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QUALITY MANAGEMENT, ISO 9000 AND GOVERNMENT PROGRAMMES

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ABSTRACT

This document provides the reader with additional information related to the document "Quality Management and Competitiveness: The Diffusion of the ISO 9000 Standards in Latin America and Recommendations for Government Strategies". That document argues that quality management can positively contribute to the competitive performance at the enterprise, sectoral and national levels. The document then analyses the ISO 9000 standards on quality systems as example of these quality management techniques. In Latin America it may be observed that the diffusion of the ISO 9000 standards (and quality management in general) is limited as compared to other regions. It seems that certain market failures within companies, between companies and in factor markets inhibit the rapid and widespread diffusion of quality management techniques. Since the incorporation of quality in society is desirable from a public point of view, governments may choose to implement programs that adjust such market failures. The document concludes with recommendations for a programme that aims to enhance the diffusion of the ISO 9000 standards, and it evaluates related activities that have been implemented in selected countries in Latin America.

This complementary document aims to provide information to those readers who are less familiar with different quality management concepts, the ISO 9000 standards and public-sector diffusion programs.

The first chapter discusses how quality contributes to competitiveness at the national, sectoral and enterprise levels. Competitiveness is most tangible at the enterprise level. It may be broken down into the competition factors efficiency, quality, delivery time, flexibility and innovation. In each of these areas, several relevant quality management techniques are discussed. It is argued that the strategic implementation of several of these techniques would lead to a total quality management (TQM) organization, resulting in increased competitive performance.

Details of the implementation and independent third-party certification of the ISO 9000 standards on quality systems are discussed in chapter II. The establishment of an ISO 9000 quality system basically involves the creation of documentation, training, investment in quality-control equipment and certification. Next, the institutional support structure associated with ISO 9000 implementation and certification is discussed. Because the ISO 9000 standards aim to facilitate international trade, aspects related to the international recognition of ISO 9000 certificates are also addressed.

In the final chapter, the information presented concerning the background of programme activities (as described in chapter IV of the main document) may serve interested parties in their efforts to include and justify specific areas in national quality policies and strategies. The chapter provides background information in the following areas: dissemination of information on quality; support for the implementation of ISO 9000 within enterprises and in enterprise networks (clusters); and the consolidation of the ISO 9000 support infrastructure.

RESUMEN

En el presente trabajo el lector encontrará información adicional relativa al documento "Quality Management and Competitiveness: The Diffusion of the ISO 9000 Standards in Latin America and Recommendations for Government Strategies". En dicho documento se considera que la gestión de la calidad puede contribuir significativamente al desempeño competitivo de los países, a nivel empresarial, sectorial y nacional. A continuación se analizan las normas ISO 9000 para los sistemas de calidad, como ejemplo de aplicación de estas técnicas de gestión de la calidad. Cabe señalar que en América Latina la difusión de las normas ISO 9000 (y la gestión de la calidad en general) es limitada en comparación con otras regiones. Parecería que ciertas fallas de los mercados, que se producen en las empresas, entre estas y en los mercados de los factores, impiden la difusión rápida y amplia de las técnicas de gestión de la calidad. Como la incorporación de la calidad en la sociedad es conveniente desde un punto de vista público, los gobiernos pueden optar por poner en marcha programas para realizar los ajustes necesarios para superar dichas fallas. El documento concluye con recomendaciones para formular un programa destinado a intensificar la difusión de las normas ISO 9000, y evalúa las actividades conexas que se han llevado a cabo en ciertos países de América Latina.

En el presente trabajo complementario se pretende proporcionar información a aquellos lectores que estén menos familiarizados con los diferentes conceptos relativos a la gestión de la calidad, las normas ISO 9000 y los programas de difusión del sector público.

En el primer capítulo se analiza cómo la calidad contribuye a la competitividad a nivel nacional, sectorial y empresarial. La competitividad resulta más tangible en el ámbito de la empresa. Se puede desglosar en factores de competencia como la eficiencia, la calidad, los plazos de entrega, la flexibilidad y la innovación. En cada una de estas áreas, se examinan diversas técnicas pertinentes de gestión de la calidad. Se sostiene que la aplicación estratégica de varias de estas técnicas en una organización lleva a una gestión total de la calidad, lo que promueve un mayor desempeño competitivo.

En el capítulo II se analizan los detalles de la implementación de las normas ISO 9000 para los sistemas de calidad y la certificación de su cumplimiento realizada por un tercero independiente. Básicamente, el establecimiento de un sistema de calidad conforme a las normas ISO 9000 entraña la creación de documentación, la capacitación, la inversión en equipos de control de calidad y la certificación. A continuación se examina la estructura de apoyo institucional vinculada con la aplicación de las normas ISO 9000 y su certificación. Como las normas ISO 9000 tienen por objeto facilitar el comercio internacional, también se abordan aspectos relacionados con el reconocimiento internacional de los certificados ISO 9000.

En el último capítulo, la información presentada acerca de las actividades del programa (que se describen en el capítulo IV del documento principal) puede resultar útil para quienes se interesen en incluir y justificar ciertas esferas concretas en las políticas y

estrategias nacionales de gestión de la calidad. En dicho capítulo figura información básica relativa a los siguientes elementos: difusión de información sobre la calidad; apoyo para la implementación de las normas ISO 9000 en las empresas y en las redes de empresas (*clusters*), y consolidación de la infraestructura de apoyo a la implementación de las normas ISO 9000.

INTRODUCTION

Over the years, the concept of quality has come to involve the overall management of an organization, rather than being a secondary problem of specialized departments. Quality refers to the totality of features or characteristics of a product or service that bear on its ability to satisfy stated or implied needs. Therefore, the implementation of quality within an organization requires the internalization of the concept of consumer satisfaction. Moreover, because quality failures and defects can cause the substantial loss of an organization's resources and impair performance, the implementation of quality will involve the "continuous improvement" of those activities that affect quality. Total quality management (TQM) is a management philosophy that aims to achieve improved enterprise results through realizing objectives related to consumer satisfaction and continuous improvement. TQM emphasizes measurement and monitoring, improved cross-functional communication and external relations, quality assurance and human resources development. A wide range of quality management techniques that incorporate these TQM principles has been developed and applied to establish both an effective (consumer satisfaction) and efficient (continuous improvement) organization. As such, the TQM principles may guide the implementation process of the different quality management techniques.

The World Competitiveness Report defines competitiveness as the ability of a country or organization to generate proportionally more wealth than its competitors in world markets (IMD, 1995). Aspects of quality and competitiveness are discussed below at the country, sectoral and enterprise levels.

The application of quality issues is considered to contribute positively to the competitive performance of countries, economic sectors and individual organizations. Quality is associated with competitive pressures in today's increasingly globalized and liberalized markets. The internalization of consumer satisfaction will contribute to improved enterprise performance in the medium and long term. The widespread diffusion of quality concepts contributes to increased competitiveness of countries through the improved performance of the business sector. The general trend indicates that countries that apply TQM more widely and rigorously are also more competitive (IMD, 1995). The improved aggregated business performance of a country depends partly on the application of quality management within entire production and/or commodity chains. This may result in decreased transaction costs and increased flexibilities and quality innovations throughout economic sectors. In view of the increased tendencies to outsource non-core competencies, subcontractors and suppliers of products and services may therefore perceive pressures to apply quality management techniques in order to gain the confidence of clients in industrial submarkets.

An important component of enterprise competitiveness involves the ability to comply with the demands of consumers and clients in the most efficient way. After examining the different elements of consumer satisfaction, companies will simultaneously have to confront the following competition factors: price, quality,

delivery time, flexibility and innovation. Quality management techniques may be applied in each of these areas. Internalization of consumer satisfaction often leads to the reorganization of various departments along key processes in the production system, which in turn requires increased cross-functional cooperation. Once this is established, the functional departments seek increased business performance by applying management tools that facilitate the continuous improvement of their activities. Quality management techniques have thus contributed to increased competitive performance through the increased quality of products and services and through cost reductions.

One of these quality management techniques involves the implementation of an ISO 9000 quality management system. The International Organization for Standardization, (ISO) developed the ISO 9000 standards for quality systems in 1987. A quality system involves an organization's responsibility structure, procedures, processes and resources for the development, implementation and maintenance of the quality management policy. The two most commonly certified quality systems that may be used for contractual purposes are the ISO 9001 and ISO 9002 models. An ISO 9001 certificate refers to both design and production, while the scope of ISO 9002 is limited to production only.

The ISO 9000 standards function as a trade facilitator. They may improve business performance and establish a basic framework for further implementation of quality management, and as such they are associated with enterprise competitiveness. When the quality system is certified by an independent third party, the organization can assure its clients of its capacity to manage quality issues, thereby reducing the need for client audits. By establishing a well-defined and well-documented quality system, the organization simultaneously optimizes its production function and improves the quality of its products and services. An ISO 9000 quality system emphasizes the management of processes. It contributes to about 30% of the TQM requirements that may be measured through national quality awards. The ISO 9000 standards are considered a practical and useful first step towards TQM.

At the sectoral level, the ISO 9000 standards reduce transaction costs between trade partners by eliminating the need for extensive material and product inspections or for different quality-system audits by clients. At the national level, the credibility of the national third-party certification schemes is important for achieving the same benefits with regard to trade between countries. The number of companies with certified ISO 9000 systems indicates the tendency within a country concerning the application of TQM, which in turn contributes to national competitiveness.

The implementation and certification of the ISO 9000 standards require a certain institutional infrastructure. During the implementation phase, consultants may provide diagnostic and training services, institutes may provide specialized auditor training courses and laboratories may provide technical support such as calibration of quality-control equipment. Qualified auditors perform the certification audits, and certification bodies are accredited to issue the ISO 9000 certificate. The international recognition of an ISO 9000 certificate depends on the credibility of the actors involved. The rules of the institutional framework are established by the ISO guides on conformity-assessment. Usually, a government agency accredits the different actors involved. This agency has to conform to the rules for accreditation bodies, and it must assess whether a certification body or laboratory conforms to the corresponding ISO guide. The international recognition of the ISO 9000 certificate between countries may be established through agreements at the certification level, or more efficiently, at the accreditation level. There are various examples of such agreements in a regional context.

The most common today is that a certification body obtains its accreditation in various countries; the ISO 9000 certificate therefore has validity in all of these countries.

The implementation and certification of an ISO 9000 quality system typically takes 15 months. The process basically involves (a) the preparation of the quality-system documentation, (b) training, (c) the establishment and calibration of quality control-equipment and (d) a third-party certification audit. In Latin America, the companies that participate in national quality awards usually have established strategies for implementing quality management techniques in order to achieve the status of what may be called the TQM organization. However, given the TQM rankings presented by the World Competitiveness Report and the relatively low number of companies with certified ISO 9000 quality systems, it may be concluded that the application of quality management techniques in Latin America has so far been limited.

Various market failures within organizations, between organizations and in factor markets have caused the limited diffusion of the ISO 9000 standards and quality management techniques. Governments may choose to implement programmes that compensate for or correct these market failures. The indirect, long-term objective of such programmes is to reduce the gap in the levels of productivity and competitiveness between the countries of the region and the developed world.

The direct objective of such programmes is to increase the diffusion of the ISO 9000 standards by promoting the implementation of ISO 9000 within enterprises and by establishing an enterprise environment that facilitates and supports their use. Programme activities may be classified into the following main areas (a) dissemination of information in order to create quality awareness among a broad range of economic agents and to change traditional management perceptions of quality; (b) enterprise support by facilitating enterprise access to technical, capital and human resources factor markets; (c) support for ISO 9000 implementation and certification in enterprise networks in order to promote the diffusion of quality management concepts in production chains and institutional frameworks; and (d) consolidation of the institutional infrastructure that supports the implementation, certification and international recognition of the ISO 9000 standards

In brief, Governments in the region have increasingly established programmes that promote and support the diffusion of the ISO 9000 standards and quality management techniques. This tendency indicates that the diffusion of quality management innovations in organizations and economic sectors is desirable from a national point of view. In this respect, quality will play an increasingly important role in the social and economic development of the countries in Latin America.

I. QUALITY MANAGEMENT AND COMPETITIVENESS

Country level

Quality implications at the national level concern the acceptance and integration of quality aspects in the society at large: consumer demand, consumer protection, implementation in both private and public sector organizations, education, management, production and labour practices, etc. The incorporation of quality issues may influence the performance of the different economic sectors, facilitate foreign trade partnerships (e.g., conformity assessment of quality-assurance schemes) and require the development of a certain business infrastructure (both physical and institutional).

At the international level, international competitiveness may be analyzed according to the approach used by the World Competitiveness Report. This report makes a competitiveness ranking of 48 countries by calculating various factors that influence a country's international competitiveness (see box 1). Aspects of quality are primarily represented within the factor "management" (70%)[1] and to a lesser extent within "science and technology" (15%) and "people" (20%).

For example, quality issues have implications for the following areas: (a) the business efficiency of an organization (indicators;[2] productivity, labour costs, etc.); (b) entrepreneurship and innovation; (c) management development (indicators: use of information technology, willingness to delegate, implementation of strategies, long-term orientation, employee relationships, managerial constraints); (d) corporate performance (indicators: price-quality ratio, customer orientation, product development, social responsibility); (e) technology management (indicators: technology strategies, production technologies, R&D in key industries, future R&D spending); (f) attitude of the work force (indicators: worker motivation, willingness to retrain), and (g) employment and educational structures (indicators: availability of skilled people, basic education, in-company training).

Quality contributes to a country's competitiveness.[3] For example, quality management techniques are an important factor in the economic success of Japanese companies that made their production more flexible, more productive and more competitive. Western companies responded by changing their traditional forms of

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[1] Percentages in brackets indicate the percentage of the tables in this section of the World Competitiveness Report that the author found linked to quality (management).

[2] These indicators are data inputs for the competitiveness ranking as calculated in the World Competitiveness Report.

[3] To answer the question, how much does quality contribute to competitiveness?, the author has estimated that the number of tables in the World Competitiveness Report that may be associated with quality management issues contributes to about 12% of the overall calculation of the competitiveness ranking of countries. Please note this figure is the result of a very rudimentary exercise and is purely indicative.

Box 1
COMPETITIVENESS AT THE NATIONAL LEVEL

International competitiveness depends on the following factors:

(1) Domestic economic strength: macroeconomic evaluation of the domestic economy overall;
(2) Internationalization: the extent to which the country participates in international trade and investment flows;
(3) Government: the extent to which government policies are conducive to competitiveness;
(4) Finance: the performance of capital markets and quality of financial services;
(5) Infrastructure: extent to which resources and systems are adequate to serve the basic needs of businesses;
(6) Management: the extent to which enterprises are managed in an innovative, profitable and responsible manner;
(7) Science and technology: the scientific and technological capacity, together with the success of basic applied research;
(8) People: availability and qualifications of human resources.

Source: IMD/World Economic Forum, *The World Competitiveness Report, 1995*, Geneva, 1995.

the organization of production and also by introducing a range of these quality management techniques, thereby accepting them as a means to improve competitiveness. It should be considered that in Japan, quality management was developed within large firms favoured by a macro-regulatory environment which simultaneously promoted competitiveness, growth and the conquest of external markets.

A software technique developed by the Economic Commission for Latin America and the Caribbean (ECLAC) refers to international competitiveness as a country's performance in export markets (ECLAC, 1995).[4] In this respect, quality assurance is important with regard to international trade. At the national level, trade between countries is facilitated when both trade partners recognize each other's quality-assurance schemes. For example, within trade blocks, lowering the transaction costs of trade (e.g., tariffs and import duties) is facilitated when the quality of the traded goods complies with certain mutually recognized quality standards.[5] On the other hand, a country that does not possess a recognized infrastructure for quality assurance may face technical barriers to trade or high costs of inspection by the second party, resulting in higher transaction costs and decreased competitiveness of exports.[6]

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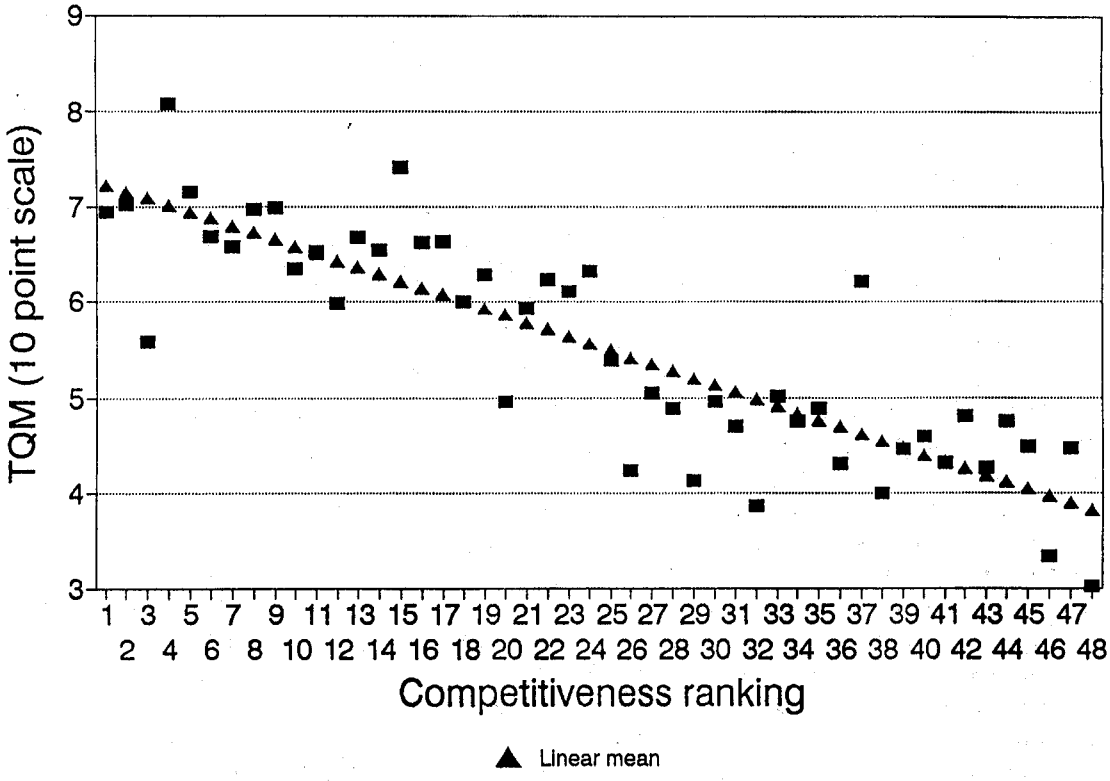
[4] ECLAC has developed a software technique with which it is possible to estimate the competitive performance of countries in the Organization for Economic Cooperation and Development (OECD) markets. Estimations may be as detailed as individual industrial sectors (up to 3 digits).

[5] In this respect the World Trade Organization (WTO), formerly called the General Agreement on Tariffs and Trade (GATT), prefers the use of international standards.

[6] In this respect, international quality-assurance models such as the ISO 9000 standards have been developed to prevent technical barriers to trade. (ISO 9000 standards are discussed in detail in chapter II.) To achieve international recognition of national quality-assurance activities, the reliability of the different actors involved in the implementation and certification of quality-assurance schemes is typically organized at the national level. (These involve national accreditation and certification schemes on the basis of conformity-assessment standards (see also chapter II).

Figure 1 presents the relation between TQM and competitiveness. The numbers on the *x*-axis correspond with countries that are classified according to their overall competitiveness ranking as calculated by the 1995 World Competitiveness Report. Executives in each country were asked to rate the use of TQM in their respective country on a scale of one to ten. The results are reflected on the *y*-axis. The overall tendency (i.e., the linear mean) in the relationship between TQM and competitiveness indicates that TQM practices are increasingly applied as countries become more competitive.[7]

Figure 1



Source: IMD/World Economic Forum, *The World Competitiveness Report, 1995*, Geneva, 1995.

• Annex 1 contains a list of country names that corresponds with the numbers in the competitiveness ranking.

[7] From figure 1, it may be observed that the relation between competitiveness and TQM is not linear. This is, for example, the case with Chile, which has achieved a relatively high competitiveness ranking (number 20) but, according to national executives, has not achieved a high TQM ranking. This non-linear relationship between competitiveness and TQM can be explained by the fact that TQM is not the only factor that determines international competitiveness.

Sectoral level

Competitive performance is not limited to individual firms but depends to a certain extent on the performance of entire industrial sectors or specific production chains. For example, the competitive performance of a company will be influenced by the performance of and communication with its suppliers and other subcontractors in both backward and forward linkages. Theories of competitive industrial development therefore emphasize the promotion of intrafirm reorganization and the establishment of enterprise networks. Networks are partnerships or groupings comprised of manufacturing and/or service firms and institutions. They may be highly personalized, informal, flexible and multifunctional. For example, an enterprise network in a particular commodity chain may consist of several large exporting enterprises that maintain relations with a network of smaller companies that provide requested materials and services.

The economic success of such enterprise networks has not come about through the advantageous access to low-cost factors of production, labour, capital and/or land, but rather from a particular, effective social and economic organization of the enterprise network (OECD, 1993). To stay competitive, enterprises need information regarding their tangible and intangible investments, especially when they are choosing strategies for systematic change and adapting innovations. The members of these groups operate by developing relationships of trust among themselves, gathering together various resources, especially information, at lower cost, and thus reducing the uncertainties of the market both in the short and the longer term. Enterprise networks combine some of the advantages of big enterprises (e.g., access to capital, technology and economies of scale) with those of smaller enterprises (e.g., operational flexibility).

Two dimensions of relations among enterprises in networks can be distinguished. The vertical dimension refers to links among enterprises in the production chain. The horizontal dimension refers to relations which are formed in order to access collective goods and defend common interests. Both vertical and horizontal networks generate information flows with regard to sectoral demand (flexibility), investment and innovation. The contribution of quality issues to the competitiveness of industrial sectors can be determined through competitive analysis as developed by Michael Porter (see box 2).

Markets are becoming larger both in volume and in number of participants, and therefore international competitiveness pressures are increasing. To face these increased competitive pressures, large companies define their core business areas according to their competitive advantages and subcontract or outsource all other activities. As large companies become more dependent on suppliers, they are looking for reliability, improved communication and long-term relationships. The internalization of quality issues within the production chain will result in reduced transaction costs and improved flexibility, thereby contributing to increased competitive sectoral performance.[8]

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[8] For example, Xerox (copying machines) trained selected suppliers in statistical process methods and operational quality management techniques. As a result, over a period of two years, net production costs decreased 10%, nonconforming product decreased 93% and the costs and time for the development of new products decreased 50% (Burnt, 1990).

Box 2
QUALITY AND SECTORAL COMPETITIVE ANALYSIS

A competitive analysis of an industrial sector is a systematic process that aims to identify the structural factors that determine the expectations for long-term profitability and the behaviour of important competitors in a particular industrial sector. The analysis of the long term profitability of an industrial sector considers the following factors (typical quality aspects are mentioned in brackets):

(a) competitive aspects within the sector (see below);
(b) markets (price versus quality, demand for quality standards);
(c) macroeconomic conditions (investment in quality innovation and human resources);
(d) government policy (standardization, harmonization of quality standards, consumer protection);
(e) technology (improved product quality); and
(f) social factors (quality culture, consumer protection).

Michael Porter identifies five forces that determine competitiveness within a particular industrial sector:

(a) entry barriers (advanced levels of quality);
(b) exit barriers (investment in quality);
(c) power of suppliers (contribution to quality);
(d) power of clients (client satisfaction);
(e) availability of substitutes (quality innovation).

These factors can be used to plot competitiveness profiles of the industrial sector and to highlight the importance of quality. Such profiles compare actual with future conditions.

Source: Seminar on Competitive Performance Management, PROCAL, Catholic University of Chile, 1995; M. Porter, "Competitive strategy: techniques for analyzing industries and competitors", 1985.

The TQM principles that seem especially relevant for achieving adequate information flows in enterprise networks and the internalization of quality issues in the production chain are communication and dissemination of information, measurement and monitoring and quality assurance. Communication and exchange of information within enterprise networks is crucial to diffuse improved efficiencies, flexibility and innovations. Continuous improvement depends to a certain extent on the active participation and cooperation of suppliers, subcontractors and clients. Also, flexibility and innovation in the production chain may be facilitated and improved if suppliers and clients use similar statistical process techniques. Within the production chain, quality is an important criteria in the evaluation of suppliers of products and services. Quality assurance is therefore crucial for supplier competitive performance. The ISO 9000 standards are commonly used quality-assurance standards for evaluating quality issues relating to suppliers.

Enterprise level

The crucial issue that determines the competitive success of a company is the ability to integrate the results of quality improvement which is crucial for consumer satisfaction, with measures of profitability.[9] In open economies, companies that are

[9] Clearly, solutions to these objectives will include both technical and organizational innovations. The present discussion focuses on the organizational measures. However, many

relatively more competitive than their rivals expand their market share because consumers are satisfied with specific characteristics of their products or services.[10] Consumer satisfaction may be associated with one or more of the following elements of an organization's products or services (Pandora, 1989).

A reasonable price. The price of the product should be in line with the client's need for the product.

A good product. The quality of the product needs to be reliable or to conform to predetermined specifications.

A reasonable delivery time. The client needs to have the product within a certain time frame; otherwise the product has no value.

A unique product. Everybody wants a product or a service that is just a little bit different or that exactly suits one's individual needs. This requires that manufacturers be capable of meeting this demand for product diversity.

A new product. Consumers change from old products that contain the above characteristics to products that are better, faster, in fashion, more modern, stronger, contain the latest materials, etc.

The competitive performance of companies in global consumer markets therefore will be determined by their capacity to deal simultaneously with the competition factors of price, quality, delivery time, flexibility and innovation (Fleury, 1995; Maas, 1992; Pandora, 1989). Simply said, competitiveness at the enterprise level may be nothing more than applying the concept of continuous improvement to the parameters that determine the competition factors of the company. These competition factors and several related quality management techniques are discussed below.[11] The TQM principles discussed in the previous section should be viewed as complementary to these management techniques. The TQM management philosophy provides the overall orientation to the practical quality management instruments.

Price

Price as a competition factor requires that the production function be operated as cost-efficiently as possible. The optimalization of capital and labour productivity has led, for example, to economies of scale in which maximum efficiency is sought through minimal production costs per unit of output. With regard to quality management and efficiency, one could think of minimizing waste material and the amount of non-conforming products, decreasing material and product waiting times (i.e., dead time) and reducing the stock of material or product.

Several management concepts have been applied to achieve higher production efficiencies. Well known and much used are the management concepts developed in the beginning of the 20th century, in which the production process is organized through a detailed division of labour in which each employee contributes by performing a specific subtask along the assembly line. Although this Taylorism or Fordism has led to large

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organizational management measures will have consequences for technological innovations, and vice versa.

[10] Consumer satisfaction is especially important in markets where supply exceeds demand. Global markets, which are literally swamped with products and services, place consumers in the position to choose.

[11] It should be considered that even though the factors are discussed from their chronological evolution, they are highly interlinked. For example, application of quality techniques and innovations can lead to increased efficiencies, and decreased delivery time may be the result of improved flexibility.

efficiency increases, it has also divided "doing" and "thinking" in the work tasks. The organization of "thinking" has led to the extensive, hierarchical pyramid of responsibilities and power relations that characterize traditional management practices. Within this pyramid, the product is passed on to the consumer through the different functional departments. In every department, supervisors at different levels take decisions concerning their own functional responsibility without considering the effects of these decisions on the performance of other departments or on clients and end users. For example, a production department is more concerned with showing a good unit production cost than with the loss that may be generated in storage because of overproduction. Leñero (1995) estimates that within the functional organization, the total duration of the product generation process to the end user (i.e., lead time) is one to two times higher than the real duration of the activities that are needed to perform the process (i.e., dead time of a product can be 100% to 200%).

Hammer and Champy describe such inefficiencies in their book *Reengineering the Corporation* (1993). Hammer defines reengineering as a "fundamental rethink and radical redesign of business processes to achieve dramatic improvements in critical contemporary measures of performance such as cost, quality, service and speed." Process redesign concentrates on major processes with cross-functional boundaries. It goes beyond improving existing processes because it continuously asks the question, "should we be doing this particular activity and if so, with what labour organization and participation?" Reengineering has evolved because the new skill requirements of the work force and rising consumer expectations have made the division of "doing and thinking" unworkable (Macdonald, 1995).

A second factor often associated with reengineering, concerns modernization through the application of modern information, communication and organizational technologies. Leñero (1995), recommends that companies ask themselves the following questions:

- How many years ago was the organizational process designed?
- What was and what is the knowledge or technology applied to the organizational process?
- Can we be competitive without applying the current knowledge?

Quality assurance that has moved from being inspection oriented to being process-design oriented is an example of modernization of the organizational process.

To achieve continuous improvement, most companies concentrate on internal processes and methods. However, benchmarking techniques may be used to determine the relative position of the company as compared to rival companies that apply the latest technologies including quality management. There are two types of benchmarking: product-oriented benchmarking looks at cost reduction through the evaluation of products and services, while process-oriented benchmarking examines production and management processes. In general, benchmarking involves the search for opportunities within the company's environment, and it has resulted in efficiency increases and cost reductions (Zairi, 1996). If process-oriented benchmarking is applied in a TQM culture, it may lead to organizational change encompassing consumer satisfaction and continuous improvement.

The term downsizing refers to discontinuing specific functions or areas that are not part of the core competencies or real competitive advantages of the enterprise. Competitive pressures cause enterprises to specialize in what they do best and subcontract all related activities (i.e., outsourcing).

Reengineering, modernization, downsizing and outsourcing often aim for increased efficiencies through fundamental, radical and/or drastic organizational changes. The

results may be visible in the short term, and reductions in personnel are common. However, it is reported that more than 30% of companies undergoing reorganization failed to implement the reengineering principles and attain efficiency benefits (Champy, 1995). The literature shows some consensus that reengineering principles should be combined with those of total quality management (Macdonald, 1995; Leñero, 1995). In this respect, any organizational change should be accompanied by human resources development. This is crucial with respect to ensuring that personnel understand the new organizational principles and technologies.

Quality

Quality concerns more than inspection of the final product. It involves the management of quality processes that incorporate various functional areas of an organization. Generally, the management of quality implies the systematic planning, controlling and improving of quality by designing an appropriate organizational structure in which quality management techniques may be applied. Such a structure is referred to as a quality management system[12] which can be assured, or made visible, to the client. This may convince clients to use the company's products or services, thereby strengthening market performance. The ISO 9000 standards are internationally recognized guidelines for quality systems. As discussed in the next chapter, the establishment of an ISO 9000 quality system should be viewed as an intermediate and useful step in achieving TQM.

The TQM principles provide orientation with regard to the relation of management practices to other competition factors. The TQM philosophy and quality management techniques are thus at the very heart of enterprise-level competitiveness. It is increasingly important that an organization can assure its clients that it is capable of conforming to certain predetermined quality standards. For example, quality assurance may involve schemes in which client companies check the production and quality procedures in supplier companies before accepting supplies. In seeking to decrease transaction costs, quality-assurance schemes have evolved from product standards such as final inspection, to process standards, such as the ISO 9000 standards, which include guidelines on quality in the production process and the product-development process. This reflects the assumption that good-quality process management results in good-quality products (ISO, 1993). However, this is not always true, as the standard does not guarantee compliance with absolute quality-performance indicators.

The ISO 9000 standards provide different models for quality assurance of quality management systems. These models provide guidelines for the objective, third-party certification of a particular company's quality system. Certification occurs after auditing the quality system and verifying that the quality system complies with the ISO 9000 guidelines. In general, both internal and external quality management audits are common. Clients may prefer to trade with companies that have ISO 9000 certification because their increased confidence in the companies' quality management allows for decreased transaction costs. This is one example of how ISO 9000 certification may be associated with enterprise-level competitiveness.

Accounting structures may be established for calculating quality cost in order to evaluate and control an organization's effectiveness in aiming for zero quality defects. Quality costs may be classified as the costs of prevention and quality-assurance

[12] A quality system involves a company's organizational and responsibility structure, procedures, processes and resources for implementing quality management.

activities and the costs that are associated with internal and external faults. Quality costs can be up to 25% of a company's turnover and in time they may decrease significantly as a result of applying TQM. An advantage of cost-calculation structures is that they show tangible results which can be used to justify and support the implementation of new quality management techniques. Quality costs are discussed in more detail in the next chapter.

Delivery time

After providing the client with the right price, quantity and quality, providing short, reliable delivery times on products and services can be the next crucial factor in achieving increased competitive performance. The delivery time of material supplies is particularly important for clients who apply operational quality management techniques to the production process. Delivery time is often related to the optimalization of the company's logistic processes, which may have consequences for the lead time in functional areas other than distribution, such as production and new product and process development. Choosing a suitable organizational structure (i.e., the way process functions are grouped) is important in confronting delivery time. For example, the organizational structure may be classified by the type of activity, product or service and by geographical location.

Technical methods for quality management are often used to control and improve the logistic processes. Another technique involves the relocation of the client order supply point (COSP), which concerns the last important material-supply point from which the client's order may be realized. By relocating the COSP further along in the production system (i.e., closer to the final product), shorter, more reliable delivery times can be achieved. For example, by locating the COSP at the stock of main components, the final product may be assembled out of these main components whenever the client specifies. Assembly time will then be the larger part of the delivery time. Another, more-integral management concept that allows the management of time factors within an organization is "time-based competition" (Wildschut, 1993).

Flexibility

Flexibility refers to the ability to deal with the increasing differentiation and volatility of markets. Managing flexibility is important because consumers demand a large number of product families and varieties. This requires batch production, and the number of non-productive hours spent adjusting installations to produce new batches can be substantial. Moreover, consumer demand fluctuates in time. Although this can be absorbed by establishing stocks of finished products, this solution leads to high costs and risks concerning the large variety of products and rapidly changing market demands. Because producers need to deliver their products in a timely manner to their clients, control of the lead time in the production process is crucial. This requires management of various types of flexibility, including the following:

- product flexibility (the ability to change easily to produce different varieties of products);
- machine flexibility (the ability to make different parts within a product family);
- process flexibility (the ability to produce a product family in different ways, for example by using different materials);
- volume flexibility (the ability to accommodate changes in volume efficiency);

- functional flexibility (the employees' ability to perform different tasks to assume above flexibility types);
- numerical flexibility (flexibility in the number of employees on the payroll, overtime, flexible time tables, subcontracting); and
- flexibility in incentives (wage, promotional and bonus schemes to reward employees for their group or personal achievements).

Various management techniques can make the production process more flexible. These include just-in-time production (JIT),[13] Kanban,[14] and cellular factory layout.[15] Clearly, these operational techniques require assigning enlarged responsibilities to operators. Ensuring that workers are sufficiently skilled and trained is crucial to the successful implementation of these techniques (Vispo, 1994).

Various definitions and interpretations of flexibility have been proposed in the literature. In the present discussion, the term is associated with the capacity to produce in a timely fashion the right diversity and quantity of products according to market demand. Incorporating flexibility will have consequences for the structure organization, and planning of the production process, with efficiency, quality and delivery time as important parameters. Obviously, new products are not excluded from possibility, and therefore flexibility and innovation may be overlapping terms. Flexibility in the production process is usually related to shorter periods of adjustment, variations of the amount of inputs and cost-oriented strategies, while innovative flexibility tends to be associated with longer adjustment periods, human resources, productivity gains and strategies oriented towards new products and processes (Reinecke, 1996).

Innovation

In the last ten years, companies that operate in global markets have competed on price, quality, delivery time and flexibility. In view of the tendencies toward larger, more-open markets and increased consumer purchasing power, consumer demand in global markets is likely to shift to products that are of higher quality, are unique and incorporate the latest innovations. Moreover, companies will specialize in submarkets through advanced technology and automation, resulting in rapid aging and depreciation of products and machinery. In the near future the additional determining factor for competition in global markets will be innovation. Innovation is often a long-term process that may involve considerable investments and bring fundamental structural organizational changes. This highlights the importance of strategic planning in quality innovation (see also chapter III).

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[13] Just-in-Time Production (JIT): To produce the right quantity at the right time at the right quality. Materials never wait in the production process. JIT is often thought of in terms of supplier relations, but internal JIT is probably a precondition for external JIT. Internal JIT requires a reduction in lot sizes, and production is most efficient when flows of materials are simple and straight forward. Internal JIT further requires multi-skilled labour. External conditions involve the establishment of subcontracting tiers that deliver in small lots, as well as coordination of government institutions that implement long-term economic and industrial policies.

[14] Kanban: A form of inventory and production control using simple manual and clerical procedures. Used as a pull system by demand in the next station. Works best in an environment of steady demand and limited number of products.

[15] Factory layout in different cells (microfactories) that unify various processes and installations that are capable of producing a complete family of products. JIT and Kanban are applied.

Markets are subject to rapid changes, which shortens the life cycle of products. Producers must be able to adjust to market changes by optimizing the amount of time needed to design, develop and launch new products or processes. For example, one indicator of innovation is the share of products in the overall product spectrum which have been introduced to the market within the last two to four years (Kaplinski 1995). The current meaning of design is increasingly similar to product development: involving not only compliance with technical and functional product characteristics, but also the successful marketing of the product. Such criteria are strongly related to the wishes of the consumer, and they include aspects such as image and form. The rapid development of new processes and products depends to a large extent on the firm's capacity to benefit from its knowledge, both internally and within its direct surroundings. This implies that ideas for improvement can come from anyone, including consumers, workers, suppliers, staff and managers. Innovation therefore depends on the proactive involvement of all concerned parties. Other enterprises seek business opportunities by comparing their relative position with regard to their competitors (benchmarking) and by imitating or improving the innovations of leading companies.

Innovation requires the right balance between creativity and control. Ridged bureaucratic processes inhibit creativity, while lack of discipline can lead to chaos and unprofessionalism. The R&D and design phases determine about 70% of the total quality costs of later phases (Maas, 1992). Therefore, it is important to create documentation, evaluate product designs and calculate quality costs as part of the management innovation process.

In general, project and quality management are the instruments for controlling these processes of change and innovation. Quality function deployment (QFC) is a systematic planning method to integrate customer satisfaction into product and process development. Another, similar technique that places emphasis on quality control in the design phase has been developed by Taguchi. Both methods aim to identify essential design aspects, reduce manufacturing costs and lead time and achieve better product quality at lower costs. Both methods often create cross-functional product teams, which are responsible for related activities. Another technique involves the use of quality control circles which are cross-functional, cross-hierarchical working groups whose goal is to identify opportunities for innovations in a general sense as opposed to being limited to the design process only.

TQM Implementation strategy

To implement TQM, enterprises must formulate and implement strategies related to quality, and they must be able to adapt these strategies at any time in response to changing market, client and supplier conditions. The strategic planning of quality aims to guide performance along the entire value chain, from research and development (R&D) through production and marketing to post-sales services at both the company and intercompany levels (Kaplinski, 1995). The TQM philosophy emphasizes a proactive approach to both consumer satisfaction and continuous improvement in order to achieve simultaneously effective and efficient production systems. Figure 2 presents possible strategies for implementing different quality management techniques.

Figure 2

Enterprise strategic planning for the implementation of quality management

	Inefficient	**Efficient**
Ineffective	NO STRATEGY - No quality system - Quality costs unknown - Traditional perception of quality: * quality costs more * quality decreases productivity * quality is inspection	CONSUMER SATISFACTION - Providing the right quality - Delivery time - Quality assurance - External audits - Benchmarking (competitors' performance) - Anticipation of new quality standards - Prevent technical barriers to trade - External communication and dissemination of information in the production chain - Diffusion of quality policy to the society at large.
Effective	CONTINUOUS IMPROVEMENT - Standardization and normalization of quality - Reorganization of processes that affect quality - Establishment of a quality system - Reorganization of quality processes - Optimalization of lead time - Supplier evaluation - De-layering - Training - Statistical process methods - Internal audits - Quality-cost structure - Improved cost efficiencies - Adjustments, revisions	TQM - Systematic evaluation of quality performance - Continuous readjustment of processes; development of production systems based on continuous improvement and consumer satisfaction - Reliable supplier base - Teamwork - Quality function deployment (innovation) - Quality-control circles - Leadership and dynamic quality culture - Emphasis on human resources management - Delegation of responsibilities - Employee satisfaction - Participation in quality prize schemes

Basically, achieving TQM implies the proactive application of the concepts of consumer satisfaction and continuous improvement. In figure 2, the reactive-company with no quality strategy is both inefficient and ineffective. It is doing the unnecessary

the wrong way. A highly efficient but ineffective organization is doing the unnecessary the right way, while an effective organization with limited efficiency is doing the necessary the wrong way. The efficient, effective company is proactively applying quality management to meet specific quality and competition criteria both internally and externally. It is doing the necessary the right way.

During the implementation process, companies will switch between the 2nd, 3rd and 4th quadrants depending on their internal resources and the relevant competition factors in the markets in which they operate. Organizations will probably first focus internally, emphasizing continuous improvement to obtain cost efficiencies. This process should be accompanied by considerations for consumer satisfaction, which will later provide key indications for continuous improvement. Gradually, the organization will reach the TQM quadrant. The driving force for sustaining the total quality process is the development of an appropriate culture within the organization. Management's leadership is crucial for promoting the total quality culture, and it should be implemented through a quality strategy (*Technovation,* 1994).

A survey of 700 Dutch companies (Dutch Institute for Quality 1996) classified organizations into different phases based on the extent or orientation of their quality management is practices.[16] The six phases are as follows:

Phase 0: no or limited quality management;

Phase 1: product (i.e., inspection of the product quality);

Phase 2: processes (i.e., management of quality aspects in processes pertaining to the different functional areas);

Phase 3: system (i.e., management of an integrated quality system);

Phase 4: production chain (i.e., quality management regarding clients and suppliers); and

Phase 5: TQM (i.e., integration and simultaneous application of phases 1 through 4).

In practice, it proves difficult to anchor quality issues in the company strategy, principally because of the difficulty of defining tangible objectives related to quality management issues. Implementing organizational innovations such as TQM generally occurs in a less systematic manner than for technological innovations. It involves a change of personnel opinions and relationships; it affects almost everybody in the organization; it changes the structure of responsibilities; it requires a high level of management commitment; and it leaves room for different interpretations.

The application of quality management techniques therefore involves a complex and aggregated organizational innovation, and it is often introduced in a sequential manner. The learning process is gradual and cumulative in character. Most companies in Latin America and the Caribbean that have introduced quality management have done so through trial and error. They have progressed through a steady build-up of capabilities, beginning in specialized areas that are later viewed in firm strategic terms and external relations (Fleury, 1995).

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[16] The survey reports that 45% of the participating companies focus their quality strategy on the primary process and related subprocesses. Very few companies are concerned with social objectives and or seek process improvements through communication with clients and suppliers. According to the survey 70% of the companies are positioned somewhere in phases 2 and 3. Only 2% of the participating companies consider themselves to have achieved the TQM phase, while 13% are in phase 4. The remaining group (phase 0) accounts for 15%.

Concluding remarks

The widespread diffusion of quality management techniques will make an organization, an economic sector and eventually a country more competitive. First, at the enterprise level the costs of product and process improvements have been offset by the reduced costs of quality defects such as scrap, rework and guarantees. Quality management may be identified as a competitiveness tool because it has improved product quality (consumer satisfaction) and reduced costs efficiency at the same time.

The same benefits may be obtained for enterprise networks. Quality management techniques contribute to improved quality, flexible production systems and quality innovation throughout the production chain. Also, the current tendencies to outsource non-core competence activities has resulted in the increasing use of process-oriented quality-assurance schemes. Because such quality assurance schemes aim to lower the transaction costs between suppliers and clients, increased cost efficiencies may be achieved in the production chain.

At the national level, the widespread adoption of quality management contributes to aggregate economic-efficiency indicators, enhanced innovation and the development of human resources which are important in achieving increased productivity and competitiveness levels. Reliable, internationally recognized quality-assurance schemes prevent technical barriers to trade and facilitate market access.

II. THE ISO 9000 GUIDELINES

Introduction

The ISO guidelines are a series of international standards on quality systems in both production (industrial) and service sectors. They attempt to reduce confusion and enhance compatibility among trading partners. The standards were drawn up in 1987 and are continuously revised and amended.[17] They have been adopted by about 100 nations.

The standards do not refer to specific products or economic sectors and therefore support the argument that the establishment of a quality system leads to quality products. ISO officials argue that if the ISO 9000 series were to become the nucleus of localized standards varying in content and arquitecture, there would be little worldwide standarization; the development of many, localized certification schemes would restrain trade. Therefore, ISO's implementation strategy is to prevent the ISO 9000 standards from becoming specialized for products in different industrial or economic sectors (ISO, 1993).

However, ISO has identified three criteria that are important to segment markets: (a) generic product categories (e.g., hardware, software, processed materials and services); (b) complexity of purchaser need, product and process characteristics; and (c) the distinction between contractual and non-contractual situations. The ISO 9000 series (one also speaks of the ISO 9000 family) includes approximately ten models of quality systems for different generic categories and ten models that support guidelines, such as terminology, auditing and measurement techniques, etc.

The ISO 9000 series center around different models, namely ISO 9000 to ISO 9004, which are discussed below. The ISO 9000 and ISO 9004 models present guidelines on internal quality management. They provide enterprises with a ready set of definitions of what constitutes quality, and they present clear guidelines for setting up a quality system. The ISO 9001 and 9003 models deal with external quality assurance and may be applicable to contracts between supplier and client. Depending on their type of operation, companies may achieve certification for each of the three models of external quality systems. Third-party certification verifies than an ISO 9000 quality system is in place, increasing the company's credibility in the supplier-client production chain.

ISO 9001 is a model for quality assurance in design, development, production, installation and servicing. This guideline may be used when the contract calls for confidence in the complete quality performance of a service or product, as in the case of new products. The ISO model refers to quality assurance in production and installation and may be used when the design of a service or product is already established or proven, as through licensing. ISO 9003 provides a model of quality assurance in final inspection and testing. It is applicable when the contact calls for confidence in terms of

[17] The latest version of the ISO 9000 quality system models dates from 1994.

statistics and measurement and may be used for products that are already in the market. With regard to the implementation and certification of an ISO900e quality system, the ISO 9001 model is the most demanding, as it includes all clauses specified in the ISO 9002 and ISO 9003 models. Similarly, the ISO 9002 model includes all clauses specified in the ISO 9003 model.

Implementation of an ISO 9000 quality system

Establishing a quality system comprises, for the most part, non-visible activities and usually involves investments in quality-control technologies. Implementing the quality system requires a strong commitment from high-level management together with their visible involvement. The responsibility for implementing the quality system should be assigned to a particular person or department. Also, companies usually contract consultants to assist in the implementation of the quality system.

Figure 3
Gradual implementation of the ISO 9001 quality system

Area of application	Activities to be implemented[a]
(1) MANAGEMENT COMMITTMENT	4.1 Management responsibility 4.1.1 Quality policy 4.1.2 Organization 4.2 Quality system
(2a) INTERNAL CONTROL	4.2.2 Quality system procedures 4.2.3 4.2.3 Quality planning 4.5 Document control 4.9 Process control 4.10 Inspection measuring and test equipment 4.11 Training
(2b) EXTERNAL CONTROL	4.12 Contract review 4.13 Purchasing 4.6.2 Assessment of subcontractors 4.7 Purchaser-supplied product 4.8 Handling, storage, packaging and delivery 4.19 Servicing
(3) CROSS-FUNCTIONAL CONTROL	4.4 Design control 4.5 Product identification and traceability 4.6 Inspection and testing 4.7 Inspection and test status 4.8 Corrective action 4.9 quality records 4.10 Internal quality audits 4.20 Statistical techniques

[a] Item numbers refer to clauses of the ISO 9001 guidelines.

The implementation of an ISO 9000 quality system typically concerns activities in the following areas: (1) management commitment and the assignation of responsibilities;

(2) definition of procedures for controlling internal and external processes; and (3) definition of processes that have a more cross-functional nature. The different clauses of the ISO 9001 quality system may be classified in these areas (see figure 3). During the implementation phases, information is generated through records, forms, audits and management revision, which allows for the improvement and optimalization of the quality system. The time needed to obtain ISO 9000 certification is usually one to two years. Of 1,880 companies surveyed in the USA and Canada (Irwin Publishing, 1996), the mean implementation time from ISO 9000 awareness to management commitment was 12 months. The additional time necessary for certification was reported to average 15 months.

Establishing a quality system involves the following main aspects: (a) preparing the documentation of the quality system according to the requirements the ISO 9000 model in question; (b) assuring that personnel is sufficiently trained to understand the operational aspects of the quality system; (c) assuring that process technology and quality-control equipment conforms to the ISO 9000 norm; and (d) selecting a third-party certification agency.

Preparation of the quality-system documentation

The ISO 9000 standards do not specify how a quality system should be structured. However, the "quality pyramid" has become a commonly suggested and accepted approach. The documentation of the quality system thus comprises the four levels described below. The documentation between the levels should be interrelated and cross referenced.

Level 1. The quality system manual describes the company's quality policy, the general company-wide structure and methods for maintaining the system. The manual also assigns the responsibilities for the various clauses of the standard. Unless a company has a clear strategy that specifies targeted markets and business segments as well as competitive positioning, then undertaking a total quality policy is a useless exercise. To succeed in a quality policy, power relationships within a company must be modified. Personnel must move from the logic of authority to a logic of initiative, not in word but in actual deed.

Level 2. The quality-system procedures are used to specify who does what, when it is done and what documentation is used to verify that the quality activity was executed as required. Also, a system should be established to enable people at different levels to understand how well they are doing and what they should do to improve consumer satisfaction.

Level 3. The work instructions describing in detail how particular tasks are to be performed if the absence of such instructions would adversely affect quality. In particular, two types of instruction are used. First, system-related instructions supplement the procedures by giving detailed instructions on how to carry out the specified controls, inspections or tests, or how to process materials or documents. They apply to all products. Second, contract-related instructions include drawings, material lists, route cards, special inspections, tests, processing or packing instructions, etc., which translate specific requirements of a contract into working documents. They are related to a specific product or product type.

Level 4. Records are used to provide assurance and evidence that the required product or service quality was achieved and that the company's quality system has been implemented correctly. Forms refer to tags, labels, stickers, pre-printed sheets, stamps,

and other means of identifying the status of materials, products, equipment, etc. used in the company to achieve specific requirements.

Every employee should be involved in designing and elaborating the procedures for his of her job function. In most cases, the employee has the most detailed knowledge of his or her tasks and responsibilities. Moreover, involving employees in the formulation of their own job function enhances the employee's responsibility, commitment and, ultimately, motivation.

Training

One of the key aspects of successfully implementing an ISO 9000 quality system involves convincing employees to change traditional working habits and assume new responsibilities. Therefore, training activities are a substantial part of the implementation process. First, all employees should be aware of the concept of continuous improvement, the operational aspects of the quality system, how it affects their job and how the company could benefit. It is necessary to explain that the procedure is not a restriction on new ideas, and that the system should be able to change rapidly if a better way is found to perform the job. Since managers and supervisors play a crucial role in the implementation process, special training is necessary for this group.

Second, employees cannot function effectively in a quality system if they have problems handling and filling out reports. Illiteracy and resistance to report writing is a crucial barrier to the successful implementation of an ISO 9000 quality system. This highlights the need to intensify employee training in new techniques. Workers with a low level of literacy would require additional training in basics such as reading, writing and mathematics. Third, employees that need to perform special tasks related to the quality system such as organizational and technical aspects of quality control, will require additional specialized training. Finally, it is important to assure to all personnel that audits will involve the performance of the quality system and not the specific performance of individuals.

Training is a continuous activity and does not end after the company has achieved certification. Continuous improvement results in continuous adjustment of the quality system. These innovations are initiated by the continuous development of human resources in the company. When new quality system documentation is produced, all employees involved in the procedure are then trained in the modified approach.

Process technology and quality-control equipment

The ISO 9000 standards require the definition of indicators and evaluation measures for all activities specified in the quality-system documentation. This allows for the identification of activities that may have been postponed, overlooked or informally organized, and it facilitates third-party auditing. Part of the evaluation measures will involve procurement or modification of measurement and testing devices, statistical software, etc. Detection of non-conformities may well result in preventive action requiring investments in the company's production process, servicing department or delivery structure. Moreover, the ISO 9000 standards require that all quality-control equipment be calibrated according to international units. For example, measuring devices need to be certified according to traceable international units for their measuring deviation and fixed uncertainty.

The establishment of an ISO 9000 quality system may result in the upgrading of process technology and R&D in order to ensure or improve levels of product quality.

Third-party certification audits

Organizations that implement an ISO 9000 quality system may seek third-party certification. Consultants generally provide services related to quality-management diagnostics, system documentation and training, while certification bodies typically carry out various audits to pre-assess, certify and maintain the certification of the quality system. The certification process generally consists of the following steps:

1. The company's application with the certification agency
2. Preliminary visit by the auditors
3. Assessment of the documented quality system
4. Pre-audit of the system
5. Certification audit
6. Certification of the company
7. Post-certification surveillance audits (approximately every six months).

Steps one through four involve the analysis, advice and improvement of the quality system. prior to the audit. These steps are optional, while steps five through seven are obligatory for the company to achieve certification. Audits are usually performed by two auditors, one with industry-specific knowledge (often the quality manager of the company) and one employed by the certification body. The certification of the quality system needs to be repeated every three years, while every six months auditors of the certification bodies participate in post-certification surveillance audits that may coincide with the internal audits of the company. Every three years, the certification audit is repeated in order to renew the ISO 9000 certificate. It should be considered that ISO 9000 certification refers to the certification of the quality system of an organization and not to any product. Therefore, ISO 9000 logos or messages to the consumer should not be used on the company's products. They may be used in commercials that refer to the organization itself, in letterheads or on companies' walls, for instance.

Institutional infrastructure supporting ISO 9000 implementation and certification

The institutional infrastructure involves various actors, organizations and institutions that provide services to companies that wish to implement and achieve certification of an ISO 9000 quality system. First, a country would need to recognize and adopt the ISO 9000 series as a valid national standard. A national government agency then usually appoints an accreditation body that may accredit various certification bodies to issue ISO 9000 certifications to enterprises. Accreditation bodies may also accredit training institutes, laboratories and auditors that are often involved in the ISO 9000 implementation process. The functions of these organizations is described in more detail in this section. A simplified overview of the institutional infrastructure related to the implementation of ISO 9000 standard is presented in figure 4.

Developing countries may lack sufficient resources and expertise to establish national accreditation and certification mechanisms. In this case, companies commonly seek ISO 9000 certification with foreign certification bodies. However, establishing an accreditation system for independent third-party certification is advisable, because using the services of foreign certification bodies entails high costs for the exporting companies and outflow of foreign exchange as well as missed opportunities for the country to build up national expertise and self-reliance. Aspects

related to the international recognition of the ISO 9000 certificate are discussed in the preceding sections.

Organizations

International Organization for Standardization (ISO). ISO's worldwide membership comprises about 120 national bodies for standardization. The general objective of ISO is to foster the international exchange of goods and services by developing and promoting common standards worldwide. The ISO committee responsible for the continued development of the ISO 9000 series is the ISO Technical Committee 176 (ISO/TC 176). All ISO member countries can participate in TC 176. ISO does not in any way certify, enforce or monitor the ISO 9000 standards.

National body for standardization. Standardization bodies are responsible for the formulation and harmonization of national standards, and they are often involved in the development of international standards as well. The standardization bodies recognize international standards, such as the ISO 9000 serie, as nationally valid. In this respect, national standardization bodies may choose to coordinate national meetings with respect to the development and adjustment of the ISO 9000 standards. National standard bodies generate revenues from the sales of standards, but they may also provide certification and even consultancy services. Although fees for ISO membership can be substantial, developing countries can obtain special discounts.

Accreditation body. The ISO 9000 standards are broad based and do not refer to any particular economic sector. Interpreting the standards for the certification of organizations of different sizes and ranges of business activities requires highly trained assessors with requisite experience and objectivity. It is therefore necessary to examine the credentials of auditing organizations, consultants and laboratories before they are accredited to certify the quality systems of the audited companies.

Accreditation of third-party services is usually performed by organizations that represent national governments according to predefined criteria. The objective of accreditation is to harmonize services related to ISO 9000 to ensure the development of reliable quality systems within the economic sector. General activities of these bodies may include: accreditation of certification bodies; accreditation of auditors and consultants; accreditation of laboratory services (e.g., testing and calibration); accreditation of training institutes responsible for the qualification of auditors and consultants; formal certification of auditors and consultants; and maintenance of registers and directories of the above organizations and certified companies to facilitate the access to the network.

To ensure international recognition of the accredited institutions, certification bodies may be accredited according to international accreditation criteria (ISO/IEC, 1995). This facilitates the establishment of Mutual Recognition Agreements (MRAs) between accreditation bodies in different countries (see also below). In general, accreditation bodies assess each other for conformity to these norms. It is also possible that a private accreditation body be periodically assessed by a government organization.

Certification body. Certification[18] is the auditing and approval of companies to the ISO 9000 standards by certification bodies. A certification body generally audits a quality system structured to satisfy the requirements the ISO 9000 standards and then indicated whether a satisfactory quality system is in place.

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[18] The term registration and certification are used interchangeably, but in some countries they may refer to different activities.

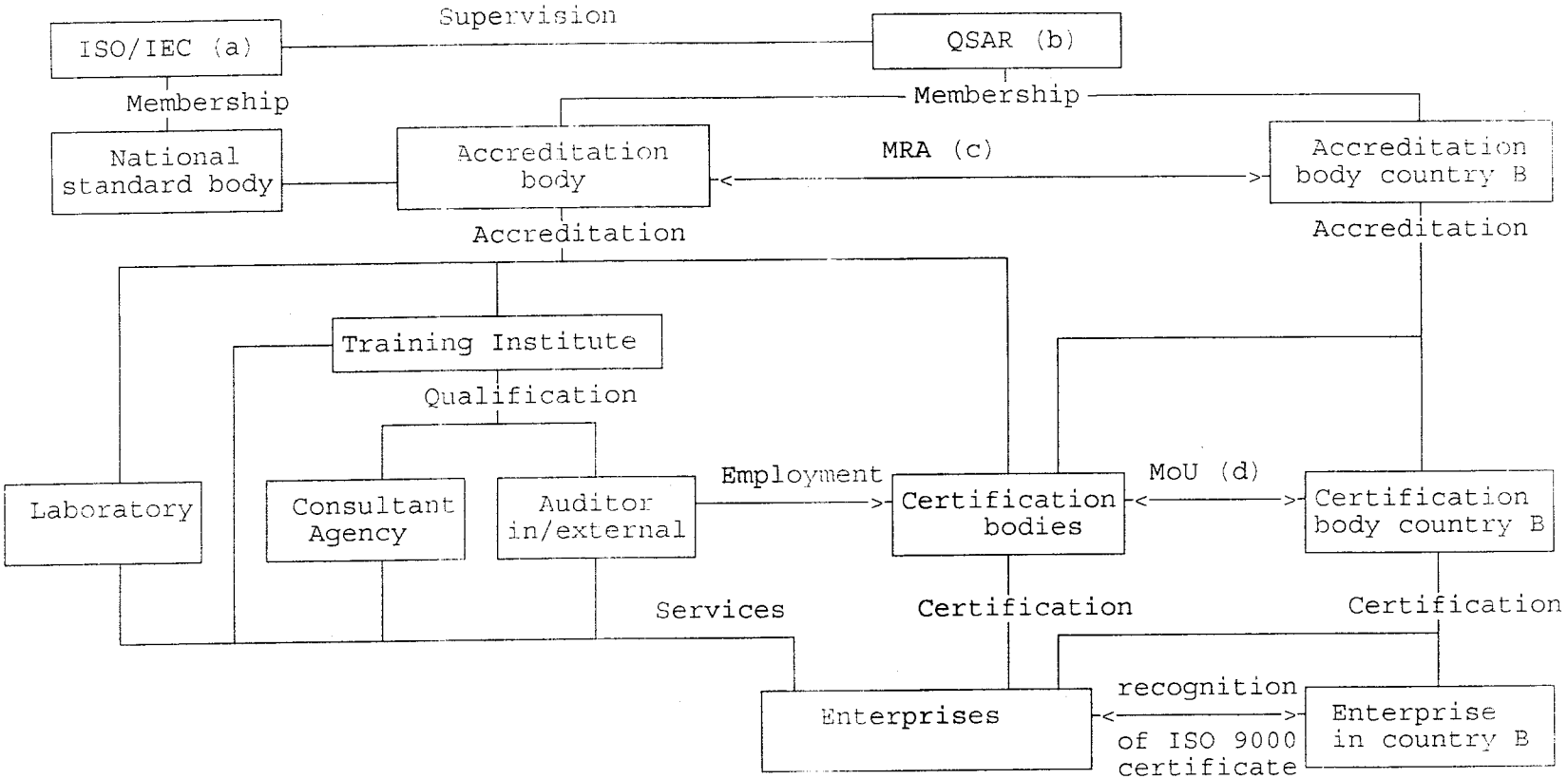
Key elements in selecting an appropriate certification body are : (a) acceptance of the issued ISO 9000 certificate by other international certification bodies; (b) qualifications of the auditors employed; (c) post-registration relationship; (d) experience in registration; and (e) available training services. The ISO/IEC guides on conformity assessment provide guidelines for the verification of certification bodies by accreditation bodies (ISO/IEC, 1995). Activities related to accreditation and certification cannot be performed by the same organization.

A survey of 1,880 companies in the United States and Canada (Irwin Publishing, 1996) found that the most important factors for selecting a certification body are reputation (69%);[19] specific industry expertise (46%); quality-system philosophy of the certifier (44%); country affiliation (41%); and prior experience with the certifier (35%).

Training institutes. Training institutes provide the necessary qualified auditors, consultants and company personnel involved in the ISO 9000 implementation framework. While auditing and personnel training may be performed by consultants, a company may choose to directly qualify their employees with the accredited training institutes. The International Register of Certified Auditors (IRCA) is a renowned organization that accredits training institutes worldwide.

[19] 69% of the respondent indicated that this was an important selection criteria.

Figure 4: Institutional infrastructure related to the ISO 9000 standards.



Notes:

a: ISO/IEC: International Organization for Standardization/International Electrotechnical Commission
b: QSAR; Quality System Assessment Recognition
c: MRA; Mutual Recognition Agreement
d: MoU; Memorandum of Understanding

Auditors. Auditors (or assessors) are individuals qualified to verify whether the established quality system conforms to the particular ISO 9000 model in question. Auditing a company's quality system requires the participation of internal and external auditors. The internal auditor has industry specific knowledge and is often an employee of the company, while the external auditors are employed by the certification body and are primarily concerned with compliance to the ISO 9000 standards. Once a company achieves certification, an external auditor performs a post-registration audit every six months to verify that the operational quality system still complies to the ISO 9000 standards. The final certification audit requires the participation of an external auditor of the first grade (i.e., the lead auditor), while normal, post-registration audits may be performed by external auditors of the second grade. Internal audits may be performed every three months by internal auditors. Various national schemes for auditor recognition exist, with different levels of requirements. These schemes register and classify auditors according to their experience and qualifications.

Consultants. Very few companies implement an ISO 9000 quality system without referring to any external advice. Consultants may provide services in the following areas (a) development and diagnostics of the quality system; (b) planning and implementation of the quality system; (c) training of personnel; and (d) post-certification services.

Consultancy services cannot be carried out by the same individual or organization that audits the company or issues the ISO 9000 certificate.[20]

Laboratories. Laboratories may provide important services to companies that wish to be certified for ISO 9000, because companies need to provide independent, third-party proof in the areas of product conformity, product safety and calibration of measuring equipment. For example, organizations may consider contracting external laboratories for certain, periodic quality-control measurements. Also, a network of testing and calibration services is a fundamental part of the infrastructure for sustaining activities related to the ISO 9000 and product certification. Within the institutional framework of ISO 9000 adoption, laboratories may be accredited to perform such services. Laboratory accreditation is a highly specific form of certification that is distinct from ISO 9000 certification of the quality management system. Each accreditation recognizes a laboratory's technical capability in specific tests, measurements, calibrations, etc. Therefore, laboratory accreditation may be viewed as the technical underpinning for a quality system, in much the same way that product verification could be considered a form of conformity-assessment that is complementary to a certified quality system.

International harmonization and recognition of ISO 9000

Given the current tendencies of economic deregulation, especially within regional trade blocks, quality issues have become major considerations with respect to free trade, competitiveness and the industrial development of a country. The validity of the ISO 9000 certificate is determined by Mutual Recognition Agreements between accreditation bodies, Memoranda of Understanding between certification bodies or multiple national accreditations of certification bodies. Such agreements of mutual confidence are established with the help of conformity-assessment guidelines. The effects of laboratory

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[20] However, it sometimes seems that the certification body is also providing consultancy or training services. For example, the international offices of Bureau Veritas often provide consultancy services while certification is performed by a separate company called Bureau Veritas Quality International. The company should obtain documented evidence that there are no formal relations between the certification organization and the service organization.

accreditation, product or process certification within an organization and registration by an assessment body are intertwined and known as conformity assessment. Conformity-assessment guidelines serve as a basis for increased opportunities for international trade.

World Trade Organization (WTO). Within the framework of the World Trade Organization (WTO) Agreement of15 April 1994, ISO 9000 standards are addressed in the Agreement on Technical Barriers to Trade (TBT). The current Agreement has widened and clarified the scope of the earlier Tokyo Agreement on TBT especially in terms of relating production processes and methods to product characteristics, thereby referring to the ISO 9000 quality management standards. Reasons for the continued existence of technical barriers include dogmatic differences concerning the means for ensuring safety and health and different traditions related to normalization, assessment and certification.[21] Therefore, one can distinguish among technical barriers that originate from differences in national industrial norms, legally enforceable; national rulings related to health, safety, the environment, etc., and assessment and certification procedures. Trade disputes concerning the ISO 9000 standards will ultimately be resolved through the WTO/TBT Agreement. Since only members of the WTO (i.e., national governments) can initiate legal procedures within the WTO, problems with the recognition of the ISO 9000 standards focus on the credibility of conformity-assessment procedures.

The TBT Agreement more accurately defined institutional responsibilities and procedures for conformity assessment, and it included a code of good practice for the preparation, adoption and application of standards applicable to both the public and private sectors. Article 5 of the TBT Agreement on "Conformity with Technical Regulations and Standards" names various conformity-assessment procedures for central, local and non-governmental bodies: no procedures are to be prepared, adopted or applied that will create unnecessary obstacles to international trade; exchange of trade information and publication of conformity-assessment procedures among WTO members should occur in a timely fashion; the organizations in question are to use - and participate in the preparation of relevant guides and recommendations issued by international standardization bodies and regional standardization networks; they are to arrive at a mutually satisfactory understanding of adequate, enduring technical competence for the assessment bodies in an exporting member country; and the procedures of local and non-governmental conformity-assessment bodies are to comply with national procedures (GATT Secretariat, 1994).

CASCO and QSAR. The ISO Council Committee on Conformity Assessment (CASCO) is responsible for the development of different approaches and documents related to the international recognition of national certification schemes. The Quality System Assessment and Recognition (QSAR) scheme is coordinating the worldwide recognition of ISO 9000 certificates to enable certification bodies to obtain international acceptance of their competence, which establishes the validity of the ISO 9000 certificates they issue. ISO created the ad hoc QSAR study group in collaboration with its partner in international standardization, the International Electrotechnical Commission (IEC). IEC already operates two worldwide conformity-assessment and certification schemes, one of which incorporates the ISO 9000 series.

Under the QSAR scheme, companies obtain the maximum value of their certificates, because multiple audits are avoided. QSAR will coordinate the international recognition of accreditation bodies, each of which will be assessed by their counterparts

[21] However behind these reasons often lies the will to protect the interests of national producers such as infant industries or sectors of strategic and political importance.

in other countries against criteria derived from ISO/IEC guidelines 61 and 62, published in 1996. ISO estimates that QSAR scheme should be in place by the year 2000.

In brief, QSAR will work as follows: accreditation bodies wishing to join will undergo assessment by their peers against criteria from the above mentioned ISO/IEC guidelines on conformity-assessment activities. After they demonstrate adherence to the stipulated guidelines, they will be accepted as QSAR members. They will then be open to requests from quality-system registration bodies for recognition and certification under the QSAR system. The clients of the certification bodies accredited by QSAR can use the QSAR logo. This will establish their certificate as having been awarded after a certification process based on internationally accepted criteria.

The QSAR system will be under the general supervision of ISO and IEC, and membership will be voluntary. Neither the ISO 9000 users nor the accreditation or registration bodies will be obliged to participate. The QSAR board will consist of six members from business organizations, three from participating accreditation bodies and three from participating certification bodies. The initial QSAR membership of ten organizations is projected to grow by ten per year for three years and then to stabilize at 40 in the fourth year (ISO 9000 News 1996a and 1995a).

Mutual recognition. Until a worldwide recognition scheme such as QSAR is in place, quality certification and the infrastructure for the accreditation and monitoring of certification bodies is left to individual countries. As a result, different countries have created different types of accreditation mechanisms. Certification bodies are obliged to reach agreements with different bodies around the world to achieve international acceptance.

When two governments form bilateral agreements in the area of regulated testing and certification, these agreements are often referred to as Mutual Recognition Agreements (MRAs). MRAs are applicable to accreditation, since these bodies are usually government related. Certification bodies formalize the mutual recognition of their certificates through Memoranda of Understanding (MoUs).

Currently, various organizations promote the establishment of international networks concerning accreditation, certification and qualification of auditors. These include the International Accreditation Forum and the EQ Net of certification bodies (see box 3). In Latin America, the Inter-American Accreditation Cooperation has established a framework through which government can sign agreements concerning the mutual recognition of conformity-assessment guidelines (see chapter III).

Box 3

ORGANIZATIONS INVOLVED IN THE INTERNATIONAL HARMONIZATION OF ISO 9000

(a) International Accreditation Forum

The International Accreditation Forum (IAF) is committed to removing technical barriers to trade through the promotion of worldwide acceptance of quality-system certification and product-conformity certification. The forum is open to all national accreditation bodies and currently comprises 30 member bodies from the European Union, Asia and North America, Brazil and Argentina are represented within Latin America and the Caribbean region.

(b) EQ Net of certification bodies

Certification bodies have established business arrangements with other certification bodies through Memoranda of Understanding One European network of national certification agencies is the EQ Net, whose members are recognized, independent, non-profit certification bodies that meet the conformity assessment criteria (EN 45012). The aim of the EQ Net is the mutual recognition and promotion of ISO 9000 systems by its members, as well as the development of uniform auditing procedures. Formally, mutual recognition is achieved by bilateral agreements between its members. The members are the national certification bodies of the European Union (EU) and the European Free Trade Association (EFTA). Associate members include certification bodies from Japan, Israel, Slovenia, Australia and New Zealand. In September 1994, the EQ Net accounted for roughly 50% of all ISO 9000 certificates worldwide.

Source: *ISO 9000 News*, "IAF continues to attract new members; Pacific Rim cooperation on accreditation", Geneva, May 1994; I. Paljak, "EQ Net: One answer to the requirement for mutual recognition", *ISO 9000 News*, January 1995.

III. GOVERNMENT ROLE IN THE DIFFUSION OF THE ISO 9000 STANDARDS

Introduction

The following sections provide a detailed discussion on specific policy measures and activities. As presented in chapter IV of the main document, government programme activities fall into two broad categories: activities that promote the diffusion of ISO 9000 quality systems within enterprises and activities that establish an enterprise environment that facilitates the diffusion of the ISO 9000 standards.

Activities that promote the diffusion of ISO 9000 within enterprises

(a) *Dissemination of information.* These activities involve the transfer of relevant information on quality management. Specific information is probably most effectively disseminated at the level of the business organization. Small and medium-sized enterprises (SMEs) are the group of enterprises that most frequently lack information.

(b) *Enterprise support for ISO 9000 implementation and certification.* Specific measures should facilitate enterprise access to the relevant factor markets, including technology, skill and capital markets. SMEs will have more specific difficulties in implementing the ISO 9000 standards because they lack financial and human resources and they use relatively outdated operational technologies.

Activities that establish an enterprise environment that facilitates the diffusion of ISO 9000

(c) *Implementation and certification in enterprise networks.* Promoting of the diffusion of the ISO 9000 standards in enterprise networks and groups is likely to enhance the use of quality management techniques throughout the production chain. Specific measures should stimulate the establishment of systematic links between firms (both horizontally and vertically) and between firms and research and technology institutions. Target groups involve networks of enterprises which include SMEs, as well as large enterprises and research institutions.

(d) *Consolidation of the institutional structure.* In Latin America, consolidating the institutional structure is necessary to support the implementation and certification of the ISO 9000 standards. Specific measures should aim to improve technology, skill and product markets to ensure reliable implementation and certification at reasonable costs. Institutions that facilitate and administer enterprise access to technology, skill and capital markets could consider the incorporation of special activities that support ISO 9000 implementation. Finally, companies need to ensure a reliable institutional infrastructure through which they can achieve ISO 9000 certificates that are recognized in the international marketplace. Such activities require the involvement and cooperation of organizations in both the public and private sectors.

Background of programme areas and activities

The following section provides the reader with background information on the different elements of programme activities aimed at the enhanced diffusion of the ISO 9000 standards in the economic sector.

Dissemination of information

In Latin America, there is a need to raise awareness on the economic benefits of the comprehensive use of quality management techniques within enterprises, as well as on quality issues in consumer markets. According to ISO, the biggest impediment to upgrading quality in industry in developing countries is the manufacturers' lack of awareness of its economic benefits. This may result from a number of misconceptions (see box 4). Programmes concerned with the dissemination of information should aim to overcome these misconceptions by highlighting the economic and strategic benefits of implementation and by providing information on specific government policies, institution building, etc. This type of programme should involve the transfer of information on the specific activities of all other main programme areas.

Box 4

MISCONCEPTIONS OF QUALITY MANAGEMENT

(a) Higher quality costs more. On the contrary, refining the manufacturing process, can lead to substantial reductions in product and cost as shown by manufactured goods from the West and Japan, where costs have dropped in real terms over the past decades (e.g., computers, electronic goods, household appliances, etc.)

(b) Emphasis on quality leads to reduced productivity. The misconception that quality can be achieved only at the cost of quantity dates from the period when quality control consisted of the physical inspection of the end product. In the modern paradigm of quality control, the emphasis has shifted to prevention during design and manufacture so that defective particles are not produced in the first place. Quality systems put emphasis on most economic methods of production, with reduced job loading and machine set-up time. Therefore they directly or indirectly result in higher productivity.

(c) Quality is affected by the work culture of the labour force. Manufacturers blame low quality of their product on the lack of quality consciousness among their work force. However, workers can be held responsible only if management has provided adequate training, detailed work instructions, traceability and corrective action schemes. In most manufacturing units, management has failed to provide these inputs.

(d) Quality can be assured by strict inspection. Inspection can only lead to the separation of good from bad pieces. It cannot by itself improve the quality of a manufactured product. To be effective, quality control must encompass the operations of all departments, including purchasing, design, engineering, production, marketing, packaging, dispatch and transportation. In fact, quality control must cover both suppliers of materials and consumers. It is important to obtain accurate feedback from customers on their perceptions of the products they receive.

Source: International Organization for Standarization (ISO), United Nations Conference on Trade and Development (UNCTAD), and General Agreement on Tariffs and Trade (GATT), "ISO 9000 quality management systems, quidelines for enterprises in developing countries", Geneva, 1993.

A crucial aspect of government programmes is the extent to which they achieve the participation of the industrial sector in implementing the ISO 9000 standards. This is very important because the ISO 9000 standards are adopted on a voluntary basis. Successful diffusion depends on widespread consensus within the industrial sector, which be facilitated through, for example, business participation in the development process and coverage in the general press and business magazines. Also, the vast majority of

companies develop their quality system because of information received at conferences and seminars.

Government programmes should be concerned with providing information that supports the competitive strategy of a specific target group, such as a business organization. The needs of the target group should be assessed to prevent the diffusion of information that is either too general or too specific. Activities related to the dissemination of relevant information are most cost efficient and effective when targeted for industrial sectors rather than a range of individual firms. Demonstration and pilot projects can be quite effective because firms may be influenced most by changes taking place among their rivals.

National quality prizes provide a market-oriented tool for stimulating companies to improve quality performance. ISO 9000 certification typically covers about 25% to 30% of the requirements of a national quality award. Quality prize assessment requires the development of indicators for inter-company quality-management performance (i.e., benchmarking). Quality prizes provide a way to monitor the performance of participating companies, promote this performance within the industrial sector at large and thereby stimulate the transfer of technological and organizational innovations in the area of quality management. Aggregate results from quality awards can be extremely useful for policy makers who design national strategies to enhance productivity and quality in the productive sector.

Enterprise support

Enterprises constitute a rather heterogeneous group. Any strategy to support firms during the restructuring process, and any incentives for investment and the incorporation of technology, must differentiate among several distinct classes of firms to avoid failure. In general terms, the main private actors in the current industrial structure in Latin America are the multinational enterprises, national economic groups and SMEs. Each of these actors has different problems and reacts differently to both market signals and policy incentives. In terms of policy design, the most important elements that distinguish the actors are their access to technology, financing and foreign markets. In view of the dualistic nature of industrial development in Latin America[22] and the limited number of SMEs that have achieved ISO 9000 certification, policies should consider including specific technical and financial assistance to SMEs.

Programme support for the adoption of quality management techniques within SMEs is justified for several reasons. As suppliers, they eventually affect the efficiency and productivity of larger firms, which affects competitiveness in the long term. The relative weakness of the supplier industry suggests that the diffusion of new technological and organizational innovations through the market mechanism may not work very well. Assistance to SMEs will have a wide impact on the economy and will therefore contribute to greater technology transfer and improved social equity (Humphrey, 1993).

The level of quality of the organization affects the competitive performance of SMEs (see box 5) The successful introduction of new technologies into a firm, in terms of profitability and productivity, requires the involvement and know-how of the work force. Also, improved profitability and the introduction of costly equipment require the

[22] For example Casar (1995) estimates that the productivity levels of labour in SMEs in Mexico was 70% lower than the industrial average, while large transnational and national groups were respectively 78% and 20% higher than that average.

reorganization of tasks and the redefinition of working procedures. The implementation of the ISO 9000 standards within SMEs will contribute to the quality of the organization and strengthen the overall competitiveness of the company. The implementation of an ISO 9000 quality system is less complex in SMEs than in large firms, and once a more participatory management system is established, SMEs can be more dynamic than is normally possible in larger companies. Moreover, ISO 9000 certification generally prevents the multiple audits by client companies. On the other hand, the conditions of many SMEs do not allow for the widespread adoption of the ISO 9000 standards, resulting in the undesirable situation that these benefits not sufficiently realized. Various publications have addressed the issue of implementing the ISO 9000 quality system in SMEs (e.g., ISO, 1996; IQA, 1995).

Box 5
SMEs AND COMPETITIVENESS

Competitiveness in SMEs depends on several factors:

(a) the basic role of the owner/manager;
(b) tangible investment in particular equipment connected with the new information and production technologies;
(c) intangible investment in information, training, quality of organization, management of technological resources (R&D), opening up to the outside world, etc.; and
(d) strategic capabilities such as innovation and flexibility (which depend on the preceding variables).

Source: Organization for Economic Cooperation and Development, "Small and medium enterprises: Technology and Competitiveness", Paris, 1993.

Specific measures of the programme could include economic incentives for SMEs, such as tax reductions and cost-effective access to credit and training schemes, to initiate their interest in ISO 9000. Inter-company visits can visually illustrate the economic benefits obtained by ISO 9000 certification. Subsidized consultancy and technical services will be necessary in most cases to develop monitoring indicators, install quality-control equipment and prepare for certification. This type of support might be allocated through sectoral pilot projects.

A company's motivation for ISO 9000 certification should be based on the intention to improve business efficiency and not solely to increase export business. Therefore, certification as a goal needs to be discouraged, and limited support should be given for certification itself. In some cases, however, it might be appropriate to subsidize pre-certification audits for a limited period in order to enhance the rate of certification within a particular target group of enterprises. In the improvement stage, the integration of quality management in strategic planning and R&D activities could be promoted.

ISO 9000 in enterprise networks

Government programmes that stimulate the widespread adoption of the ISO 9000 standards essentially aim to encourage industrial development along the lines of the incorporation of TQM techniques. Improved performance in efficiency, quality, delivery time, flexibility and innovation depends partly on the extent to which related techniques are implemented in the production chain as a whole. Although the efficiency of networks depends on various factors, SME participation in networks is considered to enhance their competitive performance (OECD, 1993). Government programmes in most Organization for Economic Cooperation and Development (OECD) countries have addressed this consideration and have included specific measures to stimulate the formation of such networks and company access to them. The extent to which SMEs are able to reach the required level of quality depends among other factors, on the grade of specialization and the technological level of the subcontracted tasks and on the access to capital and technology that the subcontractor enjoys independently of the contracting enterprise.

There are various reasons for governments in Latin America and the Caribbean to stimulate interfirm relations and the formation of enterprise networks. At the national level, it would counter the dualistic nature of economic development in Latin America, which has largely been characterized by inequalities in ownership, productivity, wages, etc. At the sectoral level, it is crucial to continue the process of regional and extraregional economic integration. The larger exporting enterprises (i.e., transnationals and national economic groups) are often adversely affected by the weak supplier base, which is characterized by low levels of working capital, uncertainty of the supply of good-quality materials and difficulties in negotiating the return of defective materials. When SMEs participate in enterprise groups, they are subjected to the demands of global commodity chains. In meeting these demands, they provide the larger exporting enterprises with an adequate supplier-service-base to support the improved competitive performance necessary for increased international and intraregional trade.

The development of interfirm relations and enterprise networks in the Latin America and the Caribbean has not yet achieved adequate levels (Fleury, 1995). Undeveloped relations are often due to limited trust and confidence between firms. A range of factors such as macroeconomic shocks, capability gaps between firms (caused by market failures within firms and factor markets) and cultural perceptions may have contributed to bad experiences in the past. ISO 9000 certification can enhance the confidence and trust between enterprises in the same production chain. Therefore, the ISO 9000 standards provide a suitable tool for initiating trust relations between firms. At the policy level, intrafirm reorganization along the lines of ISO 9000 certification is most effectively supported when firms are seen as part of a network rather than as isolated units.

A problem with government programmes that aim to enhance the diffusion of the ISO 9000 standards is that ISO 9000 certification is achieved mainly by large exporting enterprises, while stimulation measures are targeted at SMEs, who seem to be less interested. Therefore, transnational organizations, large national economic groups and state-owned companies could be encouraged to participate in the diffusion of the ISO 9000 standards among their suppliers and subcontractors. By assisting SME groups with the implementation of ISO 9000, large firms benefit through increased productivity and reliability in the production chain.

Economic incentives should be considered for large firms assisting their suppliers with the implementation of ISO 9000. Large enterprises often have specific sectoral experience with the use of quality management techniques, and they can be a valuable source of information and cooperation. Transferring this information, reduces the financial burden of activities for enterprise support provided under a particular government programme. A national quality strategy could emphasize the proactive role of the managers of these large firms, who should reorganize production and develop supply chains together with SMEs with which they have long-term relations and possibly an equity stake.

Other activities related to the incorporation of quality management techniques in the production chain include the promotion and development of networks for SMEs that are not necessarily operating in the same production chain but are closely located geographically, as in clusters or industrial districts. Here, demonstrations can be quite effective within the networks because of horizontal competition pressures. Science parks are an example of SME networks closely located to institutions and universities which provide applied R&D, design and engineering services. Once these networks are established, the interfirm relations can be institutionalized by the promotion of network associations. Newly established SMEs are thereby supported in their efforts to enter such networks since complex interfirm relations can inhibit fair competition.

Consolidation of the ISO 9000 support infrastructure

Policies that aim to consolidate the institutional structure that supports the diffusion of the ISO 9000 standards should consider two factors, First, at the national level, a framework of capacities needs to be established to support the implementation and certification of the ISO 9000 standards in a reliable and affordable manner. Second, this institutional framework should operate in line with international guidelines of conformity assessment to ensure the international recognition of national ISO 9000 certificates.

In spite of a relatively more developed institutional support structure in the European Union and the United States, some local companies have reported dissatisfaction with ISO 9000 quality systems. Although the companies' original intention was to enhance business capabilities, some have claimed that the implementation of an ISO 9000 quality system has not been beneficial to their business objectives. The key forces that establish the outcome of a company's efforts to establish an ISO 9000 quality management system are: (a) the quality system procedures (i.e., the ISO 9000 model applied); (b) the business objectives of the enterprise; (c) the certification body; (d) the consultants; (e) laboratory services; and (f) training institutes (Blackham 1994).

When companies genuinely desire the benefits of a quality system to improve their business management, the certification bodies and the consultants may be responsible for the dissatisfaction with the ISO 9000 quality system. Since certification bodies and consultants seek only to satisfy the clause-by-clause requirements of the ISO 9000 standard. This approach is the first step to an impractical quality system, because it is not focused on the effectiveness of the quality system. It is important that the auditors and consultants adapt their services to become more responsive to the needs of business management and the marketplace. Also, affordable ISO 9000 certification requires the adequate technical capacity of national laboratories. Finally, most companies train their staff to perform the periodic internal audits. Reliable, internationally recognized courses for national auditor qualification need to be available at regular intervals.

Governments may therefore choose to establish accreditation schemes for certification bodies, laboratory and calibration services, consultants, auditors and related training services. Without such schemes, anyone could claim to be qualified to implement,

service and audit a quality system. National accreditation and certification schemes enable locally operated support services to consolidate their participation in the implementation and certification of ISO 9000 quality systems. The formulation and operation of such accreditation schemes is often coordinated by the national standard body.

Consolidation of the institutional support structure may also involve other organizations which (a) diffuse and monitor information related to quality issues and the ISO 9000 standards; (b) provide financial and technical assistance on quality issues; (c) promote or carry out applied R&D and engineering services related to quality management; and (d) provide frameworks for organizational coordination, in which governments, institutions, business organizations and labour associations cooperate and develop sector-specific competitive strategies.

Policies that aim to consolidate the institutional structure should incorporate international guidelines on conformity-assessment. This can have several benefits First, within the scope of the international trade agreements of the WTO, they conform to the code of good practices between trading nations. Second, mutual recognition schemes facilitate trade between nations. They can therefore be an important asset for successfully negotiating regional or bilateral trade agreements that go beyond the WTO agreements. Third, ISO 9000 certificates issued nationally have greater international recognition, resulting in increased business value.

One important objective of ISO 9000 certification is to harmonize quality issues in order to prevent non-tariff barriers between trading nations. The value of an ISO 9000 certificate is partially determined by the extent to which it is recognized throughout the world. Such recognition is established through Mutual Recognition Agreements between countries or Memoranda of Understanding between certification bodies (see also chapter II). For mutual recognition between countries and regions to serve as a basis for market access, conformity-assessment guidelines related to an ISO 9000 quality system may incorporate one or more of the following guidelines.

For accreditation bodies:

- ISO/IEC guide 61: General requirements for bodies that assess and accredit certification bodies.

For certification bodies:

- EN 45012: General criteria for certification bodies providing quality-system certification;
- ISO/IEC Guide 40: General requirements for the acceptance of certification bodies;
- ISO/IEC Guide 48: Guidelines for third-party assessment and registration of a supplier's quality system;
- ISO/IEC Guide 56: Guidelines for a certification body to review its own internal quality system;
- ISO 10010: Guidelines for auditing quality systems (parts I and II);
- ISO/IEC Guide 62: General requirements for bodies that assess and certify quality systems; and
- Various other, related ISO/IEC guides on laboratory testing and product verification.[23]

The decision to opt for private or public services in the institutional support structure will vary among nations, depending on prevailing perceptions of economic theory and political conditions. Institutional support is not limited to national government

[23] Various guides and standards on conformity assessment have been published by ISO (ISO/IEC, 1995).

responsibilities. It requires close cooperation between the government and business organizations. According to a survey by the United Nations Industrial Development Organization (UNIDO) and ISO (1996), most certification services in Latin America are expected to be established by the private sector.

Other considerations

Government responsibility for ensuring macroeconomic stability, improvement of infrastructure and basic education are general issues related to sustainable economic development. They will also facilitate the widespread diffusion of the ISO 9000 standards and quality management techniques. While many aspects of human resources policies and labour issues should be the responsibility of firms, government can provide the context within which firms find it easier to implement quality and productivity programmes. In this respect, it may be appropriate to develop labour legislation that is more applicable to the new labour patterns required by quality management practices. A wage legislation that links performance and pay (e.g., bonuses, secondary benefits) will facilitate worker motivation and strengthen the negotiation position of workers. Another aspect of labour legislation could include the protection and treatment of specialized suppliers and subcontractors.

The widespread application of quality management requires a change in attitudes throughout society. This stresses the importance of government involvement in this process, which seems to be beneficial for the majority of the actors involved.

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Annex 1

COUNTRY CODES FOR THE COMPETITIVENESS RANKING PRESENTED IN FIGURE 1

1: United States
2: Singapore
3: Hong Kong
4: Japan
5: Switzerland
6: Germany
7: The Netherlands
8: New Zealand
9: Denmark
10: Norway

11: Taiwan
12: Canada
13: Austria
14: Australia
15: Sweden
16: Finland
17: France
18: United Kingdom
19: Belgium/Luxembourg
20: Chile

21: Malaysia
22: Ireland
23: Israel
24: South Korea
25: Iceland
26: Thailand
27: Egypt
28: Spain
29: Argentina
30: Italy

31: Portugal
32: Peru
33: Indonesia
34: China
35: Philippines
36: Colombia
37: Brazil
38: Czech Republic
39: India
40: Turkey

41: Jordan
42: South Africa
43: Greece
44: Mexico
45: Poland
46: Hungary
47: Venezuela
48: Russia

Source: 1995 World Competitiveness Report (IMD, 1995).

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