



CONSTRUCTION INDUSTRY INSTITUTE

INTERNATIONAL STANDARDS
AND U.S. CONSTRUCTION
INDUSTRY COMPETITIVENESS

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International Standards and U.S. Construction Industry Competitiveness

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International Standards Research Team**

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Executive Summary

The international standards currently being created and implemented will have a major impact on the competitiveness of the U.S. construction industry. If these new standards are not carefully monitored, their impact will negatively affect the ability of U.S. construction firms to compete globally.

The U.S. construction industry is not well-represented and, as a result, has had little influence in the development and adoption of international standards. Consequently, many international standards are being adopted without any input from the U.S. construction industry.

The research project described in this publication indicates that expanded participation by the U.S. construction industry within the international standards-setting community will:

- Increase the efficiency of developing, adopting, and maintaining international standards.
- Provide strategies to remain competitive or increase competitiveness in the global construction arena.
- Provide a service to assist in the more efficient delivery of global construction projects.
- Reduce barriers that cause conflicts or misunderstandings on global projects.

The International Organization for Standardization (ISO) is the principal organization involved in coordinating standards, and was established to foster cooperation in the development of standards for the benefit of intellectual, scientific, technological, economic and construction activities. Currently, no international regulatory agency, however, oversees compliance with these standards.

An immense effort to harmonize existing standards on a global level as well as develop new ones is now underway in the European Community (EC). Standards prepared by the European Committee for Standardization (CEN) are being put forth to ISO for adoption as world standards. U.S. Government and U.S. private firms have no input into CEN. Furthermore, some U.S. standards, which until a few years ago were being used internationally, are now being discarded by many countries in favor of ISO standards. If the U.S. does not increase its effort to counter or to join in the CEN effort and the efforts of other countries, international competitiveness of U.S. construction firms will be negatively impacted. By working with the American National Standards Institute (ANSI), the U.S. representative to ISO, international standards can be monitored, proposed, and developed to strengthen the competitiveness of the U.S. construction industry in global markets.

Introduction

Research Goals, Methodology and Objectives

The purpose of this research project was to provide insight on why the U.S. construction industry should increase its participation in the development and implementation of international standards, and to investigate the effects precipitated by the adoption or enforcement of international standards. An additional objective was to provide the CII members with information and guidance for involvement with the international standards-setting community to improve its global competitiveness.

The research goal was to investigate the current status of the development and implementation of international construction standards. The methodology used to accomplish this goal was an extensive literature review of government and non-government documents and input from approximately 540 members of the U.S. and foreign construction industry by the use of detailed questionnaires. This goal was divided into the following three objectives:

- Create a condensed synopsis of international standards-setting activities and determine the impact on U.S. competitiveness and global opportunities. This includes providing an understanding of U.S. standards-setting operations and how they relate to suggested strategies for CII members to become involved with international standards-setting opportunities.
- Supply recommendations to the U.S. construction industry and regulatory agencies on their possible role in the international standards-setting community.
- Provide guidance on ISO 9000 registration.

Scope

The scope of the research included:

- Discussing international standards and the structure of the international standards-setting community, and determining the barriers and drivers affecting the adoption of international standards.
- Discussing the influence of U.S. construction industry involvement on international standards-setting, and evaluating the effects of global standardization.
- Providing guidance on the ISO 9000 standards series on quality assurance and registration processes.

Limitations of the Study

The information collected during this research project was based on surveys that are the subjective opinions of a group of management personnel from the construction industry and related industries. Limitations of the representation, personal knowledge, experience, and bias are inherent under these types of circumstances. However, the problems, ideas, and strategies presented in the study are useful for members of the construction industry and provide insight for shaping their future corporate strategies.

Organization of the Study

This study was divided into several topic areas to effectively address all of the issues related to international standards and U.S. construction industry competitiveness. The chapters contain the views of the research team, quotes extracted from literature, and the results from questionnaires.

Chapters 2 through 4 provide general information on U.S. standards, international standards, and the ISO 9000 series of quality standards. Chapter 5 discusses the results and conclusions of the literature search and a broad-based construction industry questionnaire. Chapter 6 provides recommendations.

Standards Development Organizations

Information technology has revolutionized global trade practices, contributed to the internationalization of engineering and construction of projects, and has greatly enhanced the ability to develop international standards for quality, products, and processes. Construction markets have greatly expanded and firms from developed and developing countries are competing with each other to obtain a share of this lucrative market. For these and other reasons, the U.S. construction industry needs to increase its participation in the development and implementation of international standards.

Drivers

Standards are an important aid in the process of homogenizing the world while incorporating its variations. This worldwide competition is driving the development of international standards and gaining increasing importance. Members of the U.S. design and construction industry need to realize this and must strive to actively participate in this process so that their specific needs can be better addressed and their competitiveness enhanced. Many associations and organizations, such as CII, are examining the impact that international standards will have on global competitiveness.

To remain globally competitive, the U.S. construction industry must thoroughly examine and improve its inadequate participation in the development of construction-related standards. Involvement in standards development is important because it influences the acceptance of U.S. technology, products, and services in international markets. The U.S. cannot afford to lose ground in the global marketplace because the international trade agreements currently being used, or introduced, are *opening the U.S. market to foreign products and services*. If the U.S. construction industry does not become more involved, it may even lose traditional domestic markets to foreign competition.

Definition of Standards

A standard is accepted as a basis for comparison, used to evaluate qualities, characteristics, or properties of materials. A standard is defined as “having the quality or qualities of a model, gauge, pattern, or type generally recognized as excellent and authoritative; generally used and regarded as proper for use.”

A typical U.S. building code references 300 to 400 primary standards and these standards include materials specifications, test methods, and numerous design standards particularly structural design standards. Many of these same standards are widely used as a basis for design contracts and construction specifications, as well as for building regulations. Because of this broad regulatory and contractual use, standards provide the principal vehicle for the transfer of advancements in building technology from research into practice. [TRH: I think this is an extended quote.]

Standards are not mandated by law, but are “generally recognized as excellent and authoritative” and “proper for use.” Approximately 11,000 domestic standards (12 percent of those in use) relate to construction. Also, about 400 U.S. private sector and government organizations are involved in developing standards.

In the U.S., government and private organizations involved in design and construction have established standards for their own use. The basic intention of these types of organizations is to achieve a recognizable and acceptable level of quality. Standards help set common goals pertaining to quality and facilitate communication between interacting parties. Enhancing communication to achieve quality in design and construction is one of the main purposes of standards. Factors of cost, construction procedures, and materials specifications are the main elements set forth in standards that, in turn, establish acceptable levels of quality.

U.S. Standards

The U.S. Government shares development of standards with private organizations. This is in contrast to other countries, where one centralized agency is responsible for preparing national standards, such as the Deutsches Institut für Normung (DIN). Over 180 private U.S. organizations are involved in work pertaining to design and construction standards. With this arrangement, standardization activities are broad, complex, and decentralized.

Some 94,000 active standards are maintained by the U.S. standardization community—45 percent (42,000) which have been prepared by the private sector. The total number of standards that the U.S. government has developed is 52,000 (55 percent). Organizations in the private sector that are active in standards development fall into three categories:

- **Scientific and Professional Societies.** In addition to their professional and education roles, some societies, such as the American Society of Civil Engineers (ASCE), also develop standards.
- **Trade Associations.** These represent the mutual business interests of their members and promote the industry and its products. Many trade associations develop standards for the products manufactured by their members, although a few concentrate on developing standards for products used by the industry and its customers.
- **Standards-Developing Organizations.** SDOs are founded specifically to develop standards. Some confusion occurs when the three types of organizations are collectively called SDOs. One of the largest SDOs is the American Society For Testing and Materials (ASTM).

Government agencies, such as the U.S. Department of Defense (DOD) and the U.S. Department of Energy (DOE) have been involved in the development and use of standards since their inception. Until about a decade ago, the DOD and DOE were using standards established for their organizations. Today, they are incorporating Non-Government Standards (NGSs) and are strongly advocating their use to harness the efforts of the private industry to update, eliminate duplication, reduce cost, and develop new technology-sensitive standards.

The U.S. Office of Management and Budget (OMB) Circular Number A-119, "Federal Participation in the Development and Use of Voluntary Standards," was issued for all Federal Executive Branch agencies to address the voluntary use of standards and the participation by federal employees in their development. OMB A-119 states:

Participation by federal agency employees in voluntary standards activities is encouraged when it would be "in the public interest and is compatible with agencies missions, authorities, priorities, and budget resources." Such participation should be aimed at contributing to the development of voluntary standards that will eliminate the necessity for the development and maintenance of separate government standards.

Non-Government Standards include only those standards established by private organizations and not individual companies. Of the DOD-adopted NGSs, 91 percent come from 16 non-government developing bodies. The NGS program improves the quality of standards by requiring them to be user- and procurement-oriented, meet identified needs, be supportive of national initiatives, and be globally competitive by being of world class performance.

The National Institute of Standards and Technology (NIST) assists the private sector and other government agencies through research and development of better methods of measurement, determination of physical constraints and properties of materials, and design of practical

test procedures. Standards are an important medium for disseminating the results of NIST research, and the work of national standards bodies is of vital concern to NIST.

NIST provides information on mandatory and voluntary standards in the U.S. at the national level for governmental and non-governmental organizations; information on standards distributors, libraries, and information centers; and sources of foreign and international standards.

The American National Standards Institute (ANSI) is a private non-profit membership organization that serves as gate keeper to the ISO and the International Electrotechnical Commission (IEC). It has offices in Washington, D.C., and Brussels. ANSI is the only official U.S. member body to the ISO via the U.S. National Committee (USNC). Representatives of ANSI hold chairmanships in the ISO and the IEC on many of the committees that vote on matters related to U.S. technology. ANSI coordinates the U.S. voluntary standards system, bringing together interests from the private and public sectors to develop voluntary standards for a wide array of U.S. industries. ANSI membership includes over 1,300 corporations, 250 organizations and 30 government agencies. ANSI approves standards as American National Standards and coordinates with the ISO and other international agencies. ANSI does not develop standards, but coordinates the development of voluntary national standards.

Reducing Standards Development Time

Unnecessary duplication and complexity among federal, state and local regulations have been translated over the years into a burdensome web of standards across many sectors of business. Standards generally are developed by federal agencies in response to their mandate to comply with, and implement federal legislation. Standards generated by private SDOs are the result of various suppliers, manufacturers, and professional organizations responding to a specific marketplace or imposed statutory regulatory demands within various industries.

To foster efficient and timely development of essential standards, public and private sector partnering has become a necessity. The following two initiatives provide a method and vehicle for the construction industry to increase its profile among the standards developers and the Federal Government. Both are intended to help shorten the development time and costs associated with standards development.

The Center for Strategic Standards Management (CSSM). Recently a program was created where processes, services, and tools are provided through ANSI to enhance a firm's competitive advantage using the concept of Strategic Standardization Management (SSM). This is a system where a standard is the formal agreement defining an interface. SSM is the management tool (macroprocess) for identifying and leveraging the critical aspects of the standard related to achieving global competitiveness.

The National Standards System Network (NSSN). Changes in communication technologies are providing greater access for public and private sector SDOs to information about standards and standardization processes. The NSSN will serve as an electronic gateway to provide single-point, universal access for both sectors, and as a link between all members of the domestic and international standards communities.

International standards are used to influence, or regulate, the types of goods and services that flow between nations. One of the main purposes of international standards is to harmonize the technical regulations of individual nations. Organizations such as the American Society of Mechanical Engineers (ASME), the American Society of Testing and Materials (ASTM), the British Standards Institution (BSI), the Canadian Standards Association (CSA), and DIN produce standards that are used in many parts of the world, but they are all *national* organizations. Many of the standards from these organizations are incorporated into international standards through the ISO.

The International Organization for Standardization (ISO) is a specialized international agency created to “promote the development of standardization and to facilitate the international exchange of goods and services and to foster cooperation between intellectual, scientific, technological, and economic activities.” Formed in 1946 by 25 national standards associations, the ISO is the largest voluntary international standards organization in the world. Current members of the ISO include the national standards organizations from 91 countries. ISO standards are voluntary. ISO is not a governmental organization, but 70 percent of the official standards bodies that participate in the ISO are government agencies or bodies created by public law.

Technical work produced by the ISO is published as international standards. In January, 1995, there were 9,652 ISO standards (see Figure 1). These standards cover all areas except those related to electrical and electronic engineering, which are covered by the IEC. The ISO has established special committees to develop guidelines, definitions, and documentation related to their standards. Figure 2 shows the types and number of ISO standards.

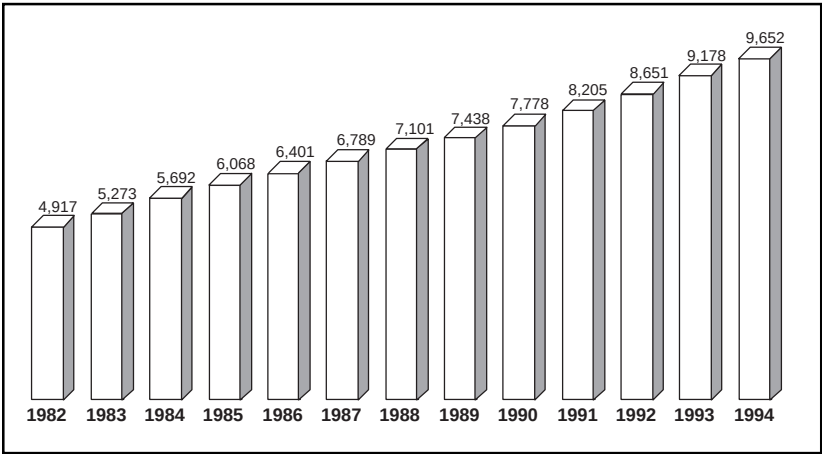


Figure 1. ISO Standards Published

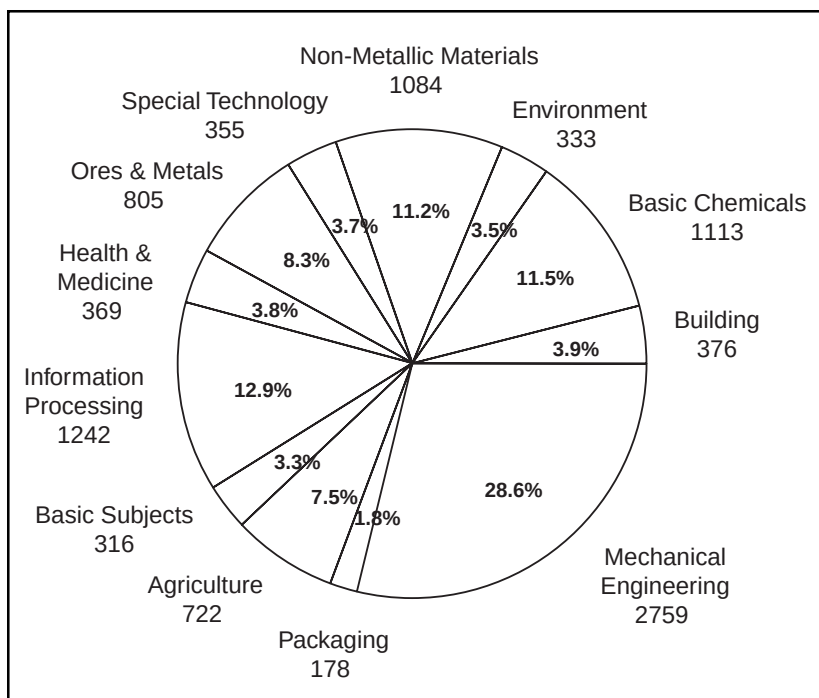


Figure 2. Types of ISO Standards

The classification structure for the 39 fields of ISO standards is described in Appendix A. International standards related to the construction industry are in Field 190, “Building and construction materials”. (Note that as with some of the other fields in Appendix A, which indicate recognition of methodologies, industries, and technologies, Field 190 only describes materials). Field 190 is further classified into 32 groups that are listed in Appendix B. Appendix B also provides examples of individual ISO construction industry standards.

The U.S. Government and ANSI help to contribute to the development and implementation of international standards. Some argue that ANSI, as a private organization, can undertake only limited standards operations in an international arena. Industries in other countries have the advantage of participating in the international

dialogue with the backing of their governments. Most of the countries participating in ISO have government funded organizations representing them.

Participation in the ISO

Other countries are rapidly adopting ISO standards, putting pressure on the U.S. to become more involved. Clients in other countries are stipulating ISO standards in contractual arrangements with contractors. Some of the countries in the European Community and the Pacific Rim are contributing millions of dollars to the development of international standards.

A standard must go through many stages, or processes, before it becomes an international standard. This process varies from country to country and from one standards-developing organization to another. Once a U.S. standard organization has developed a standard that it would like to submit to the ISO for review and possible inclusion as an international standard, the process must be administered through ANSI. A U.S. professional society or association cannot directly submit its standards to the ISO for consideration without ANSI coordination and documentation.

The ISO has numerous committees and technical subcommittees that allow participation by individuals from different business sectors. Involvement with a committee as a member allows ANSI to hold observer status on a task committee or participating member status. In order for ANSI to register as a participating member on an ISO technical committee, it must first designate an ANSI-accredited SDO as the U.S. Technical Advisory Group (USTAG) to represent it. When ANSI is registered as a participating member of a technical advisory group, it is required to vote on draft international standards and to participate in meetings.

The ISO does not fund participation of its committees or subcommittees; therefore, committee participants must be self-funded or sponsored by their firm, a consortium of firms, a professional

society, or a trade organization. Because of the extensive cost of funding a representative, many countries are excluded due to limited resources. Many U.S. firms also decline to participate in ISO standards development because of time and money commitments.

European Community Directives. An immense effort to harmonize existing standards and to develop new ones is now under way in the European Community. The Commission of the European Communities (CEC) initiated a program to eliminate the many differing national standards and technical regulations that tended to impede trade between European nations and to replace them with EC directives. These directives establish “essential requirements” or regulations containing general provisions relating to products and services to be marketed within the EC. The standards being developed will be European Committee for Standardization (CEN) standards, not ISO standards. However, where ISO standards exist and are considered satisfactory, the EC is committed to using them; otherwise CEN will develop new ones. It is expected that the European countries will push for ISO adoption of CEN standards as world standards. U.S. firms have no input into CEN, but they can participate in the development of ISO standards.

In spite of all the EC standards activity, the U.S. has a lower uptake of these new international standards than many other countries, however, it has a good standards system that is productive at creating standards in all fields.