the following persons from abroad:

Dr. Jong Wan Choi
Administrator
Industrial Advancement Administration
Seoul, Korea

Mr. Sai Pew Chow
Standards Officer
Standards Institution of Malaysia
Kuala Lumpur, Malaysia

Mr. Emanuel Lartey
Director
Institute of Standards and Industrial Research
Accra, Ghana

Mr. Sang Sup Lee
Director
National Industrial Standard Testing Institute (NIRI)
Seoul, Korea

Mr. Francis Maiko
Superintendent, Weights & Measures
Ministry of Commerce
Nairobi, Kenya

Mr. Peixoto Nogueira
National Bureau of Weights & Measures (INPM)
Rio de Janeiro, Brazil

Mr. H. Ohaya
Head, Engineering and Metrication Section
Nigerian Standards Organization
Federal Ministry of Industries
Lagos, Nigeria

Mr. Phi Minh Tam
Director
Vietnamese Institute of Standardization
Saigon, South Viet-Nam

Mr. Newton Teixeira
Technical Assistant
Brazilian Association of Technical Standards (ABNT)
Rio de Janeiro, Brazil

Ing. Hugo Velasquez, Chief
Standards Department
General Directorate of Standards & Technology
La Paz, Bolivia

The program carried out is given in Appendix I.

A few special tours of NBS facilities were arranged by individual requests. The program appeared somewhat crowded and some participants suggested that more time for discussion would have been welcome.

The original aims of the Workshop were set out in NBS Report 10583 entitled "Utilization of the Industrial Technology Capability of the National Bureau of Standards" from which the following paraphrase is taken: "Although developing countries may differ significantly from each other in their individual aspirations with respect to industrial development, many of the problems they face in establishing an effective infrastructure of measurement technology and standardization for production and quality control are similar." As a result, standardization experts in most of these countries are interested in sharing their experiences and in learning from each other. During this Workshop, as during the previous similar Workshop, it soon became apparent that a source of major benefit to many of the participants was the opportunity to interact with persons from other industrializing countries having similar problems.

Four distinct aspects are of special interest to participants:

a. Maintenance of national standards of measurement compatible with SI, and transference of these standards to local institutions.

b. Field surveillance of weights and measures in the market place.

c. Procedures for the development of standards, including standards of safety, consumer protection, building codes, etc., as well as compatibility standards for such things as pipe threads.

d. Inspection and quality control of production (sampling, tolerances, control charts).

Whereas the emphasis of the previous Workshop had been on the prospective "Surveys" of standardization capabilities in the countries involved, the countries represented this year are not ones which, in our view, are likely to be the subjects of such surveys in the immediate future, and the emphasis this year was much more on the communication to participants of useful information about NBS and related institutions.

The Workshop was successful in its objectives of acquainting the participants not only with NBS and its functions and relations with other government agencies, with the various private standards institutions, with the universities, and with the business community, but also with the complexities of voluntary and mandatory standards in a highly industrialized economy and the possibilities for international transfer of standards and measurement information. The participants also came to know one another and many NBS staff members on a personal basis.

After the Workshop was finished NBS solicited comments and criticisms from the participants. From these comments three points in particular emerged: first, that the Workshop was too structured and that more time might have been allocated for incidental visits to NBS laboratory facilities; second, that the schedule should have allowed additional time for discussion; and third, that the field visits to such institutions as the American National Standards Institute and the Underwriters' Laboratories were extremely valuable and deserved additional time. Several letters containing detailed appreciation and criticisms are reproduced in Appendix VII.

Each participant was asked to describe measurement and standards activities in his own country. These were quite interesting and provided some lively discussions, much of which centered about the interplay between voluntary and compulsory standards. Mr. Chow (Malaysia) made a number of interesting comments in this field, drawing on the experiences of his institution.

One feature of the program was specially invited talks (mostly after-dinner) by non-NBS speakers with specially relevant experience. (See Appendix I for list of speakers and the titles of their talks.) Mr. Rich, of the Navy Ship Research Center, gave a "case-method" analysis of cooperative programs with Korea on maritime activities which was most instructive on the need to consider the different ways in which persons of different backgrounds look at the same situation.

Dr. Waterston's talk on development planning emphasized the need for realism and for basing any grand strategy on sound tactics at the individual project level.

Professor Rao explained India's science planning and its rather special problems.

Dr. Deming spoke on statistics and quality control as applied to industry (especially Japanese industry, with which he has been closely connected), and the importance of top-management awareness of production-line problems and the need for quality control at all levels. A version of his speech forms Appendix VI.

The NBS staff involved felt that the Workshop successfully met its basic objectives, and offered the following suggestions for further improvement:

1. The countries sending representatives should be limited to two representatives apiece.

2. Each participant should clearly demonstrate that his government or institution is making some meaningful

contribution (financial and technical) to his participation at the Workshop. Governments that invest in an effort will also expect fully meaningful results.

3. A briefing on U.S. Government structure and the functions of NBS should be sent to each man for his personal use before he comes.

4. Literature to accompany a presentation should be given to the participants the day before the talk to which the handout refers, so listeners have a chance to ask questions based upon the literature as well as the verbal presentations.

5. The Workshop management including transportation and accommodation arrangements of participants should be delegated to special staff or contractors so that the NBS staff responsible for technical input, participant interactions, and programming are not preoccupied with routine matters.

Appendix I

Program of NBS/AID Workshop on Standardization and Measurement Services in Industrializing Economies

to be held at National Bureau of Standards
Gaithersburg, Maryland

May 4 - 18, 1973

Friday May 4	4:00 p.m.	Check-in, Holiday Inn, Gaithersburg
Saturday May 5	10:00 a.m.	Visits to National Arboretum
	12:00 Noon	Lunch, Cosmos Club
	1:00 p.m.	Visit to National Gallery
	6:30 p.m.	Welcoming Dinner (Host: H. S. Peiser) Olney Inn
Sunday May 6	Free	

All sessions for week, May 7 - 11 to be held in Lecture Room B, NBS

Monday May 7	9:00 a.m.	Plenary Session, all interested NBS staff invited. Welcoming remarks by Dr. Richard W. Roberts, Director National Bureau of Standards
	10:00 a.m.	Opening remarks by visitors on problems in their countries[1]
	12:00 Noon	Lunch, Dining Room C Speaker: Mr. J. Rabinow, Acting Chief, Office of Invention and Innovation
	1:00 p.m.	Lecture by Mr. William E. Andrus, Jr., Program Manager, Office of Engineering and Information Processing Standards, on the NBS Standards Program
	1:30 p.m.	Lecture by Mr. Charles B. Phucas, Special Assistant to the Program Manager, on the U.S. Voluntary Standardization System and the Role of NBS in that System

	2:00 p.m.	Lecture by Mr. Thomas M. Stabler, Special Assistant for International Programs, on the United States and International Standards
	2:30 p.m.	Coffee Break
	2:45 p.m.	Lecture by Mr. William J. Slattery, Chief, Standards Information Services, on the Standards Information for Developing Countries
	3:15 p.m.	Lecture by Mr. Herbert A. Philo, Chief, Office of Engineering Standards Services, on the DOC - VPS Program
	4:00 p.m.	Lecture by Mr. T. R. Young, Certification and Testing Laboratory Project, on Accreditation of Testing Laboratories
Tuesday May 8	9:00 a.m.	Lecture by Mr. R. A. Simmons, Staff Assistant for International Computer Technology, on Computer Applications
	11:00 a.m.	Lecture by Mr. J. Hilsenrath, Data Systems Design, Office of Standard Reference Data, on Data Processing
	12:00 Noon	Lunch, Senior Lunch Club
	1:00 p.m.	Lecture by Dr. E. L. Braly, Associate Director for Information Programs, on Information Programs
	2:30 p.m.	Lecture by Mr. L. Santone, Deputy Chief, Technical Analysis Division, on Technical Decision Analysis
Wednesday May 9	9:00 a.m.	Presentation by Mr. H. F. Wollin, Acting Chief, Office of Weights and Measures, on Weights and Measures Activities
	12:00 Noon	Lunch, Dining Room C
	1:00 p.m.	Lectures and demonstrations by members of Electricity Division, Chief: Dr. C. H. Page
	6:30 p.m.	Dinner, Washingtonian Motel

	8:30 p.m.	Talk by Dr. H. Rich, Fleet Liaison, Navy Ships Research Development Center, on Technology Transfer in Korea under the Naval Science Assistance Program. To be held at NBS.
Thursday May 10	9:00 a.m.	Lecture by Dr. J. W. Motz, Chief, Applied Radiation Division, on Radiation Research
	10:00 a.m.	Lecture by Dr. H. H. Plumb, Chief, Temperature Section, Heat Division, on Thermometry
	11:00 a.m.	Lecture by Dr. M. R. Meyerson, Chief, Product Evaluation Technology Division, on Consumer Product Evaluation
	12:30 p.m.	Lunch, Senior Lunch Club
	1:30 p.m.	Lectures and demonstrations by members of Optical Physics Division. Chief: Dr. K. G. Kessler
	7:00 p.m.	Dinner, Csiko's Restaurant
	8:00 p.m.	Talk by Dr. Albert Waterston, Director, Agricultural Sector Implementation Project, Governmental Affairs Institute, on New Perspectives on Development Planning
Friday May 11	9:00 a.m.	Lecture by Dr. R. M. Thomson, Senior Research Scientist, Institute for Applied Technology, on Mechanical Integrity of Materials
	10:00 a.m.	Lectures by Mr. J. P. Cali, Chief, Office of Standard Reference Materials, and members of his group, on Standard Reference Materials
	10:50 a.m.	Coffee
	12:00 Noon	Lunch, Dining Room C
	1:00 .m.	Lecture by Dr. J. B. Wachtman, Jr., Chief, Inorganic Materials Division, on Inorganic Materials Research
	2:00 p.m.	Lecture by Dr. R. K. Eby, Chief, Polymers Division, on Polymers Research
	2:50 p.m.	Coffee

	3:00 p.m.	Lecture by Dr. M. D. Scheer, Acting Chief, Physical Chemistry Division, on Physical Chemistry Research
	4:00 p.m.	Lecture by Dr. S. Silverman, Associate Director for Academic Liaison, on the Interaction of the National Bureau of Standards with the Academic Community
	6:30 p.m.	Dinner
Saturday May 12	Free	
Sunday May 13	Free	
Monday May 14	9:00 a.m.	Introduction by Dr. James R. Wright, Director, Center for Building Technology
	9:30 a.m.	Lecture by Mr. Charles T. Mahaffey, Building Standards Program Manager, Office of Building Standards and Codes Services, CBT, on Building Standards and Codes
		Tour of Plumbing Laboratory with Dr. Jack E. Snell, Chief, Building Service Systems Section, CBT
		Tour of Environmental Laboratory with Dr. James E. Hill, Thermal Engineering Systems Section, CBT
		Tour of Structures Laboratory with Dr. Norman F. Somes, Chief, Structures Section, CBT
		Tour of Materials Laboratory with Dr. Geoffrey Frohnsdorff, Chief, Materials and Composites Section, CBT
	12:00 noon	Lunch, Senior Lunch Club
	1:00 p.m.	Lecture by Professor C.N.R. Rao, Indian Institute of Technology, Kanpur, on Science & Technology Plan for India

	2:30 p.m.	Lecture by Dr. W. Edwards Deming, Consultant in Statistical Studies, on Some Statistical Logic in the Management of Quality and Competitive Production, in Green Auditorium NBS (All interested NBS personnel invited)[2]
Monday May 14	5:15 p.m.	Depart Gaithersburg accompanied by Dr. Michael B. McNeil, Assistant to the Chief, Office of International Relations
	Night	Edison Hotel 228 West 47th Street New York, New York
Tuesday May 15	10:00 a.m.	Visit to Electrical Testing Laboratory, Inc. 2 East End Avenue New York, New York 10021
	2:00 p.m.	Visit to American National Standards Institute 1430 Broadway New York, New York 10018
	Night	Edison Hotel 228 West 47th Street New York, New York
Wednesday May 16	1:00 p.m.	Visit to Underwriters' Laboratories, Inc. 1285 Walt Whitman Road Melville, Long Island, New York 11746
		Drive to Philadelphia, Pennsylvania
	Night	Penn Center Inn 20th and Market Street Philadelphia, Pennsylvania
Thursday May 17	9:30 a.m.	Visit to American Society for Testing and Materials, 1916 Race Street Philadelphia, Pennsylvania 19103
	Afternoon	Drive to Gaithersburg, Maryland
	Night	Holiday Inn, Gaithersburg
Friday May 18		Presentations by Members of the Maryland Department of Agriculture, Division of Inspection and Regulation, Office of

Weights and Measures (Secretary Hance, Mr. Thompson, Mr. De Grange):

8:30 a.m.	Demonstrate Package Testing at NBS for Visitors (Random Packages and Liquid Packages)
9:45 a.m.	Depart for Frederick with Visitors
10:30 a.m.	Arrive at McCutcheon's Apple Products, Inc. 13 South Wisner Street Frederick, Maryland (Observe Test of Vehicle Scale)
11:15 a.m.	Depart McCutcheon's
11:20 a.m.	Arrive at C. O. Meitzler, Inc., South Wisner Street Frederick, Maryland (Observe Test of Liquid Measuring Device for Gas Pump)
11:45 a.m.	Remain at Meitzler's (Observe Test of Vehicle Tank Meter for Fuel Truck)
12:15 p.m.	Depart for Restaurant and Lunch
1:30 p.m.	Returned to NBS for Farewells

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[1]See Appendices II - V for texts of four of these.
[2]See Appendix VI for text.

Appendix II

Opening Remarks

Jong Wan Choi, Ph.D.
Administrator
Industrial Advancement Administration
Ministry of Commerce & Industry
The Republic of Korea

Dr. Brady, Mr. Chairman, distinguished participants, NBS staff, ladies and gentlemen:

It is indeed a privilege and a pleasure for me to remark about my country. I am very grateful to all of you for giving me and my fellow countryman a chance to participate in this intelligent gathering, and wish to convey my sincere appreciation to you all for your unswerving interest and friendly concern in us.

By way of remarking on the programs in my country, let me first explain to you the general picture of Korean economy.

The two successive Five-Year Economic Development Plans (1962-1971) spurred the economic progress of Korea to rapid growth, and achieved resounding success. Industrialization boomed, exports expanded greatly, domestic saving increased, and a high degree of development was attained in the fields of agriculture and social overhead capital. The ground work for economic stability had been laid.

Thus, during the past decade a basis was created for Korea's entrance into a higher stage of development. Such an achievement may be attributed to the leadership of President Park, Chun Hee as well as to the economic cooperation of our friendly nations, and also to the smooth and efficient implementation of economic planning, coupled with the ardent desire of the entire people for sustained development, and with their high degree of skill and education.

While fostering economic growth by means of systematic mobilization of all available human and material resources and potential, the economic development plans have been implemented with special emphasis being always placed on early attainment of economic self-sufficiency, rapid industrialization, and equitable sharing of gains among all levels of society.

The ambitious First Five-Year Economic Development Plan (1962-66) had as target an annual growth rate of 7.1 percent. Surpassing the original target of 7.1 percent, the actual economic growth rate during the First Five-Year Plan period averaged 8.3 percent a year. It may well be said the most outstanding accomplishment of the First Plan was the sharp expansion of the nation's export

volume. In 1966, the last year in the plan period, it jumped to a whopping $250 million, compared with $54.8 million in 1962, the initial year of the period. This drastic upward trend in export industry has been maintained until now, marking $1.85 billion in the vear 1972 and expecting to attain $2.4 billion at the end of this vear. The objectives of the Second Five-Year Economic Development Plan, covering the period (1967-1971), were to bring about major increase in national income, balanced growth between agricultural and industrial sectors, and further progress in industrialization with particular emphasis on the development of basic preparatory work for heavy and chemical industries.

Originally designed to achieve an average vearly growth of 7 percent, the Second Plan exceeded the target with the actual growth rate averaging approximately 12 percent. A vigorous industrial upsurge began in Korea around the middle of the 1960's, and the index of industrial production rose almost threefold during the 1965-70 period.

To cite just a few increases in production during the said period, food processing, up 300 percent; chemical and chemical products, up 450 percent; paper and paper products, up 220 percent; textiles, up 400 percent; metal and metal products, up 310 and 250 percent respectivelv; machinery, 170 percent; electrical appliances 340 percent, and transport equipment, up 270 percent.

Industrial expansion in general was much ahead of schedule during the Second Plan period, save for a few branches of industry. The construction and dedication of modern super highways, which enabled major population and industrial centers of the nation to be linked with one another in a one-day travel range, may be regarded as another milestone in the course of the nation's effort for economic self-sufficiency and modernization.

Owing to the successful implementation of these plans, the nation's industrialization has been accelerated, social overhead capital such as electricity and roads expanded, a foundation for agricultural development laid, and exports increased greatlv.

The Third and succeeding Five-Year Economic Development Plans have been so designed as to reach new heights in the 1970's under the guiding principles of seeking harmony in growth and stabilization to realize a self-sustaining economic structure, and to ensure balanced regional development through comprehensive utilization of all available national resources.

Designed to attain an annual growth rate of about 10 percent, the Plan's emphasis will be placed on raising of the income of farmer and fisherman, expansion of health and cultural facilities in farm and fishing villages, and promotion of electrification and expansion

of roads in rural areas; construction of heavy and chemical industries; development of manpower and maximization of employment through the development of science and technology and expansion of educational facilities: balanced development of basic social facilities like electricity, transportation and communications; effective implementation of the major river basin; promotion of housing projects and social security programs; and improvement of balance of payments position.

Although we have attained excellent progress in our economy as a whole, especially in the field of manufacturing output, we have to admit a major weakness in our commodity production because of heavy reliance on light industrial type products and consumer goods. Thus, the industrialization efforts now in Korea are moving and expanding toward heavy from light industries. Quality consciousness is taking over from simple quantity mindedness, especially in the field of capital goods such as machinery, shipbuilding, electronics and petrochemicals. The time has come to require quality control: standardization and calibration of precision measurement system have to be organized and controlled at the national level.

Here I would like to quote a phrase from "A Report on a Survey in Korea on Standardization and Measurement Services in Support of Industrialization Goals" prepared jointly by NBS/AID of U.S.A. and the Korean Government;

> "It is therefore suggested that early consideration be given to setting up a national standardization laboratory with responsibility for precision measurement in all fields at the national level.....If Korea is to achieve its industrial development targets it will need to be done....."

Thus, the Industrial Advancement Administration was created, partly due to implementation of the above mentioned recommendation, for the efficient management of quality control and standardization of industrial products through unification of various activities for industrial standardization, quality control, weights and measures, and industrial testing and inspection, which had been randomly carried out by the related government departments in the past. I happened to become the first Administrator of this new Administration. As explained in the brochure distributed to you, IAA consists of four Bureaus, two Offices, which handle the administration and promotion of standardization and quality control, NISRI (the National Industrial Standard Research Institute) and NGMRI (the National Geological and Mineral Research Institute).

NISRI will function in a similar role to NBS of the United States in such areas as the production and dissemination of standard reference materials, research and development of methods of testing, measurement

and analysis, maintaining the physical standards at the national level, and calibration of precision measurement equipment. The first Director General of this Institute, Mr. Lee, is with us here today.

Realizing the role of IAA and to meet the growing requirements of Korean industry, the most emphasis and priority are to be given to securing the national physical measuring standards; to establish the measuring standards calibration system; to develop the test methodology; to produce and disseminate standard reference materials; and to establish and implement training programs.

Dr. Brady and friends, I believe this Workshop will be greatly helpful to pursue our role and future activities by enhancing our knowledge and by expanding our vision on the subjects.

We should try our best to be benefited by the Workshop and continue to have a mutual joint effort toward common goals.

Thank you.

Appendix III

Opening Remarks

Mr. Phi Minh Tam
Director
Vietnam Institute of Standardization
Saigon, Vietnam

During the past decade, eyes of the world have focussed on Vietnam due to its struggle for political survival as an independent and free nation. From the colonial heritage, Vietnam inherited a war-weary people and little residual technology and trained manpower. The interim period of peace between 1954 and 1959 was too short for the development of properly staffed institutions through which technology could be received, maintained and developed to sustain the country's development efforts.

While fighting against an external as well as an internal enemy and at the same time trying to build a viable nation with a constitutional democracy, Vietnam has made considerable efforts to prevent social and economic upheavals common in developing economies and particularly likely in war conditions. The lack of security in the countryside made major natural resources inaccessible, power development projects inoperable, and investment concentration in the capital and surrounding areas unavoidable. Production fell sharply. During the period between 1963 and 1969, the industrial sector contributed only 10% of the GNP, while the agricultural sector contributed about 30% and the services sector 60%. Foreign trade was critically out of balance, with the peak of imports in 1969 amounting to $853 million and export amounting to $33 million or less than 4.0% of imports.

Against this background, little was done for long-term development in general, and for the development of technological capability and measurement services in particular.

Twenty years of war have possibly delayed the development of Vietnam for twenty years as compared with other LDC's. However, the war has also required the massive transfusion of technology in a short time and has brought instant sophistication in transportation, communication, consumer products, and utilities. Other side effects have accelerated education in certain fields, awareness of technological progress, exposure to a higher standard of living, and cooperation with different countries throughout the world.

Now that a peaceful settlement has been achieved, peace is promised if not assured. Long neglected due to the military struggle, economic development is now the key to continued survival. The four-year National Economic Development Plan, 1972-1975, denoted the

transition between a war economy and the beginning of a new era of economic development.

One priority area identified in the Plan is the rapid expansion of the export capability so as to improve the foreign trade balance. This entails the increase in industrial investment and the improvement of production facilities and techniques to upgrade quality. Measures have already been taken by the Government, including the support of several institutions critical to economic development, among which is the National Institute for Standardization.

The purpose of this paper is to describe the conditions in which the standardization program of Vietnam has evolved, to note the problems it faces, and to mention methods of approach in solutions.

Viet Nam has basically an agricultural economy. Major exports in the prewar period included rice, rubber, tea and other agricultural products. In 1953, 56 standards were published for various animal and vegetable products, the inspection of exports being performed by an office in the Ministry of Agriculture. However, since exports of agricultural products have declined drastically and have practically stopped for many products, implementation of export standards has not been given serious support.

The government has also promulgated on an ad hoc basis standards for textile, shrimp, fertilizers. These standards were mandatory and are controlled by the issuing agencies, but have not been catalogued and up-dated. Many, if not all of them, have been forgotten because of either their inapplicability or the lack of any scheme for their implementation.

Viet Nam began to develop industrially after 1954, but not until 1964 and 1965 were there concrete proposals for the creation of a central office of standards. In 1966, an interministerial meeting was convened to discuss the establishing of a "National Standards Body" (NSB). From the minutes, it appears that two issues were discussed specifically and in great detail, and that they received unanimous agreement. The meeting recommended that NSB be a technical service and an independent institution and that standards prepared by NSB be voluntary and be implemented by other concerned government agencies. Unfortunately, the recommendations did not receive official approval. However, now the need for an institution to "improve product quality" and to "protect the consumer interest" is so urgent that the creation of a NSB could no longer be ignored.

Established in early 1967 as a department of the Ministry of Industry, VIS was crippled at birth by the built-in sluggishness of an administrative agency and a lack of direct budget allocations. In the inflating economy, government salary scales could not be readjusted to

allow successful recruitment of technical staff; as a result, for most of its existence, VIS was only a paper organization.

During the first year of its existence, VIS has established contact with NBS's of other countries. From the experience of countries with more advanced standardization programs, VIS mapped out an integral proposal for the development of standardization and measurements services in a draft law. The draft Standardization Law, presented in late 1968, was approved in late 1969 and was sent to the National Assembly for enactment.

In the meantime, VIS began to develop contact with local manufacturers and other technical institutions and provide technical information from its humble library consisting of technical books and sets of foreign standards. Technical committees were set up to discuss and approve standards prepared by the limited technical staff available. Many of the projects were merely translations of existing foreign standards or ISO recommendations.

The first Vietnamese National Standards were published in 1968 and 85 standards had been published by the end of 1972. It would be difficult to estimate the degree of implementation of published standards, because neither VIS nor any other government agencies have proper facilities to implement those standards. Intermittently, manufacturers and purchasing agencies would come to VIS to have products evaluated for compliance with national standards. In those cases, VIS introduces them to the existing laboratories for the services needed and helps with the interpretation of the test results.

VIS will not be able to fulfill its unusually important role in Viet Nam's rapidly developing economy and will remain a paper organization until VIS develops its capability to provide the needed services including testing, measurement, calibration, research and development.

At the time VIS was established, financial support was hard to obtain for a cause still not well understood and of doubted utility. To build its first laboratory, VIS relied on local manufacturers' contributions of materials and other contributions in cash and land. US/AID was engaged to provide technical assistance in the form of training for the technical staff, expert services and test equipment. Also, by bilateral arrangements, other countries and international agencies have made training opportunities available to VIS staff and supplied books and sets of standards.

VIS' first laboratory will become operational by the end of 1973. At the moment, two technical experts under US/AID contract are assisting VIS in the installation of the equipment and the training of

VIS technical staff in the operation of the equipment. The present facilities will be capable of routine chemical analyses and simple electrical and mechanical measurements. A small calibration section will be operated to support the laboratory activities and provide calibration services on a limited basis to other laboratories and industry.

Plans for enlarging the present facilities have already been approved and funded by the government. When completed by the end of 1976, areas available for testing and calibration will be doubled (to 10,000 sq. ft.) and will be able to accept reference standards of weights and measures.

1973 is the year of transition between the present VIS and the reorganized NIS, created on the first of December, 1972, when the long awaited "Standardization Law" was promulgated. The implementation decree prescribing the organization and operation of NIS was approved in March 1973. Rules and regulations for the operation of NIS are being finalized and NIS should be operational by no later than the end of 1973.

VIS is an administrative unit of the Ministry of Economic Affairs, yet NIS is a public autonomous institution. VIS is supported entirely by the Ministry budget and VIS employees are civil servants governed by the Civil Service rules and regulations. On the other hand, NIS must find an independent source of financial support although NIS may receive subsidies from the national budget.

NIS organizational structure consists of:

- a Governing Board
- a National Standardization Council
- the secretariat and other functional units

a) The Governing Board is made up of a Chairman, two Vice-Chairmen, a Secretary-General and five to seven members, of whom three members are appointed, one by the Chamber of Commerce, one by the Confederation of Industries and one by the National Standardization Council. The Board shall be responsible for the overall operation of NIS.

b) The National Standardization Council consists of 40 to 50 members duly appointed to represent all parties concerned with standardization. The Council assists the Board by recommending policies, programs of work, and project standards. To carry out its responsibilities, the Council may form a Divisional Committee for each branch of industry or each field of technology. In turn each Divisional Committee may form Technical Committees to elaborate and investigate standards projects.

A draft standard approved by the Technical Committee will go to the Divisional Committee for comments and to the council for approval. A draft standard approved by the Council becomes a project standard. When promulgated by the Chairman of the Board, the project standard becomes a national standard.

c) The Secretariat of NIS is headed by a Director General. The office under the Director General may consist of as many departments as the Board may feel are required to discharge the functions of NIS. Essentially the following departments are projected: general business, standards promotion, quality control, testing and research, and national physical standards. The name of each department indicates its basic functions.

For many an autonomous institution, at the time of its establishment, the National Budget allocates an endowment fund with which the institution can make incentive loans and receive interest to cover its operational expenses. However, this mode of financial support is inapplicable to technical service institutions having no business character. For institutions like NIS, part of the income will be derived from services provided. However, this source of income is very small compared to large funds needed for the development of NIS. To promote long range financial support for institutions critical to economic development without drawing from the National Budget, a special fund was recently set up by Presidential decree which prescribes that for all foreign exchange transactions, one piaster for each dollar shall be put in the fund as a royalty. The details of operation of the Fund are still to be worked out. The creation of this Special Fund shows the determination of the country in developing and giving support to institutions such as NIS.

The Standardization Law outlines the basic functions of NIS and set the general course of its activities. Future NIS programs are mainly designed in connection with or in support of programs for industrial development and export promotion.

Viet Nam invariably lacks a system of industrial and commercial testing. A preliminary survey made recently revealed the capability of some existing laboratories to provide some testing. But more important, the survey revealed the common problems faced by laboratories irrespective of their purposes and objectives. They all need technical support in term of calibration, spare parts, reference standards. These laboratories express their willingness to participate in a National Conference of Laboratories (NCL) to coordinate the existing facilities into an industrial and commercial testing system. NCL shall serve as a forum for discussions of common problems and shall provide liaison with other scientific and technical institutions and any other organizations interested in scientific and technological progress.

The functions assigned to NIS by law as the custodian of national standards of measurement with authority to provide back-up testing and calibration services and to designate and approve testing agencies make its role the more suitable to sponsor NCL. When NCL develops into a workable system, NIS will shift more and more the routine testing responsibility to other laboratories and will concentrate its efforts in the more advanced aspect of measurement technology.

One of the main reasons that have hindered the export of Vietnamese products is their relatively poor and non-homogeneous quality. Preshipment inspection has proved to be effective in the promotion of exports because it assures the buyer of the expected quality. Henceforth, the immediate priority in NIS programs is related to the coordination of an effective system for preshipment inspection including the careful selection of commodities for required inspection and the designation of capable inspection agencies. Coupled with required inspection, technical services shall be provided to the industry as incentives.

The use of the standards certification mark has been successfully used by many a country to promote quality of products for local consumption. NIS plans to introduce the mark as soon as it develops testing capability for the products intended to bear the mark. Licenses for the use of the mark are issued to selected manufacturers whose products comply with the designated standards and who maintain approved quality control systems in their plants.

As NIS laboratory and other authorized laboratories develop their testing capabilities, NIS is faced with the need to develop a unified measurement system which can insure validity of test results and traceability to the SI system.

Since the cost in capital investment and in human resources to establish and maintain national physical standards are relatively high, NIS includes in its plan for Phase I ending 1975 only the maintenance of basic standards of weights and measures. Other standards will be introduced as the needs are identified and the proper staff are trained for their maintenance and use.

The trained manpower and the highly specialized equipment which NIS must dispose to effectively discharge its various functions can be profitably devoted to some research and development works. Although the value and the need for industrial research have been fully demonstrated, NIS will defer its research and development program until it has fully established itself.

It is expected that the contact by NIS with the manufacturers through meetings to approve standards and routine services in testing,

calibration, trouble-shooting, technical information will give NIS staff more insights into the industrial problems and will gain confidence of the industry. The follow-up on phase of industrial research will not find difficulty for acceptance, once the manufacturers have confidence in the capability of NIS to help them.

The standardization and measurement program for Viet Nam was initiated in 1967 at the time of creation of VIS. However, because of the institutional, procedural and financial problems faced by VIS, one can justly say that the take-off began only with the birth of NIS at the end of 1972. The standardization law giving NIS autonomy did remove some of the constraints that held back VIS development. But many of the problems that had plagued VIS will continue to haunt NIS for some time to come.

The struggle for survival has drawn the great majority of the available human resources. A handful of technicians on loan from the army are barely sufficient to run the administrative machine in a stagnant economy. With the return of peace, the army will hopefully release some of its trained manpower and the rate of formation of technicians can be accelerated to ease the presently tight manpower supply.

NIS will need a well qualified staff and is given a better chance than VIS for successful recruitment. Being autonomous, NIS will be able to decide on incentives to encourage and reward dedication, ingenuity and creative thinking such as: improved salary, better working conditions, yearly promotion... which have not been possible with government departments.

NIS technical staff have been enjoying the training made available by agreement with US/AID and other countries. It is hoped that many more countries will make this form of transfer of technology available to LDC's.

Another possible consideration for the development of NIS is the employment of foreign staff in key positions in the early years. This is conceivable since time is required to recruit and train local staff and in the meantime NIS will have to carry out its functional obligations in face of the urgent demand for its services.

Little resource has been allocated for economic development in the past for obvious reasons. With the return of peace, the standardization and measurement programs, long delayed, will certainly have a share of the limited national resources made available. While the infrastructure for technological development is practically nil, the approach at the national level is to establish multi-purpose institutions responsible for many related areas of activities. NIS is an example as its functions include the preparation of industrial

standards, the testing and inspection of commodities, the preshipment inspection of exports, the accreditation of other laboratories and inspection agencies, the custody of national physical standards, the calibration and certification of measurement instruments... To minimize capital investment and cost of operation, NIS facilities are established mostly on the working level without many of the nice-to-have features, and NIS will be one of the first institutions to provide services on a cost and fee basis.

Although the rapid economic development of the country puts unusual importance upon NIS contribution and this has been recognized by the government, few people understand the objectives and involvement of standardization. The poor quality of a product is usually attributed to the ineffectiveness of the standards body and it is a general belief that quality will somehow improve when a standard for the commodities is published.

In-depth education in key ministries and sectors of industry is needed to implement the standardization and measurement programs on a realistic basis. Through the National Standardization Council, NIS brings together representatives of various sectors into contact with the standardization program. At different levels in technical committees, divisional committees and in the Council, they will have the opportunity to investigate, discuss and approve solutions to standards problems. On the other hand NIS capability and services will be promoted through public relation programs to build up public credibility in the cooperation with NIS.

Political instability and the uncertainty of the course of economic development in the past made it almost impossible to identify the needs and priorities. The recently approved economic development plan narrowed down the national priorities to industrial and export promotion and all NIS activities are geared toward those objectives. Still in those areas, there is urgent need for specifications, standards, and testing capabilities in large numbers and varieties. The lack of knowledgeable staff gives additional dimensions to the problem.

The success of NIS programs in standardization and measurement depends largely on the careful planning for NIS progress. NIS has learned much from the experience of other LDC's. However, conditions under which NIS has developed and will progress will radically differ from other countries. NIS progress must first of all be concerted with the national priorities for maximum effectiveness of limited resources and to provide a wide range of services with a small staff. A five-year plan for NIS development is being prepared with the assistance of US/AID contractors and should be completed by the end of 1973. NIS will try then to seek assistance based on the needs identified.

Appendix IV

Remarks

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Chief, Standards Department
General Directorate of Standards & Technology
La Paz, Bolivia

NBS/AID Workshop
on Standardization and Measurement
Services in Industrializing Economies

National Bureau of Standards
Monday, May 7, 1973

GENERAL DIRECTORATE OF STANDARDS AND TECHNOLOGY
(DGNT) OF BOLIVIA

1. First of all, I must give thanks to the National Bureau of Standards and the Agency for International Development for the opportunity given to my country to be present in this Workshop.

2. Introduction

Standardization has become a powerful tool for national planning, industrial production, commerce and trade.

In the less developed countries we have come to realize this and have started organizing ourselves to initiate this important activity to improve our standard of living.

3. General Directorate of Standards and Technology

3.1 The General Directorate of Standards and Technology was established by Supreme Decree on April 1971 as a technical unit, dependent on the Ministry of Industry and Commerce.

3.2 The General Directorate of Standards and Technology has the following duties:

- Elaboration of technical standards.
- Definition of the characteristics of all material, semi-finished and finished products, specially those which have commercial interest to Bolivia.
- Establishment of test and sampling methods.

- Establishment of an official system of weights and measures.
- Quality certification and regulation of the use of the DGNT mark in conformity to Bolivian Standards.
- Performance of all kinds of scientific and technical investigations and research on the subject of standards.
- Technological investigations, especially on typical products, and transfer of the technology involved to industry.

3.3 The General Directorate of Standards and Technology is headed by a General Director and has three departments, which are:

- Standards Department.
- Technology Department.
- Laboratory Department.

3.3.1 Standards Department.

The Standards Department is to prepare, coordinate, control and promote the general adoption of standards in Bolivia.

This Department must coordinate its work with regional and international organizations related to standardization and quality control.

The Standards Department has two Divisions, which are:

- Standards Elaboration.
- Quality Control.

3.3.1.1 Division of Standards Elaboration.

The duties of this Division are as follows:

- To draw up standards.
- To carry out all kind of scientific and technical research on subject of standards
- To put all draft standards on public scrutiny for a determined time.
- To publish the official standards.

The drafting of standards is carried on in the usual way, that is, through technical committees and subcommittees in the different fields, in which are represented government departments, producers, consumers, and technical educational institutions.

At present there are 28 committees and 175 subcommittees, but there are only 38 subcommittees working on different groups of subjects.

So far, the General Directorate of Standards and Technology has approved 44 standards and another 90 draft standards are in study by the respective subcommittees.

For the drafting of standards the DGNT has given equally high priority to the following fields:

- Food Industries
- Textile Industries
- Plastics
- Construction
- Mining
- Metallurgy
- Occupational Safety and Health.

The DGNT is a member of the Panamerican Standards Commission (COPANT) and works with all the other members in the preparation of Panamerican standards.

3.3.1.2 Division of Quality Control.

The duties of this Division are as follows:

- Establishment of diagrams on process control.
- Application of sampling methods for statistical quality control.
- Issuance of certificates of quality in conformity to Bolivian Standard.

The use of DGNT mark in conformity to Bolivian Standards will be regulated by a law which is being drafted now by the DGNT.

The DGNT thinks that to establish the official system of weights and measures is one of the main tasks that must be realized by this Institution, and it is possible that in the near future will be created a Division or perhaps a Department of Metrology.

3.3.2 Technology

The Technology Department has the responsibility to carry out studies related with transfer of technology, and with scientific and technical research in all those fields determined by the General Director and the Ministry of Industry and Commerce as having priority.

This Department has two divisions, which are:

- Division of Technology Investigation
- Division of Transfer of Technology

In this Department, the Staff are studying the possibility of creating a Technical Information Center.

The Division of Transfer of Technology should participate in regional and international projects on the transfer of technology.

3.3.3 Laboratory Department.

The Laboratory Department has the responsibility of performing all the necessary tests required by the Division of Quality Control and must also carry out the tests required by the Standards Department in order to confirm the specifications given in the national standards.

The Laboratory Department must coordinate its job with the Technology Department in order to perform all the research required for a special product.

This Department is doing now a national inventory of laboratories, because there is a need on the part of the General Directorate of Standards and Technology to know what kind of apparatus are available and what tests are being performed in our country.

4. I do not speak about our problems, because as you have heard, the DGNT is the youngest standardization body in South America and we think that there is a long way to advance, but with our own effort and with all the cooperation we hope to have from international organizations and friendly countries, we shall reach the main goals determined like priorities by the Bolivian Government.

Appendix V

THE PROBLEMS OF STANDARDISATION AND MEASUREMENT SERVICES IN KENYA

F. B. Maiko
Superintendent of Weights and Measures, Kenya
Ministry of Commerce and Industry

In Kenya, an organisation to deal with standardisation has not been started. We are in the middle of doing this. In talking about problems as far as standardisation is concerned, I shall confine myself to problems encountered in trying to start the organisation and the problems that will be met at the outset. I have not had as much time as I would have liked to examine which problems are anticipated, since this would have been better done at home where all the data and personnel directly affected are.

As far back as the early sixties the need for standardisation was felt in the country but more so a few years after Independence when the country started having light industries. By 1968, my country was ready to establish a standards Institute, but before doing so, there was a need to examine the economic effect of such an institution on trade between the three partner states of the East African Community of which Kenya is a member. After this examination of the problem it was found that it would be better to have a co-ordinating Institute serving the three partner states Institutes so that standards would be the same in all the three countries forming the common market. For political reasons, the details of which I shall not go into, the above mentioned project has failed so far to materialise. It would therefore seem that Kenya will have to establish a standards Institute very soon to combat the problem industry is facing in the country and hope that it will be possible to co-ordinate standardisation activities of the three partners states when the other two partners establish their standards bodies, and the East African Community Co-ordinating Institution.

It is our intention that the Institute will be concerned with the laying down of specifications for the manufacture of goods, and codes of practice in the manufacture and handling of goods including agricultural produce. It is the intention that the Institute will be managed by both government and the private sector except in the financial aspect where at the beginning the Institute to a very large extent will be dependent on the government for its finances. The problem at the outset is in securing the services of experts in the particular fields on standardisation that we may start with. It is not that there aren't available in the country personnel with the basic qualifications needed but that such personnel will not have had

experience in drafting standards. If the Institute is established, there will be a need for the personnel recruited to be attached to standardisation bodies already well developed to acquire the experience needed on how to go about drafting standards. The second source of our worry is whether the remuneration that well be offered to prospective candidates will attract personnel of the right calibre for the job. It is our conviction that to produce a widely accepted standard or code of practice, it is necessary that expert committee secretaries are the personnel recruited so that when standards or codes or practice are drafted, they are in accordance with the discussion of the committee members. The secretaries must be experts in the fields in which they draft standards.

My country is primarily an agricultural country trying to establish what I might term primary industries. When the standards body is established, it will be necessary that priorities are looked into carefully. In the developed countries standardisation really means industrial standardisation. We shall have to ask ourselves which of the two sectors needs standardisation more urgently than the other. Is our infant industry which is making so much noise for standards the one that needs standardisation to a greater extent than the agricultural sector or not? Do we for example require a code of practice on the picking, transportation of pyrethrum to the factory and the specification of the standard of pyrethrum more than the standard for the manufacture of tyres? It is easy for use to get a standard already established for industrial products from the developed countries (although it may not be suitable) but this is not so in the agricultural field. In most cases even where we find one, it seems to favour the consumer. Therefore priorities will be a top priority subject for our Institute when formed.

Standards in most of the developed countries are voluntary once made. There are many good arguments that this should be so in less developed countries. On my part and looking at my country, I find the solution although near the middle leans toward enforcement of the standards by various methods available. In my country except to a large extent in the agricultural field, we are dealing with foreign investors. It seems to us that these companies are more interested in recovering their investments within a period of about five years. In the beginning they make goods of a quality comparable to imported goods then plead to government to give them protection against imported goods, because the market is too small, besides the point that the company is very young and unable to compete with well established companies exporting goods from abroad. This the government accepts and takes steps to protect the company. In a short time the standard of the goods of this protected company deteriorates rapidly. The government then finds itself being attacked locally by politicians on behalf of the people. The government finds itself in an embarrassing

situation. In a case like this a government should impose a mandatory standard. All goods for export must be made to a standard that will enable them to be competitive in the international market. The question is of course whether those goods made for the local market should be of the same standard as those exported. We say they should, because standardisation should not only benefit the outsiders. If this is allowed then it is quite likely that the internal market will be subsidising the external market.

The other system of indirectly enforcing standards is through the certificate mark. This mark will be applied voluntarily by whoever wants to use it in or from outside the country. The mark will show that the goods bearing the mark reach at least the minimum of the specifications laid down in a standard by the Institute. It will be the government's duty then to ascertain that the goods are in fact made to that standard. If they do not then the company must be prosecuted and the outcome of the prosecution published in the newspapers. Here of course the proposed standards Institute will have its biggest problem which as far as I can see can only be solved by aid from developed countries.

In my country the testing laboratories and the facilities available for testing are not what the Institute would like. More laboratories are needed and more personnel. The government chemist today and the M.O.W. have the biggest laboratories in the country. For these laboratories to serve the standards body satisfactorily in testing samples collected from the field and factories and to carry out research they should be expanded in both floor space, equipment and personnel. The university of course is another place that would help, but this will need negotiations between the standards body and the university. Without the laboratory facilities mentioned the standardisation process in the country cannot function efficiently or effectively. You are very fortunate in this country in this respect, that you have many research facilities including the magnificent services of the NBS in this respect.

In the International Standards field we have such bodies as the ISO & IEC. It is our opinion that these bodies to-day reflect much of the thinking in Europe. When our standards body is established it is intended that we join the international bodies. How effective shall we then be in evolving International Standards? The amount of money required to fly experts to attend the technical committees abroad, and the number of expert personnel required to attend the meetings and carry out experiments on the subjects under discussions, seems to be too great, even if we try and confine ourselves to these subjects that are most important to us. We will need money and personnel but which is the right agency to help us to tackle these two important problems? Perhaps this seminar may enlighten us.

The basic requirement for this is well established in the country, in the Weights and Measures Department. What we lack is qualified manpower to run the services that we have clearly spelt out by law. The training programme currently being pursued will produce most of the required personnel by 1977.

There is one headache that will remain. Servicing of weighing and measuring equipment is not a government function. It is the responsibility of companies and individuals who have been licenced by the government. The time has now come when we are getting - even if it is in isolated cases - equipment which is electronic. The present mechanics cannot repair this equipment nor is there someone to teach them to do this. The problem now is how do we induce overseas manufacturers of equipment to offer scholarship to individuals to train in the repair of this equipment. What can NBS/AID do in this field to help?

We do not have a laboratory of metrology for the calibration of our primary standards or the determination of accuracy of measurement equipment held at the university and in industry. We do not have a workshop for the repair of precision measuring instruments. The UNIDO/UNESCO bodies have examined this problem and offered a solution for the whole of the East African Community countries. This solution does not seem to be moving fast enough to help industry etc., and yet for one of the three East African Community countries to try and establish a metrology centre by itself, is extremely expensive for the local resources available. What do we do to help industry, the government and the university in this particular field?

What I have outlined above are some of the problems we face in my country and if a solution can be found in this workshop even to one of them, a lot will have been achieved as far as we are concerned. I am very grateful to this country in inviting my country to participate in this workshop, so as to share our experience with you and my colleagues from the L.D.C.

Appendix VI

ON SOME STATISTICAL AIDS TOWARD ECONOMIC PRODUCTION

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The purpose of this paper is to explain some of the obligations that management must assume in a program for improved uniformity and dependability of product, and for reduction of costs. I write as a statistician, working with problems of management in industry, and working in research in many disciplines. I am not a consultant in management.

The principle stated in this paper will apply to any company, large or small, whether engaged in production or service, agricultural or industrial, and in any country, whether it be developed, under-developed, or over-developed.

Explanation of statistical techniques is not one of the aims here. There are many books on statistical methods, in many languages. What is not in the books is how to use the techniques effectively, and it is this deficiency that I am trying to fill. Books on quality control and on statistical techniques deal only with special causes and do not explain management's responsibility for correction of the system.

No permanent impact has ever been accomplished in quality control without understanding and continued appreciation, understanding, and propulsion from top management. Without propulsion from the top, statistical methods that cover only special causes (vide infra) will burst into flame here and there, fizzle, and die out. A continious prairie fire is essential. Only management can keep it roaring. Management needs to know something about techniques. No short-cut has been discovered.

It was statistical aids to management, along with Japanese management's propulsion, understanding, appreciation, and interest in quality, beginning 1950, that within a few years put Japanese products into the market-place the world over. Japanese management acted.

Recalls of automobiles, all too familiar to people in America, for hazards of failure in operation of components and assemblies, have been necessary because of failure of management to carry out proper tests, in advance, depending instead on tests to be carried out by the customer on the road. If appropriate tests were carried out, management must have ignored the meaning of the results.

Failure to carry out tests of components and assemblies over all reasonable ranges of jolt, stress, dust, speeds, voltages, corrosion,

likely to be met in practice, or failure to heed the statistical inferences that emanate from such tests, is chargeable to management. There is no one to share the blame with management. To put it another way, one cannot blame the production-worker for faulty design of components and assemblies nor for faulty tests thereof, nor for faulty interpretation of tests. Obviously, the fault lies at the top.

In my opinion, the reason why statistical methods in the control of quality, which flared up here and there with brilliance in the U.S. soon after 1942, with the publication of American standards[1] and several pioneering books (still as good as ever), was that they dealt only with special causes--that is, causes of variation that the production-worker himself could correct, and did. This left 80 or 85% of the problems of variation and rejection and high cost still unsolved, and management never mustered up the courage to own up to their own responsibility for quality control.

It was during seminars held in Tokyo in 1950 under the auspices of the great Union of Japanese Scientists and Engineers that these thoughts occurred to me: (a) What the engineers are learning in these seminars is good, but something more is required. Nothing will happen without propulsion and appreciation of management. (b) Management must be brought into the act, and they must understand something about their responsibilities. (c) The mistakes of American industry need not be repeated in Japan. (d) Management must learn rudimentary statistical thinking. There are regular short courses in Japan for Management.

We have all learned a lot since then, but enough was known then to furnish a lot of guidance to Japanese management. The whole world knows that management took hold, and what the results were, and still are. No such vision of management has taken place in America, nor is there any vehicle (journal or organization) that I know of in America to bring to the attention of management their responsibilities and methods of solution.

Variability needs to be studied, whether it leads to rejections or not. Variability is the cause of loss in the form of extra material and labor, if not outright rejection. Causes of variation and of high cost (and loss of competitive position) may be usefully subsumed under two categories:

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[1] Z1.1-1942: Guide for Quality Control, and Control Chart Method of Analyzing Data; Z1.3-1942: Control Chart Method of Controlling Quality During Production; all published now by the American National Standards Institute, New York. Leslie E. Simon, ENGINEERS' MANUAL OF STATISTICAL METHODS (Wiley, 1941). Eugene L. Grant, STATISTICAL QUALITY CONTROL (McGraw-Hill, 1946).

Faults of the system (common or environmental causes)	Special causes
85% (?)	15% (?)
These faults stay in the system until reduced by management. Their combined effect is usually easy to measure. Individual causes may be isolated by experiment.	These causes are special, being specific to a certain worker or to a machine. The worker himself can remove, on statistical signal, a special cause of variation.

Confusion between common causes and special causes--a failure of management--is one of the most costly mistakes of administration in industry, and in public administration as well. Confusion between these two causes leads to frustration at all levels, and leads to increase in variability and cost of product--exactly contrary to what is needed.

Fortunately, confusion between the two broad sources of trouble can be eliminated with almost unerring accuracy. Simple statistical charts provide signals that tell the operator when to take action to improve the uniformity of his work, and when to leave it alone. This is well known. What is not known (outside Japan) is that the same simple statistical charts show how much of the proportion of effective material is chargeable to the system (common or environmental causes), correctible only by management.[2] (See Example 1.)

The production-worker himself may in most cases plot the statistical charts that will tell him whether and when to take action on his work. He must of course be taught. He can learn in a few hours. One of the obligations of management is to see that the production-worker is taught. Incidentally, the production-worker requires only a knowledge of simple arithmetic. He will certainly not be a statistician.

In my opinion, the reason for slow advancement of the statistical control of qualtiy in America is that people have been satisfied to reach a state of control. No wonder: unfortunately, the books only talk about special causes. Actually (as Dr. Juran remarked), the important problems of quality control have only begun at this stage. A state of control does not solve the problems of the system: it shows them up.

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[2] W. Edwards Deming, On some statistical logic in the management of quality, All India Congress on Quality Control, New Delhi, 17 March 1971.

The boost in morale of the production-worker, when he perceives a genuine attempt on the part of mangement to improve the system and to hold the production-worker responsible only for what the production-worker is responsible for and can govern, and not for the sins of management, is hard to over-estimate. It has not been tried.

"We rely on our experience," is the answer that came from the manager of quality in a large company recently, when I enquired how they distinguish between the two kinds of trouble (system and special) and on what principles. This answer is self-incriminating: it is a guarantee that this company will continue to have about the same amount of trouble as in the past. Experience means nothing without theory. There is a better way, now.

The QC-Circle movement on Japan (5 million members) gives to production-workers the chance to attack some types of common causes, and to change the system, but the QC-Circle movement is in Japan, not in America.

It is wrong to suppose that statistical methods for the control of quality are useful only in large companies and under ideal conditions of mass production. Actually, speaking of America, it is the big companies that lag behind. It is in small shops where quality control has the best chance for quick results, because the management is usually right there on the job. This is recorded history.

Another stumbling block in most places (except in Japan, I believe, where they had the benefit of a better start, and willingness of top management to learn and stay interested) is management's supposition that quality control is something that you install, like a new Dean, or a new carpet, or a clock. Install it and you have it.

Another road-block is management's supposition that the production-workers are responsible for all trouble: that there would be no problems in production if only the production-workers would do their jobs in the way that they were taught. Man's natural reaction to trouble of any kind in the production-line is to blame the production-workers. Actually, in contrast, in my experience most problems in production have their origin in common (environmental) causes, which only management can reduce or remove.

I should mention here also the costly fallacy held by many people in management that a technical man (a statistician, for example) must know all about a process and all about the business in order to work on it. All evidence is exactly the contrary. Competent men in every position, from top management to the humblest worker, know all that there is to know about their work E X C E P T H O W T O I M P R O V E I T. Help toward improvement can come O N L Y F R O M O U T S I D E K N O W L E D G E.

Good quality control does not require in most places more data than are now being collected. As a matter of fact, in my experience, companies collect far more figures than they know how to use, What is needed is meaningful figures and intelligent use thereof (cf. the section, "How to make an information-system informative and useful").

Management usually discharges their responsibilities (sweep them under the rug) by turning the job over to someone else. This would be a happy solution and good administration if it solved anything, but it seldom does: the job lands on somebody that tries hard but has not the necessary competence, and the management never knows the difference.

As a result, one finds in most companies not quality control, but guerrilla sniping--no organized system, no provision nor appreciation for the statistical control of quality as a system. Companies run along with a fire department that hopes to arrive in time to keep fires from spreading. A quality control department has done its duty, if the men therein discover that a carload of finished product might cause trouble (even legal action) if it went out. This is important, the number of fires in the first place. Companies spend money on quality control, but ineffectively.

Exhortation and platitudes are not very effective instruments of improvement in today's fierce competition, where a company must compete across national boundaries. Something more is required. Statistical methods supply the road-map.

Partial list of usual faults of the system (common or environmental causes of variation). Note that the production-worker cannot act on any of these causes.

1. Hasty design of component parts and assemblies. Hasty production.

2. Inadequate testing of component parts and assemblies.

3. Inadequate testing of prototypes.

4. Failure to pay due respect to the limitations of the inferences that are drawn from tests of component parts, assemblies, and prototypes.

5. Failure to take action to remove or reduce common (environmental) causes of variation (faults of the system).

6. Failure to provide production-workers with meaningful job-descriptions.

7. Failure to provide production-workers with statistical signals that will tell them how they are doing and when to make some change.

8. Failure to re-train production-workers. It is a mistake to assume that a man knows how to perform in his job just because he has been doing it for 11 years. The production-worker often needs to know the results of doing the job his own way.

9. Failure to revise job-descriptions.

10. Wrong setting of machine.

11. Raw material not adapted to the process.

12. Poor light, smoke, noise, unnecessary dirt, confusion.

When a process is in a state of statistical control, it has an identity and a capability--an economic level of quality and uniformity.[3] For best economy, the production-worker should be held responsible to maintain statistical control of his own work. Statistical signals supplied by simple charts will help him. When he has achieved a state of statistical control, he has put into the job all that he has to offer.

Job-descriptions in production should be written in terms of the capability of the process. Quality better than the capability of the process cannot be turned out without sorting the bad items from the good ones. No company in a competitive market can afford this attempt, always unsatisfactory, a refuge of the destitute.

Costly computers turning out tons of figures is not quality control, nor (in most of my experience) is it information.

As an example, take the case where items of production of a certain line are inspected and the results fed into a computer, perhaps hundreds of miles away. The inspection itself may be automatic, though it need not be. The computer feeds back to the plant manager every morning a distribution of one or more quality-characteristics of this line, with a mark to show the specification and the percentage of product that will be rejected by one of the company's best customers.

This is a marvelous achievement in modern electronic gear, but a useless one. The plant-manager has enough problems without this extra one now dumped into his lap. He has not the faintest idea what to do about that figure on rejections. He tries this and that. If the next day is better, he dares to hope that he is on the trail of a solution, only to find on the day following that quality took a dip and is now worse than it has been for days. Finally, in frustration, he ignores

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[3] See any good book in the statistical control of quality.

the distribution, which happens to be a wise thing to do, as the distribution contains no information that can help him toward improvement of quality nor to lower costs.

There is a happy solution, and a simple one. The results of inspection are fed into the computer in order of production, or in some other rational order. The computer could print a run-chart, or even a control-chart, which (a) would provide signals that detect the existence of special causes, and (b) would provide a measure of the effect of faults of the system, some of which the plant manager could find and correct or reduce. The added cost would be trivial.

Figures fed back to a worker do more harm than good unless they are accompanied by signals that tell him (a) whether he himself is partly or wholly the cause of trouble discovered in product that passed through his operation, or (b) that the trouble arose from the system (common or environmental causes), beyond his control. Meaningless figures lead to frustration and dissatisfaction of any conscientious worker, and to more variability and higher costs. He needs statistical signals to tell him where the responsibility lies.

Figures that are not interpreted with the aid of statistical theory will at the best give a picture of what the quality of the product is, without a road-map to indicate how to achieve improvement.

An important step for the management in many companies would be to take a hard look at their so-called information-systems. Under more intelligent guidance, the same system that now produces frustration and leads to more trouble and higher costs could be adapted, with the aid of statistical theory, to provide useful information about production-processes and could lead to better uniformity and greater output at reduced cost per unit.

Example 1. Fig. 1 shows at a glance that the main trouble on this job is common causes or faults of the system. The ordinates are the means ($\bar{x}$) of samples of n=2 for tests of uniformity of finished wheels. The test is the running balance of the wheel. Observations:

1. The production-worker is in a state of control with respect to his own work (which is the only work that he is responsible for).

2. He is producing now and then a defective, a wheel that will not be accepted by the customer.

3. These defectives do not arise from faults of the production-worker. He is meeting the reqirements of his job. He can do no more. He has nothing further to offer.

4. The main trouble lies in the system. The central line, at about 125 gram-cms. represents the contribution of the system to the total trouble. The worker is handicapped. The limits within which he must produce are narrow compared with the handicap of 125 gram-cms. which comes from the system itself. If the faults of the system were reduced to 50% of their present level, or even to 75%, the entire product would be accepted; economies in production would be realized.

I may remark in passing that in my experience, as in this case, management is usually reluctant to acknowledge the handicap of the system, or rather their responsibility for doing anything about it. The big hurdle is to remove this blind-spot. It sometimes requires a lot of patience. The usual remark is that they did not have in mind this kind of quality control when they went into it. They were looking for everything to clear up, once the production-workers put their best efforts into the job.

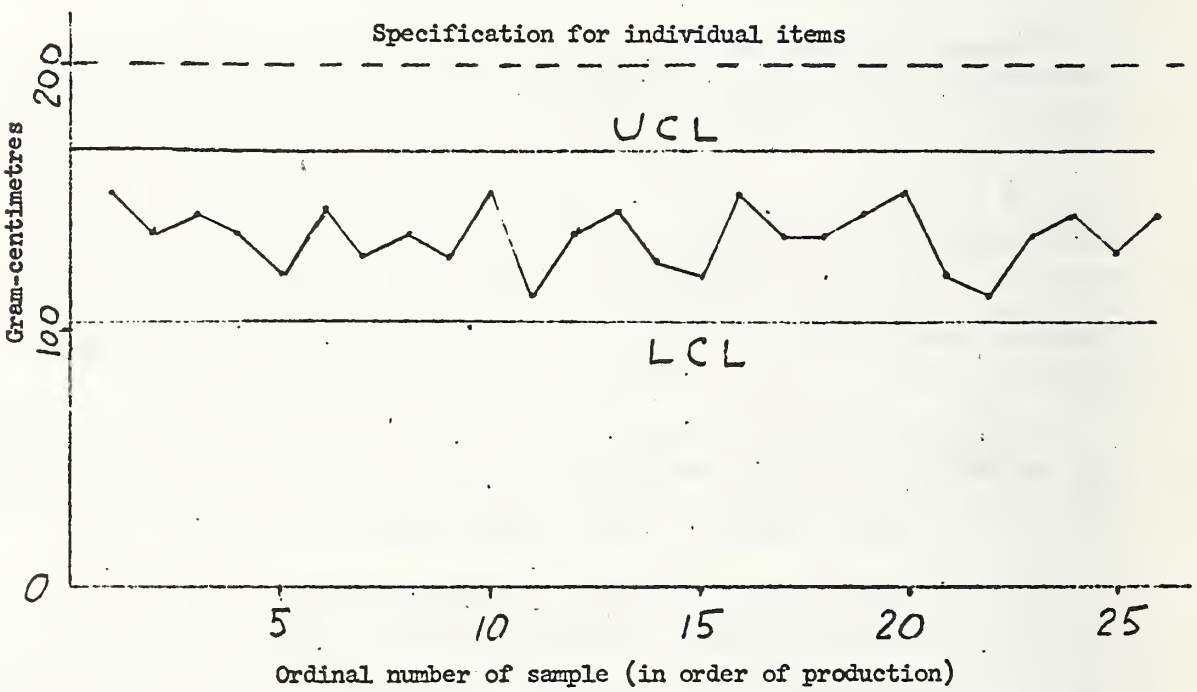

Fig. 1. Chart for $\bar{x}$ for test of uniformity of wheels turned out by a production-worker. Size of sample, n = 2. His work is in a state of control, but he is under the handicap of the system, which causes the variation represented by the central line.

Charts like Fig. 1 are to be seen almost anywhere, but their interpretation in terms of a quantitative measure of the faults of the system seems to go unnoticed. What is worse, it is something new and incomprehensible to a man in an executive position that management could be at fault in the production-end. Production and quality are the responsibilities of the production-worker, in the view of management. Research into faults of the system is not what a manager is trained for. Result: the faults of the system stay put, along with rejections and high costs of production.

Example 2. The 2d example deals with the business of motor freight, or freight by lorry. Drivers of trucks (lorries) pick up shipments and bring them in to a terminal for re-load. A large company in motor freight may have anywhere from 10 to 40 terminals in or near large cities. There is a long chain of operations between a request of a shipper (usually by telephone to the switchboard of a motor freight company) until the shipment is actually on the platform, ready for re-load and line-haul to the terminal of delivery. Every operation offers a chance to make a mistake. We here deal only with mistakes that drivers make. Although the frequency is small, the loss is severe.

This company has 20 terminals, but Tables 1 and 2 refer to only the one terminal that was studied.

There are 6 types of mistake, plus all other, making 7 types. In mistake No. 1, the driver signs the shipping order for (e.g.) 10 cartons, but someone else finds, when the truck reaches the platform at the terminal and the contents are ready for the next operation, that there are only 9 cartons on board, one carton missing. Where is it? There may have been only 9 cartons in the first place; the shipping-order was written incorrectly. Or, the driver may have left one carton on the shipper's premises, in which case the shipper may call the switchboard of the motor freight company to report that the driver left one carton: please come and get it because it needs to move with the other 9 cartons: the consignee is waiting for all 10 cartons. Or, the shipper may not discover the carton, or he may not report it. Let us list some of the sources of loss from mistake No. 1:

1. It costs $15 on the average to send a driver back to the shipper to pick up the missing carton.
2. It costs about $15 to search the platform, or to find the truck (by now out on the road) and to search it for the missing carton.
3. If the carton is not found, and the shipper claims that he has it not in his possession, then the shipper may legitimately put in a claim for the 10th carton. The motor freight company is responsible for 10. The value of this carton may be anywhere from $10 to $1000, with the possibility of an amount even greater.

Table 1. The 7 types of mistake

Error number	Description
1	Short on pick up
2	Over on pick up
3	Failure to call in (by telephone) on over, short, and damaged cartons on delivery
4	Incomplete bill of lading
5	Improperly marked cartons
6	Incomplete signature on delivery-receipt
7	Other

Table 2. Distribution of the drivers for all 7 errors combined

Number of errors x	Number of drivers that made x errors f	Number of errors fx	Cumulated up
0	26	0	617
1	18	18	617
2	22	44	599
3	14	42	555
4	22	88	513
5	8	40	425
6	9	54	385
7	3	21	331
8	4	32	310
9	7	63	278
10	7	70	215
11	3	33	145
13	1	13	112
14	1	14	99
15	2	30	85
16	1	16	55
17	1	17	39
22	1	22	22
Total	150	617	xxx

It is obvious that Error No. 1 may be costly. Any one of the 7 errors will on the average lead to a loss of $50. The 617 mistakes shown in Table 2 caused a loss of $31,000. Multiplied by 20, for 20 terminals, the total loss from the 7 mistakes was $620,000. (This is a minimum. Some mistakes are not recorded, but they nevertheless cause loss.)

There were 150 drivers that worked all year long. Most of them had worked in the same job for a number of years. Table 2 and Fig. 2 show the distribution of drivers by number or errors, all 7 errors combined.

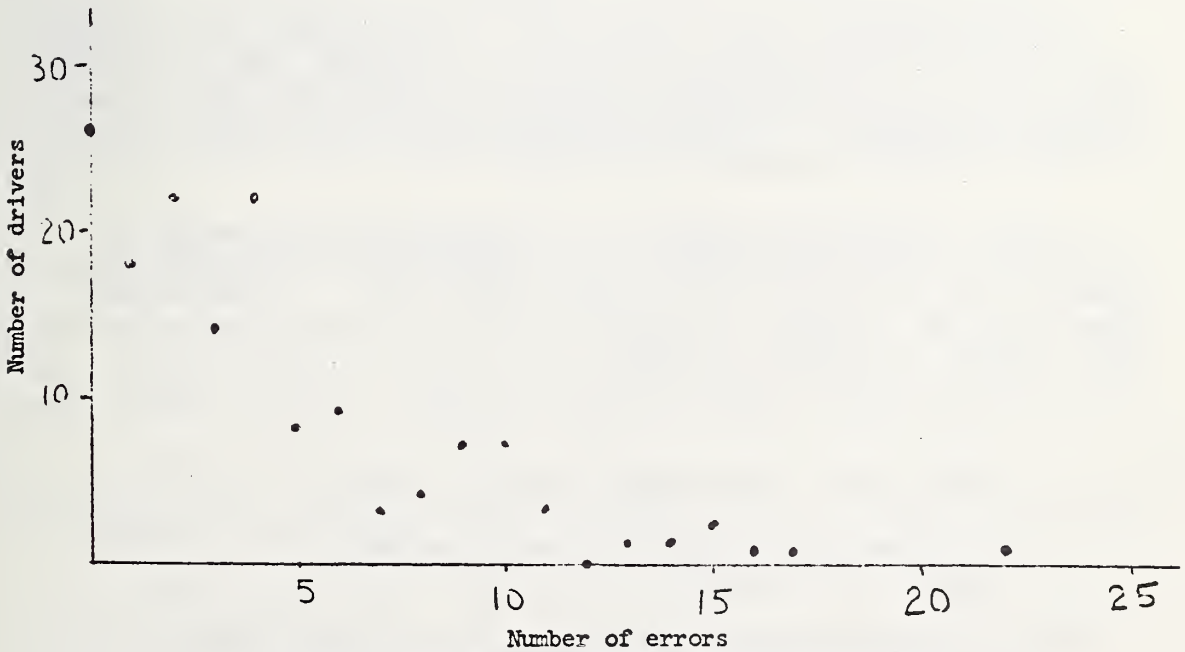

Fig. 2. The distribution of drivers by number of errors, all 7 errors combined

We postulate the following mechanism, which will distribute errors at random to drivers. We imagine a huge bowl of black and white beads, thoroughly mixed. Each driver scoops up a sample of 1000 or more (the number of trips that an average driver makes in a year), and returns the beads to the bowl for more mixing. The number of black beads in a scoop will be a random variable, following the Poisson distribution. An estimate of the mean would be

$$\bar{x} = \frac{617}{150} = 4.1 \qquad (1)$$

The upper and lower 3-sigma limits for these samples would be

$$(\sqrt{4.1} + 1.5)^2 = 12 \qquad (2)$$

and

$$(\sqrt{4.1} - 1.5)^2 = 0 \qquad (3)$$

We interpret the upper limit to mean that a driver that made 12 or more errors in the year is not part of the system. He is a special cause of error. The postulated mechanism of random distribution of errors is untenable. I may add here that other models that I have tried lead to about the same conclusions.

Drivers that made no error at all are at the other end of the distribution. Drivers that made 1,2,3, or 4 errors are far more numerous than the Poisson distribution would allow. I accordingly consolidate the drivers that made 0,1,2,3, or 4 errors, and postulate that there are 3 groups of drivers:

A. Drivers that made 12 or more errors.

B. Drivers that made between 5 and 11 errors.

C. The extra careful group, drivers that made 0,1,2,3, or 4 errors.

What have we learned from this simple statistical model?

1. The 17 drivers with 12 or more mistakes accounted for 112/617 or 18% of the errors. They could reduce their error-rate to average if they knew that they were outliers.

2. Drivers that made 5 to 11 errors measure the losses that arise from the system itself. They have put into the work all that they have to offer. The faults of this group account for (425 - 125)/617 or about 50% of the errors. This group cannot reduce their errors. They are handicapped by the system. Clearly, the lion's share in the reduction of losses from the 7 types of error is up to the management to improve the system.

3. The 76 drivers of Group C accounted for only 31% of the errors. This Group C is worth studying: how do they do it? did they have easy routes or easy conditions (e.g., day-time pick-ups, inside pick-ups), or do they have a system of their own? These are questions to pursue. If these men have a system of their own, then they should teach the others. (Enquiry turned up no evidence of easy routes.)

No problem is simple. An ever-present cloud over any interpretation is that the reporting of errors may be spotty and unreliable. I find in my own practice that records whether from instruments or from human observation are often so unreliable that one hardly dares to be positive about any interpretation.

I asked the management, before calling errors to the attention of the drivers in Group A, to determine whether these drivers worked unusually difficult routes, or whether they have achieved excessive mileage (high productivity). As it turned out, the drivers that made 15 or more mistakes had indeed achieved excessive mileage. It was thus a matter of great delicacy to explain to these drivers that they might possibly decrease their error-rate while not reducing greatly their production.

Now what can the management do to improve the system? I am only a statistician, but I may offer the following suggestions to management.

1. Hold a meeting now and then with the drivers to acquaint them with the importance of their jobs. Explain to them that there are many ways to make a mistake; that the average mistake costs the company $50.

2. Take a good look at the forms that the drivers fill out. Perhaps the type could be improved, and the spacing also. Drivers have to work in snow and in rain and at night, perhaps in dim light and in the cold.

3. Take a good look at the routine prescribed for drivers. Perhaps the routine prescribed for the drivers should be first to count the cartons or boxes that he is going to be held responsible for. Second, protect or isolate them in some way before he loads them.

4. Perhaps the management could enlist the cooperation of regular shippers to assemble their cartons in one spot, and to count them carefully, and to record them correctly on the shipping order.

5. Make it clear to the drivers that the management is undertaking a thorough review of their own responsibilities for the system, with the aim of making it easier for a driver to come through with a clean record, with a low error-rate.

6. Study Group C. How do they do it? They may have a system that should be spread to all drivers.

A lesson in administration. This company had been sending a letter to a driver every time he made a mistake that was discovered. It made no difference whether the driver made one mistake in a year or if he made 15 mistakes in a year: the letter was exactly the same. The records of the company show that the 7 types of error have been remarkably steady for years: the letters to the drivers, year after year, had no effect except to demoralize them. The letters, with no indication that the management acknowledged responsibility for the system, or even that there was a system, ensured that the losses from these mistakes would continue at about the same level, or higher. The letters were part of the system.

It is entirely wrong for the management to suppose, without a statistical test, that an error occurred because of carelessness on the part of the worker. He may have been careless, or he may not have been: it depends on whether he belongs to the system, or is an outlier, a special cause.

What was needed was a separation of responsibilities for improvement--special causes, to be corrected by the drivers of Group A, and the system itself, to be corrected by the management.

Appendix VII

Suggestions for Future Workshops Provided by Participants

In order to assess the value of the present Workshop and to ascertain what improvements are called for in future workshops, a letter of enquiry was sent to each participant after he returned home.

These are the replies we received.

MINISTRY OF COMMERCE AND INDUSTRY

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All correspondence should be addressed to "The Superintendent of Weights and Measures"
Telegrams: "ASSIZERS", Nairobi
Telephone: Nairobi 29607 and 23687
When replying please quote
Ref. No. WM. 91/2/(5)
and date

WEIGHTS AND MEASURES DEPARTMENT
P.O. Box 41071
NAIROBI

4th June, 19 73

AIRMAIL

Mr. H. Steffen Peiser,
National Bureau of Standards,
Room No. A 931 Administration Building,
WASHINGTON D.C. 20234,
U.S.A.

Dear Mr. Peiser,

COMMENTS ON NBS/AID WORKSHOP ON STANDARDISATION AND MEASUREMENT SERVICES IN INDUSTRIALISING ECONOMIES.

The workshop was quite valuable in that it enabled me to study the value of supporting services to standardisation in order to achieve meaningful standards. As a Weights and Measures man, my visit to the section dealing with Weights and Measures, the presentation on Weights and Measures activities by Mr. H.F. Wollin, our visit to Frederick in Maryland and my visit to Vaginia to witness the testing of LPG meters was of unmeasurable value. Our visits during the second week to various Laboratories and Organisations contributed a great deal towards understanding what your country can offer in the field of testing facilities.

It is my feeling however, that the participants could have achieved more from the workshop if a programme of the activities taking place had been circulated long before those taking part were chosen by their countries. Such a programme could help the participating countries in choosing the right person to attend the workshop. It would avoid a situation similar to what happened in my country. The invitation was sent from one Ministry to another looking for the right department from which some one could be choosen to attend the workshop.

To achieve more, I would rather have the workshop concentrate on a particular field, e.g., Administration of a Standards body, or Certification and testing laboratory projects, or electricity etc. In this way the persons chosen could be those who have specialized or are working in that particular field in which the workshop is concentrating.

It is true that those giving lectures are extremely busy people, but I would still say that the lectures would be more valuable if some kind of notes or reference material is handed out so that when the participants go back home, they can refer to such notes or references whenever they forget a point made by a lecturer while attending the workshop. I find it rather difficult to remember as much as I would have liked to without such notes because the lectures were very crowded and left no time to reflect back on what one heard during the lectures.

The feeling I heard from most of the participants is that they would have liked to stay in Washington rather than Gaithersburg. Certainly, this was my feeling but this is a minor point.

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Even with the above observations, I still think the NBS/ AID did a wonderful job for us to achieve what we did within such a short period of two weeks. There are many problems I shall now face with confidence in the standards and measurement field. I know to whom I can go for help in U.S.A. when confronted with certain problems. Please send us invitations again. It will also be appreciated if the per diem allowance is included in the letter of invitation so that if there is a need for the participating country to give a supplementary allowance, this will be done in good time. I give my thanks to all the lecturers, but in particular I will single out Dr. E.L. Brady, Mr. H.S. Peiser, Dr. M.B. McNeil and Mrs. Bullman for the very personal attention they gave us during our stay.

Yours sincerely,

F.B. MAIKO
SUPERINTENDENT OF WEIGHTS & MEASURES.

MINISTRY OF COMMERCE AND INDUSTRY

TELEPHONE: NAIROBI 35153 to 35156
All correspondence should be addressed to "The Superintendent of Weights and Measures"
Telegrams: "ASSIZERS", Nairobi
Telephone: ~~Nairobi 29607 and 23687~~
When replying please quote
Ref. No. WMS. 21/2/(10)
and date

WEIGHTS AND MEASURES DEPARTMENT
P.O. Box 41071
NAIROBI

19th June, 1973

By Airmail.

Mr. H. Steffen Peiser,
Chief,
Office of International Relations,
U.S. Department of Commerce,
National Bureau of Standards,
Washington, D.C. 20234,
U.S.A.

Dear Mr. Peiser,

Thank you for your letter of 23rd May, 1973. By the time I received your letter, on the 5th of June, I had already sent you my comments on the Workshop. Let me answer the points you have enumerated.

(i) Most Useful

(a) International Standards and related topics.

(b) Certification and testing laboratory projects on accreditation of testing laboratories.

(c) Computer technology.

(d) Information programs.

(e) Technical devices analysis.

(f) Weights and Measures activities.

(g) Consumer product evaluation.

(h) Invention and innovation by Mr. J. Rabinow.

(i) Lectures and demostrations by members of Optical Physics Division.

(j) New perspectives on development planning.

(k) Standard reference materials.

(l) Building technology.

(m) Science and Technology plan for India.

(n) Some statistical logic in the management of quality and competitive production.

(o) Electrical Testing Laboratories New York.

(p) Underwriters Laboratories.

...../2

(q) Maryland Department of Agriculture Division of Inspection and Regulation Weights and Measures.

(r) My visit to Virginia on May, 21st.

(ii) Least Useful

(a) Open remarks by visitors on problems in their country - because no discussion was held on this topic it was rendered least useful.

(b) Data Processing.

(c) Lectures and demonstrations by members of Electricity Division.

(d) Technology Transfer in Korea under the Naval Science Assistance Program.

(e) Radiation Research.

(f) Inorganic Materials Research.

(g) Polymers Research.

(h) Physical Chemistry Research.

(iii) Too Short

(a) The visit to the American National Standards Institute.

(b) The visit to the American Society for Testing and Materials. They were not prepared, in that their talk was superficial.

(iv) Too Detailed

(a) Thermometry.

(b) Optical Physics Division.

(c) Mechanical Integrity of Materials.

(d) Standard Reference Materials.

(e) The Interaction of the National Bureau of Standards with the Academic Community.

(v) The Laboratory Type Demonistrations

There was enough.

I feel that the field of Standardization was not adequately covered as compared to the Measurement field. It would be of great assistance to those attending if more speakers could be invited from Standardization bodies to give talks on how each of the bodies goes about making standards. This should be in as much detail as possible because such detail would enable the participants to see some of the benefits in approach that are

employed by the American Standards bodies that could be useful in the less developed countries.

I would rate the four speakers, in the following order of relevance, presentation and balance, Mr. Rao, Mr. Deming, Mr. Waterston and Mr. Rich. The talk by Mr. Rich could perhaps be useful to people who intend to work in a country outside their own where one does not understand the people, which made the talk to us irrelevant.

It was quite useful to discuss our problems and opportunities with colleagues from other countries.

The literature we have asked for should prove quite useful in my country as most of it will be for the purpose of reference. I shall be grateful if it is possible if you could send to me the twelve volumes of the metric report and the other volumes, I forget how many, covering the various measurement fields.

I do believe that the NBS/AID Workshops are an effective means of implementation relative to other services that are or might be provided by the AID office of Science and Technology so long as the planning is done to achieve a particular aim in a particular field.

Find enclosed a copy of my talk to the workshop I made on 7th of May. I am very happy indeed that you have asked for my comments as one of the participants in the workshop and I feel that the time spent in writing this paper has been well used if the comments prove useful. Please read this paper in conjuction with my letter WM. 91/2/5 of 4th June, 1973.

Sincerely yours,

F.B. MAIKO
SUPERINTENDENT OF WEIGHTS & MEASURES

Enc.

FEDERAL MINISTRY OF INDUSTRIES

NIGERIAN STANDARDS ORGANISATION ..... DIVISION

11, Kofo Abayomi Road, Victoria Island, Lagos.

P.M.B. No. 12614

Telegrams PERMIND

Telephone 56239

Ref. No. SI.67/XIV/I/338

Date 16th June, 1973

Mr. M. Steffen Peisser,
Chief, Office of International Relations,
National Bureau of Standards,
U. S. Dept of Commerce,
Washington DC. 20234,
U.S.A.

Dear Sir,

INTERNATIONAL CONFERENCE ON STANDARDISATION
AND MEASUREMENT SERVICES IN RAPIDLY DEVELOPING COUNTRIES
GAITHERSBURG, MD. USA APRIL - JUNE 1973

I wish to inform you that I have now safely returned to Lagos after completing my programme for the above conference.

2. My visit to the underwriters laboratory in Chicago and my participation in the Technical Committee meeting of ASTMC.7 in Akron, Ohio were both very useful.

3. Really my experience from the whole workshop will be very helpful to me in contributing to the rapid growth and development of our young organisation. This also appeared to be the general feeling among the participants from the other countries. As I mentioned in my brief speech to the workshop on May 7, 1973, the Nigerian Standards Organisation will continue to require the USNBS/AID assistance particularly in the training of technical staff and expansion of its laboratory facilities. Our visit to the Electrical Testing Laboratory in New York has been very rewarding. This is one place that must not be omitted in planning similar programmes in future. There is no doubt that the continuation of such workshops in future will be most beneficial to the developing countries.

4. It is very much regretted that I cannot write letters individually to all those who organised the workshop and who in no little way contributed to making my stay in U.S.A. most comfortable. I would like however to sieze this opportunity to thank personally Dr. E. L. Brady, Dr. Michael McNeil, Mrs. Bullman and Mr. Phucas, who in various ways contributed to virtually eliminate all problems I would have encountered from the very day I arrived in Washington DC till my departure for Nigeria. As for Mr. Peiser, I must say, "you are a wonderful person" since only a person of you calibre could keep the diverse peoples from different parts of the world all satisfied throughout the duration of the conference.

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5. My boss, Mr. D. O. Ogun has asked me to give his heartiest regards to you. We all will ever remain so grateful to you for the selfless services you and your organisation havebeen rendering to the Nigerian Standards Organisation.

Yours faithfully,

(H. O. Ohaya)
for Director,
Nigerian Standards Organisation,
Federal Ministry of Industries.

P/S

Attached My Air Ticket is hereby returned for the attention of Mrs. Bullman and for reconciliation of your financial records. Please note that the flight from Washington DC to New York City was not made; the extra luggage ticket was also not used.

PUSAT PIAWAIAN MALAYSIA

STANDARDS INSTITUTION OF MALAYSIA

(Established By The Standards Act 1966)

Member: International Organization For Standardization

SEKRETARIAT AM
GENERAL SECRETARIAT:

WISMA DAMANSARA,
TINGKAT KEEMPAT,
8, JALAN SEMANTAN,
KUALA LUMPUR, 23-03,
MALAYSIA.

PETI SURAT: 544, K. L. 23-03
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KAWAT: SIMSEC
TELEGRAMS: KUALA LUMPUR

SILA ALAMATKAN SEMUA SURAT2 KAPADA "PENGARAH"/ PLEASE ADDRESS ALL CORRESPONDENCE TO THE "DIRECTOR"

SURAT KAMI (OUR REF:) SIM/K/10/019(26)

SURAT TUAN (YOUR REF:)

Tarikh : 1973-06-20

Mr. H. Steffin Peiser,
Chief, Office of International
Relations,
National Bureau of Standards,
A931 Administration Building,
Washington, D.C. 20234,
U. S. A.

Dear Mr. Peiser,

Thank you very much for your letter dated 23rd May, 1973. I am very sorry for this belated reply.

It is indeed a great pleasure to me at the recent Workshop to have the opportunity of meeting you and other NBS Staff and also Standardisation colleagues from other Institutions. The two weeks at NBS were very enjoyable and interesting. The experience and ideas gained are certainly useful and helpful to me in meeting some of my responsibilities back home. On the whole, the Workshop programmes were well-planned. Perhaps, however, it may be better that future Workshop of such nature be allowed more time for discussions after each sessions or presentations.

Attached is a copy of my general comments on the Workshop. I hope this would be useful to you to evaluate on the overall success of the Workshop. In my personal opinion, the NBS/AID Workshop is certainly a good means to helping developing countries to build up the technological infra-structure in standardisation activities. Perhaps, other Workshop participants may share the same view as I on this matter.

We have just met at NBS and I hope we shall meet again at some other times.

Yours sincerely,

(CHOW SIK FEW)

GENERAL COMMENTS ON THE NBS/AID WORKSHOP

1. NBS presentations and visits to the various laboratories

The presentations by NBS Staff gave a useful general overview of NBS activities and facilities to the Workshop participants. The lectures were instructive and useful especially the presentations on metrology such as weights and measures, calibration and measurement activities in the Heat, Electricity and Optical Division. The visits to the various laboratories though short and brief gave an excellent opportunity to the Workshop participants to see the actual experimental facilities at NBS and other Testing Laboratories outside NBS. The technical information gained in the NBS presentations and the observations made at the various laboratories were valuable as these would provide some useful ideas for the development of similar facilities in the developing countries.

The NBS presentations on research activities such as applied radiation and chemical research, computer technology, data processing and system design, and etc. were interesting too though many standardisation organisations in developing countries might not have such activities at the present stage. However, the information gained at these sessions will be useful to these countries at a later stage when their expansion programmes for such activities are planned.

2. Presentations by distinguished guest speakers

The talks by the four distinguished guest speakers were very enlightening as they all touched on different aspects of problems and difficulties encountered in most developing countries. These presentations were certainly good balance to the subjects of the Workshop.

3. Discussions among Workshop participants

The Workshop afforded a good opportunity for standardisation colleagues of different developing countries to exchange views on common problems faced in their respective countries and exchange ideas on the possible solutions to these problems. The problems differ from one country to the other and will have to be tackled according to the special economic, social and political circumstances of the country concerned.

4. Technical literature & information

The scientific literatures and documents given out at the Workshop were very valuable especially documents relating to the weights and measures activities, and calibration services. Some of the documents might not be directly useful at the present stage. However, they will certainly be useful at a later stage when new projects similar to that of NBS are set up. In any case, all these documents are most welcome by fellow colleagues back home.

.../2-

5. General observations

The Workshop was well-organised and the programmes well-arranged to cover most sections of activities in Standardisation and Measurement Services. The technical information and ideas gained at the Workshop were useful and valuable for the planning of standardisation activities and programmes in developing countries. In this respect, the NBS/AID Workshop are certainly effective means of implementation relative to other services that are or might be provided to developing countries by the AID Office of Science and Technology.

/as

Comments by PHI-MINH-TAM on the NBS/AID Workshop on Standardization and Measurement Services, May 1973.

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1. The workshop was very useful and effective in exposing the participants to various aspects of standardization and measurement activities. Given the differences in the participants' backgrounds, all presentations were perhaps either too short or too detailed for each of us. I feel that a general introduction to all aspects of NBS activities can be given to the entire group and additional sessions can be allowed for each participant to visit and discuss the subject or subjects that interest him most.

2. The program is singly technical. In between sessions can be inserted social and cultural activities. The participants will better appreciate and evaluate the technical and scientific activities to which they are exposed in context with the american society as a whole. Concerts, music-hall, museums, picnics would certainly make the sojourn more interesting.

3. Dr. Rich's talk was informative and pictured the problems encountered not only in Korea but also in other LDC's. Dr. Waterson's recommendations on how to approach development planning were well taken and appreciated. Dr. Deming pointed out who were the people responsible for quality improvement but did not show us how to convince them of their responsability.

4. Although the participants stayed together and maintained very friendly relationship, I noticed little communication or discussion on common problems. Group discussions around the table on certain subjects can be more effective in sharing experiences.

ASSOCIAÇÃO BRASILEIRA
DE
NORMAS TÉCNICAS

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National Bureau of Standards
A 931 Administration Building
Washington, D.C. 20234
Attn: Dr. H. Steffen Peiser
Chief, Office International Relations

Dear Mr. Peiser,

I would like to extend my appreciation and gratitude for having had the opportunity to attend NBS/AID Workshop on Standardization and Measurements. I will always remember the courtesy extended to me by all of you during my stay in the United States.

The AID/Workshop was indeed very much useful though I am no longer an expert on any of the many and interesting subjects that were dealt with. In fact I have found my way and I hope the same has happened do all my colleagues.

It was a hard, tiresome work, but now I can realize that was the only way to give us a general idea of NBS, as well as of the many laboratories, enterprises and private associations.

So, in case we need more aid we now know where and how to get it.

I have enjoyed the wounderful relationship too, that had naturally been developing itself all those days among us, peoples of so many different ways of life and economies.

Standardization is, in deed, one of the best tools that could be employed by man in order to improve understanding and good will among peoples, as it was the case at the Workshop.

I am looking forward to a new opportunity to see you again here in Brazil or in your wonderful country, and if, in any way, I may be of any use to any of you on personal or business matters, I will be delighted to have the chance to return your kindness.

My best and most respectful wishes to Mr. Brady. Many thanks to Mr. McNeil who so wisely and tactfully has attended to our personal needs, in spite of the rigid schedule of the Workshop, which was no easy task.

Hoping you will excuse me for this broken English of mine, I am yours, sincerely.

José Newton Teixeira
Technical Assistant

JNT/mclm

MINISTERIO DE INDUSTRIA Y COMERCIO
BOLIVIA

DGNT 289/73
La Paz, June 29, 1973

Mr.
H. Steffen Peiser
Chief
Office of International Relations
National Bureau of Standards
Washington D.C.

Dear Mr. Peiser:

Through Mr. David L. Jickling, I received your letter dated on May 23, which I am replying now.

I hope that you have had a very good trip and the work that you have been realized have been so succesfull as you hope.

Before to speak about the NBS presentations I would like to speak about all the participants, I understand that most of us work like administrative manager and only a few work as technical manager, then I think that not all of those who work as administrative people had appreciate all the technical presentations of NBS members and outside speakers.

About the NBS presentations I would like to say that all of them were very useful to me and my institution, but the most useful were:

- Information Processing Standards.
- Acreditation Testing Lab.
- Data Processing.
- Weights and Measures activities.
- Consumer Product Evaluation.
- Standards Reference Materials.
- Building Technology.
- Polymers Research.

I think that most of the NBS presentations were neither too short or too detailed.

I understand that it's necessary more laboratory demonstrations, specially all those topics related with weights and measures,

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and I think that perhaps for the future it will be necessary to have people from the Food and Drug Administration (F.D.A.) in order to cover all what is related with foodstuffs and food industry and its necessary to cover the field of Occupational Health and Industrial Safety.

About the four distinguished visitors, I would like to say that: Mr. Rich shows us a different field of cooperation and his lecture was very interesting, Mr. Rao shows us the work of planning that he is doing for his country and it was very useful to me, Mr. Deming is an authority on Statistical but I think what we need in our countries is how to applied the statistical methods in industrial quality control.

Of our tour when we visited Underwriters Lab., Electrical Testing Lab., American National Standards Institution and American Society for Testing and Materials I think that all those visits were very useful, because in that we know how works each one of the mentioned institutions.

For all the people who assisted at the workshop I think that this was a great experience, because as you said, we were not in regular contact, but thanks to the workshop we are in contact now and perhaps this contact help us to solve some primarily problems, because I noticed that in all developing countries exists similar problems.

I believe that the NBS/AID workshop is an effective mean of implementation relative to other services that may be provided for the NBS to developing countries, specially in the field of Metrology.

At the end, I hope to see you soon here in my country, all the people who work at the General Directorate of Standards and Technology will be very happy if you decide to visit us.

Sincerely

Hugo Velasquez A.
Chief of Standards Department
General Directorate of Standards
and Technology

c.c Rodolfo Costas L.
General Director
c.c Mr. D.L. Jickling
AID.

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On May 4 - 18, 1973, a Workshop was held at the National Bureau of Standards (Gaithersburg), under the sponsorship of AID, whose object was to give standards officials of industrializing nations insight into the standards and measurement systems in the United States and the role of the National Bureau of Standards, so that these officials might consider what parts of the U.S. system might usefully be adapted to conditions in their home countries. The report contains copies of speeches and presentations by representatives of both the U.S. and the industrializing nations, in addition to a general agenda of talks, presentations, and tours of laboratories both of NBS and of other organizations.

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