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STANDARDIZATION

ITS ROLE IN THE DEVELOPING COUNTRIES 1/

by

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1/ The views and opinions expressed in this paper are those of the author and do not necessarily reflect the views of the secretariat of UNIDO.

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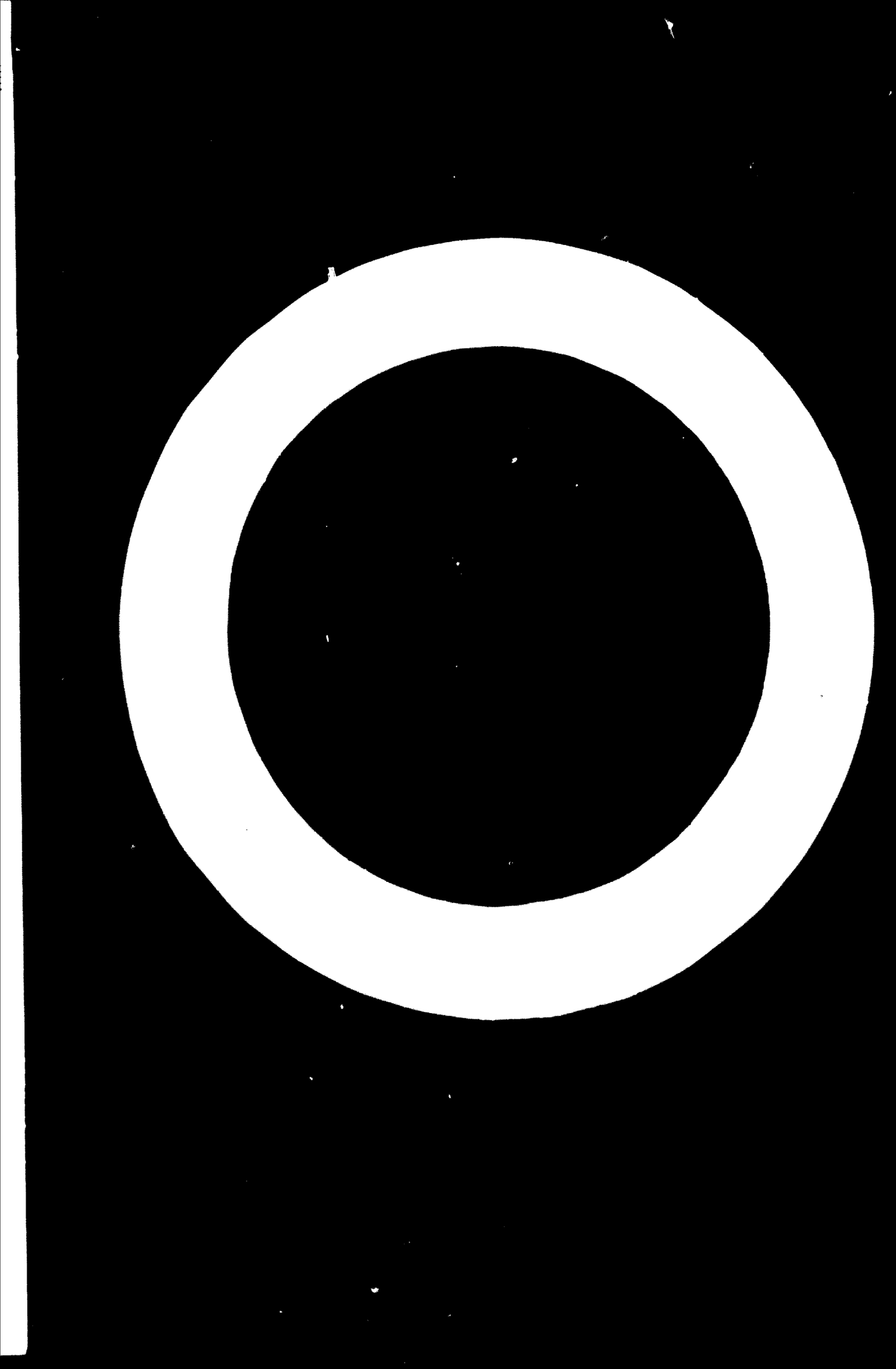

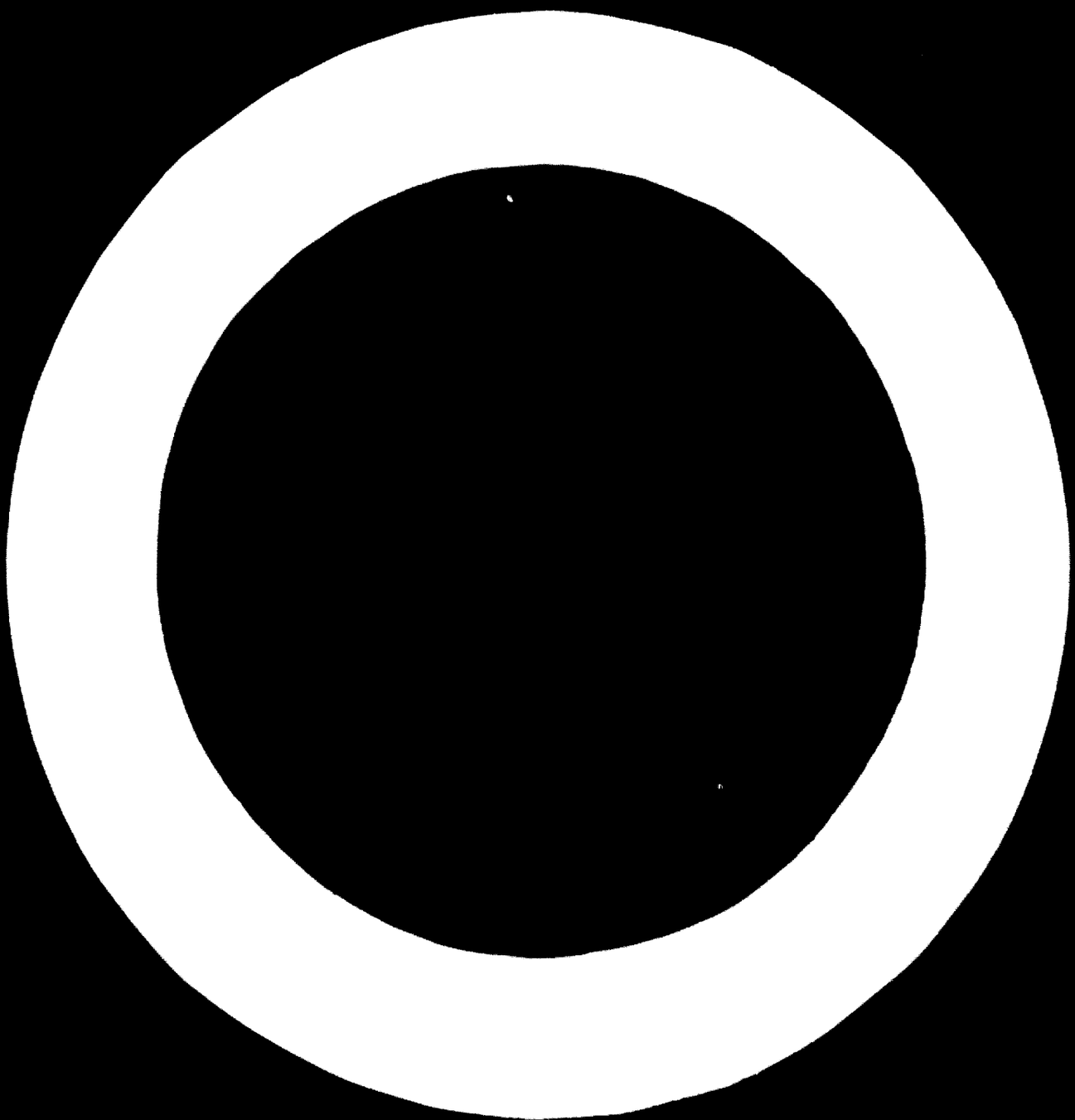

1. STANDARDIZATION

Standardization is a discipline by which human activities of all kinds can be ordered and regulated, on the basis of experience and technological development.

According to the definition given by the International Organization for Standardization (ISO) 1/, standardization is:

> "The process of formulating and applying rules for an orderly approach to a specific activity for the benefit and with the co-operation of all concerned and in particular for the promotion of optimum overall economy taking due account of functional conditions and safety requirements.
>
> "It is based on the consolidated results of science, technique and experience.
>
> "It determines not only the basis for the present but also for future development and it should keep pace with progress.
>
> "Some particular applications are:
>
> (1) units of measurement;
> (2) terminology and symbolic representation;
> (3) products and processes (definition and selection of characteristics of products, testing and measuring methods, specification of characteristics of products for defining their quality, regulation of variety, interchangeability, etc.);
> (4) safety of persons and goods."

2. THE ROLE OF STANDARDIZATION IN THE LESS-DEVELOPED COUNTRIES

2.1 Problems

The less-developed countries are now facing, or have in the past had to face, many problems, including the following:

(a) They are essentially dependent on one basic activity: it is usually an industry extracting or producing a raw material that is wholly exported: e.g. Chile was dependent on saltpetre, and then on copper; Bolivia on tin; other regions on copra, vegetable oils, and so on.

(b) They import a large proportion of consumer goods and services from all over the world, because national industry is very limited;

(c) They are wide open to the introduction of industries to produce these consumer goods from countries with a different technology, because of the lack of planning in developing countries and the eagerness of the developed countries' industries to expand;

1/ Definitions 1, Standardization Vocabulary, Basic terms and definitions, ISO, Geneva, Switzerland, March 1971, page 1.

(d) They give indiscriminate protection to local industry while it is starting up and growing;

(e) The quality of the protected products declines, because they do not have to compete with similar products from abroad; this may come about deliberately or as a result of the lack of competent personnel or new machinery or spare parts;

(f) Domestic consumers are dependent on the will or whim of producers as far as quality is concerned - "Take it or leave it";

(g) Technical education becomes increasingly difficult, because of the diversity and complexity of technology in the country (languages, units of measurement, etc.);

(h) Domestic industry seeking to export its products is dependent on the varying requirements of different foreign buyers.

The above can be summed up as the following set of conditions:

Inefficient industry and high cost of production;
Lack of technical development in industry and education;
Low quality of output;
High prices;
Markets limited by high prices;
High rate of repair for products.

2.2 Role of standardization

At the ISO General Assembly's open session on "Standards and the developing countries" [2], Mr. Katkhouda, Acting Chief, Industrial Institutions Section, said that since its inception in 1967, UNIDO has recognized the important role of standardization, introduced at an early stage, in accelerating the industrial process in developing countries and in avoiding waste of capital and human and other resources in disorderly growth. Standardization had another part to play in the transfer of technology by providing organized information and by the codification and classification of data on a uniform basis.

Effort in international standardization could minimize production in engineering industries and minimize repair, maintenance and servicing costs of equipment by ensuring that plant components were easily interchangeable with the minimum of spare parts.

2/ Minutes of the 13th General Assembly of ISO, Ankara, 21 - 25 September 1970, page 29.

The expansion of export markets and the substitution of domestic products for imports were both facilitated by the acceptance of standards ensuring consistent quality and packaging of exports and also giving the local consumer confidence in domestic products. In the latter case, standardization should assume an educational function, making the consumer aware of the level of quality and performance he was entitled to demand.

Thus, technical standardization has an important role to play in the industrial development of the less-developed countries, for the following reasons:

(a) It puts those concerned with production, consumption and the general interest in contact, making it possible for them to get to know each other better, thus creating goodwill and a desire to improve the situation and resolve any problems;

(b) Common definitions and units and a common technical vocabulary be adopted, eliminating ambiguity and confusion in technical terms and in production.

(c) The most suitable types and models for the market can be selected and the range of varieties reduced, making industry more efficient and production cheaper;

(d) Interchangeability as regards sizes and functions becomes possible, which encourages integration and specialization in industry;

(e) Minimum quality and safety requirements can be drawn up for products, - in accordance with the level of the country's economy, - so that they are suitable for the uses for which they are intended, giving the user maximum satisfaction at minimum cost;

(f) Standardized methods can be established for any kind of test, making it possible to compare the qualities of a product with those of similar products from abroad.

It can be seen from the above that when a country's technical experts decide to adopt an international or foreign standard, or to adapt it, modifying it to suit the economic level of the country, they are effecting a valuable transfer of technology, without the cost of "royalties" or patent payments to other countries; they are also avoiding colonialism.

3. RELATIONSHIP BETWEEN RESEARCH, STANDARDIZATION, QUALITY CONTROL AND METROLOGY

3.1 Research

Research we regard as a system or set of procedures through which it is possible:

(a) To identify the components or general or particular characteristics of an activity, process, raw material, natural product or manufacture;

(b) To determine the extent to which such a component or characteristic is present in the conditions in which it is found in nature or when the conditions change in the environment in which it occurs or develops;

(c) To determine the optimum operating conditions or conditions for obtaining or modifying the characteristics identified, either by direct action or by simulation.

3.2 Standardization

The definition given in paragraph 1 of this report clearly shows the range and objectives of this discipline. Through it:

(a) Standards are drawn up which relate to:

Definitions, terminology or symbols;
Fundamental or derived units;
Specifications with regard to quality or operation;
Procedures for testing requirements (physical or chemical tests etc.);
Procedures in general (registration, calculation, etc.)

(b) It is ensured that these standards correspond to the economic level of the environment in which they will be applied, in the hope of raising that level and benefiting the community in general;

(c) Maximum efficiency and yield is obtained from raw materials, processes and products.

3.3 Quality control

Quality control is a system or set of procedures through which a process or product is tested to see whether it complies with the specifications laid down for it, in order to maintain the process within the limits set or to ensure that the product will be suitable for the use for which it is intended.

Thus, through quality control:

(a) Compliance with specifications can be tested;

(b) Procedures can be drawn up enabling possible weak points and the causes of non-compliance with specifications to be detected;

(c) These defects or causes can be eliminated, in order to reduce the number of rejects in the final output;

(d) Savings can be made in raw materials, processes and manpower;

(e) In short, quality can be improved and costs reduced.

3.4 Metrology

Metrology has been defined as the science which studies the system of weights and measures.

Going into more detail, it becomes clear that there are two aspects - legal metrology and technical metrology.

Legal metrology is that part of the activity through which, by legislation, the following are established:

(a) The system of weights and measures that will be recognized, with the set of fundamental and derived units it comprises;

(b) The system of fundamental and derived models that will be used for reference and calibration;

(c) The national, regional and individual systems that will be used for consumption statistics.

Technical metrology is that part of the activity through which:

(a) Measuring tools and equipment are designed, and calibrated against official models;

(b) Operators are shown how to make proper use of the equipment available and to eliminate the influence of the environment on measurement.

3.5 Inter-relation of these activities

Applied research is closely linked to standardization in as far as it is the basis for the technical work involved; research is essential to define the characteristics that can be demanded of a raw material, product or process, and to determine the extent to which they must be present, in order to find the optimum point that

decides the suitability of this material, product or process for the use for which it is intended, in accordance with the economic level of the environment in which it will be used. Research is also needed in order to find methods of testing the characteristics sought in the most efficient and economic way possible.

Standardization, in turn, backs up applied research, providing established methods of design and testing. Comparable and reliable results can thus be obtained.

Standards are also the end-product of research work, once it has been rounded out by practical experience.

Quality control uses applied research extensively to establish the optimum procedures required for specific purposes; it also bases itself on standardization when exact standards are drawn up by which costs can be minimized and control procedures made as effective as possible. Metrology, being an activity based entirely on the relativity of things, entails both scientific and applied research, leading to standard definitions, sizes, units, instruments for the laboratory and for industry, standards for calibration and conditioning and procedures for their application. It is also the basis of the systematic or periodic checks through which quality is controlled.

4. DETERMINING STANDARDIZATION PRIORITIES FOR THE VARIOUS SECTORS IN COUNTRIES AT DIFFERENT LEVELS OF INDUSTRIAL DEVELOPMENT

4.1 Some background notes and opinions

At the meeting mentioned above 3/, Dr. Salama, Secretary-General of the Arab Organization for Standardization and Metrology, made a statement in which he said that the standardization effort in a developing country was faced with the crucial question of what to standardize. To answer that question it was necessary to assess the whole economic, industrial, agricultural, legislative and educational levels of development. Requirements varied from one country to another, but from his experience he would include among the priorities the following:

1. Application of the SI units for measurements
2. Codes of practice
3. Performance standards
4. Quality standards
5. Test methods
6. Unification of technical terms and symbols
7. Standard marks
8. Safety standards
9. Functional organization.

3/ SALAMA, M. - Op.cit. (2), page 30.

Mr. Lopez Ore, General Director of the Institute of Industrial Technological Research and Technical Standards (ITINTEC), in a statement read out at the same meeting [4] said that a non-industrial country exporting raw materials could develop by incorporating the maximum treatment of raw materials to add to their value, by reducing imports with local industry producing the maximum of manufactured goods, and by seeking new raw materials for export or local production.

From ten years' experience in one country it was not possible to arrive at a method generally appropriate in all developing countries as conditions were so varied, but there were certain signposts worth noting. A good tactic was the publication of a standard useful for the country's economy, most easily done by adopting an ISO Recommendation already existing. In an under-developed country the choice could be a raw material exported, but unfortunately ISO had published few Recommendations of that kind. The choice could be a standard for goods imported, but there again there were few ISO Recommendations. The next need for a country with newly established industry was standards of methods of manufacture.

Mr. Leong Kwok Onn, Director of the Standards Institution of Malaysia, addressing the same meeting [5], said that a problem developing countries encountered was to decide which national or international standard was the most suitable to use as the basis for their own national standards. Only a few of the Malaysian standards were based on ISO Recommendations, which did not often serve the interests of tropical countries like Malaysia.

4.2 Determination of priorities

With this background in mind, in trying to determine what priority should be given to standardization in the various economic sectors of countries at different levels of industrial development, the following must be taken into account:

(a) The stage of development of each sector;
(b) The social and economic needs of the sector and the country;
(c) The importance of the raw materials produced by the sector;
(d) The degree of dependence on imports;
(e) The general standard of living.

4/ LOPEZ ORE, A. - Op.cit. (2), page 30.
5/ KWOK ONN, Leong - Op.cit. (2), page 31.

The opinion of this writer is that developing countries should give priority as follows:

(a) Basic standards of science and technology, such as the system of sizes and units, since they form the basis for other standards and for training the country's technical personnel;

(b) Health and safety standards;

(c) Standards for nomenclature, labelling and tolerance in the packaging of products, for the protection of consumers;

(d) Standards for exports, whether raw materials or processed products in order to improve the country's image abroad;

(e) Standards for imports, to prevent the dumping of imperfect and poor quality goods;

(f) Standards for products in sectors that the Government wishes to improve.

5. ROLE OF THE GOVERNMENT AND INDUSTRY IN DRAWING UP, PROMOTING AND IMPLEMENTING A NATIONAL STANDARDIZATION PROGRAMME

5.1 Main difficulties in developing countries

Mr. Raymond Frontard, General Director of the French Association for Standardization, said in a paper submitted at the UNIDO-ISO-ASMO seminar held in Cairo in December 1970 6/:

"The difficulties met with are on the following levels:

Convincing leaders of the country
evaluation of problems
investment of material means
personnel
methods

"The convincing of leaders of the country is evidently the indispensable starting point: in most developing countries it is in general illusionary to count on the spontaneous action of associations and syndicates of producers .... etc. if there is not the will and the push of the government, very often helped by international co-operation. Great progress has been made in this direction during the last years.

"The evaluation of problems - that is the definition of the aims and structures and means and methods to use in a given country, is one of the most difficult problems ever.

6/ FRONTARD, R. - "Normalisation et développement" ("Standardization and development"), Courrier de la Normalisation, No. 216, November-December 1970, Paris, France.

"The usual method consists of seeking an international group of experts and entrusting them with consulting a national team of high quality.

"Investment of material means is not usually the most difficult problem.

"It is solved under the limitations of the budget when the other problems are solved.

"We must note, however, that since there are always financial limitations it would not be wise to concentrate means too much on the central laboratory for reasons of prestige.

"Three modest instruments for routine measurement placed in three enterprises and used daily are infinitely more effective than one expensive instrument in the central laboratory that is used once a year.

"As for personnel the greatest problem is training.

"Starting with a good basic culture and a sufficient experience in industry, an engineer can get an initiation in the practice of national standardization in several months. Later he would need 2 or 3 years of experience to master the problems sufficiently.

"The training of those engineers and other co-workers can be greatly accelerated by training missions in standardization institutions of industrialized countries."

5.2 Government responsibilities

Generally speaking, the Government of a country must be responsible for:

(a) Establishing an industrial development policy;

(b) Creating an infrastructural basis for industry;

(c) Drawing up a production promotion policy;

(d) Drawing up a policy for increasing productivity;

(e) Drawing up a training policy;

(f) Checking on quality;

(g) Supervising the expansion of exports.

5.3 Responsibilities of industry

Industry in a developing country is, in my opinion, responsible for:

(a) Seeing what type of product is most suited to the market in which it operates;

(b) Improving productivity in order to achieve economies in processes and stocks and make maximum use of raw materials and human resources;

(c) Maintaining the highest possible quality, within the market.

5.4 Role of the Government regarding standardization

In drawing up a national plan the Government has to:

(a) Consider the need for standardization in all fields;

(b) Establish a formula for co-operation among the various sectors taking part in the preparation of the standards;

(c) Arrange for a group of national or foreign experts to define, in conjunction with the country's senior officials, the needs and aims with regard to standards and quality;

(d) Provide the basic means for establishing a standardization body and make arrangements for industry to help finance it.

In promoting the use of standards, the Government can:

(a) Provide incentives for the use of standardized products, through tax relief, special freight rates, etc.

(b) Require State purchases to be made in accordance with the standards, with a mark or certificate of conformity;

(c) Arrange for scientific principles of standardization and quality to be included in education and training.

In implementing the national standardization plan, the Government can:

(a) Require its technical bodies and companies in which the State has an interest to participate fully in specialized studies;

(b) Ensure that the various sectors have laboratories for output control, either through direct action or by providing incentives;

(c) Promote quality control in industry;

(d) Encourage specialization courses to the full, both at home and abroad.

5.5 Role of industry in standardization

In connexion with the formulation of the national plan, industry must make a contribution to the definition of aims, priorities and methods and co-operate in setting up the body responsible for the development of standards.

In connexion with the promotion of the use of standards, industry has a duty to use, in production, the standards it has helped to approve and to require that materials and parts it purchases should meet them.

In connexion with the implementation of the national plan, industry can play an important role by demanding the preparation of the standards that the country needs for imports and exports for safety and for general well-being.

6. COMPARATIVE ANALYSIS OF A MULTI-PURPOSE BODY AND SPECIALIZED BODIES

We shall try and make a comparative analysis of the advantages and disadvantages of setting up a multi-purpose organization to deal with such matters as standardization, research, quality control, metrology and so on, as opposed to setting up various specialized bodies for each of these activities.

6.1 Some opinions

Mr. Frontard, at the seminar mentioned above 6/, said:

"There is a habit in many industrialized countries to consider separately each of the activities of metrology, scientific instrumentation, applied research, standardization and quality control ... etc. and to entrust more or less independent organizations with their fulfilment. This is due to historic reasons as well as to the general tendency to specialization.

"It often happens that developing countries not bound by such historic considerations and limited, on the other hand in manpower and resources, solve the same problems in a more grouped and synthetic manner.

"It seems to me that this tendency to group problems must be encouraged. Nevertheless it needs some effort to clarify matters. For example, the use of the word "metrology" for some people is connected with legal metrology, while for others it also includes industrial metrology and scientific instrumentation. The approach to problems varies according to whether we tend to one interpretation or the other.

"But in any country a standardization institution would be working in "empty space" if its action is not connected with laboratories equipped with adequate instruments.

"The elaboration of standards often requires preliminary programmes of research and testing ...

"This requires laboratories occupied with applied research.

"The conformity of products to standards presupposes the application of control procedures:

Routine control on the factory level: this pertains to factory laboratories;
Inspection control on the level of the standards institution: this pertains to one or more central laboratories;
Verification by the buyer during reception.

6/ FRONTARD, R. - "Normalisation et développement" ("Standardization and development"), Courrier de la Normalisation, No. 214, November-December 1970, Paris, France.

"A connected procedure of great practical importance is the permanent calibration of instruments (and also of methods used in factory laboratories as compared with central laboratories); this pertains to general metrology and standardization.

"In the opposite direction laboratories even if they are perfectly equipped would be working in "empty space" if they do not have fixed aims before them.

"The UNIDO Colloquium held at Athens in 1967 had not completely excluded true scientific research from the occupations of developing countries but it recommended them to give priority to tasks connected with industrialization for their research laboratories. Thus we can very often see in the brand new laboratories of developing countries, operators occupied with turning knobs, reading scales, collecting results of experiments without utilizing these results to any practical end because of the lack of ties with the industry; we can never insist enough about the following:

"The best measurement cannot be practically used unless the figure to which it leads is placed in a framework prepared in advance (standardized result sheets, that is, ones studied in the repetitive spirit of standardization).

"The best result sheets cannot have any industrial effect unless some results would- like flashers on the instrument board- give rise to decisions (acceptance of a lot or correction of a production process). The switching on of these "flashers" takes place with reference to standardized limits (for example: the operator surrounds the results falling outside the tolerance with a red colour to attract the attention of a responsible authority to them).

"This tends, particularly in developing countries, to bind the need for standardization with the need for scientific instruments. It is possible to think of many solutions to achieve this tie: either the institution for standardization can be an integral part of a polytechnic centre equipped with laboratories for applied research and control, or as a "client" it would call on external technical laboratories to help solve its problems.

"The first solution is adopted in such countries as South Africa, Egypt, Iran and to a certain extent the USSR.

"The second is adopted in such countries as England, France; we must, however, mention that the BSI* has established a laboratory for a small number of questions connected with safety ...

"It is difficult to say that one of these two solutions is better than the other for all cases. However, we can state that in developing countries the tendency is to establish incorporated laboratories, while in industrial countries the enormous variety of problems that have to be solved would require the establishment of centres of such a volume that the second solution is more often adopted.

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* British Standard's Institute

"If we pass now to the company level we must state that it also needs control laboratories.

"A standards institution must try to connect its laboratories to a national network:

- by associating them with research and preliminary testing that take place before the adoption of a standard (there is nothing abnormal in taking into consideration objective contributions of private origin when preparing a national standard);
- by associating them with tests of conformity and certification procedures."

Mr. A. Abdullah, representative of the United Arab Republic at the General Assembly of ISO in Ankara (September 1970) 7/, listed the initial activities of a national standards organization in a developing country as follows:

1. Elaboration of standard specifications
2. Securing reference standards for calibration
3. Providing measures for quality control
4. Checking accuracy of measuring instruments
5. Establishing laboratories for metrology and quality control
6. Co-ordinating standardization work on national and international levels
7. Inspecting the observance of regulations for standardization and metrology
8. Developing a system of quality marks, verification and stamping of measuring instruments to check compliance of products.

He considered it necessary that those fundamental functions should be undertaken by an organization combining standardization, metrology and quality control, an idea supported by European experts at the Quality Conference in Stockholm in June 1966. That system had been followed by the United Arab Republic and was recommended as a suitable example for developing countries.

6.2 Advantages and disadvantages of both systems

(a) Multi-purpose institutions

An organization whose functions include research, legal and industrial metrology, standardization, quality control and certification would have the following advantage:

- Better co-ordination of both financial and human resources for planning industrial development, enabling some common operations to be organized for maximum efficiency and minimum operating costs.

This system would have the following disadvantages:

- The various fields of activity are very different and would require large number of specialized staff;

7/ ABDULLAH, A. - Op.cit. (2), page 32.

- Providing equipment for each field of activity would make the total investment very high;
- Such a system tends to lose the capacity to be flexible in tackling problems.

(b) Independent bodies for each sphere of activity

This scheme would have the following advantages:

- It would allow specialization in each field, operations being rationalized to give maximum flexibility in each case;
- Organizations or units already in existence could be used, reducing the total cost;
- Each element of the system could be cheaper to operate, even if it is dearer as a whole, because of the inevitable duplication in some services.

As for disadvantages, the following should be noted:

- The lack of authority or proper regulation of the system may mean a lack of co-ordination in planning development or the unnecessary proliferation of similar bodies.

(c) Suitable scheme

In the author's view, the system should be organized in the following way:

- A supreme council of research, standardization, metrology and quality control should be set up, with the task of drawing up general plans and co-ordinating their application in development;
- New parallel and independent bodies should be set up as required for research, standardization, metrology and quality control, with the necessary capacity to work in all the different spheres of activity essential to the harmonious development of the various sectors.
- All bodies already working in these fields should be brought into the scheme, to ensure a better use of the nation's resources.

7. STANDARDIZATION ACTIVITIES IN LATIN AMERICA AND THE ORGANIZATION OF INSTITUTES

The various standardization agencies in the Latin American countries have been set up since 1935, and especially since the Second World War. These bodies differ greatly in structure, in some countries being purely private organizations and in others completely dependent on the State.

They do not pursue profit-making aims.

As far as integration with other bodies is concerned, some institutes do not have laboratories of any kind; in others there is partial or total integration with applied research institutes or quality control laboratories.

With some variations, all of them carry out their technical work according to the classic system for the study of standards:

(a) The preparation of basic documents by specialized staff;
(b) The discussion of these documents in study committees;
(c) Public consultation for varying periods, depending on the subject;
(d) Application for a provisional phase or as an emergency standard;
(e) Approval by a technical committee and ratification by a board;
(f) Official adoption by the State.

Funds come from three sources, the State, the members and payment for services rendered; the proportion contributed by each sector varies according to the country. Application of the standard is generally voluntary, except in rare cases or countries; standards referring to health or safety are generally mandatory.

Some details concerning various countries are presented in the annex.

8. THE CO-ORDINATION OF NATIONAL STANDARDIZATION WITH REGIONAL OR INTERNATIONAL STANDARDIZATION

8.1 Description of the present status

It is not always easy to determine to what extent international or regional standard recommendations have been applied within a given country. There is at the moment an important group of standards in which the national document has been partially harmonized with the international document, but it is necessary to point out that local conditions do not always permit full concordance.

According to an investigation undertaken at the end of 1966 [8/], seven countries in ISO (Czechoslovakia, France, Federal Republic of Germany, India, Netherlands, Romania and the United Kingdom) had fully or partially harmonized their standards with 50 to 70 per cent of the ISO recommendations; between 18 and 22 per cent of the other national standards were under review for the same purpose. In thirteen other countries standards had been aligned with between 30 and 50 per cent of the ISO recommendations. The remaining twenty-nine countries surveyed stated that they had harmonized between 20 and 30 per cent or less than 20 per cent of their standards with the ISO recommendations.

8/ Standardization, UNIDO Monographs on Industrial Development, No. 12, United Nations publication, Sales No. E.69.II.B.[illegible], Vol.I, page 36.

There are no studies on the harmonization of electrical standards with the recommendations of IEC (International Electrotechnical Commission). Nevertheless there seems to be a strong tendency towards their use for this purpose.

Also, it is not known what are the results of the co-ordination being attempted at the level of the studies for recommendations of COPANT (Pan American Standards Committee), a body set up by the Latin American countries, which includes the United States of America. Although this body has declared its intention to use international standardization, it has had to carry out studies of its own in many fields in which the Technical Committees of ISO are not yet working or in which they are very much behind-hand. That is due to the integration processes in which the American countries are engaged.

Lately, with the conclusion of the Cartagena Agreement in the Andean sub-regional area (Bolivia, Chile, Colombia, Ecuador and Peru), a Sub-regional Technical Standardization Agreement has been adopted between the institutes of the five countries, whose objectives are complete harmonization of national standards by means of the preparation of Andean technical standards, which will be mandatory with regard to trade between these countries, when the Agreement machinery so provides. Co-ordination will be effective because the aim is that the Andean technical standard should become the national standard in each country, and it will be based for preference on COPANT recommendations.

8.2 Possible co-ordination measures

The recent ISO provision regarding the approval of "international standards" will accelerate the co-ordination of national standards, since it will be able to interest industrial circles by a new approach.

Of particular interest are the standards related to:

(a) Sizes and units based on the SI;
(b) Nomenclature and definitions of raw materials, processes and products;
(c) Designation and graphic representation (drawing, etc.);
(d) Chemical analysis;
(e) Mechanical, physical and other tests;
(f) Procedures for taking samples and/or inspection.

It is highly to be recommended that national standardization bodies should make a great effort towards adopting the greatest possible number of these "international standards" of ISO.

It also seems important for national bodies to press, in COPANT and the Andean area agreement, for the adoption of the greatest possible number of these standards.

It is desirable that standards with regard to specifications should be harmonized on the same basis; however, this must be subordinated to the quality level existing in the area that is being standardized and should be considered thoroughly and with care.

In general, an effective measure for the harmonization of national standards with those prevailing at regional or international level would be a statutory reform of ISO, COPANT and other bodies, by which the countries would accept the principle that the standards that those bodies approved in the areas mentioned (sizes and units, nomenclature, designation and graphic representation, and analysis and tests) would be mandatory for those countries, application of standards for quality requirements or specifications remaining voluntary at the national level.

This seemingly utopian idea needs to be thoroughly discussed.

ANNEX

I. STANDARDIZATION

ITS ROLE IN THE DEVELOPING COUNTRIES

This annex contains a brief description of the standardization bodies in the Latin American countries, as stated in section 7.

1.1 Argentina

ARGENTINE INSTITUTE FOR THE RATIONALIZATION OF MATERIALS (IRAM)

This body was set up in 1935 and is the oldest in South America. It was founded because it was necessary for the State to have specifications of its own for purchases of the materials that it needed for development. It was set up jointly by the State, industrial institutions, technical organizations and study centres.

It is a private institution, consisting of voluntary members.

It is financed by government contributions and by means of special laws, the contributions of its members, donations and income from the Institute's property; fees for services such as certification, expert opinions and the granting of quality seals; special contributions of official and private organizations and special standards studies.

The application of its standards is voluntary and they are declared official through approval by an interministerial committe, by which the ministry concerned incorporates them into its regulations, the standards then being official; this act makes their use by the State compulsory for the purpose of purchases.

1.2 Bolivia

OFFICE OF STANDARDS AND TECHNOLOGY (DGNT)

Set up in 1971 under the Ministry of Industry, in place of the Bolivian Standards Institute established in 1969.

It is a purely State body, whose functions are research, metrology and standardization. It is wholly State-financed.

At the time of writing, no further details are known of its organization or mode of operation.

1.3 Brazil

BRAZILIAN TECHNICAL STANDARDS ASSOCIATION (ABNT)

Established in 1940, by a merger of the Materials Testing Laboratories, to continue their work and that of other earlier bodies. It is financed by members' contributions, by contracts and agreements with public and private institutions for work on standards in which they are interested and by the sale of its publications.

The members are divided into collective supporters (industrial organizations, government organizations, commercial and technical bodies) and individual members. The standards are made official in accordance with Act No. 4150 of 1962. Once approved they automatically become compulsory for public bodies.

1.4 Central America

CENTRAL AMERICAN RESEARCH INSTITUTE FOR INDUSTRY (ICAITI)

The Institute was set up in 1956 to promote industrial development in Central America, but its standardization division did not come into being and start work until 1962.

It is an international autonomous non-profit-making organization set up by the five Central American countries: Costa Rica, El Salvador, Guatemala (where it has its headquarters), Honduras and Nicaragua.

It is financed by the five countries and by a special fund of the United Nations.

The standards drawn up and approved by ICAITI are optional for the countries, except those specially prepared for the integrated industries of Central America, which are compulsory.

Any country can, however, declare a particular standard or standards to be compulsory in its territory if it sees fit.

1.5 Colombia

COLOMBIAN TECHNICAL STANDARDS INSTITUTE (ICONTEC)

Set up in 1963 by agreement between industrial and professional bodies in order to promote the country's development and improve the quality of both national output and imports.

The Institute is a private non-profit-making body; it is financed by members' contributions, income from its property, payments for services and the issue of certificates of quality and any other activities which are consistent with its status and do not affect its independence.

It acts as an advisory body to the State in all matters relating to technical standardization.

The National Technical Standards Commission, the members of which are ministry representatives, recommends the standards approved to the Ministry of Development for adoption, either as optional standards or as compulsory ones.

1.6 Cuba

OFFICE OF STANDARDS AND METROLOGY

Founded in 1961, as the Technical Standards Department of the Ministry of Industry, which, after various reorganizations, now operates as the "Office of Standards and Metrology" and is responsible for standardization, metrology and quality control for the whole country.

It is wholly State-financed.

Being a State body, it has no members.

It co-ordinates all standardization work by all ministries and other bodies in Cuba.

There are two classes of standards:

(a) National standards approved by the Standards Office, which are compulsory for the whole country;

(b) Factory standards approved by factories, which are compulsory for each factory.

1.7 Chile

NATIONAL TECHNOLOGICAL RESEARCH AND STANDARDIZATION INSTITUTE (INDITECNOR)

Established in 1943 by agreement between the University of Chile, the Institute of Mining Engineers, the Engineers' Association and the Production Promotion Corporation.

The Institute is a private-law corporation, which has been designated as advisory body to the State in all matters connected with standardization. It is financed by members' contributions, the State contribution, the sale of standards and the provision of instrument calibration services, which, together with certificates of quality and technical reports, are becoming particularly important. The standards approved are made official by a decree of the Ministry concerned and are compulsory for State organs and public bodies under the authority of the State.

For private bodies and persons the standards are optional, except those relating to health and safety.

1.8 Ecuador

STANDARDIZATION INSTITUTE OF ECUADOR (INEN)

Set up in October 1970 by the Ministry of Industry and Commerce. It is a public-law corporation attached to the Ministry.

It is financed under the national budget.

Standards adopted by INEN will be approved by the Ministry and made official, either as optional standards or as compulsory ones. In the latter case, they will be generally applicable.

The Institute has seven members, five being State bodies and two representatives of polytechnic institutes and consumers.

1.9 Mexico

STANDARDS OFFICE (DGN)

In 1943, when the Ministry of the National Economy was re-organized, the Standards Office was set up as one of its departments.

The members are the official members and the private members, who belong to the standardization committees, representing commerce and industry. These members belong to educational institutions, private institutions, chambers and associations.

The Federal Government covers and finances all the expenditure of the Standards Office. The standardization committees are financed directly by the industrial sectors concerned.

The Ministry of Industry and Commerce is legally authorized to declare standards compulsory in the case of those relating to the system of weights and measures, industrial standards for materials and processes affecting the life and health or physical integrity of persons and those relating to export products.

1.10 Panama

PANAMANIAN INDUSTRIAL STANDARDS COMMISSION (COPANIT)

Set up in August 1970, as a body attached to the Ministry of Commerce and Industry. It has ten members, five of whom represent the State and the other five the University, the College of Industrial Engineers, industry and chambers of commerce.

The Commission is financed under the Ministry's budget.

The standards are made official by the Ministry and are compulsory for the State, public corporations, municipal authorities and private industries covered by development legislation.

1.11 Paraguay

NATIONAL TECHNOLOGY AND STANDARDIZATION INSTITUTE (INTECNOR)

Set up under an Act of 1963 with special funds from the United Nations. It is a government body under the direction of a board; it has no members. It is financed out of import duties and payments for research services to industry and other authorities under special contracts.

The standards are optional but can be declared compulsory if necessary in the national interest.

1.12 Peru

INSTITUTE OF INDUSTRIAL TECHNOLOGICAL RESEARCH AND TECHNICAL STANDARDS (ITINTEC)

Established at the beginning of 1970, in place of the National Institute of Industrial Technical Standards and Certification (INANTIC), which had been set up in 1959 under the College of Engineering.

ITINTEC is a decentralized public-law corporation, which is administratively and financially subordinate to the Peruvian State, through the Ministry of Industry and Commerce.

Legislation governing the application of standards in Peru is at present being prepared. Under this legislation the Ministry of Industry and Commerce will be responsible for making standards official.

1.13 Uruguay

URUGUAYAN TECHNICAL STANDARDS INSTITUTE (UNIT)

Set up in 1939, at the initiative of the South American Union of Engineers' Associations.

It is a private non-profit-making body. It includes founding, active, life, corresponding and ordinary members.

It is financed from members' contributions, other income of a kind not incompatible with its functions, and the sale of standards.

The standards are optional; in some cases, some ministries may make them official and their application by the State compulsory.

1.14 Venezuela

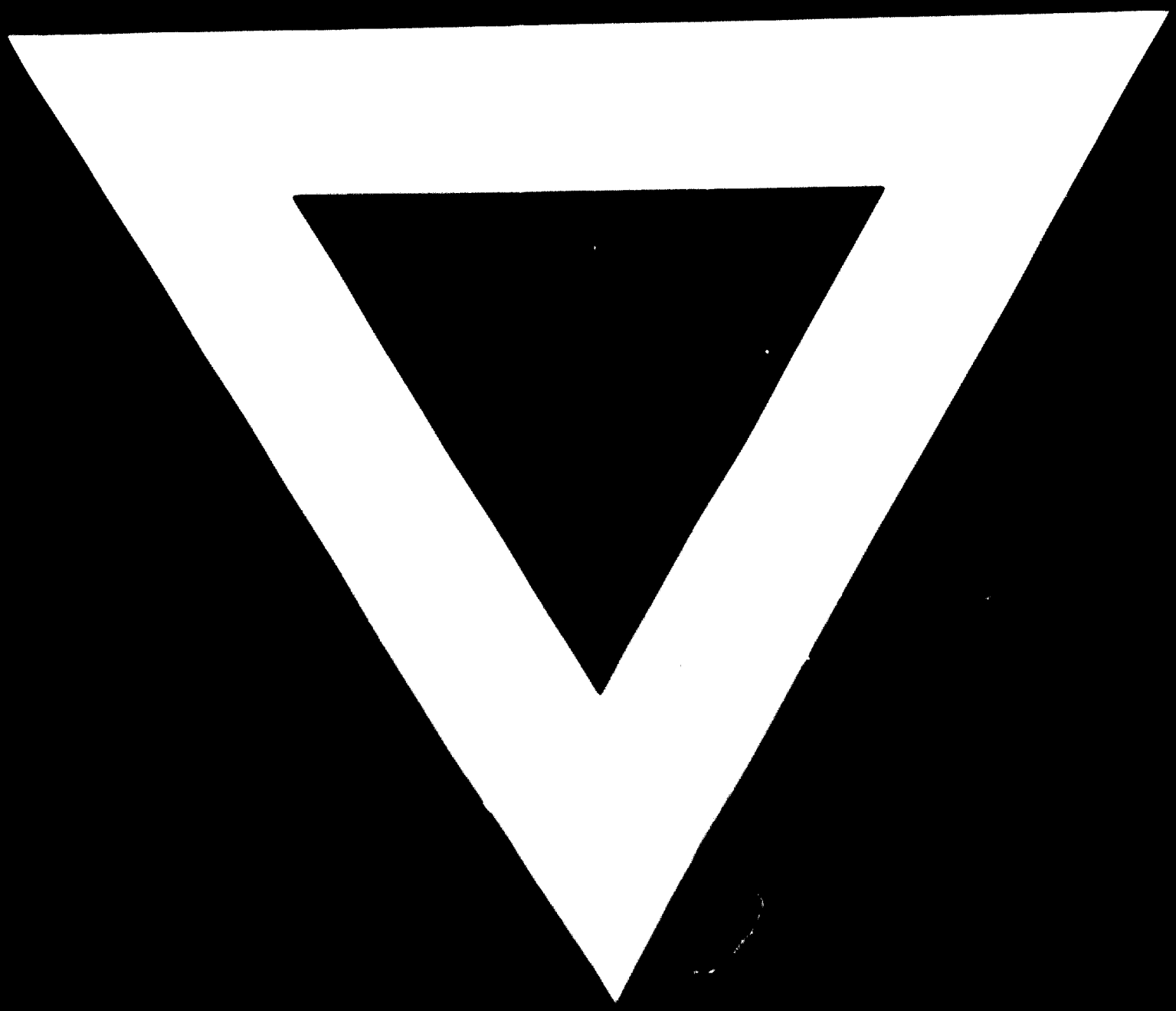
VENEZUELAN INDUSTRIAL STANDARDS COMMISSION (COVENIN)

Set up in 1958 by a decree of the Venezuelan Government Junta, under the Ministry of Development.

The members of the Commission are representatives of the Ministries of Housing, Public Works, Agriculture, Mining and Hydrocarbons, and Health and Social Security, the College of Engineers, the Federation of Chambers of Commerce and Production, representing the general interest, the Pro-Venezuela Association and the Metrological Office.

It is financed by the Ministry of Development.

The standards are in the nature of official recommendations and are optional.



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