CHAPTER - V

GROWTH OF STANDARDS AND SPECIFICATIONS

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5.0 Introduction

Standards and Specifications are documents which state how materials and products should be manufactured, defined, measured or tested. Although standards display an increasingly important role in modern industry, standardisation has always been an essential feature of human activity. Standardisation was originated with the human speeds and communication. The development of commerce between primitive people established standards of weight, measurement and currency.

"The first attempt at scientific standardisation of measurement was made in 1558, when the length of a certain bronze bar was decreed to be the British standard yard. The metric system of measurement and weight was established in France between 1790 and 1799. At first the old arbitrary system of measurement died hard. There was much popular resistance to the introduction of the metric system, and in 1840 the French government deemed it necessary to pass a law forbidding the use of any other system." Later in 1613, first attempt was made to standardise the products in the Britain with the publication of first edition of "British Pharmacopia", a work which endeavoured to determine the optimum compositions of the drugs and chemicals used in medicine. The present food and drugs act demands that chemicals manufactured for use in blood and drugs must comply with the standards of the "British Pharma companies".

Eli Whitney developed commercially the idea of standardised interchangeable industrial parts, which he used in the manufacture of a
consignment of 10,000 rifles produced for the US army in fulfilment of his first contract in 1798.

Further, Joseph Whitworth was the first British Engineer to advocate standardisation to achieve interchangeability of threaded parts in the Engineering Industry. In a read to the institution of civil Engineers in 1841 he urged British Industry to accept an uniform system of screw threads in place of the various shapes and sizes. The united system of screw threads, an adaptation of white Worth's thread is now in use throughout Great Britain, U.S.A and Canada.

Sir, John Barry, a civil engineer emphasized the necessity to standardise structural components, persuaded his industry to "consider the advisability of standardising various iron and steel sections", and thus was formed the engineering standards committee which was the pre-cursar of the British Standard Institution.

Today standardisation covers almost all aspects of our life. From a pin to a huge machinery, from an electric bulb, to a TV tube they are all products of standardisation. Many thousands of accepted standards are widely used in science and technology. Hence they now occupy an essential place in Technical literature. In modern days, standardisation is not only limited to concrete things such as products, but also to abstract things like preparation of bibliographies, Indexes.

Consequently, standards are also formulated in library and information services. In 1870, for the first time standards were made in the field of materials used in the libraries. However, the work on the
intellectual side of the subject was recognised soon after World War II. The scope of the International standards has been limited to European Languages.

In India, the standardisation was started at the time of independence, under society act 1860 in January 1947, to prepare and to promote standards. During the second world war the Indian defence authorities felt the standardisation. The committee has been formulated in 1958.

5.1 History and growth of Standards and Specifications

In early days before the dawn of civilization man started improving his hunting capability with a piece of stone and improved on it further by crudly shaping it to a more lethal form. Thus this was the beginning of introduction of man made standards in his daily life. His grunts and growls soon developed into primitive language as a means of communication enabling him to better convey his thoughts, feelings and messages to his followers. Each sound phase syllable carried a given standard meaning. This was the beginning of a spoken language which slowly developed through symbols, science, and pictograms to the modern written languages, which are taken for granted today. Most striking example of standardization in an early prehistory is the form and shape of stone implement which exhibits an extra-ordinary degree of similarity, whether they have been found in excavation of Europe, Africa or Asia. Coming down to pre-historic time, one finds highly developed
civilization endowed with the faculty and many refined forms of
standardisation which could appear not to have been quite so intuitive.

Egypt, Babylon, Mesopotamia, these civilisations offer hundreds of
examples in which the pre-Christian era civilisation have been found to
be using many kinds of standards in their daily life.

On the Indian sub-continent, Mohenjadaro civilisation covering an
area of 6,50,000 kms has left an extraordinary testimony regarding the
height to which standardisation had been carried about 5-6 thousand year
ago in the fields of town planning, water supply, drainage, house
building and even weights and measures.

Religious Edicts

The importance of standardisation apparently became more and
more recognised as time went on until standards began to find their way
to religious edict. The law than shall not infringe with the wrong weight,
wrong measure. Manu in his manusmriti 400 BC gives a table of 13 units
of weights and their inter-relationships. Kautilya who is well known for
his Arthashastra has left an admirable blue print of the organisation he
had created for the administration of weights and measures.

The Middle Ages

Gradually, as complexities of life increased and clever operators
began to learn how to falsify standards to their own advantage, more
extensive legislative measures were initiated. Due to the inaccuracy of
the definitions and a general lack of adequate inspectorate, confusion
continued to prevail until more recent times. Standards for other items were also legalised for example in Rome lead pipes were specified in their dimensions and weights. With the inventions of steam engine and onset of industrial revolution however, conditions began to be created for the emergence of standardisation in somewhat same manner as soil is prepared for cultivation. But in the purely modern science, the present day standards movement may be traced back to the French Revolution, The responsibility of standardisation was passed from the state to scientist with a task of establishing Metric systems of measurement system by 'James Watt'.

The First World War

By the time first world war broke out, standardisation was well recognised as an industrial process capable of ensuring productivity through INTERCHANGEABILITY not only with a given factory but also from one factory to another. The importance of creating industry-wise standards and national standards slowly began to be understood. An International standardisation movement began to develop early in the 20th century. Engineers and physicist concerned with the development of Electricity and its use established the first ever organisation for a standardisation on a world wide basis. The experience of a world war revealed for further potentialities of standardisation. The first standardisation which began nearly an associate of machine building process developed into a means of ensuring interchangeability and later
emerged as a technique for simplification for the conservation of National resources and enhancement of productive capacity.

**Second World War**

The second world war brought the urgency of the National and International standardisation even more pointedly to the fore front. Supply management during the war also re-emphasised the importance of the standardisation and variety reduction of materials and products brought about in the evolution of many new techniques like operational research, value analysis, statistical quality control and so on. In the United Kingdom a committee similar to the Hoover committee of the early twenties was constituted in 1948 under the chairmanship of Sir Ernest Lemon. This was done inspite of the fact that by this time most European countries including United Kingdom had well organised National standard bodies actively engaged in the work of preparing standards mostly without the help of government. Along with the hectic post war reconstruction activity, the pre-occupation with strengthening the standards movement and promoting variety reduction became quite universal. Thus France, Germany, Japan, USSR and most other advanced countries (whether on one or other side of the war) began to take fresh look at their standard and try to learn more about the American Industry. Another factor which gives spurt to the standards on movement at this post war stage was the creation of “United Nations Standards Coordinating Committee” for bringing together the existing national standards bodies into an International Form. The co-ordinating committee
of the United States met in 1946 brought into being what is today known as the International Organisation for Standardization (ISO). ISO Since then has made valuable contributions to the growth of world standards and the development of standards on movement as a discipline. The second world war had also brought about a transformation of the colonial pattern. As a result of which many countries, one after the other secured independence during the decade or so that followed. From a meager beginning of 57 members, the United States membership has now swelled to 132, of which 90 are in the category of developing countries. Anxious as these countries are to develop at a fast rate in the attempt to catch up with the advanced countries. They are also keen to take advantage of every modern technique that can come to their assistance. As a powerful tool standard has naturally attracted quite a good deal of attention. This development has greatly assisted in the universalization of thinking of standards and the general advancement of the techniques and procedures involved in preparing and establishing them.

In the developing countries where everything in industry has to be started from scratch, the function of standardisation served as infrastructure for the development. This idea of standardisation being a vital part of National Planning is of relatively recent origin as far as most developing countries are concerned. The most remarkable historical development in the realm of standardisation has been the evolution of the authority which makes voluntary standards effective instruments for guiding commerce and industry and thus constituting an economic force in national life and also in international trade. This is brought about
mainly by following the consensus principle in preparing standards by which largest possible agreement is secured among all interest concerned with the use of standards such as the producer, user, trader and technologist. Once all these interest have agreed and a common ground upon which to base the standard has been found. The standard acquired an authority possibly much more powerful than legal instruments.

5.2 Evolution of International Standards

The history of international standardization dates back to 1926 when the International Federation of the National Standardization Associatin (ISA) was formed. Within 25 years the number of national standards bodies involved with the ISO had grown from 25 to 70. The objectives of ISO are to promote the development of standards in the world with a view to facilitating the international exchange of goods and services and to developing mutual cooperation in the spheres of intellectual scientific, technological, and economic activity.

Features of ISO are as follows

1. To take action to facilitate the coordination and unification of national standards and issue the necessary recommendations to member bodies for this purpose;

2. To set up international standards and issue the necessary recommendations to standards;
3. To encourage and facilitate, as occasion demands, the development of new standards having common requirements for use in National or International spheres;

4. To arrange for the exchange of information regarding the work of its Member Bodies and of its Technical Committees; and

5. To co-operate with other international organisations interested in related matters, particularly by undertaking, at their required, studies relating to standardisation projects.

ISO Member Structure

The ISO membership is composed of member countries and liaison members. A member country is represented by a member body, which is the national body of representative of standardisation in that country.

In 1964, the Council decided to create a new category of membership, that of correspondent member. Such a member is normally an organisation which do not themselves have a national standards body and central secretariat. The Secretary-General, who is appointed by the council, is in charge of the Central Secretariat. He represents the ISO in its relations with other international organisations and maintains overall responsibility for the application of the Constitution, the Rules of Procedure, and the Directives for the Technical Work of ISO. Under the direction the Central Secretariat coordinates the work carried out by the ISO technical committees, convenes all meetings of technical committees and subcommittees, institutes the voting procedures, circulates documents to member bodies, and publishes all documents accepted by
the Council as International Standards. It also keeps the Member Bodies and council informed of the work of the various technical committees. It must inform the technical committees of work under taken by other international organisations in related fields.

Technical Committees (ISO/TC)

The technical committees are composed of a delegation from each of the member bodies wishing to take part in their work. Each technical committee has a secretariat which is undertaken by a member body acting impartially and designated by the Council Membership in technical committees is open to interested member bodies as participating (P) or observer(O) members.

Subcommittees (ISO/TC/SC)

This is the level at which most of the technical decisions are made and is also the level at which much of the technical liaison takes place. Subcommittees are charged with the study of one or several items within the program of work of the technical committee.

Prior to July 1971, subjects proposed and approved by ISO were known as "ISO Recommendations", Although the ISO charter included provision for the approval and publication as ISO Standards, the procedure was never invoked. In mid-1971 a decision was made to publish all ISO draft recommendations as draft International Standards. At the same time a new category of document, to be known as a "Technical Report", was introduced. The material which follows reflects the current technology.
### Table - 1

**Some Important International Standard Organisations are listed below:**

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Acronyms</th>
<th>Date of Establishment</th>
<th>Place</th>
</tr>
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<tbody>
<tr>
<td>1)</td>
<td>American British Canadian Australian Conference on Unification of Engg. Stds</td>
<td>1944</td>
<td>Michigan (USA)</td>
</tr>
<tr>
<td>2)</td>
<td>Asian Standards Advisory Committee</td>
<td>1966</td>
<td>Bankok (Thailand)</td>
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<tr>
<td>3)</td>
<td>International commission on rules for the approval of Electrical equipment</td>
<td>1946</td>
<td>Arnham (Netherlands)</td>
</tr>
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<td>4)</td>
<td>European committee for standardization</td>
<td>1960</td>
<td>Paris (France)</td>
</tr>
<tr>
<td>5)</td>
<td>European committee for Electrotechnical Standardization</td>
<td>1960</td>
<td>Brussels (Belgium)</td>
</tr>
<tr>
<td>6)</td>
<td>General Conference of on Weights and Measures</td>
<td>1875</td>
<td>Paris (France)</td>
</tr>
<tr>
<td>7)</td>
<td>International Conference on Weights and Measures</td>
<td>1875</td>
<td>Paris (France)</td>
</tr>
<tr>
<td>8)</td>
<td>Pan American Standards Commission</td>
<td>1947</td>
<td>USA</td>
</tr>
<tr>
<td>9)</td>
<td>European Coal and Steel Community</td>
<td>1951</td>
<td>Berlin (Germany)</td>
</tr>
<tr>
<td>10)</td>
<td>International Organization for Standardization (World)</td>
<td>1947</td>
<td>Geneva (Switzerland)</td>
</tr>
<tr>
<td>11)</td>
<td>International Standardization</td>
<td>1926</td>
<td>--do--</td>
</tr>
<tr>
<td>12)</td>
<td>Pacific Area Standards Congress</td>
<td>1973</td>
<td>USA, Canada, Japan, Australia, Newzealand.</td>
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</table>
5.3 Indian Scene

In India, the standardisation movement is of very recent origin. The agriculture produce (grading of marketing) Act of 1937 is the forerunner of all standardisation activity in our country. The act 1937 was amended in 1945 to hide its scope to cover many other areas. The Indian Standard Institutions was established as a society under the societies regulation act 1860, in January 1947 to prepare and promote Standards. The Indian Standards institution certification marks act, 1952 covered the operation of the certification mark scheme. The Indian standard institution in its multifarious activities like standards formulation, certification, setting up laboratories and promotional activities, need was felt for.

5.3.1 Bureau of Indian Standards (BIS) and its Functions

a) Providing recognition and status to the organisation to enable it to discharge. It functions effectively and efficiently towards acceptance and promotion of Indian Standards;

b) According to priority to the functions in line with the rational priorities.

c) Making a provision in the enactment for introduction of mandatory certification in the public interest;

d) Extending outside India services of the bureau for inspection, testing and similar other purposes; and
e) Providing more stringent punishment against misuse of standard Mark.

Keeping these factors in view, Bureau of Indian standards was established with effect from 1st April 1987 under the provision of the 'Bureau of Indian Standard and Act 1986' (BIS). BIS took over functions, assets and liabilities of the Indian Standard Institution.

Main functions of the BSI are briefly enumerated as under:

1. To prepare standards relating to products, commodities, materials, and processes and the promotion of their general adoption on National and International level;

2. To promote standardisation, quality control and simplification in industry and commerce;

3. To co-ordinate the efforts of producers and users for the improvement of materials, products appliances, processes and methods;

4. To provide for registration of standardisation markets applicable to products commodities etc.; and

5. To undertake circulation of statistics and other information relating to standardisation.

It has formulated over 14,000 Indian Standards with the help of some 37,000 experts in various disciplines represented on more than 1950 Technical Committees of the BIS, under its certification scheme over 10,000 licenses are in operation covering a wide range of products from articles of daily use to sophisticated engineering products. The
certification scheme is basically voluntary in character but has been made mandatory by the Government for a number of items of mass consumption. The BIS has lately been taking steps to consolidate standardisation movement in the country and re-orient its working in line with the national priorities in a greater measure. It is playing a pivotal role in the development of a harmonious system of standardisation in the country which is expected to use in a new era in the national standards movement linking each standards formulating organisation with the national system. In the formulation of standards, an inter-disciplinary approach is being adopted with the development of multi-technology areas. Five such areas identified relate to energy conservation, environmental protection, safety, rural development and basic materials. Special cells have been set up to coordinate these areas and evolve the basic approach and guidelines for standards development. The BIS is also playing an active role in the work of "Technology Missions" launched to tackle problem areas with the application of available scientific and technological inputs. It is working in close collaboration with the Technology Mission on Drinking water in villages and under the project approved by the Government, it is to undertake preparation of standards and guidelines for products and technical activities related to the Mission and assist it in obtaining quality items through its certification scheme. The BIS interacts actively with public sector undertakings for their development in standardisation and quality control activities, adoption of Indian Standards, and accord preference to standard marked products, interaction with the various State Electricity
Boards is also being strengthened. The Certification scheme will have to play a greater role as a tool for consumer protection in view of the Government’s stress on welfare of the consumer. BIS is, therefore, engaged in identifying items for mandatory certification in a phased manner in consultation with the concerned ministries and organisation.

Graph 2 - Standards in Force

During the year, the Bureau of Indian Standards formulated 819 standards bringing the total number of standards in force to 16142 as on 31 Mar 1993. The graph showing the number of standards in force over the last five years is illustrated. The technical activities under Electronics and Telecommunication and Electrotechnical in defence research field are highlighted in the graph, cited below.

Graph 3 -
The data is derived from information received from over 65,000 publishers, worldwide, covers 1974 onward, updated monthly and approximately 6,500 new records are being added annually. The total number of records in the file are 2,00,000 as of 1994.

The primary application of this database includes:

a) Retrieving descriptive notes for active titles.

b) Locating subscription information for a periodical.

c) Finding the name, address of the publisher of a journal.

d) Determining whether a periodical is available on CD-ROM or ONLINE.

5.3.2 History and Development of Indian Defence Standards

During the second world war when India had become a base for all operations in the far east, the Defence authorities acquired vast range of stores and equipment. These equipment of assorted sizes and types from American, Canadian, British and Commonwealth sources poured in uncontrolled. Interservice co-ordination did not exist and as such respective services procured the required equipment from their British or American counter parts which has resulted in diversity and multiplicity of equipment for similar roles. Future procurment of items, the denial of supplies of which could be critical in war, must be through indigenous production. Standardisation of new equipment proposed to be introduced to prevent one growing but still limited development and production resources being dissipated on an uncoordinated multiplicity
of equipment requirements. Concentration of the undertaking of development and production of standardisation requirements should result also in simplified procurement, easier maintenance and training.

A standardisation committee has been formed vide govt of India, Ministry of Defence, Memorandum No. 7 (11)/58/2752/CG (Admn) dated 24 Mar 1958.

The committee has the power to co-opt the Director of Indian Standards Institution (presently called as Bureau of Indian Standards-BIS) and any other technical representative considered necessary by the standardisation committee.

**The functions of the standardisation committee as follows.**

a) To lay down the policy of joint services standardisation and to guide and progress activities of the sub committees and specialist panels.

b) To liaison with the other national standardisation organisations.

c) To review specifications with a view to ensuring that these are related to the capability and economy and indigenous manufacture.

There is an old proverb that "present is the child of the past and father of the future". Unless the research activities browse through the past findings with concerns to facts in alliance and intellectual precision, a rational distinctiveness line in a particular innovation will not be perfect. The present chapter unfolds the retrospective information of both standards and specifications.

The following chapter VI takes a close look of the actual position of the standards and specification in DRDO libraries.
Reference


