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QUALITY MANAGEMENT AND COMPETITIVENESS THE DIFFUSION OF THE ISO 9000 STANDARDS IN LATIN AMERICA AND RECOMMENDATIONS FOR GOVERNMENT STRATEGIES

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ABSTRACT

Quality will play an increasingly important role in the objectives for the social and economic development of the countries in Latin America. This document aims to demonstrate the importance of quality in national strategies for increased productivity and competitiveness. Governments in the region have increasingly established programmes that promote and support the diffusion of quality management techniques. This tendency indicates that the diffusion of quality management innovations is complicated by market failures but is desirable from a national point of view. This document may therefore be relevant for government agencies, international organizations, sectoral business organizations and institutes that are involved in policy design related to quality issues, as well as for individual companies interested in the implementation of quality management techniques. One of these techniques, the ISO 9000 standards for quality management systems, is the main topic of this document.

The first chapter discusses how quality positively contributes to competitiveness at the national, sectoral and enterprise levels. 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. Its implementation may be assigned as a management function. Basically, the Total Quality Management (TQM) philosophy and related quality management techniques have contributed to increased competitive performance through increased quality of products or services and cost reductions. An example of these quality management techniques is the ISO 9000 standards on quality management systems. Their scope, institutional infrastructure for certification and the costs and benefits of the implementation of ISO 9000 standards are discussed in chapter II. ISO 9000 standards function as a trade facilitator. They may improve business performance, and they establish a basic framework for further implementation of quality management practices. Consequently, the adoption of ISO 9000 standards is associated with enterprise competitiveness.

Chapter III presents global and regional ISO 9000 diffusion data and describes some of the underlying factors that may have determined the diffusion pattern. This allows for a rudimentary estimation of the future diffusion of the ISO 9000 standards in Latin America. Chapter IV first identifies some of the underlying factors that have so far limited the diffusion of quality management techniques in Latin America. These obstacles provide a basis for the identification of market failures related to the diffusion of the ISO 9000 standards. The chapter then examines government programmes that aim to promote the enhanced diffusion of the ISO 9000 standards by correcting or adjusting these market failures. This document is concluded by an evaluation of different government-programme activities in Latin America.

RESUMEN

La contribución de la gestión de la calidad al logro de los objetivos de desarrollo económico y social de los países latinoamericanos será cada vez más importante. El propósito del presente documento es demostrar la importancia de la calidad, en el contexto de las estrategias nacionales de incremento de la productividad y la competitividad. Los gobiernos de los países de la región han venido adoptado, cada vez con mayor frecuencia, programas destinados a fomentar y facilitar la difusión de técnicas de gestión de la calidad. Esta tendencia indica que, si bien las fallas del mercado dificultan la difusión de innovaciones en materia de gestión de la calidad, ésta es conveniente desde el punto de vista de los países. Por lo tanto, este documento puede ser de utilidad para organismos gubernamentales, organizaciones internacionales, asociaciones empresariales de distintos sectores e institutos que participan en la formulación de políticas relacionadas con la calidad; también puede ser útil para empresas interesadas en aplicar técnicas de gestión de la calidad. El presente documento se centra en una de esas técnicas, las normas ISO 9000 sobre sistemas de gestión de la calidad.

En el capítulo Ise analiza la positiva contribución de la calidad a la competitividad, tanto en el plano nacional y sectorial como en las empresas. La calidad es el conjunto de factores o características de un producto o servicio que influye en su capacidad de satisfacer necesidades explícitas e implícitas. Su aplicación puede considerarse parte de la función de gestión. La filosofía de la gestión de integral de la calidad y las técnicas conexas han contribuido a realzar la competitividad, puesto que elevan la calidad de los productos y servicios y permiten abaratar costos. Las normas ISO 9000 son un ejemplo de técnicas de gestión de la calidad, cuyo alcance se analiza en el capítulo II, junto con los costos y beneficios que supone su aplicación. Estas normas facilitan el comercio. Asimismo, pueden mejorar el funcionamiento de las empresas y ofrecen un marco que sirve de base a la adopción de otras prácticas de gestión de la calidad. Por lo tanto, la adopción de las normas ISO 9000 se relaciona con la competitividad de las empresas.

En el capítulo III se presenta información sobre la difusión de las normas ISO 9000 a nivel regional y mundial, y se describen algunos de los factores que pueden haber determinado su forma de difusión. Todo lo anterior posibilita una estimación rudimentaria de la futura difusión de las normas ISO 9000 en América Latina. El capítulo IV se inicia con la identificación de algunos de los factores que han limitado la difusión de las técnicas de gestión de la calidad en la región y que, a su vez, permiten identificar las fallas del mercado existentes en esta área. A continuación, se examinan los programas gubernamentales destinados a estimular la difusión de las normas ISO 9000, mediante la corrección o superación de esas fallas. El documento concluye con una evaluación de actividades realizadas en el marco de los programas gubernamentales en América Latina.

Chapter I

QUALITY MANAGEMENT AND COMPETITIVENESS

Introduction

The International Organization for Standardization (ISO) defines quality as the totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs (ISO 8402). The concept of quality has evolved over the past five decades. First, quality started with inspection-oriented quality assurance[1] of the final product. However, quality inspection does not eliminate the root cause of bad quality. The concept was broadened by integrating quality into all of the different functional areas that may be associated with the production process, including suppliers, sales, production and services. This approach is known as process-control-oriented quality assurance. It works well in producer markets in which producers determine supply. However, in current global consumer markets it is crucial to know what clients and consumers want. Producing a high-quality product is not sufficient if the consumer does not want the product or finds it too expensive. In short, one does not only have to design a "good" product but also the "right" product. One speaks of quality assurance with emphasis on new product development, in which quality is defined as complying with the wishes of the client. This orientation considers quality issues within the whole production system.

The concept of quality is not limited to products, but also incorporates the productive, organizational and design functions that may be associated with a particular product or service, as well as the people that are involved in these processes. Quality can therefore be identified as a management function because it needs to be planned, implemented, monitored and improved.

Total Quality Management (TQM)

Total Quality Management (TQM) is a management philosophy that involves all aspects of quality that are of interest to both the consumer and the organization. Globally, the TQM approach has shown to be a viable way of cutting costs, increasing productivity and improving quality.

Total quality management involves all levels of an organization's management, including human resources management, leadership, policy and strategy formation, management of processes and material resources management. It also reflects enterprise results and the satisfaction of interested parties such as employees, consumers and society.

[1] Quality assurance: All planned and systematic actions necessary to provide adequate confidence that a product or service will satisfy given requirements for quality (ISO 8402).

TQM organizations develop a wide range of indicators to measure and improve their performance with regard to the above parameters. Standardized methodologies that define TQM evaluation criteria include regional or national schemes such as quality for awarding the Deming Award in Japan and the Malcolm Baldridge Award in the United States.

The main objectives of TQM are associated with consumer satisfaction and continuous improvement, both of which are crucial for favourable enterprise results. The importance of consumer satisfaction is based on the fact that in open economies, clients or consumers are the only reason why any productive process exists.[2] By measuring tendencies in relevant consumer markets, an organization attempts to internalize consumer satisfaction in their production system.[3] However, as the organization's environment changes continuously, consumer satisfaction and profitability can only be maintained if products, processes and human resources are continuously improved. The continuous improvement of the organization's productive system implies, for example, that any kind of error (or nonconformity) in the production system needs to be detected as early as possible and then resolved, in order to improve to the "zero error" situation. Continuous improvement thus requires the establishment of feedback mechanisms to eliminate detected quality failures at their point of origin. Both consumer satisfaction and continuous improvement are dynamic concepts resulting in the continuous monitoring and adjustment of the different elements of quality management.

Quality management practices may be defined as techniques for achieving objectives related to both consumer satisfaction and continuous improvement. In general, quality management practices optimize both the efficiency and effectiveness of a certain production system (e.g., produce only what you need to produce), while traditional management practices are usually only concerned with maximizing the efficiency of the production system (e.g., produce as cheaply as possible). Therefore, the principal difference between the two management approaches is that quality management practices aim to internalize the concept of consumer satisfaction in the different activities of the organization.[4] This has resulted in different ways of organizing the production system and the application of different technologies. For example, the quality management philosophy does not necessarily result in the "traditional" large economies of scale. Opportunities for continuous improvement can result in efficiency improvements, but they will only be implemented if they are compatible with aspects related to consumer satisfaction.

In most enterprises, the introduction of the TQM philosophy will be accompanied by organizational change. Establishing a TQM culture, therefore, is often a long-term organizational process. The commitment of management to introducing and improving organizational and technological innovations is crucial for the successful implementation of TQM. Well-defined and communicated policies and strategies are the formalization of such management commitment. The TQM philosophy is planned top down, while its actual benefits are generated at the operational levels. Control of primary production processes and systematic planning of cross-functional innovation are often the most visible aspects of TQM.

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[2] Consumers refer to any kind of clients in retail, wholesale, or industrial markets. Quality-assurance schemes are usually more important in trade between industries.

[3] It is helpful to think of a production system in which different factor inputs (labour, tools, materials and machinery) are used within particular social structures. The social dimension is important since the application of individual combinations of factors yields very different outcomes depending on the way the production process is organized (Humphrey, 1995).

[4] This is consistent with the definition of quality as principally a characteristic related to consumer demand.

In this respect, various quality management tools may be simultaneously implemented by using TQM objectives and principles to give direction to the organizational change that accompanies their implementation.

To formally define, describe, and manage the objectives related to consumer satisfaction and continuous improvement in the overall management function, the following fundamental principles are usually applied in the TQM approach (Rauter, 1995).

Monitoring and measurement techniques. To internalize consumer satisfaction and improve the quality of processes systematically, the organization must develop and measure relevant, reliable indicators. Such indicators are often measured with the help of statistical process methods and quality-control techniques.

Quality assurance. In general, TQM reduces dependence on inspection-oriented quality assurance and promotes the formalization of quality as the management function through the establishment of quality management systems. For example, an organization may develop quality manuals, procedures, work instructions or other forms of documentation which are applicable to any activity that may affect quality. The proper functioning of a quality management system can be guaranteed to the customer by external verification, namely second or third-party certification.

Clients and suppliers within the organization. Quality issues within the organization must be viewed, implemented and managed as a process. This implies that different functional departments need to view their relationships in terms of suppliers and clients, even though the transactions occur within the organization. Also, the main quality process (e.g., variation of the end-product specifications) can be subdivided into subprocesses that are often also cross-functional (e.g., control of the nonconforming product, communication, etc.).

Communication and dissemination of information. Because quality issues are cross-functional and dynamic, quality management places a strong emphasis on communication. For example, any adjustments in the quality management system need to be communicated to employees, suppliers, clients and the community. Also, "good" and "right" product quality depends to a certain extent on external factors such as supplier inputs and consumer wishes. TQM companies therefore communicate intensively with their critical suppliers and clients.

Delegation of responsibilities. Opportunities for continuous improvement or innovations are most effectively and efficiently identified at the operational levels. This implies that employees and workers of every functional department need to incorporate the concept of quality into their daily operational activities. Everybody is a quality manager. This is often referred to as the cultural change that an organization needs to go through to effectively implement TQM. It would be inefficient in terms of time, cost and flexibility if every functional department were to establish its own quality unit. This would lead to an additional hierarchical layer for inspecting quality issues, and it would discourage proactive participation concerning the implementation of TQM principles at all levels of the organization. Therefore, TQM organizations generally enlarge employee responsibilities (see box 1). Delegation leads to fewer hierarchical organizational levels, which, in turn, may result in a more-flexible, less-bureaucratic organization. This seems to be prerequisite for continuous improvement and innovation (Maas, 1992). A supervisor of a TQM organization is more a team catalyst than a work inspector.

Human resources development. Emphasis on training and worker satisfaction is one of the core principles of the TQM philosophy, and it is crucial with regard to the implementation of the other TQM principles. TQM emphasizes the establishment of an environment that allows organizational change to happen.

Box 1
Training Aspects For Direct Production Workers

The increased tasks for direct production workers include the following:
- formalization of visual inspection;
- increased reliance on operators;
- statistical Process Control, with periodic samples for simple testing (mean and variation);
- diagnosis of problems;
- machine adjustment and preparation;
- timely production;
- job rotation; and
- routine and preventive maintenance.

The successful integration of consumer satisfaction and continuous improvement in any organization depends, in the end, on human factors, because technology may always be imitated by competitors. TQM organizations continuously train employees at all levels. Workers need to be trained to understand and apply the measurement techniques, to perform their enlarged responsibilities, to understand the TQM principals and their potential impact on quality, and to have sufficient skills to identify innovations. TQM organizations often apply a wide range of services and incentives to ensure employee satisfaction, including child care; health and pension funds; wage incentives and lifetime -employment schemes; and training.

Quality management and competitiveness

The widespread diffusion of quality management techniques will make an organization, an economic sector and eventually a country more competitive. In this section, aspects of quality and competitiveness are first discussed from a macro perspective. Then examples of specific quality management techniques are related to factors that determine enterprise competitiveness.

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.

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 have 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. Finally, 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 double-sided competitiveness tool because it has improved product quality (consumer satisfaction) and reduced costs (efficiency) at the same time.

Competitiveness at the macro level

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). At the national level, international competitiveness may be analyzed according to the approach used by the World Competitiveness Report. The 1995 version makes a competitiveness ranking of 48 countries by calculating various factors (such as domestic economic strength, conducive government policies and infrastructure) that influence a country's international competitiveness. Aspects of quality are primarily represented within the factor "management" (70%)[5] and to a lesser extent within "science and technology" (15%) and "people" (20%). Quality contributes to a country's competitiveness.[6] 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.

A software technique developed by the Economic Commission for Latin America and the Caribbean (ECLAC) refers to international competitiveness as a country's trade performance in export markets (ECLAC, 1995a,).[7] In this respect, quality assurance is important with regard to international trade. 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.[8]

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.[9]

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

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

[6] 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.

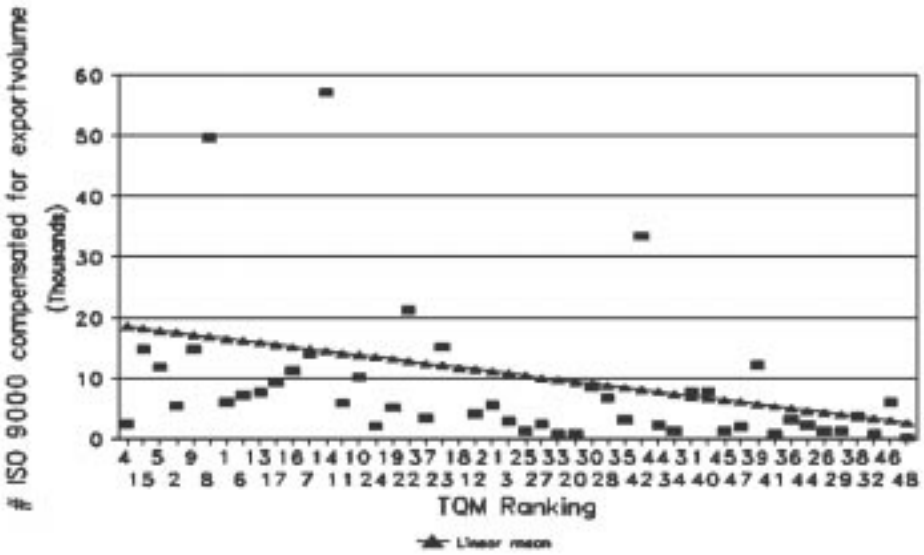
[7] ECLAC has developed a software technique with which it is possible to estimate the competitive performance of countries in Organization for Economic Cooperation and Development (OECD) markets. Estimations may be as detailed as individual industrial sectors (up to 3 digits).

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

[9] 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.

and communication with its suppliers and other subcontractors in both backward and forward linkages in the same or connected sectors.

Figure 1
TQM AND COMPETITIVENESS



Source: Institute for Management Development (IMD)/World Economic Forum, *The World Competitiveness Report, 1995*, Lausanne, 1995.

[a] Annex 2 contains a list of country names that corresponds with the numbers with the competitiveness ranking.

Theories of competitive industrial development emphasize the promotion of intrafirm reorganization and the establishment of enterprise networks. Networks may be 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. 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 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). 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.[10] 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.

The contribution of quality issues to the competitiveness of industrial sectors can be determined through competitive analysis as developed by Michael Porter (1985). In brief, a competitive analysis is a systematic process that aims to identify the structural factors that determine the long-term profitability, expectations and behaviour of important competitors in a particular sector. Such analysis considers, for example, a) competitive aspects within the sectors; such as entry barriers and the power of suppliers and clients with regards to quality; b) macro conditions including investment in quality innovation and human resources; and c) government policy with regard to consumer protection, quality standards and export requirements.

Competitiveness at the 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.[11] In open economies, companies that are relatively more competitive than their rivals expand their market share because consumers are satisfied with specific characteristics of their products or services.[12] Consumer satisfaction may be associated with one or more of the following elements of an organization's products or services (Pandora, 1989).

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[10] 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%, non-conforming product decreased 93% and the costs and time for the development of new products decreased 50% (Burnt, 1990).

[11] Clearly, solutions to these objectives will include both technical and organizational innovations. The present discussions focus on the organizational measures. However, many organizational management measures will have consequences for technological innovations, and vice versa.

[12] 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.

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. Therefore, the concepts of consumer satisfaction and continuous improvement are the basis for the following strategies: definition of core competencies and the maximalization of capital and labour productivity (efficiency); aiming for zero quality defects in the organizational activities at large (quality); optimalization of total lead time (delivery time); organization and control of production inputs and outputs in order to deal with diverse and fluctuating market demand (flexibility); and organization and control of product design and development in order to anticipate and respond in a timely fashion to changing market conditions (innovation).

An overview of the TQM principles, related quality management practices, their desired objectives and enterprise-level competition factors are presented in table 1. The TQM principles discussed in the previous section should be viewed as complementary to these practices, as the TQM philosophy can provide the overall orientation for the more practical quality management instruments. The application of quality management techniques is generally perceived as a means to increase a company's competitive performance. A study on quality management practices that are being applied by more than 500 businesses in North America, Japan and Germany reported: the following top-line findings (Ernst & Young American Quality Foundation, 1991): more than 50% of the participants evaluate the business consequences of quality performance at least monthly; 40% of the companies put primary importance on customer satisfaction in strategic planning; 30% of United States and Japanese companies place primary importance on competitors' analysis (benchmarking); 90% of Japanese companies and 25% of United States companies continuously reengineer production or service processes; and all companies view cross-functional quality teams as the best method to increase employee involvement.

Another study of 700 companies in Western Europe reports the benefits of companies that have achieved TQM status:[13] higher consumer satisfaction, increased personnel participation, increased quality awareness, cost reduction and improved enterprise results (KID, 1996).

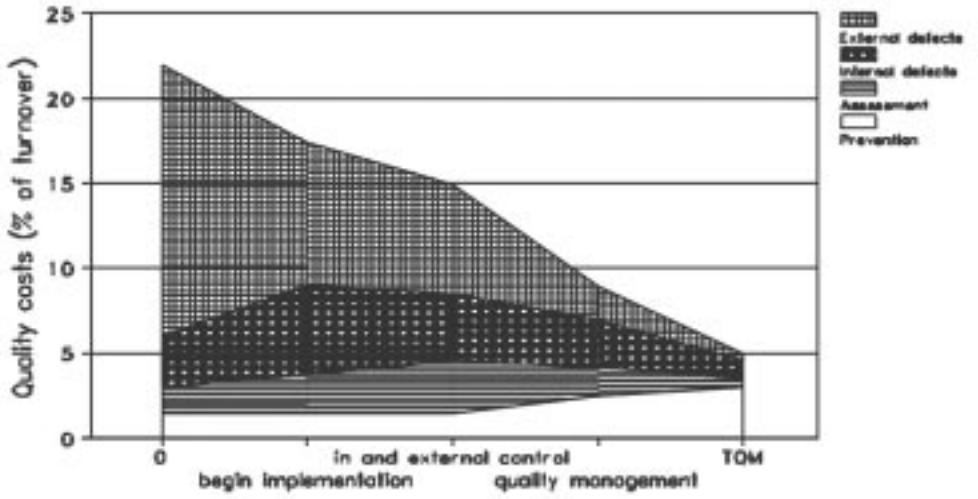
[13] TQM companies are found in the electrotechnical, automotive and chemical sectors.

Table 1:
OVERVIEW OF TQM PRINCIPLES

TQM Principles	Examples of management concepts	Objectives - Results	Competition factors
Consumer satisfaction and continuous improvement of issues related to relevant competition factors Measurement and monitoring Quality assurance Communication and dissemination of information to concerned parties Internal clients and suppliers Delegation and employee participation Human Resources Development (systematic training)	Talorism, Fordism Reengineering Benchmarking Downsizing Outsourcing	Efficiency: - maximalization of capital and labour productivity - definition of core advantages	Price
	Quality system Quality costs ISO 9000 certification Quality audits	Management dimension: Zero quality defects in products, processes and services Product dimension: "right" quality	Quality
	COSP Time based competition	Optimalization of lead time (logistics)	Delivery time
	JIT Kanban Delayering cellular factory layout	Organization and control of productive systems in order to deal with diverse and fluctuating market demands	Flexibility
	Benchmarking Quality function deployment Quality-control circles	Organization and control of the product design and development process in order to anticipate and respond in a timelly fashion to changing market conditions	Innovation

The potential reduction of quality costs through TQM implementation has been estimated by TUV Rheinland Chile, which specializes in product verification and ISO 9000 certification. As figure 2 illustrates, a company can decrease its quality costs from 23% to about 6% during a period of four to five years, which is the necessary time-frame for achieving the TQM phase.[14] Most of the quality costs in the TQM phase are preventive costs and assessment costs, and these are well compensated for by savings on internal and external quality-failure costs. Chapter II provides additional information on quality costs.

Figure 2
QUALITY-COST REDUCTION THROUGH TQM



Source: TÜV Rheinland Chile.

[14] See the first section of chapter IV for information on the different phases of the TQM implementation process.

Chapter II

THE ISO 9000 STANDARDS AND COMPETITIVENESS

Introduction

With technological advances in transportation, communications and information technologies, international trade is growing at an increasing pace. In those economic sectors where quality is emerging as a crucial factor in purchasing decisions, clients demand that manufacturers produce their products within certain quality standards or through certain quality production processes. Contracts may be established to formalize these quality guarantees among national and international trading partners, markets, countries and/or economic regions. Therefore, it is important for purchasers and clients to obtain proof of the supplier's ability to meet quality requirements and delivery commitments. Previously, before placing an order, purchasers would assess the quality of products by testing a few samples, as well as by sending experts to the potential suppliers to check their quality-control systems. With the increasing number of domestic, regional and global vendors, this methodology has become unfeasible because of the costs involved. Even for suppliers, multiple assessment by different purchasers with varying verification standards and procedures was causing problems.

Consequently, a defined standard of quality management systems was needed to enable suppliers to demonstrate their ability to meet customers' requirements and thereby gain the confidence of the purchaser.[15] The ISO 9000 guideline is an international procedure that standardizes quality issues.[16] This guideline refers to a series of international standards on quality systems in both production (industrial) and service sectors that attempts to reduce confusion and enhance compatibility among trading partners. ISO 9000 represents a series of international standards which prescribe acceptable methods for designing, implementing and assessing quality management and quality- assurance systems (ISO,1994). The worldwide membership of the International Organization for Standardization (ISO) consists of 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 9000 standards were drawn up in 1987 and are continuously revised and amended.[17] They have been adopted by about a hundred nations. The ISO committee responsible for the 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.

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[15] This approach in which the producer rather than the purchaser has to provide proof of quality has evolved through various agencies that aim to protect the consumer.

[16] ISO 9000 has been developed by the International Organization for Standardization (ISO).

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

According to the ISO 9000 methodology, any kind of organization may establish a quality system by implementing 20 different guidelines, each of which describes a specific quality process. The objective of these process guidelines is to control variation in the desired specification of an organization's products and services. Annex 1 contains a detailed description of the 20 guidelines of an ISO 9000 quality system. The standards do not refer to specific products or economic sectors and therefore support the argument that good quality-process management leads to good-quality products (ISO, 1993). However, this is not always true, as the standard does not guarantee compliance with absolute quality-performance indicators.

ISO 9000 certification

Adoption of the ISO 9000 standards is voluntary, but it becomes obligatory when specified in contracts. In that situation, an organization would need to obtain independent verification that an effective ISO 9000 quality system had been established. However, rather than have every purchaser assess all its suppliers, the standard had to be amendable to third-party certification to avoid multiple assessment of suppliers by various purchasers. The objective was to create a mechanism by which suppliers' quality management systems could be audited and certified by an independent third-party agency which would provide objective evidence for all purchasers. So far, ISO 9000 certification has had significant impact in industrial markets and submarkets and is less relevant in retail markets. ISO 9000 certification refers to the quality of an organization, and the certification logo may not be used on products.

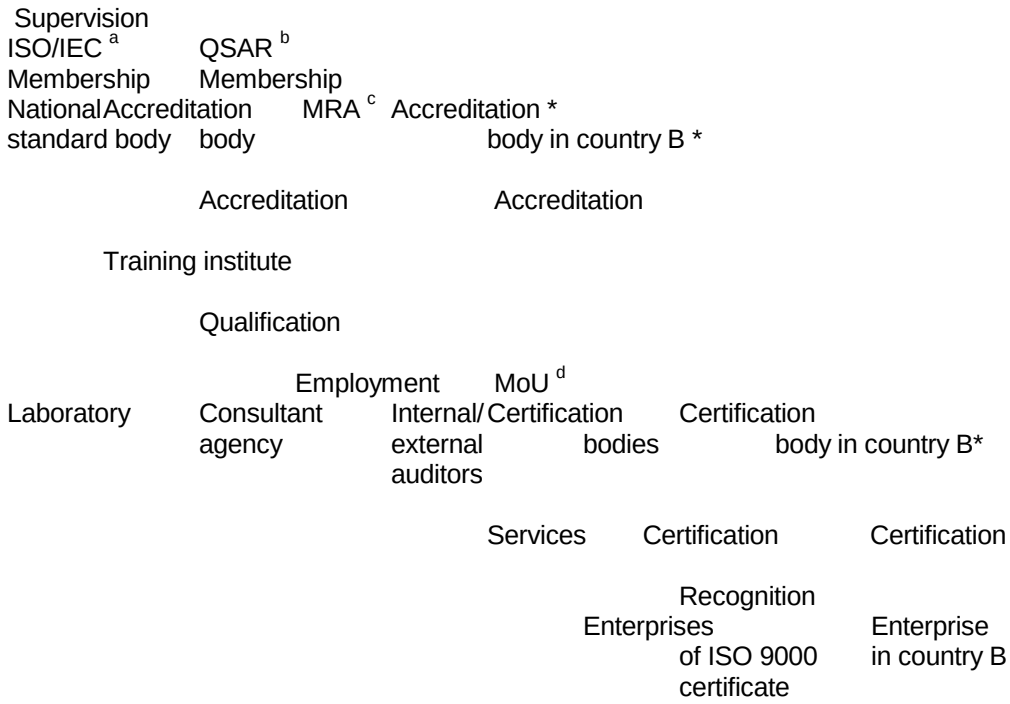
The certification of an ISO 9000 quality system requires a certain institutional infrastructure. Accredited auditors perform the certification audits, and accredited certification bodies issue the ISO 9000 certificate. During the implementation phase, consultants may provide diagnostic and training services, institutes may provide specialized auditor-training courses and laboratories may be involved in technical support such as calibration of quality-control equipment. As shown in figure 3 these suppliers may also be subjected to accreditation.

The international recognition of an ISO 9000 certificate depends on the credibility of this institutional structure. The ISO guides on conformity assessment establish the rules of the institutional framework. Accreditation —or approval of third-party services— is usually performed by organizations that represent national governments according to predefined criteria. The objective of accreditation is to harmonize ISO 9000 -related services in a country to ensure the development of reliable quality systems within the economic sector. Accreditation bodies have to conform to the ISO guides for accreditation bodies, and they need to assess whether a certification body or laboratory conforms to their corresponding ISO guides.

The international recognition of the ISO 9000 certificate may be established through agreements at the certification level (Memoranda of Understanding, or MoUs) or more efficiently at the accreditation level (Mutual Recognition Agreements, or MRAs). There are various examples of such agreements in a regional context. The most common practice today is that a certification body obtains its accreditation in various countries, and therefore the ISO 9000 certificate has validity in these countries. For example, the EQ Net is a network of non-profit European certification bodies that recognize each other's certificates through MoUs. MRAs and MoUs are often based on the ISO guides on conformity assessment.

Figure 3

INSTITUTIONAL INFRASTRUCTURE RELATED TO THE ISO 9000 STANDARDS



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

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.

Within the framework of the World Trade Organization (WTO) Agreement of 15 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.[18] 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 ISO 9000 quality system

The ISO 9000 series centers 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 to 9003 models deal with external quality assurance, or certification, 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 that 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 9002 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 contract calls for confidence in terms of statistics and measurement and may be used for products that are already in the market. With regard to the implementation

and certification of an ISO 9000 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.

A quality system involves an organization's responsibility structure, procedures, processes and resources for implementing quality management in such a way that it complies with the company's quality policy. An ISO 9000 quality system comprises the description and documentation of two actors that run as a common thread through all business activities: people and processes. Everything that happens in an organization does so by virtue of someone doing something. When this is represented by means of flow charts, it is possible to build a picture showing the processes that deliver the service, the people involved and the relevant interactions among them. This approach clearly delineates the core process —the way the organization works. Within the core process are many layers of subprocesses, activities and tasks that need to be defined. The principal strength in defining organizations in these terms is that it is possible to represent the view of the consumer, who becomes the focus of each process. Meeting the requirements of the customer, rather than those of the managers, becomes the key objective (Blackham, 1994).

Despite their nature or size, all organizations that operate ISO 9000 quality systems have common characteristics: formalized quality policies; specified lines of authority and areas of responsibility; and definition of the production processes, specifications and procedures. The operational aspects of an ISO 9000 quality system involve both the administration of principal activities of the company and the formal documentation of the quality system, of which all workers of the company have taken note. The principal orientation of the ISO 9000 quality system is consumer satisfaction and continuous improvement. Continuous improvement is achieved by taking corrective and preventive action when quality defects are detected and adjusting technical and/or organizational aspects of the quality system.

Costs and benefits of implementing ISO 9000

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.

The time needed to obtain ISO 9000 certification generally varies from one to two years. Of 1880 companies surveyed in the United States 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.

Enterprises choose to implement the ISO 9000 guidelines and obtain third-party ISO 9000 certification for several reasons. First, without mutual recognition of quality standards between trading partners, quality issues are likely to present significant non-tariff barriers to future trade. Current global trends are driving many companies toward strategic recognition that they need and should conform to international standards in order to gain critical access

[18] 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.

to markets. Regional economic trade blocks, in particular, show a general tendency to use standardization to avoid confusion and enhance compatibility between trading partners. Second, compliance with ISO 9000 regulations calls for the implementation of quality systems that may result in increased efficiency and cost savings in the production and service sectors. Third, an important benefit for any organization is the reduction of the costs of multiple assessments required by different trading partners (ISO, 1993). Table 2 presents different motivations for ISO 9000 certification as reported by three international surveys.

Table 2

DRIVING FACTORS FOR ISO 9000 CERTIFICATION, ACCORDING TO SELECTED SURVEYS
Affirmative responses (%) [a]

DRIVING FACTOR FOR ISO 9000 CERTIFICATION	Survey A [b]	Survey B [c]	Survey C [d]
Increased competitiveness	69	73	45 (80)
Continuous improvement	61	77	55 (80)
International trade requirement	8	23	20 (55)

Source: Survey A: *ISO 9000 News*, "Australian ISO 9000 survey reveals significant gains for certified organizations", T.O'Brian, Engineering Centre for Manufacturing, Carlton, Victoria, Australia, June 1995; Survey B: Irwin Publishing, "The ISO 9000 survey, comprehensive data and analysis of registered companies in the USA and Canada", Burrkidge, Illinois, 1996; Survey C: *ISO 9000 News*, "Survey provides "snapshot" of ISO 9000 certification in 10 countries", Ernst and Young, Brisbane, Australia, April 1995.

[a] Survey C respondents distinguished between major and minor influence/benefits. Major influence/ benefits are listed first, while the total of both major and minor influence/benefits are listed in brackets.

[b] Represents 477 organizations in Australia.

[c] Represents 1880 organizations in the United States and Canada.

[d] Represents 1,000 leading manufacturing companies in Australia, Canada, France, Germany, Japan, South Korea, Sweden, The Netherlands and Great Britain. Survey conducted by Ernst & Young in 1994.

Costs

Activities necessary to implement and maintain the quality system may be classified as either internal or external costs. Internal costs may concern salaries of additional employees responsible for implementing the quality system, documentation, overhead costs, internal training expenses and investments in production and quality-control technologies. External costs may concern external advice and training, calibration services and certification costs. Significant additional technological investments that might be necessary to guarantee quality cannot be directly associated with the quality management system and are generally not included as a cost.

It is difficult to draw general conclusions with regard to average implementation costs of an ISO 9000 quality system. The total labour resources involved are difficult to assess because quality-system activities are usually seen as additional assignments for existing employees. Also, labour costs tend to differ among geographical areas. Establishing the appropriate documentation may increase costs significantly, particularly if a company should choose to hire consultants involved in the diagnostics and formulation of the quality system. Similarly, costs for process equipment and employee training vary widely. Companies producing software, auto parts or foodstuffs or distributing petrochemicals clearly face very different equipment investments; the level of investment further depends on the technological state of existing operations. Training involves all personnel and may require external training

in specific technological areas. Costs will be lower for companies that have already been operating some form of quality management or for companies using state-of-the-art technologies. Certification costs depend on the amount of time needed to certify the company as well as on the location of the company. Auditors affiliated with international certification companies charge between US$1,000 and US$1,500 per day, and administrative costs for the ISO 9000 certificate are about US$2,000. Training and or diagnostics consultants costs US$2,000 to US$4,000 per man week. Travel and accommodation expenses depend on local conditions.

Table 3 presents cost information based on quality system implementation and certification in 1,880 companies in the United States and Canada,[19] The survey was carried out among medium-sized and large companies.

Table 3

AVERAGE COSTS OF IMPLEMENTING AN ISO 9000 QUALITY SYSTEM

Turnover category (million of US$)	Number of employees [a]	Classification	Average implementation time (months)	Average total implementation cost (US$) [b]	No. of employees to maintain the system
< 11	< 150	Medium	14	71,000	0 to 2
11 - 25	150 - 500	Medium-large	15	102,000	0 to 2
26 - 50	150 - 500	Medium-large	15	121,000	1 to 2
51 - 100	500 - 1500	Large	15	147,000	1 to 4
101 - 200	500 - 1500	Large	16	216,000	1 to 4
201 - 500	500 - 1500	Large	17	271,000	1 to > 5
500-1000	> 1500	Large	15	274,000	1 to > 5
> 1 billion	> 1500	Large	15	409,000	1 to > 5

Source: Irwin Publishing, "The ISO 9000 survey, comprehensive data and analysis of registered companies in the United States and Canada", Burrkidge, Illinois, 1996.

[a] Concerning the number of employees, the distribution of respondents of the survey is as follows: 23% (less than 150); 29% (150-500); 20% (500-1500); 23% (more than 1500); and 5% (no answer).

[b] Average implementation costs and savings are based on the weighted average of the midpoint of the dollar range indicated by the respondents. Statistically this is not correct. Figures should be viewed as indicative and should be used for comparison purposes only.

Clearly, the costs of implementing a quality system depend on an organization's turnover and number of employees. The data are consistent with survey data from Australia (ISO 9000 News, 1995a). There, the average ISO 9000 quality system implementation and certification costs and times are as follows:

- Small-sized companies (less than 50 employees): US$55,000 and 7-12 months;
- Medium-sized companies (50-350 employees): US$83,000 and 10-16 months; and
- Large companies (more than 350 employees): US$144,000 and 13-18 months.

[19] The presented quantitative information is largely based on the most detailed ISO 9000 cost-benefit survey that could be found in the literature (Irwin Publishing, 1996).The information is consistent with other questionnaires and case studies found in the literature as well as interviews by the author with certified companies.

Table 4 gives an indication of the average costs of quality system implementation in North America as a percentage of the company's turnover. The estimated total cost of ISO 9000 implementation within the 1,880 participating companies was roughly estimated at 0.06% of the total US$422 billion turnover. Even though ISO 9000 certification costs on average may not be a significant percentage of a company's turnover, the average costs as a percentage of turnover increase as the company's turnover decreases. No wide variation was reported in the ratio between internal and external costs for the different categories of company turnover. All participating companies spent on average 73% on internal costs and 27% on external costs. About 40% of the external costs were spent on certification, while about 38% of the companies did not use any external services other than the certification agency during ISO 9000 implementation. The last column in table 4 shows that ISO 9000 certification costs (as a percentage of total implementation cost) increase as the company's turnover decreases. In summary, ISO 9000 implementation and certification is relatively more expensive as the company's turnover decreases.

Table 4

AVERAGE ANNUAL IMPLEMENTATION COSTS AS A PERCENTAGE OF TURNOVER, AND CERTIFICATION COSTS AS A PERCENTAGE OF TOTAL IMPLEMENTATION COSTS

Average turnover (millions of US$)	Average annual implementation costs (US$) [a]	Costs as % of turnover	Certification costs as % of total costs
5	61,000	1.2	16
17.5	80,000	0.5	15
37.5	97,000	0.3	15
75	126,000	0.2	12
150	159,000	0.1	11
250	198,000	0.08	9
750	215,000	0.03	9
1 billion	325,000	0.03	7

Source: Irwin Publishing, "The ISO 9000 survey, comprehensive data and analysis of registered companies in the United States and Canada", Burrkidge, Illinois, 1996.

[a] Average annual costs and savings are based on the weighted average of the midpoint of the dollar range indicated by the respondents. They are to be used for comparison purposes only.

Benefits

Companies do not only view ISO 9000 certification as a commercial decision, but also as a strategic consideration that changes the culture of the company and that may fundamentally influence the long-term future of the company. Intangible benefits may therefore account for an important part of a company's choice to achieve ISO 9000 certification. However, in accordance with the ISO 9000 philosophy that "all progress should be measurable," the perceived benefits should ultimately justify the investment costs of a quality system. The tangible, intangible and post-certification benefits are discussed below.

a) ***Tangible benefits***

The tangible benefits of ISO 9000 system implementation lower the internal fixed and variable costs of an organization through increased efficiency and improved quality of the company's operations. Examples of tan box 2. These qualitative indications have been reported by a wide spectrum of companies of different sizes and activities.

Box 2
Tangible benefits of ISO 9000

Increases in	
* profitability	8%, 15%
* productivity	6% 4% per year
* capacity utilization	30%, 43%
* sales	11%
* order processing time	43%
* delivery time	10%
* % of satisfied customers	70 to 100%
Decreases in	
* inventories	40%, 80%, 50%
* raw-material costs	4%,12%
* waste generation	10-15%
* production lead times	46%
* component defects	99%
* rework	51%, from 15% to 1-2%
* rejection batches	10%
* customer complaints	40% to 60% py
Savings in	
* quality costs	5% (% of sales)
* direct overheads	27%
* variable costs	15%
* insurance payments	variable

Source: ISO 9000 Forum issues, 1993-1995.

b) ***Intangible benefits***

Intangible benefits include strategic considerations related to increased competitiveness in new and existing markets, improved employee motivation in a quality management culture, improved working conditions due to the establishment of the quality system and the initiation of systematic continuous improvement after certification has been achieved.

Strategic considerations (markets). One of the most important intangible benefits of an ISO 9000 quality system often involves enlarged market accessibility and internal efficiencies, through which a company is able to achieve a comparative advantage over its competitors. Understandably, companies are hesitant to credit improved market share solely to the ISO 9000 quality system. However, many organizations view the implementation of an ISO 9000 quality system as a strategic planning element in the medium-long term (Askey and Dale, 1994).

Market access is facilitated when the implementation of international quality standards results in the increased confidence of economic agents or regulators. Entering new markets

and establishing subsidiaries is facilitated if organizations have already voluntarily conformed to potential requirements by showing good practices and overcoming technical barriers to trade. *Marketing activities* are facilitated because purchasers and clients may be more easily convinced of the quality of products and services. For example, in the chemical industry most suppliers and purchasers place great importance on quality and safety. Product price may even increase as a result of enhanced confidence of clients. *A more flexible response* to market demands is created through the internalization of the concept of consumer satisfaction that may be initiated by the ISO 9000 quality system. Through the establishment of procedures concerning effective design and production, product variety and monitoring of market performance and competitors, a company will take better advantage of market opportunities.

Improved employee motivation. The ISO 9000 standards provide a basic framework for implementing a quality management culture in which the company's responsibility for its employees and clients and its concern for its impact on society at large are central. By establishing a quality culture, companies create an organization in which labour activity is not defined so much in terms of the hierarchical structure of the organization as in terms of one's contribution to the team (section, division, company). A recent survey from Brazil indicates that ISO 9000 implementation tends to favour aspects related to labour inputs in the production function of a company (INMETRO/MICT, 1996). Guideline 4.18 requires that the company identify, fulfil and evaluate the training needs of its employees. Human resource development, together with clearly delegated traceable responsibility, motivates personnel to participate in company affairs. Improved worker motivation has positive implications for the innovation of a company's processes and quality of activities (i.e., continuous improvement and consumer friendliness) and for the company's productivity.[20]

Improved working procedures. Through the implementation of the different requirements of the ISO 9004 standards, a company clearly defines and documents its “way of doing things”. Establishing the quality system documentation involves the evaluation of all company operations that may affect quality. This may result in the following benefits.

Decision making. on quality issues is easier to control and involves more aspects of management. The process of decision making becomes much more formalized in a quality system because of the establishment of the management review committee and quality system indicators. *Communication* between different functional areas may be greatly improved when the responsibilities of employees, work units and divisions are clearly organized in the quality processes described in the quality manual. Also, training familiarizes employees with TQM principals. *Work routines and conditions* can become more effective, efficient and safe. If ISO 9000 has been combined with delegation and increased responsibilities, most of the recurring problems are now solved at the implementation level and no longer reach the manager's desk. In the documentation process, the company's inefficiencies are detected and eliminated. Contractual considerations with clients and suppliers may improve substantially through enlarged control and evaluation procedures, especially those required by the ISO 9001 model. *Office administration* may be greatly

[20] To some extent one could wonder if a culture of "traceable" responsibility and periodic audits does not lead to a controlled working environment that could adversely influence worker motivation. Interviews with various companies' management, however, indicate that familiarizing employees with quality management plays an important part in its acceptance and that after such training, audits are viewed as supportive, informative activities. Moreover, they are usually performed by independent parties. In some cases it was mentioned that employees who are not willing to accept the new responsibilities should not be working for the company in the first place.

improved because responsibilities and work systems are clearly defined. Little time is lost when nonconformities are detected, and repetition of work is avoided. *The legislative obligations* of the company become easier to identify when material and organizational processes are clearly described and documented.

c) *Post-certification benefits*

Before implementing the quality system, companies may have had little or no idea of the costs resulting from quality nonconformities. Once the certification is obtained and the tangible and intangible benefits have become apparent, companies have a range of quality-control indicators with which to promote further improvements of the quality system, such as inventory control, decrease of quality costs, reorganization, re-engineering and internal optimization of processes. A well-defined and operational ISO 9000 quality system provides the basic framework for the incorporation of innovations leading to fewer nonconformities within and outside the company. Such continuous improvement eventually results in the adoption of total quality management (TQM).

Another post-certification benefit involves the experience a company gains from the successful implementation of an ISO 9000 quality management system. This experience is often used to implement ISO 9000 more easily, quickly, and cost efficiently in the company's other activities,[21] in its other subsidiaries, in its supplier network and in other third parties. Centralized quality-control departments in multinationals often provide this type of consultancy service. Between subsidiaries, the uniform ISO 9000 approach may provide a framework for corporate benchmarking.

Balancing costs and benefits

As the above discussion demonstrates it can be difficult to present an average cost-benefit balance concerning the implementation of an ISO 9000 quality system. The costs of implementing a quality system depend on many factors, including the size and nature of the company, the number of employees, the type of ISO 9000 model to be implemented, the extent of external services required, the certification fees of the third-party auditor, whether the company has had previous experience with quality management systems, the amount of quality-control equipment needed, the state and age of operational technologies, the level of trained personnel on payroll, and the commitment of company personnel and unions.

Furthermore, many of the benefits resulting from ISO 9000 implementation are intangible and difficult to quantify. It also may prove difficult to credit benefits solely to ISO 9000 implementation. For these reasons and more, most companies have not calculated detailed cost-benefit balances. Even if all intangible benefits could be transformed into cost indicators, it would still remain difficult to perform an accurate cost-benefit analysis because companies are usually unaware of their nonconformity quality costs before implementing the quality system.

[21] For example, a company may start with ISO 9000 certification in the areas of procurement and sales and later include the production and design activities. Similarly, the ISO 9002 model may be implemented before achieving certification for the more strict ISO 9001 model.

However, some cost-benefit indications can help measure investments made in establishing the ISO 9000 quality system. These are discussed below.

Payback period

Only about 30% of the 1,880 companies surveyed in the United States and Canada have a system in place to quantitatively measure annual cost savings associated with ISO 9000 implementation and certification. However, 60% of the surveyed companies provided data which allowed the calculation of average one-time savings in the first year of certification, as well as average annual savings in following years (see table 5). These data demonstrate that most companies experience savings as a result of ISO 9000 system implementation and that savings and cost reductions tend to increase in the second year. The calculated payback period indicates that companies with less turnover need more time to recover their ISO 9000 implementation costs. In absolute terms, about 50% of the participating companies estimate that the payback period of the investment in an ISO 9000 quality system is less than 3.3 years (Irwin Publishing, 1996).

Table 5

AVERAGE ONE-TIME AND ANNUAL SAVINGS AND PAYBACK PERIOD, BY COMPANY TURNOVER

Turnover category (million of US$)	Average implementation costs [a]	Average savings in the first year	Average annual savings	Payback period (years) [b]
< 11	71,000	14,000	23,000	3.1 - 5.1
11 - 25	102,000	31,000	57,000	1.8 - 3.3
26 - 50	121,000	48,000	72,000	1.7 - 2.5
51 - 100	147,000	68,000	102,000	1.4 - 2.3
101 - 200	216,000	102,000	167,000	1.3 - 2.1
201 - 500	271,000	118,000	123,000	2.2 - 2.3
500 - 1000	274,000	139,000	193,000	1.4 - 2.0
> 1 billion	409,000	164,000	291,000	1.4 - 2.5

Source: Irwin Publishing, "The ISO 9000 survey, comprehensive data and analysis of registered companies in the United States and Canada", Burrkidge, Illinois, 1996.

[a] Average annual costs and savings are based on the weighted average of the midpoint of the dollar range indicated by the respondents. They are to be used for comparison purposes only.

[b] Calculation of the payback period is based on about 60% of the total number of the respondents.

Quality-cost calculation

According to the American Society of Quality Control (ASQC), quality costs may be classified as two types: those related to the pursuit of quality objectives and those that result from limited quality control (see box 3). The first type of costs includes prevention and assessment costs, and they may be adjusted by management. These are desired costs. The second type is classified as quality failures. These are unwanted costs and they need to be eliminated to the extent possible.[22] The optimal expenditure on quality involves the balancing of preventive and assessment costs on the cost side, and the calculation of benefits as a result of reduced quality failures on the other side (Van de Broek, 1991).

Another type of quality-cost benefits involves the quantification of the results of quality management. Such benefits include significantly improved product performance, conformance, durability, serviceability —in short, all improvements that may lead to increased consumer demand and market share. These improvements may be termed revenue enhancers (Winchell, 1987; Spitzer 1993).

Box 3
ASQC classification of quality costs

Preventive costs:
* quality management
* design and development
* training in quality
* information on quality

Assessment or appraisal:
* material and product inspection
* evaluation of processes
* administrative support

Internal quality failures:
* degradation of product and materials
* rework
* trouble shooting
* process adjustments
* special measures to save the product

External quality failures:
* investigation of claims
* guarantees and services
* product replacement
* liability damages
* market pull-out of defective products

Source: American Society for Quality Control (ASQC)

The literature contains various conclusions concerning issues related to quality costs.

a) Quality costs may account for a significant percentage of total turnover. A study in The Netherlands concluded that while quality costs differ among industrial sectors, they average 10% of turnover. A study of 54 companies in France reports quality costs of 5-23% of turnover (Van de Broek, 1991). ISO estimates that the costs of poor quality in developed countries range from 15-25%, and they are likely to be higher in developing countries (ISO/UNCTAD/GATT, 1993).

b) Roughly 60-70% of quality defects detected on the shop floor are directly or indirectly attributable to errors in other areas, such as design, engineering, purchasing, production, packaging, dispatch and transportation. In contrast, almost all traditional quality-assurance activities (i.e., inspection) are directed to the shop floor (Nakamura, 1992).

c) After taking actions for quality improvements, quality costs may decrease significantly. This indicates that the establishment and implementation of preventive and assessment measures are probably worth it. In The Netherlands, companies have achieved

[22] The distribution of quality costs in companies without quality care have been estimated as follows: prevention, 10%; assessment, 35%; internal failures; 48%; and external failures, 7% (Van de Broek, 1991). TÜV Rheinland Chile indicates that in Latin America external failures may be as high as 70% of quality costs.

savings that average 3% of total turnover, with costs decreasing from 10% to 7% (Van de Broek, 1991). TÜV Rheinland Chile estimates that total quality costs in the TQM stage average around 6-7%, of which the majority is associated with preventive and assessment activities (see also figure 2 in the previous chapter).

Even though actual figures may differ greatly among companies, sectors and countries, the above examples point to some general indications on the cost benefits of ISO 9000 implementation and certification. First, the costs associated with the ISO 9000 quality system may be classified as preventive costs (e.g., quality system, training, calibration, standardization) and assessment costs (e.g., audits, measurement and monitoring, laboratories). Second, the costs of ISO 9000 implementation and certification in medium-sized to large companies is roughly 1.5% to 0.05% of the total turnover (see table 4). Reported tangible quality-cost savings and reductions, as a percentage of turnover, have been estimated to be several times greater than the
implementation costs. If the benefits from the reduction of quality-cost failures (tangible) and from revenue enhancements (less tangible) amount to more than the implementation and certification costs, then the implementation of the ISO 9000 quality system would be favourable from a cost-effectivenes point of view.

In budgeting quality costs, quality-control managers will need to determine the optimum between costs and benefits. Obviously, this requires the establishment of a structure for calculating quality sosts. The ISO 9000 survey presented previously (Irwin Publishing, 1996) reports that in most cases, companies have not instituted systematic quality-cost calculation because they lack quantifiable objectives. Traditional quality-cost structures are product oriented, while the calculation of preventive quality costs are activity or process oriented. This implies that ISO 9000 quality-cost structures are principally focused on determining the benefits of management activities. The Activity Based Costing (ABC) technique may facilitate the establishment of quality-cost calculation systems at the activity or process level.

The relation between TQM and ISO 9000

The basis for TQM implementation is the establishment of a quality management system which involves the organizational structure, responsibilities, procedures and processes. The most frequently used guidelines for quality management systems are the ISO 9000 international standards, which emphasize the establishment of a well- documented, standardized quality system. The role of the ISO 9000 standards within the TQM circle of continuous improvement is presented in figure 4.

Continuous improvement is a circular process that links the diagnostic, planning, implementation and evaluation phases. Within this circular process, the ISO 9000 standards are commonly applied in the implementation phase. An ISO 9000 quality system also requires the establishment of procedures that standardize the way an organization handles the diagnostic and evaluation phases. However, the ISO 9000 standards do not prescribe particular quality management techniques or quality-control methods. Because it is a generic organizational standard, ISO 9000 does not define quality or provide any specifications of products or processes. ISO 9000 certification only assures that the organization has in place a well-operated quality system that conforms to the ISO 9000 standards. Consequently, an organization may be certified but still manufacture poor-quality products.

Figure 4
THE ROLE OF ISO 9000 WITHIN THE CIRCLE OF CONTINUOUS IMPROVEMENT

-> Diagnostics --> Planning and implementation ---> Evaluation		
Quality management	Quality assurance	Quality control
* Identification of what to improve * Selection of the approach to organizational innovation (TQM, re-engineering, bench-marking, etc.)	* Standardization of key quality processes * Development and maintenance of the quality system * Documentation * Training <----- ISO 9000 ---->	* Measuring and monitoring * Inspection * Audits * Certification * Management revision
<----- Feedback and adjustment <-----		

Source: Based on information from PROCAL, 1995.

TQM prize schemes such as the Malcolm Baldridge Award focus on competitiveness through continuous improvement and customer satisfaction. This is barely addressed in ISO 9000. The intent of the ISO 9000 series is to establish and maintain a basic quality system to assure customers that organizations have the capability to produce and provide quality products and/or services. As such, the principal scope of ISO 9000 is to facilitate and enhance trade (Rheimann, 1993).

Table 6
COMPARING THE GUIDELINES OF THE EFQM COMPANY QUALITY AWARD AND THE ISO 9000 STANDARDS

EFQM Categories	Estimated % covered by ISO 9000
Leadership	30 : weak
Policy and strategy	40 : weak
Management of processes	75 : strong
Management of resources	35 : weak
Employee satisfaction	20 : weak
Customer satisfaction	35 : weak
Societal recognition	0 : not applicable
Enterprise results	35 : weak
	AVERAGE COVERAGE : 34%

Source: European Foundation for Quality Management (EFQM), "The ISO 9000 standards and the EFQM Company Quality Award", Brussels, 1992.

An indication of the differences between TQM and ISO 9000 may be obtained by comparing the parameters considered in TQM prize schemes and ISO 9000 quality system clauses (see table 6). The European Federation for Quality Management (EFQM) (1992) estimates that the ISO 9001 standard covers approximately 30% of the EFQM Company Quality Award. ISO 9000 is considered to be "strong" concerning the management of processes, including planning, control, improvement and change. This, together with the emphasis on documentation, leads one to believe that ISO 9000 implementation results in a better knowledge and organization of the production function of the organization. It may be argued that this is the root cause of the benefits reported in table 7.

ISO 9000 and competitiveness

By laying out 20 clauses of what constitutes a quality system, the ISO 9000 standards provide guidance for all types of organizations that want to implement effective quality systems and establish a systematic framework for developing further TQM activities. Moreover, the ISO 9000 standards present generic requirements against which a customer can evaluate the adequacy of an organization's quality system. ISO 9000 thus serves as a model for the quality assurance of quality systems, which is useful for introducing quality management in the production chain as well as for harmonizing quality issues in trade relationships. Both benefits are important to the business value of any organization.

In 1991 in the United Kingdom an independent market-research organization commissioned by Lloyd's Register Quality Assurance Ltd. (LRQA), an ISO 9000 certification agency, questioned 400 quality managers of ISO 9000-certified companies as to whether TQM activities had developed instead of or in addition to ISO 9000. The survey found that 97% of the companies were developing TQM in conjunction with ISO 9000 (Q Review, 1993). To demonstrate the business value of reported ISO 9000 certification benefits, LRQA used key business indicators to compare 222 ISO 9000-certified companies with the industry average in the mechanical engineering manufacturing sector (ISO 9000 News, 1996d). The key findings are presented in box 4.

Table 7

BENEFITS OF ISO 9000 CERTIFICATION, ACCORDING TO SELECTED SURVEYS

	Affirmative responses (%) [a]		
BENEFITS OF ISO 9000 CERTIFICATION	Survey Ab[b]	Survey B[c]	Survey C[d]
BENEFITS			
ENTERPRISE LEVEL:			
CONTINUOUS IMPROVEMENT:			
Improved documentation	74	89	45 (80)
Customer and quality focus	62	83	
Improved processes	51		
Reduced scrap and rework	38	19	
Increased efficiency and productivity	37	40	20 (70)
Enhanced company communications	26	53	
Improved company morale	25		25 (70)
Reduced warrantee claims	13		
CONSUMER SATISFACTION:			
Higher perceived product quality	60	83	
Valuable marketing tool	57		
Improved customer satisfaction	44		25 (65)
SUPPLIERS			
Encouraging certification:	74		65
all suppliers	50	25	
select suppliers	29	22	
may encourage	-	36	10
When certified:			
positive difference		51	
no difference		32	

Source: Survey A: *ISO 9000 News*, "Australian ISO 9000 survey reveals significant gains for certified organization", T. O'Brian, Engineering Centre for Manufacturing, Carlton, Victoria, Australia, April, 1995; Survey B: Irwin Publishing; "The ISO 9000 survey, comprehensive data and analysis of registered companies in the United States and Canada", Burrkidge, Illinois, 1996; Survey C : *ISO 9000 News*, "Survey provides "snapshot" of ISO 9000 certification in ten countries ", Ernst and Young, Brisbane, April 1995.

[a] Survey C respondents could distinguish between major and minor influence/benefits. Major influence/benefits are listed while the total of both major and minor influence/benefits are listed in brackets.

[b] Represents 477 organizations in Australia.

[c] Represents 1880 organizations in the United States and Canada.

[d] Represents 1000 leading manufacturing companies in Australia, Canada, France, Germany, Japan, South Korea, Sweden, The Netherlands and Great Britain. Survey conducted by Ernst & Young in 1994.

Box 4
Enterprise results of ISO 9000-certified companies as compared with the industry average (engineering manufacturing sector)

Profit margin: Certified companies report profits more than double the industry average. For small companies profitability was almost three times the average.
Return on capital employed (ROCE): Certified companies show a ROCE of almost double the industry average.
Sales per employee: Large companies recorded figures more than double the industry average.
Capital employed per employee: Here again, certified companies exceed the industry average with medium-sized firms showing the greatest positive differential.
Asset turnover: ISO 9000 certified companies invest up to 70% more than the industry average.

Source: ISO 9000 News, "ISO 9000-registered companies are twice as profitable, says survey of Lloyds Register Quality Assurance", No. 1, 1996.

Three international ISO surveys (ISO 9000 News, 1995a; Irwin Publishing, 1996; ISO 9000 News, 1995c) report that the primary benefits of ISO 9000 certification are improvements in competitive performance and in production processes (see table 7). The reported benefits of ISO 9000 certification are directly associated with the TQM concepts of continuous improvement and consumer satisfaction. The surveys demonstrate that companies repeatedly recognize that the ISO 9000 standards are a powerful tool for achieving effective quality management and greater consumer satisfaction. The ISO 9000 standards improve operational efficiency, productivity, the quality of goods and services and market performance, thereby contributing to a company's competitive performance in both domestic and global markets.

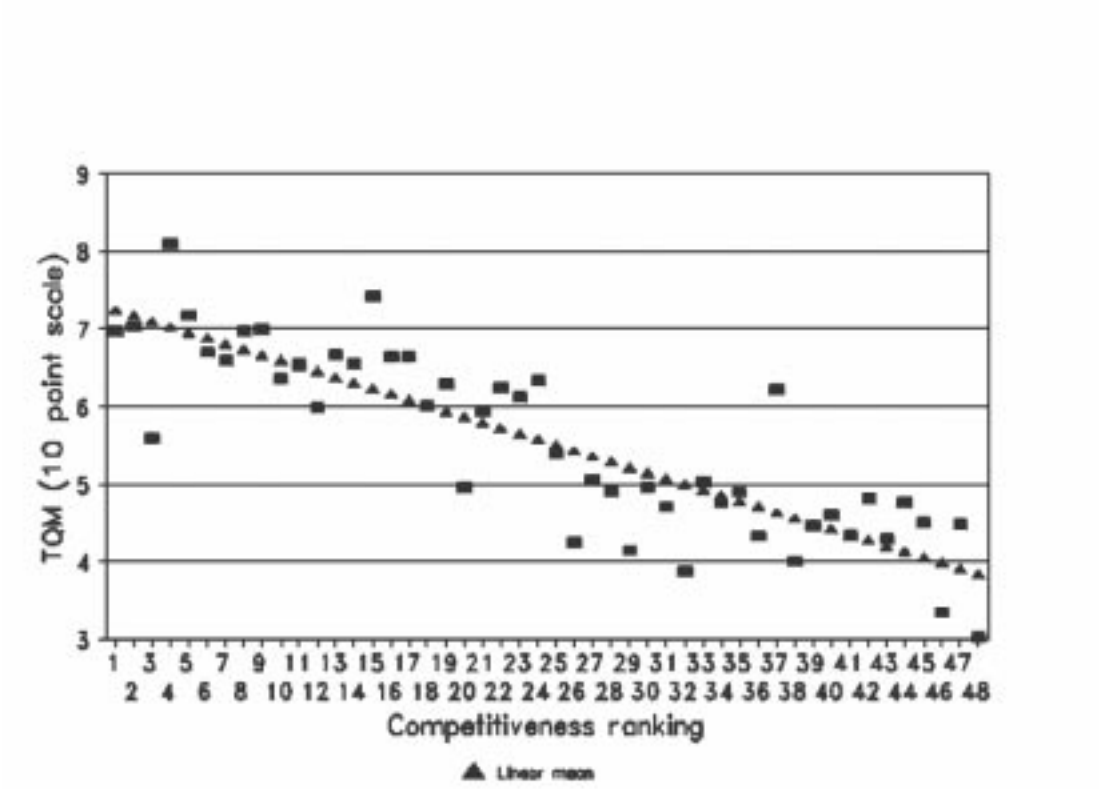
Table 7 further indicates that several of the benefits of ISO 9000 implementation and certification are directly related to the implementation of quality management techniques in the production chain. In industrial supplier markets, suppliers and subcontractors to ISO 9000-certified companies may perceive pressures to implement process- oriented quality-assurance schemes. A study carried out by the European Commission (1995b) showed that each subcontractor was audited by its principal clients more than seven times a year, which cost more than US$30,000 yearly. ISO 9000 certification by third parties is a means to reduce the number of audits substantially, resulting in increased savings in resources and credibility in the suppliers' technical capabilities.

Benefits such as easier access to export markets, improved product quality and increased competitiveness demonstrates the importance of ISO 9000 at the national level. It proves difficult to link directly the number of companies certified for ISO 9000 to the international competitiveness of a particular country. However, the average tendency is for countries applying higher levels of TQM in general to achieve more ISO 9000 certificates (see figure 5), although there is a wide variability in the data.[23] ISO 9000 contributes to

[23] The non-linear relationship between TQM and the number of ISO 9000 certificates may be observed in the case of Japan, which is ranked first in the world in TQM but has not achieved a large number of ISO 9000 certificates. In Japan there was obviously no widespread need to adopt a quality system according to the ISO 9000 format since companies were well advanced in TQM

competitiveness because it prevents potential technical barriers to trade, but this requires that domestically issued certificates be recognized internationally. Therefore, the credibility of the domestic ISO 9000 certification scheme is important for competitiveness at the national level.

Figure 5
ISO 9000 AND TQM



[a] Since the amount of ISO 9000 certificates in a particular country depends on the economic volume of that country, the amount of ISO 9000 certificates has been adjusted to reflect the volume of exports. This was done as follows: the number of ISO certificates (Mobil 1996) was divided by the quotient of the amount of exports of a country and the amount of exports of the United States (world's largest exporter) (IMF 1996). This implies that the numbers on the y-axis have no real meaning.

[b] The TQM ranking is presented in the 1995 World Competitiveness Report (IMD, 1995). Annex 2 contains a list of country names that correspond to the numbers.

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implementation. Initially ISO 9000 was perceived as an unnecessary change leading to increased costs.

The number of ISO 9000 certificates within a country represents a trend in the economic sector to apply a quality management system that can be objectively evaluated in international markets. The widespread implementation of an ISO 9000 quality system facilitates the widespread application of TQM, which in turn contributes to the competitive performance of enterprises, sectors and countries. However, the ISO 9000 guidelines only initiate and facilitate the implementation of TQM practices. For sustainable market performance, companies must go beyond the ISO 9000 standards to comprehensive quality management techniques.

Chapter III

DIFFUSION OF THE ISO 9000 STANDARDS

The next sections discuss global and regional trends concerning the number of ISO 9000 certificates achieved. The diffusion of ISO 9000 standards and quality management in Latin America is covered in detail.

Global tendencies

The data presented in table 8 indicate that the ISO 9000 standards have been widely accepted in a short time. In this respect, the ISO 9000 standards are the fastest-growing international standard ever. The standards have been adopted by over 70 countries around the world, an average annual growth rate of more than 50%. Assuming that the average costs for implementing an ISO 9000 quality system range from US$50,000 to US$200,000, about US$5 billion to US$20 billion was invested globally in ISO 9000 between January 1993 and December 1995 (Saaralainen, 1996).

About one-third of the issued certificates concern the ISO 9001 model, while the remaining two-thirds concern ISO 9002 certification. ISO 9003 represents only 1% of the total number of issued ISO 9000 certificates. Apparently, most companies do not expect many benefits from ISO 9003 certification, which only encompasses inspection of the final product.

United Kingdom

In the beginning of 1996, about 40% of the total number of ISO 9000 certificates had been issued in the United Kingdom. The British national standard on quality management systems (BS 5750), which was the main precursor of ISO 9000, was first published in 1979. BS 5750 was developed partly as a reaction to the Japanese quality management movement, with its emphasis on employee behavioural change and TQM principles. In contrast, the use of codified rules to impart organizational change seemed to be more culturally compatible to the British factory tradition. After the development of the ISO 9000 standards British companies could easily convert their BS 5750 certificate into an ISO 9000 certificate by incorporating minor changes. Another big impetus for the fast growth in the United Kingdom came from the White Paper, a government policy paper on quality and international competitiveness of industry published in 1982, This programme assisted smaller firms with the costs of engaging external consultants to advise them on how to prepare for BS 5750 and ISO 9000 certification.[24] Between 1988 and 1994, companies with not more than 50 employees could be reimbursed for up to 50% of the consultancy fees. The funding

[24] No funding was available for assessment fees by certification agencies.

programme ceased in 1994 which has had the impact of slowing down the growth of ISO 9000 certification. Personal correspondence with the Quality Assurance Department of the British Standard Institute, 1996.

Table 8
THE NUMBER OF COMPANIES WITH CERTIFIED ISO 9000 QUALITY SYSTEMS, BY REGION

Region/country [a]	Jan. 1993	June 1994	March 1995	Dec. 1995	Share 1996
United Kingdom	18,577	36,832	44,107	52,591	41%
Europe:[b]	4,515	18,577	27,810	40,019	31%
Germany	790	3,470	5,875	10,236	
France	1,049	3,359	4,279	5,535	
The Netherlands	716	2,718	4,198	5,284	
Italy	188	2,008	3,146	4,814	
Spain	43	586	942	1,492	
North America:	1,185	4,830	7,244	10,159	8%
United States	893	3,960	5,954	8,762	
Pacific	1,862	4,628	6,479	10,526	8%
Australia	1,668	3,710	5,299	8,834	
Asia	692	3,421	6,568	10,278	8%
Japan	165	1,060	1,827	3,762	
NIEs [c]	382	1,561	3,004	3,892	
India	8	328	585	1,023	
China	10	150	285	507	
South-East Asia[d]	4	59	229	370	
Africa/Middle East:[e]	954	1,705	2,286	2,340	2%
South Africa	824	1,161	1,369	1,454	
Israel	110	279	497	526	
Saudi Arabia and the UAE	7	65	108	202	
Latin America	39	533	873	1,440	1%
Brazil	19	348	548	932	
Mexico	16	85	145	215	
TOTAL[f]	27,824	70,526	95,367	127,389	

Source: Mobil Europe Ltd., "The Mobil survey (fifth cycle) of ISO 9000 and environmental certificates awarded worldwide", August 1996. Also published in ISO 9000 News No. 6, August 1996.

a To compare the number of certificates in different countries, objectively one should consider the relative volumes of the economy and/or exports. The number of certified companies can only give a limited indication of the actual volume of products that are produced or exported under certification.

b Excluding the United Kingdom.

c Newly Industrial Economics (NIEs) (% of certificates in December 1995): Taiwan (35%), Singapore (30%), Hong Kong (19%) and South Korea (16%).

d South-East Asia (% of certificates in December 1995): Thailand (39%), Indonesia (34%) and the Philippines (27%).

e The majority of the certificates have been issued in South Africa (62%), Israel (23%), Saudi Arabia (4%) and the United Arab Emirates (4%).

f It is estimated that in 1998/1999 there will be approximately 225,000 ISO 9000 certificates issued.

Europe

European companies have taken the standards seriously, and thousands of companies are spending considerable resources to establish quality systems meeting the requirements of ISO 9000. More than 70% of all ISO 9000 certificates have been issued in Europe. While the standards were first adopted by industries in the chemical and mechanical sectors, adoption is now common throughout the industrial sector. A major ISO 9000 certification body, Société Générale de Surveillance (SGS), is also observing a shift toward ISO 9000 adoption in the service sectors (ISO 9000 News, 1995d).

The European Commission has issued various technical directives which have made the use of a recognized quality standard fundamental for doing business in the European Union.[25] A well-documented and well-implemented ISO 9000 quality management system has thus become common, though generally not obligatory, in the European business environment. The draft of the European Quality Promotion Policy, however, argues that ISO 9000 certification should only be applied when other, less-burdensome means cannot be used to obtain assurances (European Commission, 1995). It is something of a coincidence that the unification of Europe into a single market has run parallel to the introduction of the ISO 9000 standards. ISO 9000 is one of the tools for facilitating harmonization and, as such, has been used to its full advantage. Regional economic integration and the harmonization of quality and safety issues explain the large number of ISO 9000-certified companies in Europe (CBI, 1994). As in the United Kingdom, several European governments have established programmes that provide financial support for the implementation of the ISO 9000 quality system in industrial sectors. Furthermore, nations in the European Union have to establish a credible national infrastructure that can perform conformity-assessment activities.

[25] Since 1992, the European Commission has been developing the so-called New Approach Directives on the harmonization of technical demands for different product groups. Products covered under these New Approach Directives need to bear the EC mark in order to be traded. The EC mark is not a quality mark, but rather a safety mark. However, a certified quality system along the lines of one of the ISO 9000 models is required as part of the process of obtaining the EC mark. Hence, ISO 9000 certification may, in practice, be obligatory for products covered by the New Approach Directives: toys, pressure vessels, building products, machinery, electromagnetic compatibility, personal protection means, non-automatic weighing systems, active implantable electromedical devices, gas appliances, peripheral equipment for telecommunication, high-efficiency central-heating boilers, explosives for civil use, medical appliances, low-voltage electrical equipment, recreational craft and elevators (European Commission, 1995b; CBI 1994).

North America

Past apprehension to the "European standard" have given companies in North America a late start in adopting the ISO 9000 standard. So far only about 10,000 companies have achieved ISO 9000 certification. The main obstacles include resistance to additional regulations and procedures, the high associated costs of certification and uncertainty whether large companies and government institutions require suppliers to be ISO 9000 certified (Zuckerman, 1994). However, the importance of ISO 9000 became clear and convincing in 1993, when the "Big Three" automobile manufacturers in the United States (Ford, Chrysler and General Motors) took the decision to include the ISO 9001 model in a harmonized quality-system requirement programme for their suppliers, called QS 9000.[26] Additionally, the United States Department of Defense has approved the use of the ISO 9000 series instead of specific military quality standards. The number of companies that will achieve ISO 9000 certification is therefore expected to increase over the next few years. The United States was the first non-European nation to establish an accreditation body, called the Registrar Accreditation Board (RAB).

The Pacific

The demand for ISO 9000 certification in Australia and New Zealand has been relatively high. State and Federal Governments have introduced formal purchasing policies specifying compliance with the ISO 9000 standards for supply of goods and services. Several government and other public organizations have obtained ISO 9000 certification.

Asia

The number of certificates issued to companies in Japan and the Newly Industrialized Countries (NIEs) [27] account for the majority of the total certificates in Asia. Companies in these countries were pioneers in establishing quality management systems that operate somewhat differently from the ISO 9000 standards, with much more emphasis on TQM principles. This, combined with existing high levels of quality and international competitiveness, has resulted in the relatively low number of companies that have implemented ISO 9000 quality systems. Nevertheless, ISO 9000 certification has grown rapidly over the last two years, reflecting the standard's importance in international trade.

In most of the countries in developing Asia, the primary motivation for implementing the ISO 9000 standards has been to facilitate exports, especially to the European Union. However, with the exception of Malaysia, demand for ISO 9000 certification has started only recently and is still at relatively low levels compared to developed nations. In Malaysia, the national certification agency, Standards and Industrial Research Institute (SIRIM), has taken an active stance since 1988; its ISO 9000 certification scheme is currently purely market and consumer driven (ISO 9000 News, 1995e).

[26] QS 9000 is based on the ISO 9001 model and contains additional requirements that are specific automotive industry. The data presented in table 8 do not include QS 9000 certificates.

[27] South Korea, Taiwan, Hong Kong and Singapore (NIEs).

Developing countries

Only 2-3% of the total number of ISO 9000 certificates have been issued in developing countries. The majority of these certificates has been obtained by large companies, of which a sizable number are transnationals or joint-ventures. Very few small- and medium-sized enterprises (SMEs) in developing countries have achieved certification. The main reasons for the relatively low number of certified companies in developing countries are the lack of quality awareness and the perceived high cost of implementing the ISO 9000 standards. ISO 9000 certification is perceived as important primarily for exporters, particularly in Asia and Latin America. Therefore, the reasons for implementing ISO 9000 are related more to international trade issues, such as meeting overseas customer demand, removing barriers to trade or increasing market share, and less to improving internal efficiencies. Most respondents from both regions agree that they need to face the increasing tendency towards quality products and consumer protection and that the "ISO 9000 quality assurance revolution" demands basic structural changes in the way international trade is applied (UNIDO/ISO, 1996).

The UNIDO/ISO survey (1996) further concludes that awareness of ISO 9000 is reasonable, because most countries were promoting quality awareness in general. On the other hand, few countries operate special funding or technical-assistance programmes related to ISO 9000 implementation. The institutional structure related to ISO 9000 implementation is inadequate in many developing countries. Technical support services such as information, training and consultancy are generally available, but trained auditors and internationally recognized certification services are less available. It seems that the recognition of existing testing and certification bodies in developing countries is still moving with difficulty. Few certification bodies have signed Memoranda of Understanding (Molls) with foreign bodies. National accreditation schemes are present in few countries, and few Mutual Recognition Agreements (MRAs) have been signed.

Tendencies in Latin America and the Caribbean

The number of certifications in Central and South America are presented in table 9. With the possible exception of Brazil the surge in demand for ISO 9000 certification in Latin America has mainly come from a) subsidiaries of multinational companies that are implementing ISO 9000 globally; b) joint ventures or large national companies that are widening existing export markets; c) enterprises that are strengthening their domestic market base while seeking to increase their exports to foreign markets; and (d) enterprises that are not yet export oriented but use stringent safety measures in their operations.

The number of companies that have achieved ISO 9000 certification is relatively low in Latin America —about 1% of the world total (see also table 8). In July 1996, approximately 80% of the certificates had been issued in the two largest economies of the region: Brazil and, to a lesser extent, Mexico, where ISO 9000 certification started to take off in 1994. In Argentina and Venezuela certification seems to have taken off in 1996, while in Colombia and Chile the growth of ISO 9000 certification has been steadily increasing since 1995. Currently, many companies are in the process of establishing ISO 9000 quality systems in these six countries. In Uruguay and Peru, ISO 9000 certification is still limited, but there seems to be quite a lot of interest from the economic sector. In the countries of Central America, ISO 9000 remains low, although about 30 companies in Costa Rica are in the process of implementation and certification. The first ISO 9000 certificates are expected to appear soon in Guatemala and El Salvador. The diffusion of the ISO 9000 standards remains

low in Panama, Nicaragua, Honduras and Belize, as well as in the Caribbean region (with the exception of Puerto Rico and Trinidad and Tobago).

Table 9
NUMBER OF COMPANIES IN LATIN AMERICA WITH CERTIFIED ISO 9000 QUALITY SYSTEMS

Country	Jan. 1993	Sep. 1993	June 1994	June 1995	June 1996	Share 1996
Brazil	19	113	384	607	1150	66%
Mexico	16	24	85	150	256	15%
Argentina	3	9	23	37	123	7%
Venezuela	1	1	2	56	81	5%
Colombia	-	6	23	51	49	3%
Chile	-	3	9	15	22	1%
Puerto Rico	-	2	4	12	25	1%
Trinidad and Tobago				2	9	
Uruguay				6	8	
Peru	-	-	-	-	7	
Curaçao					4	
Dominican Republic				1	4	
Costa Rica	-	1	1	2	3	
Cuba					2	
Jamaica	-	-	-	-	2	
Bahamas and Barbados	-	-	1	1	2	
El Salvador	-	-	1	1	1	
TOTAL	39	159	533	941	1748	

Source: Based on Mobil Europe Ltd., “The Mobil survey (fifth cycle) of ISO 9000 and environmental certificates awarded worldwide”, August 1996.

Surveys in Brazil (CNI, 1996 and 1994) and Argentina (A. Ramos, 1995) report no major differences regarding issues related to ISO 9000 implementation and certification as compared to the rest of the world (see table 10). For example, ISO 9000 implementation time and costs are similar. On the other hand limited use of external consultants was made after extensive training efforts by government productivity and quality programmes. In Brazil, some certified companies pressure suppliers to certify as well, and an ISO 9000 system is often implemented in addition to TQM techniques.

Table 10
ISO 9000 IMPLEMENTATION AND CERTIFICATION IN BRAZIL AND ARGENTINA

Implementation aspect	Responses (%) [a]
Implementation time	28 : less than 1 year 55 : 1 to 2 years 14 : 2 to 3 years
Implementation and certification costs Average certification cost [b]	6 : US$0 - 10,000 42 : US$10,000 - 100,000 33 : US$100,000 - 1,000,000 ISO 9001: US$18,300 (2000 employees) ISO 9002: US$10,500 (250 employees)
Distribution of costs [c]	40 Consultancy and training 40 Metrology 10 Certification 10 Overhead
Type of external services used Use of government credit lines	57 : None 40 : Consultants 3 : Head-office support 94 : No
Methods used to facilitate employee participation	32 : Financial bonuses 18 : Promotion and "decoration" 13 : Salary increases 18 : Other 38 : No formal methods
Supplier quality-system evaluation	33 : Yes 12 : Will require ISO 9000 55 : None
Other quality management techniques used	47 : TQM 8 : Quality-control circles 5 : Statistical process control 2 : Benchmarking 2 : Kanban 2 : Cycle time 1 : Reengineering

Source: Instituto Nacional de Metrologia, Normalizacao e Qualidade Industrial (INMETRO) and Ministerio da Industria, do Comercio e do Turismo (MICT), "Brasil e a certificacao ISO 9000", Brasilia, May 1996; Confederation of National Industries (CNI), "A insaciavel busca da competitividade", *Revista CNI*, Rio de Janeiro, November-December 1994.

[a] The INMETRO/MICT survey was carried out among 1,150 companies with ISO 9000 certification. Results are based on the 592 companies that replied. The CNI Survey was carried out among 93 Brazilian enterprises with ISO 9000 certification.

[b] Survey carried out by Centro Brasileiro da Qualidade, Seguranca e Productividade (QSP)in 1994. Figures refer to the average certification costs of 8 certification bodies. Published in CNI, "ISO 9000 como instrumento de competitividade: a experiencia Brasileira", Rio de Janeiro, 1996.

[c] Survey carried out by FUNDECE among 49 companies in Argentina.

ISO 9000 diffusion factors

The ISO 9000 norms have been adopted at different rates in the different regions in the world. The ISO 9000 standards have diffused most rapidly within the countries of the former Commonwealth and the European Union; steadily in North America and Developed Asia; and, so far, little in Latin America, Africa and Developing Asia, although growth rates are very high in some countries. This section discusses the underlying factors that may have caused these different rates of diffusion. The diffusion of the ISO 9000 quality systems can be viewed in two different ways: diffusion as an international standard and diffusion as a quality management technique.

Diffusion as an international standard. International standards are adopted when trading partners or countries feel the need to harmonize trade issues. The diffusion of international standards occurs to a large extent in the form of quasi-systematic endorsements within a country's own national set of standards, especially when export activity is being initiated or consolidated. Trade across national borders is increasingly, formalized in contracts which specify penalties and legal actions for products that do not comply to certain predetermined standards. These contracts often include verification by third-party organizations to ensure objectivity.

The increased globalization of trade and the resulting need for harmonization have made the ISO 9000 guidelines for quality systems the fastest growing international standard ever. The rapid international diffusion of the ISO 9000 series is due to at least two basic values: a) they are the only universally accepted standard for quality systems, and b) they provide clear criteria for establishing quality systems that can be properly documented and objectively audited and certified for contractual purposes.

Diffusion as a quality management technique. Although the adoption of the ISO 9000 system is voluntary, competitive pressures arising from international and domestic markets can be an important driving force for companies to achieve ISO 9000 certification. Companies may feel the need to implement an ISO 9000 quality system because they recognize the need to improve their performance in relation to their competitors or because they are pressured by clients who use quality management techniques and who therefore prefer suppliers that do the same.

Three main areas seem to be particularly important for defining the nature and speed of the diffusion of the ISO 9000 guidelines in particular countries or economic sectors. These are trade considerations prevailing in different geographical areas; enterprise-level considerations; and macro-level considerations.

Market and trade factors

An important factor in the diffusion of the ISO 9000 standards is whether the standards are viewed as the best way, or as just another way, of meeting market demands. These demands or pressures can originate from an organization's participation in the international market place, from regional economic trade agreements, from domestic markets or from a combination of these.[28]

[28] An indication of the trade influence may be obtained by calculating the amount of manufactured exports (US$) per ISO 9000 certificate per country. In countries where international markets are primarily determining ISO 9000 diffusion rates, roughly US$150 million of goods are exported for every ISO 9000 certificate. In regional trade agreements such as the European Union and

International trade. The wide acceptance of the ISO 9000 standards in the European Union has influenced the adoption of the standards in overseas markets. As European companies began to evaluate their international trading partners, contracts demanding the existence of ISO 9000 quality systems became increasingly common. Consequently, the ISO 9000 standards have diffused steadily in those countries that trade with the European Union. The relatively late development of the ISO 9000 standards in North America and Asia has in turn influenced the rate of adoption in Latin America and Developing Asia.

The global tendencies in the diffusion of the ISO 9000 will no doubt increase the demand for certification in certain exporting sectors of the countries in Latin America, especially those sectors in which appliance of ISO 9000 is common. Such companies will confront international market pressures and/or perceive competitive advantages concerning ISO 9000 certification. Companies that export products to the European Union may encounter obligatory certification, most notably for products that are covered under the EC New Approach Directives. The Chamber of Industry in Brazil (CNI, 1996) reports that the main driving factor for the introduction of ISO 9000 was the necessity to prevent technical barriers to trade with the European Union.

Regional economic trade agreements. Harmonization and standardization of regulations involving quality issues within a framework of regional trade agreements between the countries of the European Union has no doubt, played an important role in the diffusion of the ISO 9000 standards. Here, the standard almost serves as a prerequisite for intraregional trade, providing trade partners with confidence in product quality. The relatively late implementation of the ISO 9000 standards in North America has limited the influence of the North American Free Trade Agreement (NAFTA) on ISO 9000 diffusion.

In Latin America, there are currently seven regional trade agreements that will increase the demand for ISO 9000 certification related to intraregional trade. In certain sectors, ISO 9000 certification will probably become increasingly common in trade between the countries of the Southern Common Market (MERCOSUR) (Argentina, Brazil, Chile, Paraguay and Uruguay) and the Andean Pact (Peru, Bolivia, Ecuador, Venezuela and Colombia).

Domestic markets. Once the ISO 9000 certification becomes widely accepted within a country's economic sector, the need to keep up with competitors becomes apparent. In this phase induced international demand becomes less important for the establishment of an ISO 9000 quality system, because trade between domestic partners will be facilitated by ISO 9000 certification. Large multinational and national companies require their suppliers to establish quality management systems along the lines of ISO 9000. However, the cost-effective implementation of the standards in the supplier network often requires a certain level of maturity in the institutional network, as well as specific government programmes that stimulate the diffusion and adoption of the ISO 9000 standards.

A country's domestic public sectors can provide an important driving force for ISO 9000 certification. Demand from the public sector can originate from procurement by government agencies or from compulsory regulations involving products and production processes that can adversely affect public health and safety. The public sectors in the European Union, North America and Australia/New Zealand may select their suppliers on the basis of the existence of ISO 9000 quality systems. The implementation of the ISO 9000 standards as a result of domestic market pressures is being initiated in some countries in the region. Some of these industrial sectors include manufacturing, aeronautics, electrical

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the North American Free Trade Agreement, (NAFTA) this figure lies between US$50 million and US$150 million. In countries where ISO 9000 is common in domestic markets (e.g., the United

equipment, telecommunications, chemicals and basic metals. In general, domestic pressures for certification in Latin America will probably become increasingly common in the medium and long term. In Brazil, the public sector and state enterprises apply ISO 9000 supplier-preference schemes in their procurement policies.

An international survey (UNIDO/ISO, 1996) found that the most important reasons for ISO 9000 certification in developing countries in Latin America are to meet overseas customer demand and to remove barriers to trade. Such studies lead one to conclude that those companies that are exposed to the pressures of international markets have adopted quality management techniques. This partly explains why a significant number of transnational and large exporting companies in Latin America have sought ISO 9000 certification. Such companies view quality as an integral part of their competitive strategy, and they are usually aware of the benefits of quality management techniques in the organization itself as well as throughout the production chain. In Latin America, past regional and domestic market considerations have not created high levels of quality awareness.

The situation in the industrialized areas of Brazil is distinct from the rest of Latin America.[29] The main driving factors for certification in Brazil are not directly caused by external trade factors (see table 11). Note that domestic market considerations are an important motivational factor for ISO 9000 certification, and the experienced benefits concern increased operational effectiveness and efficiencies. Another, more-recent survey in Brazil (INMETRO/MICT, 1996) also reports that ISO 9000 certification is driven by institutional clients (i.e., other companies) rather than by voluntary awareness. Consequently, quality awareness should be higher in the industrialized areas of Brazil than in the rest of Latin America.

The survey was carried out among 93 Brazilian enterprises that had achieved ISO 9000 certification. 46% of the respondents mentioned that the larger part of enterprise capital was multinational.

Enterprise-level factors

Type of sector. Even though the ISO 9000 standards are generic and can be applied to any organization, some sectors have implemented the standards more rapidly than others. For example, in Latin America the standards have diffused more rapidly in the high-value-added industrial sectors than in the agricultural and service sectors. Within the industrial sector, the chemical and manufacturing subsectors have implemented the ISO 9000 quality systems more rapidly than the textile and wood subsectors. The structure of the economic sector of a particular country or region influences the diffusion of the ISO 9000 standards.

Kingdom or Australia), it is less than US$50 million per certificate.

[29] In May 1996, the states of Sao Paulo, Rio de Janeiro, Minas Gerais and Rio Grande do Sul accounted for 82% of the total ISO 9000 certificates in Brazil.

Table 11

DRIVING FACTORS AND BENEFITS OF ISO 9000 CERTIFICATION IN BRAZIL

DRIVING FACTORS	Affirmative responses (%)
Client needs	34
Improved quality and productivity	3
International competitiveness	31
Support for export commitments	13
Improved staff awareness	4
Reduced operational costs	4
Contractual requirements	2
Fiscal incentives	1
Other	17
EXPERIENCED BENEFITS	
Productivity increases	55
Process standardization	35
Improved staff awareness	32
Improved product quality	25
Improved image	21
Increased client satisfaction	21
Cost reduction	18
Improvement in the quality system	10
Fulfilment of export requirements	7
Results still to come	4

Source: Confederation of National Industries (CNI), “A insaciavel busca da competividade”, *Revista CNI*, Rio de Janeiro, November-December 1994.

Different sectoral ISO 9000 diffusion rates may be due to a variety of factors, including; a) the importance of quality as a competition factor; b) the use of other quality standards; c) the extent of the "globalization" of the sector (e.g., the presence of multinational companies); and d) the nature and extent of intrafirm relations in a particular sector including a high level of vertical integration, horizontal competitiveness and supplier evaluation.

ISO 9000 certification in Brazil and Argentina is presented in table 11. Diffusion of ISO 9000 certification is most rapidly achieved in the International Standard Industrial Classification (ISIC) sectors 3.8 (i.e., production of metal products, machinery and appliances), 3.5 (i.e., production of chemical substances and chemical derivatives of petroleum, carbon, rubber and plastic), 3.7 (i.e., basic metal industries) and 3.4 (i.e., production of cellulose, paper and paper products and printing). As in the rest of the world, the ISO 9003 model is not very widely applied.

The data presented in table 12 reflect the relative number of certified companies as compared to other sectors. The figures do not reflect the actual product volumes manufactured under ISO 9000 certification. For example, most of the pulp and paper production plants in Brazil, Argentina and Chile have achieved ISO 9001 or ISO 9002 certification. However, ISO 9000 seems to be most relevant for the companies, suppliers and contractors in the chemical, basic metal and manufacturing industries. ISO 9000 certification in the food and beverage sector has not been common primarily because of the use of other quality system standards in these sectors. The most common is the Codex Alimentarius

Hazard Analysis Critical Control Point (HACCP) developed by the FAO/WHO Codex Alimentarius Commission[30] (see FAO, 1994). This process standard is concerned with product hygiene, health and safety characteristics through control in the production process (see FAO/WHO, 1995).

Table 12
THE SECTORAL DISTRIBUTION OF ISO 9000 CERTIFICATES IN BRAZIL AND ARGENTINA

Sector	Brazil	Argentina
Agriculture	0%	0%
Mining	1.3%	0%
Industry	84.3%	92.7%
Foods, beverages and tobacco	2.2%	6.5%
Textiles and leather	1%	0%
Wood industry and wood products	0%	0%
Pulp, paper, printing and publishing	2.3%	2.4%
Chemicals (including petrochemicals and plastics)	20.7%	30.1%
Non-metallic minerals	7.9%	2.4%
Basic metals	12.3%	14.6%
Manufacturing and machinery	30.8%	36.6%
Other manufacturing	7.1%	0%
Electricity, gas and water	0.1%	0%
Construction	1%	0%
Commerce and hotels	0.3%	0%
Transport and distribution	4%	4.1%
Finance and banking	1.8%	0%
Collective, social and personal services	7.3%	3.3%
Non-specified activities	0%	0%
Distribution of:		
ISO 9001	33%	35%
ISO 9002	66%	64%
ISO 9003	1%	1%

Source: Committee for quality of the Brazilian Association of Technical Standards (ABNT/CB-25), "Brazilian quality: Over 1000 ISO 9000 certificates", 1996; Subsecretaría de Acción de Gobierno de la Presidencia de la Nación, "Updated list of ISO 9000 certified companies in Argentina", Buenos Aires , May 1996.

Geographical export destination. Although there are exceptions, the ISO 9000 standards have diffused most rapidly in those companies that are oriented towards export markets where quality is an important competition factor and where ISO 9000 certification is common. Both Brazil and Mexico have sizable exports to the European Union and NAFTA.

[30] HACCP is also a certifiable process standard, but it is focused on quality control in the primary production process while ISO 9000 presents 20 requirements for organizations.

Pressures for ISO 9000 certification seem to have affected, for example, Brazilian metalworking companies that export to the European Union. Thus, both export destinations and type of exports are factors specific to the enterprise that influence the diffusion of ISO 9000.

Property structure. It is not possible to distinguish foreign subsidiaries from nationally owned companies with certainty, but it is estimated that about 50% of the ISO 9000 certificates obtained in Latin America belong to subsidiaries of transnational companies and joint ventures. Such companies often implement ISO 9000 as a result of corporate strategy (i.e., demand from the head office). Of the 123 companies certified in Argentina, more than 50% bear the names of multinational companies. According to an ISO 9000 survey of 93 companies in Brazil, about 46% reported that the larger part of enterprise capital was foreign (see table 11).

Company size. Diffusion of the ISO 9000 standards occurs more rapidly in medium-large and large enterprises. The financial and human resources to implement quality management techniques are more readily available in larger companies and implementation costs of the ISO 9000 standard are relatively smaller as a percentage of total turnover. Moreover, the payback period for the costs associated with ISO 9000 implementation is relatively longer in SMEs (see also tables 4 and 5).

Macro-level factors

The existence of certain conditions at the macrolevel can also influence the diffusion of ISO 9000 standards.

Existence of government programmes. Several governments throughout the world view the application of international quality standards such as ISO 9000 as an important tool for industrial and economic growth. This has led to increased allocation of resources to national standardization bodies, quality-awareness campaigns, consolidation of the national institutional-support structure for ISO 9000 implementation and certification, and, in some cases, special support programmes. For example, the British programme to reimburse companies for certification-related consultants' fees is partly responsible for the large number of British companies with ISO 9000 certification.

The relatively large number of ISO 9000 certifications in Brazil may be partly attributed to the government's programme for productivity and quality, which aims to establish and support such an institutional framework. Government programmes in Latin America which promote quality and ISO 9000 are discussed in more detail in chapter IV.

Institutional infrastructure. The implementation of the ISO 9000 standards will require the services of various organizations and institutions (see chapter II). In most countries in the European Union, third-party product certification has been common for several decades, whether compulsory (i.e., when products or production processes may affect public safety) or voluntary. Consequently, the existing institutional infrastructure easily integrated activities related to ISO 9000 certification.

National accreditation and certification programmes have only recently started to emerge in Latin America and the Caribbean. This implies that formal accreditation procedures are still being developed, that international recognition is limited for the ISO 9000 certificates registered by national certification agencies, that technical services may be inadequate and that the costs of implementation can be substantial due to the amount of foreign expertise required. Under these conditions companies encounter serious practical constraints in their attempt to achieve certification.

Other. Various considerations at the macro-level may influence the diffusion rate of the ISO 9000 norms. These include the prevailing macroeconomic conditions, the level of basic education of employees, labour relations and cultural factors.

Latin American companies often operate in domestic markets with repressed demand, economic liberalization and privatization and high interest rates. Unstable macroeonomic conditions tend to result in high levels of interest on financial loans, which complicates ISO 9000 implementation, especially in SMEs. For example, the recession in Mexico in 1995 has most likely stagnated the demand for ISO 9000 certification.

Basic education provides the basis for employee training programmes, which create the skilled and technical labour necessary to implement an ISO 9000 quality management system. In-company training already accounts for a large part of implementation costs; it will only be more costly if basic educational levels are low.

The successful implementation of an ISO 9000 quality management system will partly depend on the motivation and participation of the work force. Labour issues such as the stability of employment, wages and promotion schemes, traditional labour practices and the role of labour unions all influence the diffusion of organizational change.

Cultural factors are generally not considered to influence the diffusion of the ISO 9000 standards,[31] although aspects of ISO 9000 quality systems may differ among countries to suit local conditions. Therefore, cultural factors should be considered in the ISO 9000 implementation process.

Future tendencies in the diffusion of ISO 9000

Two important tendencies are responsible for the expected increased use of the ISO 9000 standards: 1) increased trade within a framework of international and regional free-trade agreements (i.e., diffusion as an international standard) and 2) increased pressures from clients and competitors for quality management assurances (i.e., diffusion as a quality management technique).

First, from 1990 to 1994, The World Trade Organization registered a record of 33 regional trade agreements. Free-trade agreements generally tend to harmonize and standardize trade issues. The large demand for ISO 9000 certification and the various, related private- and public-sector efforts to streamline the institutional infrastructure for conformity assessment indicate that the ISO 9000 standards will be the most important international standard for quality management in trade issues. ISO 9000 certification will become a fundamental contractual requirement for doing business in the global market place, within economic trading blocks, between countries and with government agencies (CBI, 1994).

Second, short-term trends in enterprise competitiveness demonstrate that in order for large companies to reduce operating costs, they will outsource all activities that do not contribute to their value added or core competencies. Each of these companies will become the center of a network of specialized, flexible small- and medium-sized enterprises (SMEs) working together as close partners in supply, distribution, research, services, etc. The ISO 9000 standards permit the objective formalization and evaluation of company relations in such a network structure. In the major industrialized countries, ISO 9000 is an increasingly

[31] People of all cultures should be equally capable of implementing ISO 9000. Traditional perceptions of quality and resistance to formalized documentation, which may inhibit diffusion rates, may be eliminated by training and bonus schemes.

strategic asset for trade in domestic markets. The diffusion of ISO 9000 standards in the production chain thus contributes to enhanced competitive performance. Such tendencies will influence non-industrial sectors, which will also need to implement the ISO 9000 standards.

It is projected that the number of issued ISO 9000 certificates will continue to grow globally by about 25% to 30% annually for the next two to three years (ISO 9000 News, 1995d). If so, by the end of 1998 the number of certificates would total 200,000 to 250,000. SGS expects annual growth rates of 15% to 20% in areas with a highly developed certification base, such as Europe. Services related to the ISO 9000 norm are likewise expected to increase and improve. For example, the total number of certification bodies worldwide is expected to increase from 200 to 350 by 1998, and the global recognition scheme (QSAR) will partly be in place by this time.

The continued growth of ISO 9000 certificates globally will influence the demand for quality systems in Latin America. Several tendencies in Latin America favour the increased use of the ISO 9000 standards, including the macroeconomic stabilization of the industrialized countries in the region, the increased amount of export activity to NAFTA, the European Union and Asia and the increasing integration in economic blocks such as MERCOSUR, and the Andean Pact. Using the growth rates experienced in North America and Australia/New Zealand in 1993, when the number of certified companies was at the same level currently seen in Latin America, it is estimated that the number of ISO 9000-certified companies in Latin America will increase by about 50% annually. These growth rates are two times higher than the global average. Consequently, in two or three years the number of certified companies in the region will account for 2.5% to 3% of the total. About 6,000 companies in Latin America may be ISO 9000 certified by the year 2000.

Demand for ISO 9000 certification will probably be strongest in the countries of the MERCOSUR. Reasons for this include the relative popularity of ISO 9000 certification in Brazil; the likelihood that some of the certified companies will encourage or require their suppliers to certify as well; increased government attention for ISO 9000 awareness and technical support for SMEs; and the consolidation of national certification and accreditation schemes in the MERCOSUR countries. Based on the sectoral distribution presented in table 12, in the short term, ISO 9000 certification within the countries of MERCOSUR will probably diffuse more rapidly in ISIC sectors 3.8 (i.e., production of metal products, machinery and appliances), 3.5 (i.e., production of chemical substances and chemical derivatives of petroleum, carbon, rubber and plastic), 3.7 (i.e., basic metal industries) and 3.4 (production of cellulose, paper and paper products and printing). In the food and beverage sectors, the HACCP norms will probably be implemented first in order to satisfy minimum trade requirements. The diffusion of the ISO 9000 norms will probably be less rapid in traditional sectors such as 3.2 (textiles and leather) and 3.3 (wood industry and wood products). Finally, in the medium and long term, ISO 9000 certification will probably gain more acceptance in the service sectors.

Chapter IV

GOVERNMENT ROLE IN THE DIFFUSION OF THE ISO 9000 STANDARDS

Introduction

Various countries have formulated and established programmes that enhance the adoption of ISO 9000 standards. The immediate, short-term objective of such programmes is to enhance the implementation and certification of quality systems in the economic sector. The indirect and longer-term objective is to increase the comprehensive use of quality management techniques, resulting in increased productivity levels. Increased productivity is expected to contribute to enhanced international competitiveness and improved equity through increased income and skill formation. The key challenge for governments of countries in Latin America and the Caribbean is to promote industrial growth on the basis of rapid productivity increases in order to reduce the competitiveness gap with developed countries. In this respect, it is estimated that the average total factor productivity in Latin America is two to three times lower than in developed countries (J. Ramos, 1996).

The principal question of the current discussion is whether the widespread use of the ISO 9000 system and quality management practices will eventually develop as a result of a sequential process of learning, or whether specific factors which inhibit the systematic implementation of quality management techniques. It seems likely that even though quality management techniques have proved to enhance the productive and competitive performance of companies and countries, the market mechanism alone cannot always ensure the timely and widespread diffusion of new forms of production management and organization. For example, the diffusion of ISO 9000 standards through the market mechanism has been limited, affecting only certain sectors and companies.[32]. Furthermore, certain facilitating conditions and institutional frameworks are necessary at the macro level. Governments can play an important role in promoting the diffusion of quality management techniques and the ISO 9000 standards among a broader range of economic agents.

Status of quality management awareness and application

Total quality management requires that enterprises formulate and implement strategies related to quality and that they 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

[32] This might also indicate the efficiency of the market. However, the limited levels of quality awareness in SMEs may ultimately affect competitiveness and limit options for sustained economic growth and employment.

intercompany levels (Kaplinski, 1995). The TQM philosophy emphasizes a proactive approach to both consumer satisfaction and continuous improvement in order to achieve effective and efficient production systems simultaneously.

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 practices.[33] 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); and
Phase 4: production chain (i.e., quality management regarding clients and suppliers); and
Phase 5: TQM (i.e., integration and simultaneous application of phases one through four).

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).

Enterprises, sectoral organizations and national governments must develop strategic plans to meet and implement specific quality criteria. One of the main objectives of this document is to present recommendations concerning the strategic orientation of quality, competitiveness and international trade at the national level. Such recommendations aim to support organizational innovation within economic sectors in view of improving performance domestically and within international or regional trade agreements.

The TQM ranking presented by the World Competitiveness Report (see chapter I) and the relatively low number of companies with certified ISO 9000 quality systems indicate that in Latin America the application of integral quality management techniques is limited and the average level of quality awareness is low (see table 13). To understand some of the underlying factors, the next section examines the obstacles to the implementation of quality management in Latin America.

[33] 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 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%.

Table 13
THE ROLE OF QUALITY IN VARIOUS COUNTRIES

Country or region	Role of quality management	Level of quality awareness
Japan	Quality is the key element of overall management	Excellent
USA	Quality is gaining importance	Good
Europe	Quality is seen as a special professional problem of management. In certain countries, authorities are taking measures to promote quality	Not sufficient
Central and Eastern Europe	Quality is seen as a specific problem generally linked to workers	Limited
Other countries	Quality is seen as a secondary problem and not as an element involving management	Occasional

Source: European Commission, 1995.
Note: To correlate this ranking with the ten-point scale presented in figure 1, use the following ranges, 8 and higher: excellent (Japan); 7 - 8: good (United States, Switzerland, Sweden); 6 - 7: not sufficient (most European countries, Brazil); 4 - 6: occasional, limited (Latin America).

Implementation obstacles in Latin America

Trade and market considerations

Most Latin American governments abandoned import-substitution economic practices in the late 1980s. International trade increased, together with the amount of direct foreign investment. The resulting competitive pressures from international markets created the need for organizational and technological innovations. Large national companies and subsidiaries of multinationals that participate in the global marketplace have therefore had to consider adopting quality management practices.

A sizable portion of trade is within the region itself. In spite of the existence of various regional free-trade agreements, the demand for formal quality management systems has been limited to certain countries and industrial sectors. This indicates that quality management and assurance in intra-regional trade is based on product inspection and has not yet been formalized along the lines of the process orientation of the ISO 9000 standards.

In domestic markets, many consumers are poor, and they base their purchasing decisions on considerations of price rather than on product quality. In those domestic markets where demand for consumer goods exceeds supply, anything sells. Because of the low levels of education, consumer knowledge of quality and its implications is limited. The absence of international competition as a result of past protectionist measures has further

hindered the growth of national quality cultures. However, the quality of imported goods is often greatly admired both in consumer and industrial markets. The current, more open market regimes imply that domestic producers face competition with such imports, resulting in more attention to quality issues.

Enterprise access to resources

At the enterprise level, the lack of adequate resources is one of the principal obstacles for the widespread implementation of quality management techniques and ISO 9000 quality systems in Latin America. Table 14 presents the principal obstacles and facilitators for ISO 9000 quality system implementation in Brazil. Limited availability of resources was an obstacle for 72% of the companies surveyed. The specific enterprise capacity to access the necessary resources is surely most complicated in SMEs. Unstable macroeconomic conditions further limit resources through inflation and can undermine commitment to quality management.

Table 14
PRINCIPAL OBSTACLES AND FACILITATORS FOR ISO 9000 IMPLEMENTATION IN BRAZIL

OBSTACLES:	AFFIRMATIVE RESPONSES (%)
Employee resistance	85
Low levels of quality awareness	75
Not understanding ISO 9000	72
Limited availability of resources	72
FACILITATORS:	
Training and information	92
Management commitment	90
Internal audits	78
External consultancy	52

Source: Brazilian Association of Technical Standards (ABNT), "A SEBRAE survey demonstrates ISO 9000 implementation difficulties in Brazilian companies", *Revista ABNT*, March 1996.

Note: This survey was conducted by the Brazilian Assistance Service for Micro and Small Enterprises (SEBRAE) in 1994 among 110 enterprises with ISO 9000 certification.

Enterprise-specific capacity. The main actors in the current Latin American industrial structure are multinational enterprises, national economic groups, large state enterprises and SMEs. These may be distinguished by their different capacities to access the resources necessary to implement quality management techniques.

Multinational enterprises are often in favour of international quality standards. These companies operate directly in global consumer markets where trademark quality is an important aspect of competitiveness. Production is highly capital intensive; technology is state of the art; and quality management systems are often already in place as part of normal operational procedures, using licensing and safety regulations. Management is

often highly skilled, and access to information, financial resources (foreign exchange) and modern technologies is relatively easy.

National economic groups are often large and in many cases they control the industries that produce inputs based on natural resources. Their access to information, technology and finance is similar to that of multinational enterprises. In recent years they have made important advances regarding the quality of management and the organization of production.

Many of the large state-owned enterprises are currently undergoing privatization in order to generate state revenues and increase productive and competitive performance. The implementation of quality management within these companies may be complicated by years of limited investment, protection from foreign competition and labour issues. On the other hand, some state-owned enterprises are keen to implement quality management techniques to demonstrate that state-owned enterprises can be operated efficiently, thereby reducing the need for privatization.

The adoption of quality management techniques is more complicated in the small- and medium-scale enterprises (SMEs) and firms in tradiional industrial sectors such as shoes, garments or furniture. SMEs tend to be product driven rather than marketing led, and therefore customer and service issues may be secondary. Documentation of the quality system is rarely given priority and is often poorly organized. This leads to the conclusion that knowledge of the production function —the mathematical relation between quantities of inputs and outputs— is very informa.l[34] The obstacles to the implementation of quality management in SMEs include: a) predominantly price-based competition; b) limited access to and availability of financial and human resources; c) low rate of technological change and development; and d) limited access to information and technology.

In 1994, the Brazilian Assistance Service for Micro and Small Enterprises (SEBRAE) carried out a survey among 35 small, 38 medium-sized and 37 large Brazilian companies with ISO 9000 certification or in process of obtaining certification. The survey found that 85% of the small companies, 75% of the medium-sized companies and 55% of the large companies reported difficulties in obtaining the resources necessary to implement the ISO 9000 quality system. Moreover, 80% of the small companies, 45% of the medium-sized companies and 25% of the large companies required external consulting services (ABNT, 1996). Another survey in Brazil (INMETRO/MICT, 1996) reported that among 592 companies with ISO 9000 certification an average of 55% used external consulting services; in small companies with less than 100 employees, this percentage was 70%.

The diffusion of quality management techniques in SMEs as suppliers generally occurs as a result of domestic market pressure through the supplier-client production chain. For example, SIDERAR Argentina, a basic- metals subsidiary of a large national economic group, evaluates its suppliers according to financial stability, technological modernization and the use of quality management techniques. With regard to the latter, SIDERAR may require ISO 9001 or ISO 9002 certification depending on the type of supplier and its critical contribution to the production process. In the automotive and telecommunication sectors, pressures for ISO 9000 supplier certification are considered to influence medium-term profitability. A study of SMEs in Brazil (Fleury, 1995) indicated that many SMEs[35] and

[34] Therefore, the SME sector could greatly benefit from the widespread introduction of ISO 9000, since the standards allow for a better definition of operational routines.

[35] The SMEs in this study are defined as locally owned companies with 150 workers or less.

industries in traditional sectors lack the internal capacity to conform pressures from client firms to provide quality assurance.

Macroeconomic conditions. Stable macroeconomic conditions facilitate the definition of long-term competitiveness strategies, foreign investment flows and investment in the modernization of equipment. On the other hand, macroeconomic instability and inconsistency result in high inflation, recessions and cuts in employment, which have caused firms to reverse the path of quality innovation. Under these conditions, companies are often forced to spend a large amount of their time and resources on financial management at the expense of organizational innovation. Most importantly, macroeconomic instability limits the private sector's commitment to medium- and long-term planning. In a situation of increasing deregulation of markets and unclear industrial and technology policies, few firms, other than transnational and large local enterprises, are willing or able to invest in modernization of equipment and training. An environment of recession forces firms to downsize their activities through cuts in training activities and in the size of their workforce which undermines the motivation for employees to participate in the implementation of quality management, if it is implemented at all.

Traditional management practices

The lack of quality awareness in Latin America may be associated with the predominant application of traditional management practices. The resulting obstacles to TQM implementation include the lack of management commitment, employee resistance to change, and limited human resources development.

Lack of internal support by management. Studies in Brazil indicate that the implementation of new organizational methods fails because of inadequate internal support on both the technical and organizational levels within a given company (Fleury, 1993). Apart from the success stories, many companies are not able to implement quality management practices. The problems can usually be traced to an inadequate commitment from top management or to the allocation of in sufficient attention and resources to quality management implementation. Programmes are thus given a low priority and are considered a part-time activity.

Resistance to reorganization. The introduction of quality management techniques will often require reorganization. This will change the former responsibility and power structures. Traditional labour practices, which are authoritarian and feature a detailed division of labour, provide an obstacle to the more horizontal organization in which employers grant employees greater confidence and responsibility. Even though organizational innovation can lead to improvements in production, resistance from middle and senior management in different departments can be a major obstacle to the timely implementation of quality management. Inconsistent implementation may result from the partial visions of specialized departments. It is therefore important that top-level management assume leadership and be determined to implement the new approach.

Insufficient human resources development. Workers must understand their new positions and be skilled to work with the new production techniques. Companies will have to meet these demands through the initiation of training and human resources programmes. Employment practices in Mexico show that skill formation is often achieved by hiring young, motivated employees who are then trained extensively on the job (*Latin American Research Review*, 1994). Studies in Brazil, however, indicate that although quality and productivity

efforts have increased efficiency and improved management practices, they have often failed to promote labour involvement and participation because of insufficient training for direct production workers (Kaplinski, 1995; Fleury, 1993).

Many SMEs are family owned. Corporate growth and effective management may be constrained by the reluctance of the family to devolve responsibility to professionally trained outsiders. The training structure within SMEs is frequently underdeveloped and, often still based on the managerial practices of mass production. Moreover, the low educational levels of the SME labour markets often make training a costly activity.

Considerations at the macro level

Various factors at the macro level may have inhibited the diffusion of quality management techniques in Latin America. This emphasizes the importance of government involvement in the diffusion of quality management techniques. Some of the key issues are insufficient institutional support and capacity, inadequate supplier/subcontractor networks, labour issues and cultural factors.

Insufficient institutional support and capacity. Evidence from Japan, United Kingdom and Sweden indicates that the diffusion of quality management practices requires a certain institutional network (Fleury, 1993). In these countries, industrial and employer associations, research institutes and government agencies have provided the financial resources, technological support and information necessary to support the diffusion of quality management techniques. The existence of institutional support varies greatly among the different countries in Latin America and the Caribbean, and also within the of countries themselves. In many cases, the establishment of an institutional framework requires government support. The relatively underdeveloped institutional infrastructure complicates the widespread diffusion of quality management techniques and ISO 9000 quality systems within the industrial sector, especially within SMEs.

Inadequate supplier/subcontractor networks. The application of quality management techniques requires that suppliers change traditional delivery practices and deliver reliably in small batches of guaranteed quality, since any quality defects in buffer stocks will lead to delay. External subcontractors and suppliers of utilities may not be able to conform to the demands of the client company's new production methods. In Brazil, supplier firms in the autopart manufacturing sector have adapted to a sophisticated level of quality management. These firms are often subsidiaries of international companies that strongly support the change. They often assist in the implementation of quality programmes, with a strong emphasis on the technical and operational aspects. Also in Brazil, companies have found that the complete implementation of operational quality management practices may not be possible because large suppliers of materials and utilities cannot guarantee quantity, quality and reliability of delivery. This is the case, for example, in the steel and electricity sectors. Finally, a sufficient level of physical infrastructure is required to operate and promote a dynamic, flexible supplier network (Fleury, 1995).

Labour issues. Quality management requires multi-functional workers, flexible production and innovation at the plant level, which enlarges the responsibilities and tasks of direct production. However, if the work force does not have a sufficient basic educational backgroound it is almost impossible to delegate more responsibilities to individual shop-floor workers. Conditions in labour factor markets thus play an important role in the adoption of quality management within a country. Studies in Brazil and Mexico (Kaplinski, 1995)

indicate that although quality and productivity efforts have increased efficiency and improve management practices, they have often failed to promote labour involvement and participation. High labour turnover rates and low levels of basic education have made employers reluctant to invest in training programmes for direct production workers. Also, employers have been hesitant to improve wages and promotion opportunities even though they may be critical factors in facilitating the commitment of direct production workers.The importance of labour issues within quality management highlights the need to increase the active participation of labour unions.

Cultural factors. In general, cultural factors are not considered to inhibit the application of quality management techniques (Kaplinski, 1995). It is sometimes argued that non-Confucian cultures are inherently conflictive and that this would make it difficult to establish trust relations, which are critical to the success of quality management practices. However, there is little evidence that culture is a significant factor in the adoption of quality management techniques because a) virtually all of the particular TQM practices have been successfully transferred to different countries and cultures; and b) a range of incentives has been used to support the implementation of quality management techniques, including life-time employment and payment and promotion schemes. This indicates that quality awareness within an organization is facilitated by reward or incentive schemes that, in turn, depend on cultural aspects.

The establishment of a "quality culture" in an organization involves clear company strategies, well-defined working procedures, quality awareness, and communication.[36] In Latin America, standardization of quality issues and in-company training have been given low priority, and quality awareness in general has been low. Traditional management techniques have resulted in command-control communication based on hierarchy, which complicates process-oriented organization. Reward and incentive mechanisms have been limited and often are not available for the larger part of the workforce. However, to prove that these issues are inherent to Latin American cultures would be difficult. Culture should be viewed as a dynamic concept that is interdependent with economic, technological, social and political conditions that may have meaning both at the macro and micro levels. An adequate company culture may be developed by creating the right mix of these conditions at the micro or macro levels.

Market failures and the diffusion of ISO 9000

In general, market failures occur within organizations, between organizations and in factor markets (Lall, 1995). Table 15 presents various market failures related to the diffusion of the ISO 9000 standards, as well as examples of corrective interventions. The limited diffusion of the ISO 9000 standards within enterprises is caused by a range of factors that involve the lack of quality awareness, limited access to resources (especially in SMEs), limited demand for quality-system assurance in the production chain and inadequate financial, technical and institutional support in factor markets. Market failures result in the limited

[36] Culture factors may determine the form a quality culture takes within an organization. This is especially evident with regard to communication. For example, in the United States when a boss speaks, a subordinate will show him respect by looking directly at him for short periods, while in many Asian cultures, looking directly into the eyes of a superior is a sign of disrespect (Dillon, 1992).

diffusion of the ISO 9000 standards and quality management techniques within organizations and throughout the production chain.

Government programmes

Government policies and strategies that aim to eliminate these market failures enhance the diffusion rate of quality management instruments. For example, the governments of Japan, the United States, Brazil, the United Kingdom and The Netherlands[37] have implemented competitiveness and productivity strategies in which quality plays an important role. At the regional level, the European Union has drafted a European Quality Promotion Policy (European Commission, 1995a). Such programmes include specific support activities concerning the ISO 9000 standards.

These programmes need to be continuously monitored and evaluated, and they must incorporate corrective action to ensure their effectiveness and improve their impact. Specific policy measures can be either selective or functional. Adjustment of market failures within and between enterprises will probably have a selective nature, because of limited resources at the national level and sectoral differences in international competitiveness, productivity and relevance of the ISO 9000 standards. Selective action requires the competitive analysis of specific industrial sectors that develop new products for export, stimulate employment and provide a demonstration effect for other companies in the region. Specific measures would facilitate the access to technology, skills and capital markets. Functional policy measures include government interventions in technology, skills and product markets that aim to create the supporting structure for the implementation and certification of ISO 9000 standards. These are considered functional because they are accessible to the whole national economic sector. In view of the effectiveness and the continuity of the programme, it is crucial to start with those activities that are likely to produce rapid, positive results.

[37] In The Netherlands, the Ministry of Economic Affairs estimates that an average of 15% of the total turnover in the economy is lost to redundancies and that US$1.2 billion is lost to internal quality failures annually (Dutch Institute for Quality, 1996).

Table 15

MARKET FAILURES AND EXAMPLES OF GOVERNMENT INTERVENTION REGARDING THE DIFFUSION OF ISO 9000

MARKET FAILURE			GOVERNMENT PROGRAMME
Type	Impact	Nature	Example of interventions
Within organizations	Little diffusion of ISO 9000 standards in the industrial sector, especially within SMEs (i.e., insufficient widespread adoption of technological and organizational innovations).	a. Application of traditional management techniques; lack of quality awareness. b. Limited access to resources to implement ISO 9000. c. Inadequate support for ISO 9000 implementation and certification. d. Limited demand for ISO 9000 in domestic markets.	1a. Disseminate information. 1b. Facilitate access to technology, skill and capital factor markets. 1c. Improve institutional support structure. 1d. Promote interfirm and institutional linkages (see B).
Between organizations	Insufficient use of quality management techniques throughout the production chain or in enterprise groups.	a. Undeveloped interfirm relations; inadequate supplier subcontractor capabilities. b.Insufficient institutional support for the diffusion of organizational innovations.	a. Promote ISO 9000 certification in supplier networks. b. Promote linkages between relevant institutions (economic, labour, export, technological, etc.).
Factor markets a. Technology b. Skills c. Capital d. Product	a. Inadequate support for ISO 9000 certification. b. Inadequate support for implementation of ISO 9000 quality system. c. Limited access to financial resources needed to implement ISO 9000. d. Limited recognition of ISO 9000 certificate in domestic and international markets.	a. Limited investment of metrology and R&D. b. Insufficient investment in human resources. c. Commercial loans not viable (high risk and interest rates). d. Lack of harmonization and standardization guidelines in the institutional support structure.	a. Upgrade capacity of standardization and metrology institutes; promote R&D on TQM. b. Stimulate relevant training (academic, auditor, in-firm); establish national schemes for auditor and consultant registration . c. Establish financial incentives. d. Establish national accreditation schemes that conform to international guidelines and MRAs.

Source: S. Lall, "Governments and industrialization: The role of interventions in the 1990s", Preliminary version for the ECLAC/IDRC-UNU/INTECH Conference on Productivity, Technical Change and National Innovation Systems in Latin America in the 1990s, Santiago, Chile, August 1995; A, Jarnehammar, "Towards a framework for analyzing the diffusion of organizational innovations", licentiate dissertation, Department of Industrial Management and Economics, Chalmers University of Technology, Gothenburg, Sweden, 1995.

Proposals for government programmes to promote the diffusion of ISO 9000

Government programmes that address market failures 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. This section first outlines the general goals of the differente types of programmes. Table 16 then presents concrete examples of activities for each category.

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. 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 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 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.

The widespread implementation of the ISO 9000 standards requires integrated efforts at the government, business-organization and enterprise levels in society. At the government level, policies should create national capacities for formulating and implementing productivity and competitiveness strategies. These policies should be aimed at developing technical, financial, quality, information and human resources. At the level of business organization, policies should create capacities for active participation in the

formulation and implementation of industrial policies and strategies. These policies should target industrial associations, chambers of commerce and non-governmental organizations (NGOs) in order to assist member or client enterprises. Finally, at the enterprise level, capacities should be created for the application of technologies and management solutions that lead to the increased competitive performance of products, processes and human resources. At this level, policies should be conducive to establishing quality systems, training, and technical assistance to prepare for ISO 9000 implementation and certification (UNIDO, 1995 and 1994a).

Programme activities should also take into account that the implementation rates of the ISO 9000 norms differ among industrial sectors and companies of different sizes. Therefore, governments should apply different measures to pursue the above policies, in order to initiate, support and improve the diffusion and adoption of the ISO 9000 standards. Until private institutions emerge at the meso level, governments will have to play an important role in initiating the adoption of quality management and the ISO 9000 standards. Governments can provide support to companies that seek assistance in the implementation and certification of quality systems. In the improvement stage, activities should support sectors that are well advanced in practicing quality management techniques (UNIDO, 1994a).

Table 16 presents an integrated approach of a government programme that aims to enhance the diffusion of the ISO 9000 standards. The table lists specific activities in each of the four programme areas, the organizational level at which these activities may be executed and the respective stage of the activity. For example, the diffusion of the ISO 9000 standards within enterprises can be initiated by the dissemination of government policies, strategies and economic incentives. The impact of this activity is most effective when organized or executed at the government and/or business-organization levels. Likewise, the establishment of an enterprise environment that is conducive to the diffusion of the ISO 9000 standards can be supported by promoting implementation and certification in selected production chains. This should be organized and executed at the business-organization and enterprise levels. The information presented in table 16 is illustrative only, as many other specific activities may exist.

Different programme areas and their specific activities may be linked. In this respect, activities related to the establishment of the institutional structure should be disseminated to the enterprises involved, and specific SME support can be combined with implementation and certification in networks.

Table 16
PROPOSED ISO 9000 GOVERNMENT PROGRAMME ACTIVITIES

PROGRAMME AREA Specific activity or measure	Level of organization [a]	Stage
Diffusion of ISO 9000 within enterprises		
DISSEMINATION OF INFORMATION:		
- Organize ISO 9000 programme support activities	GOV, BO	initiation
- Provide translated ISO 9000 standards and related literature	GOV, BO	initiation
- Involve press and business magazines	BO	initiation
- Develop workshops, seminars, conferences	BO	initiation
- Establish demonstration projects	BO	initiation
- Coordinate study tours, intercompany visits	BO	initiation
- Clarify international regulations and product standards		
- Establish quality awards (TQM prizes)	GOV, BO	support
	GOV, BO	improvement
ENTERPRISE SUPPORT:		
- Coordinate intercompany visits	BO	initiation
- Provide financial incentives (tax and credit schemes)	GOV, BO	initiation
- Establish training programmes	BO, E	support
- Facilitate the availability of consultants	BO, E	support
- Provide technical support	BO, E	support
- Establish precertification assistance	BO, E	support
- Promote R&D planning	BO, E	improvement
Establishment of an enterprise environment conducive to the diffusion of ISO 9000 standards		
IMPLEMENTATION and CERTIFICATION IN NETWORKS:		
- Provide economic incentives	GOV	initiation
- Establish demonstration projects	BO	initiation
- Promote ISO 9000 in selected production chains (vertical; large firms and supplier groups)	BO, E	support
- Promote ISO 9000 in SME clusters (horizontal)	BO, E	support
- Promote links with R&D institutions, universities etc.	BO	support
- Institutionalize interfirm relations	BO	support
INSTITUTIONAL STRUCTURE:		
- Establish related administrative institutions for programme support	GOV, BO	initiation
- Establish accreditation and certification schemes	GOV	support
- Establish schemes for consultant and auditor training and registration	GOV	support
- Incorporate international conformity-assessment guidelines	GOV	support
- Stimulate investment in relevant ISO 9000 R&D and metrology	GOV, BO	support
- Support specialized technical services (laboratories, calibration)	GOV, BO	improvement

[a] GOV: government/policy level; BO: Level of business organizations, institutions, semi-state; E: enterprise level.

Examples of government support in selected countries in Latin America

Table 17 presents an overview of the status of programme activities in selected countries in Latin America, according to the criteria described in the preceding section.

Some countries in the region have formal quality and competitiveness policies or strategies, but they are in different stages of development. Governments of most industrialized countries realize that the quality issue requires specific government action and participation. On the other hand, quality may not yet be an issue of high political priority that needs to be formalized rapidly through an official strategy.

Government agencies in almost all of the countries mentioned in table 17 have been involved in the dissemination of information on the ISO 9000 standards. Such activities have been carried out most extensively in Brazil. Generally, the dissemination of information has helped to create awareness on ISO 9000, but it has not resulted in the widespread application of the ISO 9000 quality system. Several governments have acknowledged the existence of market failures in capital and human resources factor markets and have established financial mechanisms and training activities to support ISO 9000 implementation and certification in companies. While credit lines have not been made available selectively to SMEs, ISO 9000 training activities have generally focused on groups of SMEs and consultants. Clearly, government financial support for enterprises is not as extensive as in some of the countries of the European Union, which may explain the limited application of the ISO 9000 standards.

The governments of Brazil and Chile have initiated and supported projects that aim to stimulate the use of quality management techniques in specific groups of enterprises in the production chain. For example, certain Chilean projects aim to develop quality-assurance activities systematically in the production chain of one large company, utilizing the expertise of that company to create a situation from which both participating suppliers and the company benefit.

Lastly, most governments are establishing national ISO 9000 accreditation and certification schemes. Certification services are operated in the private sector in most of the countries of the region. Competition among the certification bodies will harmonize their performance and allow for sector-specific expertise to develop, thus better serving domestic industries. National accreditation schemes are usually operated by government-related institutions. However, because domestic demand for ISO 9000 certification is still limited, governments may find it difficult to justify the extensive allocation of resources to this activity. On the other hand, consolidation of the standardization infrastructure is part of the WTO Agreement on Technical Barriers to Trade and also regional trade agreements, which provides business opportunities for the private sector. Most countries generally focus first on the consolidation of testing and product-verification schemes. In the medium term, national ISO 9000 certification and accreditation schemes will also likely be established in most of the industrialized countries in the region. Regional actions to enhance the mutual and international recognition of such schemes have also been initiated, as in the Cartagena Agreement of the Andean Pact, the Inter-American Accreditation Cooperation and the International Accreditation Forum.

Table 17

OVERVIEW OF NATIONAL ISO 9000 PROGRAMMES IN SELECTED COUNTRIES IN LATIN AMERICA

Country	Formal quality and competitiveness policy document or programme	Dissemination of information on ISO 9000	Support for implementation and certification of ISO 9000 quality systems		Level of consolidation of institutional infrastructure
			In SMEs	In enterprise groups	
Argentina	(-)[a]	yes	yes	(-)	good
Brazil	yes	yes	yes	yes	good
Bolivia	(-)	(-)	(-)	(-)	developing
Chile	yes	yes	yes	yes	developing
Colombia	(-)	yes	yes	(-)	good
Costa Rica	yes	yes	(-)	(-)	developing
Cuba	(-)	yes	(-)	(-)	developing
Mexico	yes	yes	yes	(-)	good
Peru	(-)	yes	(-)	(-)	developing

Source: Information gathered by the author.

[a] (-): information not available or not found, and therefore may exist.

Formal government policies and strategies on quality and ISO 9000

In Brazil, the National Programme for Quality and Productivity (PBQP) was initiated in 1990 to establish a set of activities that would induce industrial modernization, which in turn contributes to social and economic development. The programme is coordinated by the national PBQP commission and is carried out by a large number of departments of different ministries, institutes, business associations and state- and private-sector enterprises. The programme includes various activities related to raising quality awareness, diffusion of quality management techniques, human resources development, improvement of technical services for quality and institutional articulation. Within the programme, selective sectoral activities have also been executed (Government of Brazil, 1991).

The PBQP's methodology involves the following points (ECLAC, 1995b): a) analysis of the economic environment, with an assessment of systematic and internal constraints to the competitive behaviour of industry and the diffusion of quality management techniques; b) establishment of base-line quality and productivity indicators and definition of sectoral and global benchmarks for the country; c) design of a marketing plan to sensitize society and opinion makers to the importance of quality management techniques and the costs associated with waste and low productivity; d) upgrade of the institutional organizations involved in the diffusion of quality management techniques; e) targeted dissemination of general information followed by a massive effort in training; and f) definition of financing mechanisms to promote widespread adoption of quality management techniques.

An example of PBQP monitoring activities involves a repeat survey of 950 firms in 1990 (year one of import liberalization and the PBQP programme) and in 1993. All indicators presented in table 18, except the one referring to training, show a degree of improvement in this three-year period. The data also indicate that Brazilian firms still lag behind international practice in average key productivity and quality indicators.

A second example of how the programme is monitored concerns a repeat survey that is representative for 1992 and 1994. The latest survey (SEBRAE, 1996) of about 8000 companies of all sizes concludes that the application of quality has increased, although it is still not sufficient.[38] Another difference between the two surveys was that in 1994 more companies (about 56%) reported a lack of financial resources as the principal obstacle for the implementation of quality management techniques. The survey estimates that this is probably due to the increased number of respondents from micro and small firms.

The National Confederation of Industry in Brazil considers the ISO 9000 standards as an instrument that contributes to enhanced competitiveness (CNI, 1996). The PBQP programme has executed activities that improved ISO 9000 awareness in Brazilian industry associations and institutes; established funding mechanisms in the public sector; promoted the establishment of ISO 9000 supplier-preference procurement schemes in government, state and private enterprises; and consolidated the institutional ISO 9000 support structure.

[38] The number of companies that used statistical process methods, JIT and team work increased from 28%, 12% and 25% in 1992 to 41%, 37% and 52% in 1994, respectively.

Table 18
PROGRESSION OF TQM INDICATORS IN BRAZIL, FROM 1991 TO 1994

Indicator	Brazil 1990	Brazil 1993	USA and Europe	Japan
Rejections (defective parts per million)	23,000 28,000	11,000-15,000	200	10
Rework (% products returning to the process)	30	12-20	2	0.001
Technical assistance expenses (% of sales)	2.7	2.0	0.1	< 0.05
Average delivery time (days)	35	20	2-4	2
Average lot size	1000	100-250	20-50	1-10
Inventory rotation (times per year)	8	8-14	60-70	150-200
Setup time (minutes)	80	30-40	10	5
Machine downtime (as a % of time idle)	40	21	15-20	5-8
R&D expenditures (as a % of sales)	< 1	1-2	3-5	8-12
Training (%hours/employee/year)	< 1	< 1	5-7	10
Hierarchical levels	10-12	4-8	7	3

Source: IMAM Consultaria Ltd. , in ECLAC, The Brazilian industry's productive revolution and the dissemination of the ISO 9000 standards, ECLAC/UNDP Project on Innovation and Competitiveness, 1995.

In Mexico, the Ministry of Commerce and Industrial Development (SECOFI) is in the process of executing the National Plan on Quality. The plan has the following primary objectives: to promote the development of a quality culture; to provide incentives for quality improvements in Mexican firms; to promote quality improvements in Mexican products; to strengthen the technical infrastructure supporting quality; and to promote the establishment of financial and technical support mechanisms (*La Jornada* ,1996).

In Costa Rica, the second edition of the National Plan for Science, Technology, Productivity, Quality and Innovation was prepared in June 1995. During the XI National Congress of the Costa Rican Chamber of Industry, an agenda was adopted concerning the modernization of the domestic industrial sectors. The agenda, which was developed with the assistance of ECLAC and the United Nations Industrial Development Organization (UNIDO), recommends the stimulation of quality issues to increase efficiency, productivity and competitiveness. Some of the activities covered in the agenda are as follows: improve the mechanisms that regulate international trade practices; increase management capacity;

improve technical services related to quality; develop human capital, establish wage schemes and improve working conditions; develop activities that support competitiveness, such as continuous improvement in industry, academic and consultant training, clean technologies, service networks, and company finance programmes; and, promote linkages between different economic sectors and improve academic and private-sector cooperation (Costa Rican Chamber of Industry, 1996).

In various other countries in the region, formal National Plans for Quality, Productivity and Competitiveness are being developed. For example, in Chile the National Centre for Productivity and Quality was created in August 1995. The Centre states its mission as the development of policies and strategies to enhance competitiveness through increased productivity levels in the productive sector and increased quality of its products and services. The proposed activities of the Centre include programmes for the diffusion of information; inter-agency consultation in the design of activities; coordination of activities; creation and participation in national and international networks; coordination of quality prizes and quality weeks; information and training services; and development of quality indicators and studies (CNPC, 1995).

In Peru, the Ministry of Industry is working with a national standardization body (INDECOPI) and the private sector to develop the National Plan on Quality, which is expected to be formalized in 1997.

Dissemination of information

In Brazil, the National Programme for Quality and Productivity (PBQP) has placed strong emphasis disseminating information on the ISO 9000 standards (ECLAC, 1995b). The programme has organized and supported campaigns, congresses, seminars, surveys and studies to promote improved quality and productivity levels and the use of quality management techniques. Dissemination of general ISO 9000 information has focused on the media, government agencies, business associations, management of leading firms and academia. For example, the management-oriented business magazine *Exame* published articles on quality management in nearly every issue over a period of two to three years. The dissemination phase was followed by massive training efforts which are discussed below.

PBQP has demonstrated that many activities are most efficiently implemented through sectoral organizations. Much of the support and impulse for change must come from within the sector. Therefore, ISO 9000 dissemination and promotional programmes are probably most effective if applied at the business-organization level.

As shown in table 17 most countries in Latin America disseminate information on the ISO 9000 standards. Most of the national standardization bodies publish their own magazines and organize ISO 9000 awareness seminars, as in Colombia, Cuba and Costa Rica. Various countries organize annual quality weeks or months (e.g., Brazil, Chile and Peru), during which national standardization bodies, government institutions, sectoral business associations and the private sector organize conferences and offer related services. In Peru, the National Committee for Quality Management has been organizing the annual quality week since 1991.

National Quality Awards have been established in Argentina, Brazil (T*echnovation*, 1994), Mexico (SECOFI, 1996), Colombia, Ecuador, Uruguay and Chile (CNPC, 1995).

With the exception of Brazil and Mexico, the number of companies that have participated in the quality award schemes has been somewhat limited. It is expected that once ISO 9000 diffuses more widely, the participation will increase.

Enterprise support

Public organizations in Latin America provide specific incentives for the implementation and certification of ISO 9000 quality systems in enterprises. These include specific financing mechanisms (credit lines) and subsidized training, consultancy, certification and laboratory services.

a) ***Financial support***

In Brazil, Decree No. 783 (March 1993) established that companies which implement quality systems along the lines of ISO 9000 will have access to fiscal benefits within a period of 24 months. Special credit lines are available at FINEP[39] for consultancy, documentation and data bases for quality systems; at MCT/CNPq[40] for training; and at BNDS[41] for technology investment in quality-control equipment and R&D. In 1994, FINEP credit line for quality management support (LAGQ) totalled US$62.1 million, and state commitment to financing quality management is expected to grow significantly in the medium term (ECLAC, 1995b).

In Argentina, there are two credit lines for the purposes of ISO 9000 implementation and certification. The first, the Régimen de Financiación de Servicios de Consultaria, Adquisición de Bienes y Certificación de Calidad finances: a) consultancy services and technical assessment such as diagnostics, internal audits, seminars and documentation development (US$5,000 to US$25,000); b) quality-control equipment (US$5,000 to US$50,000); and, c) certification costs (US$2,500 to US$10,000).

FONTAR (the Programa de Modernización Tecnológica del Fondo Argentino)[42] supports projects that develop technological capacities in enterprises and sometimes finances ISO 9000 implementation. The Fundación de Comercio Exterior del Banco de la Ciudad de Buenos Aires may also grant credit lines for ISO 9000 quality systems (A. Ramos, 1995).

In Mexico, special subsidies for Mexican-based companies are available if the companies choose to certify with the nationally accredited certification bodies (see below). These subsidies cover 40% to 50% of the certification costs. In Cuba, ISO 9000 consultancy and certification services for national companies are subjected to maximum price levels.

Public financing schemes for technological and organizational innovation have been established in various countries in the region. However, such schemes usually do not refer

[39] FINEP:Finance Company for the Study of Programmes and Projects, Ministry of Science and Tecnology.

[40] MTC/CNPq: Ministry of Science and Technology; National Council for Scientific and Technological Development.

[41] BNDES: National Economic and Social Development Bank.

[42] With support from the National Bank of Argentina and the Inter-American Development Bank (BID).

directly to the implementation of ISO 9000 quality systems, although credit for ISO 9000 quality system implementation could be considered. Companies —especially SMEs— may therefore not be aware that special financial assistance is available.

b) *Training and technical support*

A wide range of specific, subsidized technical-support activities exist in the region for the implementation of the ISO 9000 standards. In Brazil and Chile, national funding agencies allocate financial resources for training and technical support related to ISO 9000. Such funds are administered by other organizations that may arrange for consultant, auditor or company training activities, pilot projects, dissemination of information, etc. In Brazil, SEBRAE the National Industrial Apprenticeship Service SENAI coordinate technical assistance for SMEs and large companies, respectively. In Chile, the Technical Co-operation Service (SERCOTEC) and an arrangement between the private-sector business organizations CEPRI, ASEXMA, and ASIMET[43] coordinate activities for SMEs and large companies, respectively. A variety of private and semi-private organizations or consultants may carry out the actual activities, providing publications on the application of ISO 9000 in SMEs, consultancy services and training courses. It is also not uncommon for organizations such as SEBRAE and SERCOTEC to carry out ISO 9000 activities directly.

In Brazil, various organizations were involved in the training of about 70,000 quality "multipliers" to create a base of expertise for the diffusion of quality issues. The training of managers and multipliers has played a prominent role in the rapid diffusion of the ISO 9000 standards. About 57% of the companies have established quality systems through an internal team (CNI, 1994). Also, SEBRAE has evaluated the impact of their quality management and ISO 9000 training programme among 4000 micro and small companies. From the survey results presented in table 19, SEBRAE concluded that the training programme has been a valuable instrument in enhancing comparative advantages in micro and small enterprises. Quality-management training has resulted in an increased focus on client satisfaction, preventive quality control in the production system and improved enterprise results (SEBRAE, 1995).

In most industrialized countries in the region, university extension services and sectoral organizations organize training events. In Mexico, the National Chamber of Manufacturing Industries (CANACINTRA) organizes consultant and company training concerning the use of quality management techniques in SMEs. Various other commercial training and conference organizations hold ISO 9000 seminars on a regular basis. For example, in Chile about 30 courses on ISO 9000 awareness, implementation and auditing have been organized over the past two years.

From a cost-efficiency point of view, most technical assistance and training pilot projects will be most efficiently implemented in groups of enterprises. In 1993, seven Chilean software companies decided to seek ISO 9000 certification in cooperation with EuroChile, a foundation related to the cooperation agreement between Chile and the European Commission. Because these companies operated in different market segments with no direct competitors group implementation was facilitated (Qué' Pasa 1995).

[43] CEPRI: Centre of Industrial Productivity; ASEXMA: Association of Exporters of Manufactures; and ASIMET: Associatioin of Metallurgical and Mechanical Engineering Industries.

In some of the countries in the region, including Bolivia, Peru and countries in Central America, the international community also finances projects that include ISO 9000 activities, such as consultant and auditor training and ISO 9000-implementation pilot projects. An example of the implementation of quality management techniques in groups of enterprises is the Latin American Integration Association (LAIA)/CEPROCAL project in Bolivia (LAIA, 1995). Also in Bolivia,the Swedish International Development Agency (SIDA) envisages assisting in the implementation of the ISO 9000 standards in four or five companies.

Table 19

SURVEY RESULTS BEFORE AND AFTER A SEBRAE QUALITY-MANAGEMENT TRAINING PROGRAMME IN MICRO AND SMALL ENTERPRISES (BRAZIL, 1994).

Affirmative responses (%)

Evaluation area/indicator	Before	After
Leadership:		
* Management responsible for client satisfaction	52	95
* Definition of strategic plans	65	92
* Employees well informed about company mission	9	64
* Well defined employee selection criteria	25	64
* Frequent delegation	38	63
Process management:		
* Standardization of key processes	37	62
* Use of quality/productivity improvement techniques	24	63
* Periodic preventive maintenance	40	64
* Supplier selection criteria		
- quality of products and services	68	87
- delivery time	52	60
- price	69	66
Client satisfaction:		
* Formal communication with clients	16	39
* Related training of employees	27	73
* Frequent client claims	23	5
Enterprise results:		
* Increased sales		62
* Increased number of clients		60
* Reduced waste		65
* Cleaner working conditions		65
* Improved product quality		54
* Profitability		65
* Interest in ISO 9000 certification		75

Source: Brazilian Assistance Service for Micro and Small Enterprises (SEBRAE), Resultados da emplantacao do programma SEBRAE da qualidade total para as micro e pequenas empresas, June 1995.

Note: About 4000 companies participated in the training programme initiated by SEBRAE in 1993. The survey was conducted among 885 micro and small companies that participated in 14 quality management seminars. About 55% of the companies were family owned. The sectoral distribution of the respondents was as follows: industry: 36%; trade: 38%; and services: 26%.

ISO 9000 in enterprise networks

The Governments of Brazil and Chile have initiated and carried out activities related to implementing ISO 9000 in specific enterprise networks and strengthening the actors involved to enhance current quality and productivity levels.

In Brazil, PBQP includes special activities that promote the establishment of ISO 9000 supplier-preference schemes in large enterprises in the public and the private sectors as well as in government procurement schemes.[44] The Programme also support, organizations in the areas of sectoral knowledge (e.g., universities, business associations) and consumer protection to strengthen relations and exchange information (CNI, 1996; Government of Brazil, 1991).

In *Chile*, the National Centre for Productivity and Quality argues that the productive sector can only achieve, maintain and improve competitiveness if the country possesses a system that allows for permanent innovation. The Centre therefore, aims to consolidate cooperation among the industries, worker associations, research institutions and the Government. Future technical cooperation with Japan may provide experience with the implementation of such activities (CNPC, 1995).

Also in Chile, implementation of quality management techniques in enterprise groups has been initiated through projects aiming to develop the capacity of suppliers to large companies. One of the first of such projects included two programmes aimed at enhancing the supplier capacities of the National Copper Corporation (CODELCO) and the National Mining Corporation (ENAMI), which are both state-owned enterprises. These programmes have principally sought to define the strengths and weaknesses for the development of suppliers. One of the central issues concerns the optimalization of supply and demand between the suppliers and the large companies (SEI, 1995; CIMM, 1995).

In 1995, SERCOTEC (Chile) initiated a pilot project in which critical suppliers of CTI (a large manufacturing company) are supported to the extent that CTI no longer inspects their products (i.e., free passage).[45] The expected benefits of such projects include fewer problems with quality, shorter, more-reliable delivery times, lower stocks, design flexibility and improved supplier-client relationships. Not surprisingly, the technical-assistance activities carried out by SERCOTEC consultants, CTI staff and the suppliers have focused on the application of quality assurance techniques. ISO 9000 certification was envisaged at the start of the project, but it proved less relevant than expected for both the suppliers and CTI. In many cases, asssurance of compliance with CTI's technical specifications was sufficient to obtain the free passage. The implementation of the management and documentation aspects of ISO 9000 were also considered to be unnecessary and time-consuming in this phase of the project. SERCOTEC has developed a specific methodology for such supplier development projects, and continued support for this type of project is expected (SERCOTEC, 1995).

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[44] Some of the organizations involved were Electrobras, Brazilian Petroleum Inc. (Petrobras), the Ministry of Science and Technology,the National Industrial Apprenticeship Service (SENAI), the National Plastics Institute, the Federation of Industries of the State of Rio Grande do Sul, federal Government institutions, finance institutions (e.g., the National Economic and Social Development Bank (BNDES) and the Special Agency for Industrial Financing (FINAME) and various business associations (e.g., in basic industries, electronics, supermarkets and insurance).

[45] SERCOTEC finances up to 75% of consultancy costs.

Consolidation of the ISO 9000 support infrastructure

One of the principal roles of the public sector is to create adequate conditions for ISO 9000 implementation and certification. This requires an adequate national accreditation scheme to ensure the credibility of the technical-support services of the organizations involved. The ISO/IEC guidelines on conformity assessment describe how accreditation and certification schemes should be operated. The implementation of these guidelines will facilitate Mutual Recognition Agreements (MRAs) between trade partners, thereby reducing transaction costs and preventing technical barriers to trade (GATT Secretariat, 1994; see also chapter II). The present discussion focuses on the status of ISO 9000 accreditation and certification schemes in Latin America. Specific assistance to, for example, laboratories and training institutes is outside the scope of the present discussion.

Brazil, Mexico, Colombia and Venezuela have established national accreditation schemes for ISO 9000 certification, and related MRAs with other countries are in the process of being developed. The Inter-American Accreditation Cooperation (IAAC,1996) is the regional association of accreditation bodies. It aims to facilitate commercial exchange through a system of conformity-assessment bodies. Through IAAC, countries in the Americas can establish MRAs. Moreover, the Organization of American States (OAS, 1996) coordinates a Working Group on the implementation of the WTO Agreement on Technical Barriers to Trade in the Americas. The Working Group aims to guide and coordinate the process of developing MRAs in the Western Hemisphere. Brazil,for example, is a member of the International Accreditation Forum (IAF). Both the Pan-American Committee on Technical Standards (COPANT)) and LAIA are involved in accreditation and certification activities in the region. The Andean Group (Peru, Bolivia, Ecuador, Venezuela and Colombia) is working on the development of a network of accreditation bodies, with the aim of reaching mutual recognition among members for certification of conformity assessment (Decision 376 of the Cartagena Agreement). In the area of metrology and laboratories, various MRAs and Molls have been established. For example, members of the Caribbean Community (CARICOM) have agreed to accept the certification marks of the national standard bodies for CARICOM members without further internal tests.

In Brazil, the National Institute of Metrology, Standardization and Industrial Quality (INMETRO) has accredited about 18 ISO 9000 certification bodies,of which five are national. The national Brazilian Association of Technical Standards (ABNT) has a special committee for quality (ABNT/CB-25). ABNT also has a division that is accredited as an ISO 9000 certification body. INMETRO and ABNT/CB-25 regularly update statistics on the number of companies in Brazil with ISO 9000 certification (ABNT/CB-25). All accredited certification bodies in Brazil must periodically submit updated information to INMETRO regarding their ISO 9000 certification activities in Brazil.

In Mexico, the national accreditation scheme operated by the Dirección General de Normas of SECOFI has accredited two national companies to ISO 9000 certificates since August 1994: Calidad Mexicana Certificada A.C. (Calmecac) and The Mexican Institute for Standardization and Certification (NORMEX). The Institute for Metrology and Standardization is accredited to perform calibration services. The national accreditation scheme does not allow the participation of foreign companies until 1998/1999 (Reforma 1995). Because foreign certification bodies are not part of the accreditation scheme, aggregate data on the total number of companies with ISO 9000 certification are not

collected centrally. Also, the Mexican accreditation scheme has not yet been recognized by other countries.

Argentina is currently developing a national accreditation scheme. The National Accreditation Body,which is recognized by decree 1474, will be a private, impartial, non-profit organization. Fifteen laboratories and seven certification companies will participate in the accreditation scheme. The laboratories will probably be the first to participate in the accreditation process (OAA, 1996).

In Chile, the National Institute of Standardization (INN) is developing the national accreditation scheme for ISO 9000 certification bodies. In 1996, it performed experimental accreditation audits on two certification bodies in Chile, CESMEC and SGS Chile. However, no formal national accreditation scheme for certification bodies is currently operated in Chile. INN has established a national registration scheme for ISO 9000 auditors. Currently 23 auditors have been accredited by the scheme.

In Peru, the national standardization body, the National Institute for the Defense of Competitiveness and the Protection of Patents and Trademarks (INDECOPI), completed a significant reorganization process in the beginning of 1996. ISO 9000 and inspection accreditation schemes are expected to be in place by 1997. INDECOPI receives technical assistance from the French National Standard Body, AFNOR.

In Bolivia, the Ministry of Finance and Economic Development is preparing a national strategy on quality and metrology which is currently focused on the testing and inspection of product quality and less on ISO 9000 certification. The principal accreditation agency will probably be the Ministry of Finance and Economic Development. The national standards institute, the Bolivian Institute of Standardization and Quality (IBNORCA) would be responsible for standardization, certification or laboratory accreditation. In 1996, IBNORCA seems to have lacked the resources to perform its envisaged responsibilities.

In most Latin American countries transnational product verification and ISO 9000 certification bodies also offer ISO 9000 implementation and certification services. The presence of three well-known, transnational ISO 9000 certification bodies in Latin America is presented in table 20. The national offices of these companies arrange for ISO 9000 certification and often provide ISO 9000 consultancy and training services. Because consultancy and certification cannot be performed by the same organization, these organizations have established independent certification agencies which, in turn, have obtained the accreditation for ISO 9000 certification in many countries throughout the world (e.g., Bureau Veritas Quality International in the case of Bureau Veritas). Also, national certification agencies exist in most industrialized countries in the region. Approved certification bodies, which may certify products and/or management systems, have been established in Argentina, Barbados, Bolivia, Brazil, Colombia, Costa Rica, Mexico, Uruguay, and Venezuela. The national certification bodies of Colombia and Venezuela have established a bilateral recognition agreement, and Uruguay has an agreement with Brazil concerning the certification of electrical products (OAS, 1996). In Mexico and Cuba, such bodies may charge up to 50% less for certification services. However, the international recognition of nationally issued certificates may be limited. The national, non-profit certification bodies that are usually associated with the national standardization bodies have often established Memoranda of Understanding or bilateral recognition agreements with similar foreign peers. This often implies that ISO 9000 certificates are granted after joint certification audits.

Table 20:
PRESENCE OF MULTINATIONAL ISO 9000 CERTIFICATION AGENCIES IN LATIN AMERICA

SGS	DNV	Bureau Veritas
Argentina Bolivia Brazil Chile Colombia Ecuador Guatemala Mexico Panama Paraguay Peru Uruguay Venezuela	Argentina Brazil Chile Colombia Cuba Caribbean Region Mexico Panama	Argentina Brazil Chile Colombia Ecuador Peru

Source: Leaflets of SGS (Société Générale de Surveillance), DNV (Det Norske Veritas) and Bureau Veritas, 1995.
Note: ISO 9000 certification may not be the principal activity of country offices. Therefore, not all offices may have specialized ISO 9000 departments.

Argentina has had notable success with joint certification audits. The national standardization body, the Argentine Institute of Material Rationalization (IRAM), has established an independent ISO 9000 certification service that has certified about 16% of the 123 certificates issued in Argentina, mostly through joint certification audits. .By providing certification services, IRAM is able to finance part of its budget for standardization activities. (IRAM generates its income from members, sales of standards and certification services.) This practice conforms to the ISO/IEC guidelines for conformity assessment, as long as there is a clear, legal distinction between standardization and certification activities. IRAM conducts joint certification audits with other public, non-profit certification bodies in Spain, Germany, Italy and Switzerland, and it is also accredited by INMETRO in Brazil as an ISO 9000 certification agency. This allows for more cost-efficient certification audits, which have a validity of about three years. It is expected that in view of ongoing integration in Mercosur, demand for such services will continue to grow.

In Colombia, the national standardization body, the Colombian Institute of Technical Standards (INCONTEC), carries out joint certification audits with the French certification body, AFAQ. Because AFAQ has established Molls with most of the countries in the EQ Net, the INCONTEC certificates are valid in EQ Net member countries. It has also signed Molls with certification bodies in Germany and Canada. In the same manner, the Costa Rican Institute of Technical Standards (INTECO) has established an agreement with AENOR of Spain. The Cuban National Office of Standardization has gained experience in standardization issues related to the countries of the former Soviet block.

Various standardization bodies provide technical assistance regarding the establishment of accreditation and certification activities. These include organizations in the United States, Canada, Germany and France. The European Commission also funds activities in this area. Such international assistance is part of the WTO Agreement on Technical barriers to Trade.

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Annex 1

OVERVIEW OF THE 20 REQUIREMENTS OF THE ISO 9000 STANDARDS

4.1. Management responsibility (quality policy, organization and management review)

Management needs to assume that the company's quality policy is defined and documented; communicated and understood at all levels; and implemented and maintained. Management needs to define the responsibility, authority and organization of all personnel who manage, perform or verify work affecting quality. Management needs to arrange for frequent management review meetings with all divisions in order to assess the current and future effectiveness of the quality system and to review the results from internal audits, corrective actions and customer complaints.

4.2. Quality system

This broad clause requires that a documented quality system be established, implemented and maintained as a means of ensuring that products and services conform to specified requirements.

4.3. Contract review

Procedures must be established and maintained for the review of contracts to ensure that contract requirements are adequately defined and documented, differences are resolved and the company is able to meet the contract requirements.

4.4. Design control (ISO 9001 only)

This clause requires that procedures be established and maintained to ensure adequate control and verification of product (not process) design. It covers activities such as the planning and development of each project through the assignment of responsibilities, identification and documentation of interfaces among involved groups, documentation of input and output requirements and all design changes.

4.5. Document control

Procedures must be established to control the documents of the standard, to assess the level of completeness of the quality-system documents and to incorporate any necessary modifications.

4.6. Purchasing

This clause of the standard requires that all purchased products and services conform to the specified requirements. It includes assessing the performance of suppliers; clearly defining and reviewing purchasing data before they are released; and ensuring customer verification of purchased products.

4.7. Customer-supplied Products

Clearly defined procedures are needed for the identification, verification, storage and maintenance of items supplied by the customer (e.g., packaging, bottling, electronics, etc.).

4.8. Product identification and traceability

Identification means that the product can be identified during all stages of production, delivery and installation. Traceability means that someone can go back and identify the raw material and processing steps that went into producing the final product.

4.9. Process control

This clause requires that all production and installation processes which directly affect quality be identified, planned and carried out under controlled conditions. Process control applies not only to the making of parts but also to such activities as producing software, drawings and reports (e.g., work instructions, compliance with reference standards, monitoring and control, product approval procedures, etc.).

4.10. Inspection and testing

Products and services are verified as conforming to specific requirements through inspection, testing, checking and review. Assigned procedures and work instructions include verification points and stages in the process; methods of verification; responsibilities and qualifications of the inspector and reject criteria; methods for handling non-conforming material and products; and documentation of verification activities.

4.11. Inspection, measuring, and test equipment

This clause requires that all equipment used to verify the product to specifications must be calibrated and controlled to well-defined procedures (i.e., international standards). It requires considerable documentation of equipment and safeguards to prevent equipment adjustments that would affect the quality of verification.

4.12. Inspection and test status

Test status of products must be clearly identified, including positive verification in each check and records showing the identity of inspection personnel.

4.13. Control of non-conforming product

Clear procedures must be established and maintained to ensure that the product that does not conform to specified requirements is prevented from inadvertent or unintentional use or installation. This includes procedures for identification, documentation, evaluation, disposition and notification, as well as clear responsibilities.

4.14. Corrective action

This clause requires the company to establish, document and maintain procedures for investigating the cause of non-conformity, recording changes in quality system, reworking and analysing processes and quality system.

4.15. Handling, storage, packaging and delivery

The company must establish, document and maintain procedures that preserve product quality and prevent damage or deterioration (e.g., work instructions for shelf-life, storage conditions, packaging, protection, warehouse control).

4.16. Quality records

Procedures must be established for the identification, collection, indexing, filing, storage, maintenance and disposition of quality-system records and documentation.

4.17. Internal quality audits

This clause requires that the company have a comprehensive system of planned or documented internal quality audits to verify that the quality activities comply with planned and written arrangements and to assess the effectiveness of the quality system.

4.18. Training

Procedures must be established and maintained to identify, provide and evaluate the training needs of all personnel performing activities affecting quality.

4.19. Servicing

Management must establish and maintain procedures to ensure that servicing meets the specified requirements of the customer. Servicing entails providing maintenance, backup and support to the purchaser after delivery and installation is complete (e.g., resources for servicing; service verification procedures).

4.20. Statistical techniques

When statistical techniques are used to verify, control or monitor product quality, they must be well defined and documented. It is essential that whatever statistical techniques are used, they are understood and used correctly.

Source: International Standardization Organization, 1994.

Annex 2

COUNTRY CODES FOR THE COMPETITIVENESS RANKING PRESENTED IN FIGURES 2 AND 5

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: The 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: The Philippines
36**: Colombia**
37**: Brazil**
38: The 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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